

An Exploration of Food Security and Agriculture Challenges for Female Farmers in Rubkona
County, South Sudan

By

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Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in
partial fulfillment of the requirements for the degree of

Doctor of Philosophy

in

Agricultural and Extension Education

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December 9th, 2015

Blacksburg, Virginia

Keywords: extension services, international food security, gender roles, theory of planned
behavior, South Sudanese farmers

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ABSTRACT

The purpose of this study was to explore food security and agricultural challenges to examine the feasibility of using extension services as food security challenges intervention. The study used extension services, microfinance, farm cooperatives, and educational strategy to apply the Theory of Planned Behavior (TPB) to investigate culturally specific attitudes, subjective norms and perceived behavioral constructs in relationship to female economic development through agricultural production.

The use of semi-structured interviews in a qualitative research design was found useful in exploring the informants' experiences in challenges to food security and agricultural productivity not only in South Sudan, but also in Sub-Saharan Africa. In-depth one on one semi-structured interviews were conducted with farmers and international agriculture researchers.

Dedication

Family Members

I dedicate my dissertation effort to my parents, brother, and sisters. My exceptional feeling of thankfulness goes to my late father, Gatwech Jieknyal Machar and my late mother, Nyeluok Kan Chuany, who used to call me a good and hardworking boy. I would like to thank my parents for raising me and for offering me unlimited encouragement, love, and financial support for years. Thank you so much my parents; I miss you a lot. My special appreciation goes to my brother Jezira Gatwech Jieknyal for his special respect for me as older brother and his kind inspiration. I would like to thank my sisters, Chuol Gatwech, Mer Gatwech, and Nyegai Gatwech Jieknyal for their love for me and their friendship. Your inspiration and support gave me motivation and hope to complete my dissertation work.

Acknowledgements

I would like to thank my dissertation committee, participants, friends, and family and all the people who make the partial completion of this dissertation possible.

Dissertation Committee

To my dissertation major advisor, Dr. James Anderson, a talented professor and an enthusiastic advisor, I express my thankfulness for his unflinching support, unlimited supervision and commitment. Dr. Anderson is sincerely a sound minded advisor who cheerfully put my interest first before his own interest to ensure that I understand the material and write a good quality documents. Thank you so much.

To all the advisors who served on my dissertation committee, Dr. Tom Archibald, Dr. Randy Grayson, and Dr. Joyce Rothschild. I express my deep appreciation for your encouragement and input. I truly learned something invaluable from each of you. I would like to thank Dr. Tom Archibald, for contacting your networks and old friends in South Sudan in my behalf. I would like to thank Dr. Grayson for awarding me with an assistantship for one year and I appreciate his personal invaluable advice about how to deal and handle issues. I would like to thank Dr. Rothschild for opening her door wide for me each time I needed her help. I also appreciate Dr. Rothschild for advising me to incorporate farm cooperative and microfinance in my study as strategies for food security challenges interventions. I considerably look forward to having you all as friends and networks in the future.

Informants

I thank you the entire participants for sharing with me your experiences in food security and agricultural challenges and for accepting to participate in my study. I learned more from you each of you than what I thought. The information shared will always be in memory.

Friends

Several of my friends and colleagues served as role models during my study, but some of them may not know about it. My very special thanks go to my best friend Dr. Theo Dillaha for giving me extra support in my dissertation writing. I also thank Dr. Theo Dillaha and his wife Rebecca Coldwell for staying with me when I was in Hospital. I would like to thank my best friend Betty Harrison who used to give me a ride to places and supported me financially sometimes.

I would like to thank my friend Lorien MacAuley for her company and unconditional support and inspiration. I would like to thank my longtime friends Angelo Gatluak Lul, Gatluak Majok, Puot Kuol Luak, and Maliah Deng for their strong support and inspiration during my study. Gatkuoth Kun Pan came to be a very close and enthusiastic friend. Puot Kuol Luak, my longtime friend, who sometimes financially supported me. Finally, I would like to thank my former English professor and my good friend, Frank Cronin for his unlimited help in everything.

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Chapter One:

Dissertation Overview

This research study seeks to identify and examine the food security issues currently affecting female subsistence farmers' agricultural development in Rubkona County, South Sudan and propose agricultural extension, farm cooperatives, and microfinance programs to improve food security. To be food secure means that everybody in the household has the ability to obtain and eat his or her preference food that satisfies their nutritive needs every single day (Food Security Network (FSN), 2014). This chapter presents background information on food security and marketing problems that keep Rubkona County women farmers in poverty as well as the purpose, objectives, limitations, assumptions, and significance of the study.

Background and Setting

Rubkona County is chosen for the study because it is one of the dominant counties in South Sudan that produces maize and sorghum in large quantity according to Action Contre la Faim report in 2008. Due to wars that had taken roots in the county, Rubkona County became vulnerable to food insecurity (Action Contre la Faim, 2008). The United Nation Development program and the Action Contre la Faim reported that the economy of Rubkona County depends on subsistence agriculture, which is being devastated by the civil war (United Nation Development Program, 2012). This declining agricultural productivity is creating consistent starvation, undernourishment, and poor health not only in Rubkona County, but in most parts of South Sudan. The current South Sudan civil war, which was started in December 2013 over reform debates within the ruling Sudan Peoples' Liberation Movement (SPLM), has caused untold destruction in Rubkona County (Human Right Watch, 2015). According to Most battles

that are being fought in Unity State during this struggle for democratic change have taken place in Rubkona County's towns, districts, and villages.

The war creates severe food insecurity in Rubkona County (Human Right Watch, 2015). Food insecurity occurs when farmers have limited access to markets and limited ability to acquire food for themselves and their families (Food Security Network, 2014). Conflict creates unemployment, food shortages, and increases food prices. Lack of income due to unemployment also contributes to food insecurity and leads to social exclusion problems (World Bank, 2008). Food insecurity is not a new challenge for Rubkona County's residents. For more than 30 years, the citizens of Rubkona County have struggled with hunger and food insecurity. Food and Agricultural Organization (FAO) explained that food security exists when all people, at all times, have physical, social and economic ability to acquire nutritious food that satisfies their dietary needs for an effective and healthy life (FAO, 2011; World Food Program, 2015).

Climate variation along with fluctuating rainfall configurations place additional stress on women farmers who live in isolated communities (Leeuwis, 2004). Natural environmental calamities such as floods, famine, and drought deter food security in South Sudan (Baipheti, & Jacobs, 2009). Climate change requires farmers, who are willing, to adapt to the rapid change in the environment by learning new skills. Conventional methods of helping rural farmers normally address crop and livestock production which does not respond effectively to farmers' ability to meet to natural calamities. The skills farmers require to be effective farmers are multifaceted, varied and local. Yet resolutions to natural environmental issues need to be defined in attentive collaboration between farmers, researchers and extension specialists (Leeuwis, 2004).

Agricultural marketing infrastructure in South Sudan is weak and inadequate (Ayuel, 2010). Agricultural market connection with farmers, consumers, exporters, and importers is

flimsy and insufficient. Food and agriculture organization (FAO) and world food program world food program revealed that farmers do not reach potential customers to sell their products due to lack of transportation that is caused by poorly constructed roads (FAO, 2009; World Food Program, 2009). Further limiting the commercialization of subsistence agricultural products in Rubkona County is the absence of suitable storage facilities (Mercy Corps, 2011). Subsistence farmers frequently lose a substantial quantity of harvested crops to spoilage and pest infestation (United States Agency for International Development, 2009). In the region, post-harvest losses are estimated to range from 15 to 50% (United Nation Development Program, 2012) and losses in the Rubkona County are likely near the upper end of this range.

Gender inequity jeopardizes the lives and the futures of women farmers and impacts or influences the fate of the whole society (Ali, 2011). Disproportionate rights and responsibilities within families and communities block women's success because of restrictions on women's time and availability. Women are not free to do what they want to do to earn income because cultural norms require them not to do certain things and be home at certain times.

The lack of effective extension services also contribute greatly to food insecurity in Rubkona County, South Sudan (African Development Bank, 2013; Atil, 2009; United Nation Development Program, 2012). Rural farmers do not have a connection with agricultural organizations and researchers that may help them with agricultural supplies and appropriate seeds. Absence of extension services results in limited research for disease resistant crops and inadequate training opportunities for farmers, which results in low subsistence agricultural productivity (Ayul, 2010). The Food and Agriculture Organizations of United Nations' extension specialists have difficulty helping rural subsistence women farmers because many live in disperse, remote, isolated, unstable, and more risky villages (Chambers 1997; Percy 2005).

Addressing the factors that are limiting agricultural production is of utmost importance once peace is restored. Employing procedures to effectively and efficiently cultivate the land, increase food accessibility, stabilize food prices, and properly manage natural resources becomes a priority for development in the post-conflict war-ravaged areas. In addition, utilization of participatory approach, Farm Field School, and empowerment could neutralize the severity of food insecurity in South Sudan.

Theory of Planned Behavior

The theory of planned behavior (TPB) (Ajzen 1991) was utilized in this study to investigate the perception of informants toward empowering women farmers through agricultural training. TPB was used to understand participant attitudes toward making microfinance accessible to women farmers to finance their agriculture. The TPB was built on the theory of reason action (TRA) (Ajzen, 1991; Werner, 2004). TRA was created to study the link between attitudes and behavior (Ajzen, 1980, 1988; Fishbein & Ajzen. 1975; Werner, 2004). The perception of behavior intention suggests that a person's intention to participate in a behavior is explained by the attitude that influences the behavior (Fishbein & Ajzen 1975). Behavior intention describes the energy a person would like to invest to perform the identified behavior (Ajzen, 2002; Ajzen & Fishbein, 2005).

Significance of the Problem

Insights gleaned from the investigation of subsistence farmers' food security and marketing challenges will provide higher-level extension leaders and decision makers with information they can use to design better extension programs. Agricultural extension requires a diverse range of information from researchers to be able to support subsistence farm enterprises. The desired deliverables from the knowledge gained from this study are participatory approaches

and women's empowerment strategies for developing rural farmers' ability to farm, maintain food security, and even turn their subsistence agriculture into agricultural enterprises (Baipheti & Jacobs, 2009).

Statement of the Problem

Rubkona County, South Sudan, does not currently meet its subsistence needs. The major threats to food security today in Rubkona County are the current South Sudanese civil war (Human Right Watch, 2015), poor agricultural productivity, gender inequality, environmental calamities, and a lack of farm enterprises extension services, agricultural markets, and microfinance (FAO, 2015; WFP, 2015). In addition to the aforementioned problems, poor leadership is another problem that causes conflicts from time to time in South Sudan (Action Contre la Faim, 2008).

Poor leadership that causes unrest, displacement, and damage property undermines agricultural productivity. Poor leadership returned South Sudan to civil war after two years of independence. South Sudan got her independence in 2011; unfortunately the country went back to war when the debates within the Sudan People Liberation Movement (SPLM) about reform turned violent (Luma, 2015; Ki-Moon, 2015; World Report, 2015). The conflict destroyed much of Rubkona County's property and displaced tens of thousands of Rubkona County residents (Human Right Watch, 2015).

Low agricultural productivity causes food insecurity (FAO, 2015; United Nation Development Program, 2012). The biggest agricultural threats in Rubkona County today are lack of agricultural inputs, lack of irrigation despite abundant water resources, and land degradation. The lack of strong food production systems and absence of agricultural research and development causes low agricultural production. Agricultural pests and lack of access to the

required external inputs such as pesticides results in low yields (FAO, 2015; United Nation Development Program, 2012).

Lack of farm enterprise skills is another issue that limits women incomes (United Nation Development Program, 2012). Women lack financial and marketing strategies due to market failure. Lack of markets increase food prices because there are not many items being sold in the markets. Due to lack of farm enterprise skills, women farmers are without effective business plans, financial strategies, and marketing strategies. Women do not have business plans that summarize how their farm enterprise business should work.

The absence of extension services limits women farm productivity. Nonexistence of qualified extension workers remains a difficult test for rural farmers (United Nation Development Program, 2012). Agricultural knowledge may be low for farmer contact extension specialists. Low pay and lack of benefits for extension services may create low morale. The ability to recruit and retain qualified extension specialists are limited (Food and Agriculture Organization of United Nations, 2008).

Gender inequality that does not recognize women in major decision making undermines economic growth (Ali, 2011). Cultural norms and religious beliefs place restrictions on women's success. Girls are force in to marriage at a young age and women farmers are denied access to land (United Nation Development Program, 2012).

An environmental calamity undermines women agriculture production (Frazer, 2007). The elimination of grass through overgrazing and cutting of trees for domestic use is increasing food insecurity in the country (Smith, Obeidb, & Jensen, 1999). Burning of forest for hunting inflicts severe threats to environmental sustainability. Pollution of waters, rivers, and lakes and overfishing also threatens the local environment (Morton, 2007; O'Brien & Leichenko, 2000).

Oil exploration and production also threatens subsurface and surface water supplies and soils in Rubkona County.

The absences of farm cooperatives keep women and men farmers in poverty (Ali, 2011). As there are no farm cooperatives in the South Sudan, farmers are not well connected with markets and the outside world. Women farmers do not play role in community development due to lack of involvement in decision making process (Ali, 2011). South Sudanese import most of their food items from neighboring countries. Oil production damage the environment and causes long term illness that reduce farmers' ability to work on the farms (Catholic Organisation for Relief and Development Aid, (CORDAID), 2014).

Absence of access to microfinance keeps women farming on a small scale (Moszynski, 2012). Women farmers have little or no access to financial services such as microfinance. The lacks of microgrants to finance farm enterprises keep families in poverty (African Development Bank, 2013; Atil, 2009). Financial institutions deny women farmers' financial credit because they believe that women will misuse the money due to lack of financial management knowledge.

An increase in the productivity of subsistence and commercial agriculture is needed for food security in post-conflict Rubkona County, South Sudan and to reduce the import of commodities upon which the country is now overly reliant (Joël, Quentin, & Oyekale, 2012). To this end, it is hypothesized that a more sustained approach to developing the area and reversing vulnerability to food insecurity should be based on addressing women farmers' food security issues through the establishment of environmental sustainability, microfinancing, farm cooperatives, and implementation of locally relevant extension services.

Battling hunger, supplying food and nutrition security, while protecting the environment, is a supreme problem facing farmers today. A new way is needed to promote sustainable

agricultural development for women. Innovation is required to support the manner in which information, knowledge and technology can be developed and distributed in order the extension services benefit small farmers.

Purpose of the study and research questions

The purpose of this study is to explore food security and agricultural challenges for female farmers in Rubkona County, South Sudan and examine feasibility of using improved agricultural extension services targeting women farmers. The questions guiding this study are:

1. In what ways are subsistence farmers in Rubkona County in South Sudan food secure or food insecure?
2. What could be the necessary conditions in an enabling environment for South Sudanese women farmers to increase their agricultural productivity and food security?
3. What role could female farmer directed agricultural extension services play in improving food security in South Sudan?
4. What role could female farmer microfinancing play in improving food security in South Sudan?
5. What role could female farmer cooperatives play in improving food security in South Sudan?

Definition of Terms

Food security: Occurs when all people have reliable stable access to an adequate magnitude of affordable secure and healthful food all the times (FAO, 2006).

Subsistence agriculture: A self-support agriculture whereby farmers concentrate on producing adequate food to feed their families (Baiphethi & Jacobs, 2009).

Commercial farming: A large-scale production of cash crops purposely for sale and for distribution to various markets to be sold (Joël, Quentin, & Oyekale, 2012).

Farmer empowerment: The ability of farmers to gain control of their farms, possessions, and become part of decision making in both public and private agricultural services, such as extension, training, information, investment and marketing (Anyango, Bunyatta, Muriethi & Ngesa, 2006; Duveskog, 2006; Friis-Hansen & Duveskog, 2012).

Agricultural extension: A type of non-formal community education designed to promote agricultural efficiency (Dunveskog, 2006), enhance food security, and improve rural livelihoods (Roberson, 2012).

Participatory approach: An interaction between agricultural extension services, subsistence farmers, and agricultural researchers (Davies, 2006, 2008).

Facilitator: The extension worker who trains farmers to do things by example.

Social capital: The capability to accelerate mutual action for communal gain through the corporation and interactions of farmers and rural cultivators (Ingenbleek, Tessema, & van Trijp, 2013).

Food availability: The ability of the people to obtain adequate and good quality of foods that are either produce locally or imported from the outside or food aid (Food and Agriculture Organizations of United Nations, 2006).

Food access: The accessibility of households to reach resources for obtaining food for a healthy diet (FAO, 2006).

Stability: The obtainability to secure food. Households must have unlimited access to enough food each day to be considered food secure (Food and Agriculture Organizations of United Nations, 2006).

Basic Assumptions

This study is predicated on a number of basic assumptions, such as: secondary sources of data including interviews of informants with knowledge of conditions affecting female farmers in Rubkona County and similar areas can be used in place of directly interviewing female farmers in Rubkona County; study of pertinent documents from the South Sudan Ministry of Agriculture and Forestry and Food and Agriculture Organizations of United Nations pertaining to South Sudan agriculture, women farmers, etc. can be used gain additional information on the conditions facing female farmers in Rubkona County and their needs; and agricultural extension services can be used to present ways to address women's food security conditions. In addition, extension services can be used to provide information and training to women farmers. To accomplish extension work, informants can be used to investigate women's agricultural development. The interview format will allow for questions to be posed in a comprehensible, but consistent manner. Participants should be honest in answering the in-depth interview questions. Theory of planned behavior can be used to understand participants' attitude toward empowering women in farming through agricultural training. Lastly, microfinance can be used to finance women farm enterprises and farm cooperatives could be applied to improve women farmers' food security. Because of the inability to directly interview female farmers in Rubkona County, the results of this study will be more applicable to the needs of South Sudanese women farmers in general.

Limitations of the Study

Because of the current civil war and lack of communications infrastructure such as telephone, and internet service, it was impossible to directly interview South Sudanese rural subsistence farmers, extension services staff, and government and nongovernmental

organizations in Rubkona County. Instead, the researcher interviewed available informants who worked with the farmers from the South Sudan Ministry of Agriculture and Forestry, University of Juba, Sub-Saharan Africa, and staff from Food and Agriculture Organization of the United Nations in South Sudan as well as international agriculture researchers. In addition, the study used secondary sources of data including informants, journal articles, and documents from Ministry of Agriculture and Forestry, Food and Agriculture organizations of United Nations, and University of Juba. Therefore, utilizing secondary data must be done with caution because they only represent what is believed to be the experiences of the target population.

Chapter Two:

Literature Review

This chapter provides a review of the literature on food security and agricultural market challenges that affect both Rubkona County and South Sudan in general. The chapter provides a brief background summary for both Rubkona County and South Sudan. The chapter examines the elements that create food insecurity and describes factors that could be used to eliminate food insecurity. Lastly, the chapter provides an overview of the potential of rural women's empowerment to contribute to agricultural development in South Sudan.

Background Information of Rubkona County in South Sudan

South Sudan is located in northeast Africa. On January 9, 2005, the Sudan and the Sudan People's Liberation Movement/Army (SPLM/SPLA) rebels signed the Comprehensive Peace Agreement (CPA) that ended 21 years of conflict (Food and Agriculture Organizations (FAO), 2010, 2008). The CPA allowed millions of South Sudanese who were displaced by 21 years conflict to return home from refugee camps and exile (United Nations High Commissioner for Refugees, 2006). The CPA led to South Sudan independence in 2011 following the passing of a referendum with the vote of 98% in favor of secession of South Sudan from Sudan (BBC News, 2011). However, South Sudan returned to war again after two years of independence (Luma, 2015; WFP, 2015). According to UN Secretary General, South Sudan embarked into severe civil war in mid-December 2013 when political debates on the democratic reforms turned violent within the governing party of the Sudan Peoples' Liberation Movement (SPLM). The conflict grew into tribal war when armed forces loyal to president Kiir from ethnic Dinka group and Uganda mercenaries targeted and killed hundreds of thousands of Nuer civilians in the South Sudan capital, Juba (Ki-Moon, 2015; World Report, 2015). The fight quickly spread to northern

parts of the country (Luma, 2015; World Food Programs, 2015). The resumption of war in 2013 resulted in devastation of public and civilian properties and businesses (Juma, 2015; World Food Programs, 2015). Subsequently, the outside support shifted from construction of infrastructure to humanitarian assistance (United Nation, 2014).

Rubkona County has a sub-tropical climate with adequate rainy season that runs from mid-May to the end of September and a dry season start in October all the way through the end of April (Action Contre la Faim, 2008). The Rubkona region is swampy and floods during the rainy seasons (Action Contre la ACF, 2008). Studies have shown that these swampy areas are a source of many diseases such as malaria, Kala Azar, and parasites, like bilharzia (Action Contre la Faim, 2008). Rubkona is very hot in the summer and dry (Action Contre la Faim, 2008). The dominant ethnic group in Rubkona County is the Leeh People, a sub-tribe of the Nuer ethnic group, the second largest tribe in South Sudan (Gatkuoth, 2010).

The Nuer people of Rubkona County depend on a mixture of agriculture, wild food gathering and hunting, fishing, livestock keeping and trade, and exchange of good and services as the basis of their livelihoods (Action Contre la Faim, 2008; World Food Program, 2015). Food access is seasonal and location dependence (Action Contre la Faim, 2008). Rural farmers balance household food needs through transhumance to secure better food sources for their livestock, seasonal cultivation, and to boost their resilience to normal natural environmental threats, such as famines and floods (Action Contre la Faim, 2008). The people of Rubkona have adopted transhumance lifestyles that allow them to live successfully with natural calamities unless insecurity prevents people and cattle from moving around (Action contre la Faim, 2008). The Nuer peoples' conventional way of life, which is based on cattle-herding, agriculture and fishing,

has been devastated by the civil wars that started in 1983 and 2013 (Juma, 2015, World Food Programs, 2015).

Food security. Food security is defined as the condition when every person in the household has a chance to have both physical as well as economic access to healthy food at all times, which satisfies their dietetic necessities every day in order to have healthy active lives (FAO, 2006; World Food Programs; 2014; World Food Summit, 1996). The food security conditions and living standards in the South Sudan are difficult (Food and Agriculture Organizations of United Nations, 2006). Food security conditions are dependent on the actions of various stakeholders, including the South Sudan government, international agencies, non-governmental organizations, and the business community (FAO, 2006, Food Security Network, 2014). The government of South Sudan formed agencies and committees to deal with ever-present as well as temporary food insecurity that affects the living conditions of citizens, but these efforts are in their infancy and need extensive capacity building to function effectively (FAO, 2008). The government of South Sudan guidelines and procedures that are needed to efficiently monitor food security conditioning and intercessions are either ineffective or not in existent (FAO, 2008).

The ability of the government to oversee food security conditions at the state level is very ineffective (Food and Agriculture Organizations, 2010, 2008, Food Security Network, 2014). The instructed government representatives and commissions do not have the financial nor administrative means to deal with the challenges of food security (FAO, 2008, Food Security Network, 2014). At the national government level, the Ministry of Agriculture and Forestry and the Ministry of Animal Resources and Fisheries are the leading institutions that are dealing with the challenges of food security in South Sudan (FAO, 2008). The government of South Sudan

more recently established the Ministry of Humanitarian Affairs and Disaster Management to address natural and human made tragedies (Food Security Network, 2014). The government of South Sudan still does not have an efficient early warning system for disasters that would enable emergency institutions to response to disasters as soon as possible when they happened (FAO, 2008).

Agriculture. Subsistence farming is the South Sudanese rural population's primary source of food (World Bank, 2008). A study has revealed that soil and climate conditions permit for broad ranges of food and cash crop productions (World Bank, 2008). More than 95% of South Sudanese get their income from farming, fishing, and livestock rearing (FAO, 2015; World Food Program, 2015). Estimates are that 78% of family units rely on subsistence agriculture and animal keeping as their main source of income (United Nations Development program, 2012). Approximately 53% of the family food eaten at home derives from their own production, 32% of food comes from market procurements and 15% of household incomes come from barter trade that does not involve money (United Nation Development program, 2012). Research has shown that agriculture account for one-third of the country's GDP and employs approximately 67% of the South Sudanese population (United Nations Development Program, 2012).

Rural farmers in South Sudan engage in numerous amalgamations of livestock keepings, cultivation of various crops, fishing, wild fruits and roots collection and barter trade for livelihood (Food and Agriculture Organizations, 2010, 2008; United Nation Development Program, 2012). Rural farmers manage soil fertility through shifting cultivation, and they leave fields idle for years to regain fertility (United Nation Development Program, 2012). All subsistence farmers in South Sudan grow a wide range of sorghum and maize with minor

vegetables such as okra, potatoes, groundnut and yams (Action Contre la Faim, 2008; Food and Agriculture Organizations, 2010, 2008; United Nation Development Program, 2012). South Sudan has abundant fertile soil as well as water resources (United Nation Development Program, 2012). Most of the land in South Sudan is suitable for cultivation because of the fertility of soil and availability of water sources (South Sudan: An infrastructure Action Plan, 2011; United Nation Development Program, 2012). Besides providing food to both rural and urban residents, subsistence agriculture delivers eco-friendly advantages in the form of a green environment (AFDB, 2013; Armstrong, 2000).

Livestock. Livestock provides the main source of livelihood for a substantial population of Rubkona County (Action Contre la Faim, 2008; United Nation Development Program, 2011). Nomads, semi-nomads, and pastoralists raise livestock as their main source of livelihood and they are entirely dependent on access to grazing land and watering points (Action Contre la Faim, 2008). However, a study conducted by United Nation Development Program in 2011) found that the increasing number of sedentary farmers is reducing the amount of grazing land available and this is a growing source of internal conflict in the country. Livestock production in the South Sudan is primarily for subsistence and is not managed like a business (United Nation Development Program, 2012). According to (United Nation Development Program, 2012), the livestock population all over South Sudan is about 12.2 million, which is equivalent to asset value of about US \$2.4 billion. Livestock plays big role in socio-cultural life of rural communities. For instant, rural people keep livestock as a source of wealth and use cow dung as manure (Food and Agriculture Organizations, 2010, 2014).

Fishing. Fishermen are making significant contribution to the socio-economic growth of rural South Sudanese simply because fish are an essential source of protein (Food and

Agriculture Organizations, 2010, 2014). For this reason, rural communities particularly those of Greater Upper Nile are fishing heavily to satisfy food security needs, income and livelihood (Food and Agriculture Organizations, 2010, 2014). In addition, fishing promotes social relationships such as friendships, marriage, and interaction among the rural communities through trade and exchange (FAO, 2014; Africa Caribbean Fish II, 2013).). Fishing helps sustain seasonal transhumances of rural inhabitants from one place to the other in search of food and water. Studies conducted by (FAO, 2014) pointed out that majority of fishing societies are stable, food secure, and self-sustained. Some fishermen and fisherwomen use the income received from fishing to generate an additional income for the household (Africa Caribbean Fish II, 2013; FAO, 2014).

Role of Women in Agricultural Production and Food Security

Women play major role in the agricultural development, but their role in agriculture has never been recognized as a result of the emergence of new agricultural technology utilized by men (Afshar, 1985; Medani, 2011). Shami (1990) found that more than 87 % of Sudanese's women labor forces are actively working on the farms. According to Shami, 90 % of rural women are subsistence farmers and the remaining 10 % are working on agricultural farm enterprises (FAO, 1994; Karshenas, 2001; Shami, 1990). In subsistence farming practices, farmers keep a wide range of crops and animals on the farm to satisfy the household basic needs such as food, water, clothes, and medical (Baiphethi & Jacobs, 2009). In traditional Sudanese agriculture, women and children provide the majority of farm labor (Afshar, 1985). Women are not allowed to obtain credit in the Sudan (Afshar, 1985; Klasen & Lamanna, 2009) because shopkeepers and businesses designed credit only to help men. Afshar (1985) reported that men

are considered farmers, while women are not farmers, but farm workers although both males and females work and share the same farms.

The role of women in agricultural development is huge and tremendously remarkable, but difficult to measure with precision (Doss, 2011; Food and Agriculture Organizations, 2010, 1994). Several studies reported that women's labor produces between 60-90 percent of the food from farms (Afshar, 1985; Doss, 2011; FAO, 1994). However, measuring gender contributions to the agricultural production is complex because of the large number of agricultural family units in which both males and females are engaging in crop production activities (Doss, 2011; Food and Agriculture Organizations, 2010, 2011). To differentiate the same household members' contribution to agricultural development by gender, the investigator must determine the specialized crops women cultivate and the crops men grow (Doss, 2011). In the end, the researcher can add the quantity of crops women produce and the total amount of crop men produce to calculate the share women grow (Doss, 2011; Duflo & Udry, 2001). This method has been applied in West Africa because farmer communities in West Africa have been cultivating crops by gender (Duflo & Udry, 2001; Hoddinott & Haddad, 1995; Udry, Hoddinott, Alderman & Haddad, 1995). A study conducted on agriculture in Ghana, where farmers practice gender cropping, found that the distinctions between the crops men cultivate and the crops women's farms produce do not hold up well enough to make implications concerning men's and women's relative contribution to agricultural production (Doss, 2002).

Factors that undermine food Security and agricultural development in the South Sudan

Food insecurity is a limited ability of people to acquire adequate foods via socially acceptable means (World Food Program, 2015). Traditional approaches for educating subsistence farmers have been confirmed ineffective and efforts to empower women farmers to

raise their voices are slim (Anderson & Feder, 2006; Purcell & Anderson, 1997). Challenges to food security includes handicaps policies, declining agriculture production, increased gender inequality, reduced agricultural markets, increased reliance on traditional production practices, deteriorating infrastructure, declining nutrition, health and education, and reduced microfinance and extension services (Mwaniki, 2006).

Conflict and violence. The conflict in South Sudan is severely affecting both local food production and humanitarian food supply to internally displaced people (Roberson, 2013). Numerous non-governmental organizations reported that food production is severely deteriorating and is getting worse in South Sudan every day (Food and Agriculture Organizations of United Nations, 2014; Roberson, 2013; World Food Programs; 2015). Studies conducted by international aid organizations that operate in South Sudan report that the combination of war, lawlessness, tribalism, and violence block agricultural production and, humanitarian aid delivery to the people in need of food (Food and Agriculture Organizations, 2010, 2014; United Nation Development Program, 2012; World Food Programs, 2014; 2015). The lawlessness is deteriorating food security because sustainability of food security rests on the connectivity and sequence of agricultural production as well as the income generating activities of food processing, food distribution, and marketing of agricultural commodities to the end users (Roberson, 2013). Conflicts coupled with performance of activities that threaten agricultural production not only disrupt food security, but also decrease the connectivity as well as the chain of food production in South Sudan (International Food Policy Research Institute, 2014, 2014; United Nation Development Program, 2012; World Food Programs, 2015). Most of all, conflict and displacement are repetitively forcing farmers out from their fields during the planting season and consequently deteriorating the food security condition (World Food Program, 2015).

Low agricultural productivity. South Sudan is facing one of the world's severest humanitarian and food security conditions (Food and Agriculture Organizations, 2010, 2015; International Food Policy Research Institute, 2014, 2014; World Food Program, 2015; 2014). Despite the assumption that South Sudan has substantial capacity to be a leading agricultural production nation in the region (United Nation Development Program, 2012) estimates that only about 4% of the land is used for agriculture and per hectare yields are very low compared to neighboring countries (Food and Agriculture Organizations, 2010, 2015; United Nations Development Programs, 2015). The loss of livestock from disease is causing food insecurity to the farmers and pastoralists because livestock are there most important agricultural resource (World Food Program, 2015). Livestock diseases are threatening over 70 percent of pastoral households and millions of livestock. The attempts to treat, control, monitor, and respond to the outbreak of these diseases has been extremely limited because of the conflict (Food and Agriculture Organizations, 2010, 2015; Human Right Watch, 2015).

Crop and vegetable production in the South Sudan is very low because rural subsistence farmers cultivate only small plots for the food consumption in the households (Food and Agriculture Organizations, 2010, 2015). The subsistence farmers do not grow more food because they only till and harvest crops by hand and without the use of animals (World Food Program, 2015). These rural farmers lack farm equipment (plows and animal drawn implements) to cultivate large farms and crop production depends largely on rain water (Food and Agriculture Organizations, 2010, 2015; World Food Program, 2015). Any delay in rainfall causes low yields or no harvest at all (Frazer, 2007; O'Brien & Leichenko, 2000). In addition, heavy rainfalls and floods often inundate fields and destroy crops (Morton, 2007; O'Brien & Leichenko, 2000). Lack

of access to good quality seeds and other agricultural inputs such as fertilizers and pesticides also limit agricultural production (Ajayi et al., 2007; Action Contre la Faim, 2008).

Limited access to markets. Rural poor farmers who live in tiny dispersed villages in South Sudan do not have sufficient access to markets due to lack of agricultural enterprises, lack of information about markets, and market failure, and insecurity (Food and Agriculture Organizations, 2014, World Food Program, 2014, 2015). The unavailability of markets limits farmers from receiving socio-economic advantages and delay adoption of new technologies (Food and Agriculture Organizations, 2010, 2015; World Food Program, 2014, 2015). Agricultural businesses are not progressing well due to limited surplus agricultural products available for sale (African Development Bank, 2013).

Rural communities in the South Sudan do not have reliable communication networks (African Development Bank, 2013). This lack of communication among rural farmers, traders, and agricultural organizations places major restrictions on agricultural markets across South Sudan (African Development Bank, 2013). Lack of communication between farmers and traders shrinks market size, decreases the delivery of agricultural commodities, and limits the development of market chains (African Development Bank, 2013). Currently, subsistence farmers who live in the countryside are not benefiting from available cell phone technologies (African Development Bank, 2013; South Sudan: An infrastructure Action Plan, 2011). Constructive strategies for opening up markets for agricultural commodities in various South Sudanese markets demand active engagement of policy makers (Action plan for South Sudan, 2011). So policy makers can create helpful guidelines and constructive rules to encourage local production of agricultural commodities (African Development Bank, 2013). To avoid ineffective distribution of assets, lawmakers must write laws that can guide the operations of

markets. Incompetent distribution of assets and services usually causes market collapse (Food and Agriculture Organizations, 2010).

To overcome food insecurity, gain access to market, and create wealth, subsistence farmers must be linked to various markets through value chain to gain profits (Guliani et al., 2005; Nadvi, 2004; Trienekens, 2011). A value chain is the entire sequences of commodities that generate and add value at every step by converting inputs into outputs (Guliani, Pietrobelli & Rabellotti, 2005; Humphrey & Schmitz, 2002; Nadvi, 2004; Trienekens, 2011). Agricultural market advocates argue that subsistence farmers need to be connected to agrifood value chains in order for the smallholder farmers to build up resistance to shocks and improve farm productivity and have better living standards (Fischer & Qaim 2012; International Food Policy Research Institute, 2014, 2013). To overcome the agricultural market constraints, institutional synchronization among small farmers and other organizations such as group lending, rural marketing cooperatives, and producer associations, and food and agriculture organization of United Nations are required (International Food Policy Research Institute, 2014, 2013). This pattern would allow subsistence farmers to decrease transaction costs, build up strong access to market information, and increased negotiating capability (International Food Policy Research Institute, 2014, 2013). Such arrangements require excellent capabilities and steady promotion of the participation of small farmers in organizations to obtain the highest profit for small land holders (Fischer & Qaim, 2012).

Lack of infrastructure and enabling environment. Studies have shown that underdeveloped market and road infrastructures impacts surplus agricultural production and the general economy of the South Sudan (FAO, 2010; International Food Policy Research Institute, 2014, 2014). Studies conducted on the South Sudan agriculture (FAO, 2010, 2014; International

Food Policy Research Institute, 2014, 2014; WFP, 2015, 2014) report that agricultural infrastructure is very weak. Infrastructures that would improve agriculture include improved water sources, roads, and irrigation schemes (International Food Policy Research Institute, 2014). This non-existent or poorly constructed/maintained infrastructure undermines both livestock and crop production all over the country and limits the movement of agricultural commodities from one location to the other (Ajayi et al., 2007; Burgeon, 2013). The ability to move people, inputs, and products and to send/receive information is hindered by underdeveloped roads and communication systems which weakens the South Sudanese markets (Burgeon, 2013).

Lack of paved roads in South Sudan limits the availability and running of commercial vehicles to small rural villages (Mwangi, Shen & Snyders, 2013; USAID, 2009). Transportation becomes even more tedious in the rainy season when the roads are muddy and costs of transporting produce are much higher during the rainy season (United Nation Development Programs, 2012). The poor road infrastructure, scarcity of transport, and high cost of transporting agriculture products discourage subsistence farmers from producing surplus foods (Ayel, 2010; Mercy Corps, 2011).

However, infrastructure and communication development can mitigate food insecurity; promote sustainable economic progression, and agricultural environment (EconSouth - Second Quarter (ESSQ), 2008; Rao & Srinivasu, 2013). Infrastructure is the construction of networks through which resources, commodities, and services are delivered to the people (Srinivasu & Rao, 2013). Construction of roads can increase the effectiveness of food productivity, transportation services, and communication technology (ESSQ, 2008; Rao & Srinivasu, 2013). Information and Communication Technology (ICT) could provide subsistence farmers with

greater opportunities to access market information such as prices, level of the demands for products, product quality, and information about weather conditions (Gustavsson et al., 2011; International Food Policy Research Institute, 2014, 2013). Additionally, accurate information would enable small farm holders to make tough decisions about what products to produce and sell to get the attention of markets and to engage in promoting market value chains (International Food Policy Research Institute, 2014, 2013; Poole & Frece, 2010; Robinson & Malhotra, 2005). To sum it up, the available of good roads and telecommunication networks can attract both domestic and foreign investments and enhance economic development (ESSQ, 2008; Rao & Srinivasu, 2013).

Access to health services. The United States Institutes of Peace Special Report on South Sudan revealed that South Sudanese women lack access to health services and education (Ali, 2011). The exclusion and unfair treatment of women and teenage girl is having negative impacts on South Sudanese societies at social levels (Ali, 2011). The United States Special Report in 2011 indicated that every interviewee for the study acknowledged difficulty in accessing maternal healthcare. Also, very low literacy for women and girls is one of the major urgent problems of the South Sudan (Ali, 2011).

In the South Sudan, prematurely and imposed marriages of young women are normal in some communities, but divorce is very difficult to achieve under cultural norms (Moszynski, 2012). Due to the culture of paying cattle dowries to the girl's relatives, it is extremely problematic for women to get divorced from abusive marriages because their relatives would be unwilling to return the cattle (Moszynski, 2012). The United Kingdom Department for International Development (DfID) research on South Sudanese women's health in 2012 found

that South Sudan has the world's highest maternal mortality rate as well as the lowest female literacy rates (Moszynski, 2012).

South Sudanese women in rural areas do not have reliable pre- and post-natal medical services (Ali, 2011). There are no health and nutrition services for rural communities in South Sudan (Ali, 2011). All the clinics and the hospitals that provide health services and nutrition advice are built in town centers and when a woman attempts to go to town to seek medical treatment, she risks being killed by criminals (Ali, 2011). Consequently, the poor health of women reduces their ability to do productive farm work (Ali, 2011).

Access to education. Lack of education and access to information regarding natural resource management is one of the limitations that hurt women more than men (Koda, 2004; Lambrou, 2006). Rural women have lower levels of education than men (Lambrou, 2006). The United Nations Children's Fund (UNICEF) estimated that 90% of South Sudanese women are illiterate (Moszynski, 2012). The International Rescue Committee (IRC) from the UK pointed out that the lack of education and economic independence are the cause of abuses of women in South Sudan (Moszynski, 2012). In addition, the IRC researchers believe that premature and arranged marriage and domestic violence is prevalent in South Sudan because of women's lack of education and social standings (Moszyski, 2012). The eruption of violence usually restricts the expansion of educational and economic development activities for women (Moszyski, 2012). Women in the South Sudan are facing extensive household violence, and they are also commonly tortured in the course of the cattle robbing and inter-ethnic clashes. Increasing the school education may decrease female abuse in the culture (Moszyski, 2012).

Strategies for Strengthening Rural Farmers' Food Security

Insufficient funding for agriculture and livestock education and training frustrate agricultural development (Agriculture and Livestock Extension Task Force (ALETF), 2011). The combination of low agriculture production, lack of capital, barrier to extension services access and conflict aggravates small farmers' food insecurity conditions in Rubkona County, South Sudan (Human Right Watch, 2015). To make the subsistence farmers less vulnerable to food insecurity and become food secure and develop sustainable agriculture, the researcher proposes that application of extension services, farm cooperatives, the availability of microfinances, and farm field schools would significantly alleviate food insecurity and boost agricultural production to increase food security.

Agricultural extension services. The role of extension services in food security and rural development can be significant (Davis, 2008; Percy, 2005). Birner et al. (2006) defined agricultural extension as a set of organizations that support and help people engage in agricultural production to solve problems and to acquire information, skills, and technologies to improve their livelihoods and social capital. Percy (2005) described extension as a transfer of knowledge from researchers to farmers. The role of the extension agent is to assist farmers in putting ready-made technologies developed by researchers into practice (Davis, 2008). Extension specialists advise farmers in their decision making, educate farmers to be able to make necessary decisions in the future, help farmers to clarify their own goals and possibilities, and promote advantageous agricultural development (Hawkins & Van den Ban, 1996). This section describes the role of extension services in food security and rural development.

Extension services can play significant role in conflict resolution and peacebuilding in rural farming communities by identifying the problems (Roberson, 2012; Bentz, Sofranko, &

Swanson, 1997). If the extension specialist understands the critical requirements of farmers' issues, then the extension specialist could develop good peace building strategies and respond effectively to the food crisis (Roberson, 2013). Extension specialists can detect, classify, categorize, and address most, if not all, the dimensions that trigger conflict (Roberson, 2012, 2013). After the extension specialists gather available information concerning conflict and violence, the extension specialists can attempt to bring together specific institutions with peacebuilding experts to work together in bringing peace to the war ravage countries like South Sudan (Roberson, 2012). To bring peace, extension organization must create training centers to train extension agents in peacebuilding before they go to the field (Roberson, 2013).

Agricultural extension specialists can provide agricultural training as well as information to small farmers to strengthen their food security conditions to be aware of the services that may be available for them outside the farms (Alex & Rivera, 2005). Agricultural extension specialists train subsistence and small farmers in how to heighten food production and how to amplify the quality of farm productivity (Roberson, 2013). Extension services help farmers achieve food security by encouraging farmers to utilize better inputs and farming techniques, and to put more attention and focus on worthwhile market practices (Alex & Rivera, 2005; Roberson, 2012). The services agricultural specialists offer to farmers are range from technology transfer, advisory services, and training of farmers in rural societies (Alex & Rivera, 2005; Roberson, 2012). This is an effort to defeat everyday agricultural complications that cause food insecurity (Roberson, 2013).

To help farmers, extension services often form support groups, which can bring farmers together to expedite the implementation and adoption of improved varieties of maize, beans, sorghum, rice, and millet (Roberson, 2013; Swanson, 2008). These support groups can enhance

farmers' access to financing institutions, agriculture commodities distribution centers, as well as connecting farmers to both regional and national valuable market places (Davis, 2008; Swanson, 2008). The role extension specialist's play in organizing and bringing farmers together to address common agricultural problems also provides an opportunity to utilize extension services to create technology transfer strategies in rural villages (Birner et al., 2009; Davis, 2009; Roberson, 2013).

Farm cooperatives. Farm cooperatives can end discrimination of women and improve security and agricultural development (Aal, 2008; International Labor Organizations, 2015; International Year of Cooperatives, 2012). A farm cooperative is a joint enterprise that is formed to allow owners to pursue profit and to meet the needs and interests of both members and their clients (International Year of Cooperatives, 2012). Cooperatives can deliver economic advantages to the members and provide members and their societies with a wide variety of technical and leadership skills and prospects (International Year of Cooperatives, 2012). Agricultural cooperatives are well-respected cooperatives enterprises for having the capability and energy to decrease poverty in rural villages (International Labor Organizations, 2015; International Year of Cooperatives, 2012). For example, in Tanzania, developed cooperative marketing of farm produces, such as milk, livestock, and coffee have enabled cooperative members to pay fees for their children's educational expenses (International Labor Organizations, 2015). In Egypt, over 4 million farmers get income from retailing agricultural outputs through agricultural marketing cooperatives (Aal, 2008). In Ethiopia, an estimated of 900,000 people derive income through cooperatives (Lemma, 2008).

Farmer cooperatives create inclusive principles that support gender equality (International Labor Organizations, 2015). Women are being treated with great respect in cooperatives (Suzuki, 2010). Often women involved in cooperatives have received positions in

the governance structure due to their membership in the cooperatives (Suzuki, 2010). For example, in the Spanish Confederation of Worker Cooperatives (COCETA), women are 49 % of the cooperatives membership, 39 % have a directorial role in the cooperatives, while only 6 percent of women play directorial roles in non-cooperatives enterprises (CICOPA, 2011). In Italy, studies reveal that women are 95 % in the membership of the worker's cooperatives in the fashion industry. In Tanzania, 43 % of financial cooperatives members are women (Majurin, 2012). In Kenya, 24 % of the members of boards in the financial cooperatives are women (Majurin, 2012). Due to their lack of discrimination on the basis of gender, agricultural cooperatives are attracting women in greater number (International Labor Organizations, 2015; Majurin, 2012).

Microfinancing. Accessibility to microfinance can empower women through self-employment and enhance food security (Chawal, 2013; Yunus, 2003). Robinson (2001) described microfinance as a financial assistance that offers small amount of money to individuals who are farming, fishing, and herding cattle. Likewise, Mishra, Mall and Mishra, (2013) defined microfinance as a financial institution that offers financial credits and saving to disadvantaged small farmers. Microfinance could empower women in farming through self-employment (Chawal, 2013; Yunus, 2003). When women become economic independent, they would have an opportunity to organize into groups and federated into centers (Danish International Development Agency, 2004 & Duflo, 2012). When women empowered economically, they could become decision makers, leaders and a social force (Mishra et al., 2013). Women could become group and center leaders and also members of the Board of Directors of communities, private, and public organization (Bayes, 2005). With micro-credit opportunities, women could possibly become business owners who could sell farm products in urban areas and develop

networks (Cheston, 2002). The women in farming could also become active participants in social interactions (Fontana & Natali, 2008) through commercialization processes of agricultural production by attending center meetings, workshops, interacting with national and international visitors, producing, selling and buying products (Bayes, 2005). Successful women may protest social injustice, express their concern and be respected (Dasgupta, 2006).

Studies substantiated that access to microfinance could make women qualify for micro-insurance (Barnett, 2007; Barnett & Mahul, 2007; Lybbert & summer, 2010). The micro-insurance would enable farmers to insure their assets, farms, houses and provide health insurance for the household members (Barrett, et al., 2007). Furthermore, micro-insurance could help subsistence farmers protect their property against severe weather changes (Lybbert & Summer, 2010). The small farmers could use micro insurance to insure their property against severe weather after-effects. Research has shown that micro-insurance could protect farmers against physical risks related to cultural social characteristics, livestock mortality, and crop losses (Hess et al., 2005). The micro-insurance is expected to cover administration and monitoring costs of livestock and crop yields (Skees, Barnett & Murphy, 2008; Hess, et al., 2005; Lybbert & Summer, 2010).

Farm field schools training. Farm field school (FFS) training could help subsistence farmers learn better, increase food security and agricultural development (Bunyatta et al. 2006; Rola, Jamias, & Quizon, 2003). Farmer field schools (FFS) is an informal ways of educating men and women farmers in their own agriculture fields to learn new agricultural technologies that may be appropriate for their crop productions (Bunyatta, Muriethi, Anyango & Ngesa, 2006). Studies stated that rural farmers who received FFS training adapted new technologies, improve yields, and became independent food growers and reduce food insecurity vulnerability

(Bunyatta et al. 2006; Rola, Jamias & Quizon, 2003). Davis and Place (2003) described FFS as schools without walls where farmers and agricultural extension specialists meet on weekly and monthly basses to organize experiments, arrange discussion topics, and make decisions based on hands-on experience.

The Food and Agriculture Organization of the United Nations (FAO) introduced the Farmer Field School (FFS) methodology in 1989 (Rola et al., 2003) with the purpose that farmers could learn things by doing it. The FFS was created to train rice farmers in Indonesia on integrated pest management (IPM) because the private industries and government in Indonesia ran extremely harmful pesticides business that put farmers' health, crops, and environment at dangerous conditions (International Potato Center – Users' Perspectives with Agricultural Research and Development (CIP-UPWARD), 2003; Feder, Murgai & Quizon, 2004). The FFS approach worked successfully for Indonesia's farmers in controlling rice pests and the method was promptly extended to other farmlands in Asia, Africa, the Middle East and Latin America (CIP-UPWARD, 2003).

It is believed that effective utilization of FFS could provide significant opportunities to subsistence women farmers because the FFS have worked well with rice farmers in Indonesia (Feder, et al. 2004; Hakiza et al., 2004). Women farmers could learn together and test practices and utilize practical, hands-on structures of discovery learning that underscore observation, discussion, investigation, and collective decision-making processes (Davies, 2006). Dialogue and interaction among subsistence farmers may be vital means to combine local farmers' skills with new technology that could bring the two perceptions into making decisions that lead to implementation (Davies, 2006; Hakiza et al., 2004). It is postulated that the utilization of FFS could build local subsistence farmers' self-confidence, encourage farmers to help one another

and enhance the advancement of community skills in agriculture (Davies, 2006; Duveskog, 2006).

FFS should be one of the best methods to use when providing agricultural training to rural farmers with less education because it is a participatory approach of learning, developing, and disseminating technologies to learners (Mutandwa & Mpangwa, 2004). It is extremely good to apply FFS when training adult farmers so they could learn from experience (Chmielewski, Pina, Smith, & Wingenbach, 2006). Studies suggested that the FFS model is an empowering method that can enrich the constructive decision making strategies of rural subsistence farmers (Page, & Czuba, 1999). With the help of FFS practical learning experience process (Heemskerck & Bertus, 2004; Leeuwis, 2004), rural farmers in South Sudan would be able to learn how to use the technology that the agricultural extension workers strive to introduce.

The skills subsistence farmers receive through participatory learning practices may motivate them to want to adapt new technologies to be more practical, more economical and be more responsive to shifting technologies (Friis-Hansen & Duveskog, 2012; Leeuwis, 2004). Research indicates that provision of agricultural training using FFS principles may give rural farmers an opportunity to build up their knowledge (Friis-Hansen, 2004). The farmers can take significant and constructive decisions that could provide healthy crop production systems, cost-effective and sustainable farm yields (Duveskog, Friis-Hansen & Taylor, 2011). Farmer Field Schools are considered as productive training methods because they deliver participatory extension methods that acknowledge the need for collaboration and collective work (Duveskog, 2006).

The FFS may perhaps provide deep farmer-orientation that advocates problem solving and decision making measures (Davis & Place, 2003; Easton, Monkman & Miles, 2009).

Moreover, studies postulated that the FFS could give farmers' capability to identify problems and choose the best option for action (Isubikalu, 2007; Friis-Hansen, 2004). The agricultural extension worker's ability to work well with a group of farmers is more efficient than working with individualistic farmers (Heemskerk et al., 2003; International Fund for Agricultural Development, 1996, 2011). when applying FFS practical learning methodologies. During field training communal concerns are addressed, farmers learn from one another and the outcomes of learning from each other lower the cost of extension specialists, develop social capital, increase agricultural production, and improve food security (Friis-Hansen, Duveskog & Taylor, 2012 & Leeuwis 2004). Above all, FFS encourage collaborative participation among farmers and extension specialists, motivate farmers to adapt new technologies, improve crop yields, and eliminate women farmers' vulnerability to food insecurity (Davis, Nkonya, Kato, Mekonnen, Odendo, Miiro & Nkuba, (2011) & Shabaka, 2002).

Theoretical Framework:

Theory of planned behavior

The theoretical framework that was used for this study was the Theory of Planned Behavior (TPB). The TPB (Ajzen 1988, 1991; Werner & Ward, 2004; Conner & Norman, 2005) is based on the Theory of Reasoned Action in an effort to predict and understand behaviors (Ajzen & Fishbein, 1980, 2001; Conner & Norman, 2005; Fishbein & Ajzen, 1975; Fishbein & Ajzen, 2005). The TRA is a theory that was originated in the discipline of social psychology (Ajzen, 1975). The TRA was developed by Fishbein and Ajzen to find the connections among beliefs, attitudes, norms, intentions, and behaviors of people (Montano & Kasprzyk, 2008; Werner, 2004). The two theories propose that an intention to engage in the behavior determines a person's behavior (Ajzen, 1988; Ajzen & Fishbein, 2001).

The major conjecture of TRA and TPB is that people are rational when examining their decision-making processes and the consequences of their actions. Individuals who are rational decision-makers are thoughtfully making right choices based on the observer's interpretation of the behavior (Bazerman, 2002; Eppen et al., 1998). In a rational decision making procedure, a person utilizes a sequences of rational steps to study logical actualities and potential aftermaths prior selecting a specific course of action (Basu, 1996; Eppen et al., 1998). The TRA presumed that every person has volitional control over the given behavior (Ajzen, 2002; 2006; 2008).

Intentions are motivational components that influence a behavior (Jimmieson, Peach, White, 2008). The TRA focuses on the internal factors of behavior of people mainly on physical and social conditions (Parminter & Wilson, 2003). TRA states that people's behavior is known

through their intention to perform the given behavior (Ajzen, 2002, 2006). This intention drives people's attitudes toward the behavior and their subjective norms, (Ajzen, 1988, 1991). For TRA, the good conjecturer of behavior is intention. Intention is the perceptible illustration of people's willingness to perform an identified behavior (Ajzen, 2002, 2006, 2008). Therefore, intention is regarded as a quick antecedent of behavior (Ajzen, 1988; Conner & Norman, 2005).

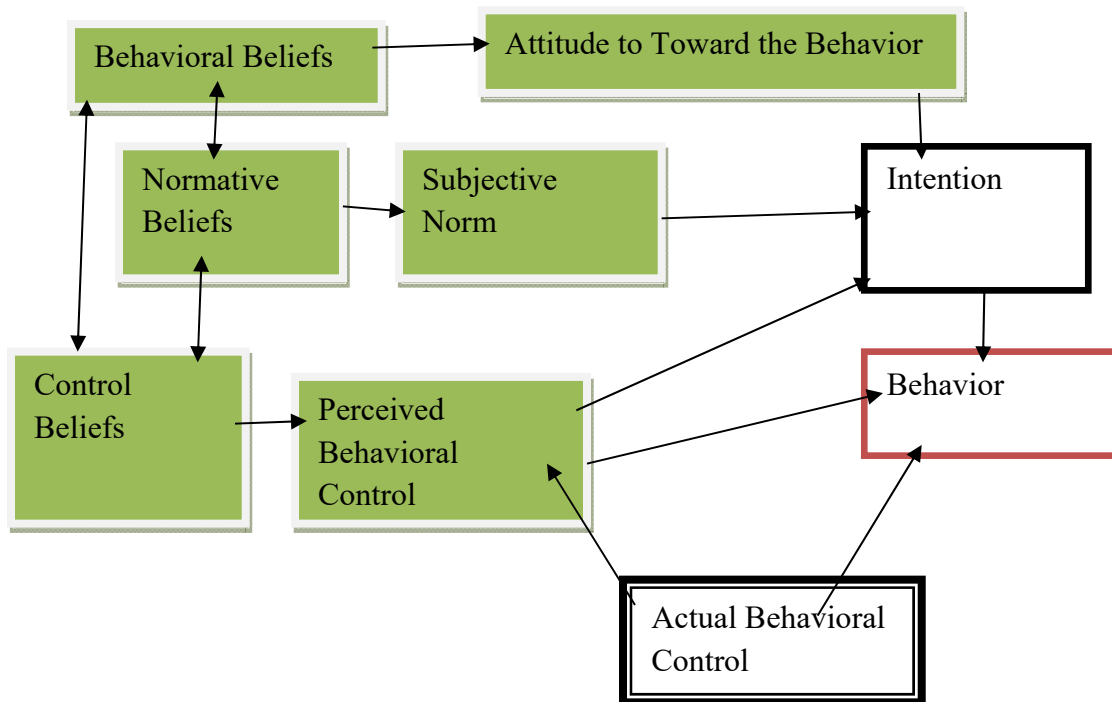
Behavior intention shows an effort a person would like to put on behavior to perform a given behavior amicably (Ajzen, 1991; Werner, 2004). Attitudes and subjective norms are used to determine the behavioral intention (Ajzen, 2006; 2008). However, TRA was criticized for disregarding the position of social factors that determine individual's behavior in real life (Grandon, Mykytyn & Peter, 2004). Social factors are elements that effect the environment around the individual behavior (Ajzen, 1991). To overcome this TRA's criticism, Ajzen (1991) recommended adding perceived behavioral control to determine individual behavior in TPB.

The distinction between the two theories is that the TPB incorporates perceived behavioral control on top of components of intentions and behavior (Ajzen 1988, 1991; Conner & Norman, 2005). The TPB was established to predict the volitional behaviors by incorporating control beliefs as supplementary predictors of behavior (Conner & Norman, 2005).

The TPB can predict and describe human behaviors and indicate their promotional and controlling factors (Armitage & Conner, 2001; Armitage, 2005; Hardeman et al., 2002; Glanz, Rimer & Lewis, 2002). The individual's intention to perform a given behavior is the essential reason the TPB was developed. The TPB is based upon three constituents of intentions: attitudes, subjective norms, and perceived behavioral control. The TPB predicts that the behavioral intentions that influence an individual's attitude toward a behavior, subjective norms, and perceived behavioral control determine the planned behavior (Ajzen, 1991, 2006; Conner,

Kirk, Cade & Barret, 2003). Lastly, the TPB assumes that attitude toward behavior, subjective norms, and perceived behavioral control form an individual's behavioral intentions and behaviors (Ajzen, 2002; Ajzen & Fishbein, 2005; Armitage & Conner, 2001).

Diagram of Theory Planned Behavior (Ajzen, 2006).



Source: Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50, P. 179-211.

Attitude Toward the Behavior

Attitudes are the psychological views individuals hold towards other people (Ajzen, 1991). Attitude toward behavior is an individual's examination of the behavior. Attitude builds on an individual's beliefs on a selective behavior and their assessment of those beliefs (Fazio, 1990; Parminter & Wilson, 2003). When many people are expecting that the identified behavior

will have favorable outcomes that may benefit them, then more people will have a positive attitude towards that behavior. However, when more people are anticipating that a behavior will have detrimental effects on their lives, then they will have a negative attitude towards that behavior (Ajzen, 2005). The TPB discusses behavior as a function of intention because of the empirical evidence such as attitude toward behavior, subjective norm, perceived behavior controls that support it (Ajzen, 1985, 2005).

Attitude toward the behavior is a person's overall assessment of the behavior (Ajzen, 1991). In addition, attitude toward the behavior is a person's favorable or unfavorable feelings toward performing a specified behavior. It is determined through an assessment of one's beliefs regarding the consequences arising from a behavior and an evaluation of the desirability of these consequences (Ajzen, 1991). The concept of the attitude toward the behavior is the level to which performance of the behavior is positively or negatively respected (Ajzen, 2002, 2008; Fishbein & Ajzen, 1980).

Subjective Norms

A subjective norm is the perceived social pressure that can either prompt the person to perform the behavior or discourage an individual from performing the behavior (Herath, 2013). This subjective norm is what causes an individual to think of whether others would approve or not to approve her for acting in a particular manner. Studies illustrate that subjective norms are combinations of the motivations and the thoughts the normative beliefs drive (Ajzen, 2008). According to (Ajzen, 1991, 2006) subjective norms are very significance in understanding people's attitudes towards a behavior. Without proper application of subjective norms, people's behavior will not change. Attitudes towards behavior are largely relay on in the hands of the individuals who want to engage or not to engage in behavior. Establishing the correct subjective

norms is largely in the heart of people who are motivated to engage in performing the identified behavior (Ajzen, 1988, 1991, 2002).

The Perceived Behavioral Control

The perceived behavioral control (Ajzen, 1988) is the individual's attitude that would make the given behavior feasible or difficult to perform. Ajzen (1991) defines perceived behavioral control as the ability of the people to perform the specified behavior. This perceived behavioral control influences individual's intentions to perform the anticipated behavior (Ajzen, 2002; 2008; 1988). Perceived behavioral control (self-confidence) is the perceived level of difficulty in performing the behavior in illustration of past experience and projected complications as well as possibilities (Ajzen, 2006). Perceived behavioral control can be determined by control beliefs. When the attitudes and subjective norms are favorable, then the perceived behavioral control that predicts intention becomes greater. Ultimately, the person's intention to perform the behavior in question would become greater (Ajzen, 2002).

Beliefs as Antecedents

Beliefs are the experiences that people hold regarding behavior and advantages and disadvantages that come with it (Ajzen, 2002). Beliefs are opinions that an individual holds as being real. People may build a belief based upon their knowledge and recognition of cultural and social norms. Ajzen, (2006) stated that a conceivable belief lives with an individual until that person accepts the belief as real. Every one assesses and inquires proof for prospective beliefs. Therefore, when an individual accepts a belief as a truth, then the belief becomes part of their beliefs system (Ajzen, 2006; Fishbein & Ajzen, 2002). Subsequently, a person would be capable to support his or her beliefs with evidence under any circumstances. Beliefs are catalysts that change people's attitude, subjective norm, and perceived behavioral control from time to time

toward their intention (Ajzen, 2006). According to Ajzen (1980, 1988, and 1991), human behavior is guided by three components of beliefs: behavioral beliefs, normative beliefs, and control beliefs.

Behavioral beliefs are individuals' beliefs concerning the outcomes of specific behavior, (Ajzen, 2002; Ajzen & Fishbein, 2008). The conceptions of the behavioral beliefs are built on the subjective prospect that the behavior can deliver the assumed result (Ajzen, 1991, 2010).

Behavioral beliefs are beliefs associated with the behavior of interest to anticipated results (Herath, 2013). The behavioral belief is the subjective prospect that the behavior may deliver an expected result. Despite the fact that an individual could hold several behavioral beliefs with respect to any behavior, only a few beliefs are reachable at a given time. It is expected that these small understandable beliefs in amalgamation with the subjective values of the expected aftermaths determine the existing attitude (Herath, 2013) toward women farmers' involvement in the extension services. Ajzen (2006) defined behavioral beliefs as beliefs that have either a desirable or undesirable attitude toward the behavior being investigated. People's attitudes are shaped through the mean of the appropriate behavioral beliefs of the behavior as well as through the consequence valuation of the precise behavioral belief (Conner & Sparks, 2005).

Normative beliefs describe the attitude of other people who would approve or disapprove the involvement of an individual in performing the particular behavior (Ajzen, 2006). In addition, normative beliefs are beliefs concerning with the expectancies of other people that result in perceived social pressure or subjective norm (Ajzen, 2006, 2008, 2010). It is supposed that these normative beliefs influence the predominating subjective norm.

Control beliefs are individual's beliefs concerning the existing attributes that may make possible or obstruct the accomplishment of the behavior. Most importantly, control beliefs and

the power of the relevant belief manipulate the perceived behavioral control (Pawlak et al., 2008). Lastly, the perceived behavioral controls are the restrictive and psychological factors that limit or promote presenting behavior (Herath, 2013).

Replication of Intention

As stated previously, the purpose of TPB is to predict behavior through intentions. The intention to perform behavior is an indication of the likelihood that a person will engage in a specific behavior. The relevant striking beliefs regarding the behavior determine intention. Thus, the TPB anticipates that the clearer a person's intention; the more likely the person will engage in performing the behavior (Pawlak et al., 2008). The amalgamation of attitude toward the behavior, subjective norm, and perception of behavioral control result in configuration of a behavioral intention. When the attitude and subjective norm are desirable, the perceived control is enhanced and the person's intention to perform the behavior in query may become stronger (Ajzen, 2005).

Intention is proposed to be the forerunner of behavior, but numerous behaviors create complications of performance that may undermine volitional control. It is helpful to consider intention in addition to perceived behavioral control (Ajzen, 2005). To the point where the perceived behavioral control becomes veridical, it may serve as a substitute for actual control and provide support to the extrapolation of the behavior in question (Ajzen, 2005).

Behavioral intentions have been described as the subjective likelihood that an individual will engage in a specified behavior (Herath, 2010). Intentions comprise all the motivation factors that affect a behavior and indicate how much effort an individual will apply to perform a behavior. According to Ajzen (2006), intentions are true tools for predicting behavior. Thus, the TPB

predicts that the deeper a person's intent to perform a behavior, the more likely the individual will engage in that behavior (Ajzen, 2005).

The TPB can be used to investigate the feasibility and intention of women farmers' use of extension services (Ajzen, 1991). The TPB will also be used to explore informants' attitudes towards training women farmers, attitudes toward financing women enterprises, and attitudes toward developing cooperatives for women farmers. The researcher is proposing to use the TPB to examine informants' perception on how women farmers themselves feel, how their family's feel, and how agricultural organizations and the government feel about extension services proposed to be provided to female farmers. The researcher will use the TPB to study informants' attitudes towards training women farmers to achieve food security needs. Informants will be interviewed to explore their attitudes concerning:

1. Women farmers' food security conditions in South Sudan;
2. Establishment of agricultural markets for women farmers to sell their agricultural products;
3. Allowing women to participate on environmental sustainability to protect natural environment to support human life;
4. Using extension services to provide training and information to the women farmers to improve their farming skills and knowledge;
5. Developing cooperatives for women farmers to build farm businesses to decrease food insecurity;
6. Use of micro-financing for women farm enterprises to reduce poverty.

Limitation of the TRA and the TPB

Studies reveal that the TRA and TPB have fallen short when explaining their determinants of predictions to an individual's behavior (Werner, 2004). The TRA and TPB limit their determinants of intention to attitudes, subjective norms, and perceived behavioral control (Ajzen, 1991), while there may be many other factors that could be effective in influencing people's behavior as well. Some scientific studies have expressed that only about 40% of the variance of behavior can be described using TRA and TPB (Ajzen, 1991; Werner, 2004). The second shortcoming of TRA and TPB is that there may be a significant time gap between valuation of behavior intention and actual behavior being evaluated (Werner, 2004). In such a long period of time, the intention of a person to perform an act could change. Both TRA and TPB are predictive models that predict people's action based on certain criteria. However, people do not always behave as predicted by those criteria (Werner, 2004).

Chapter Three:

Methodology

The purpose of this chapter is to overview the methodology used to conduct the study. The chapter includes the research questions, an overview of the research design, and descriptions of the population of the study, data collection instruments and methods, and data analysis. To identify rural women farmers food security conditions and means to improve their food security, university faculty and staff, women informants, FAO personnel, microfinance staff, farm cooperatives members, and extension specialists involved in farm work or had contact with rural farmers in the South Sudan were interviewed both in person and by telephone.

Research Purpose and Questions

The purpose of this study is to identify strategies to improve food security in Rubkona County, South Sudan through improved agricultural extension services targeting women farmers. The research questions that were used to provide guidance to this study were:

1. In what ways are subsistence farmers in Rubkona County in South Sudan food security or food insecure?
2. What could be the necessary conditions in an enabling environment for South Sudanese women farmers to increase their agricultural productivity and food security?
3. What role could female farmer directed agricultural extension services play in improving food security in South Sudan?
4. What role could female farmer micro financing play in improving food security in South Sudan?

5. What role could female farmer cooperatives play in improving food security in South Sudan?

Research Design

This study used a qualitative research design to study female farmers' food security conditions in Rubkona County, South Sudan. A qualitative research design was utilized to acquire rich and comprehensive information from the informants, by investigating opinions, beliefs, and social norms (Best & Kahn, 1998) that affected the participation of female farmers in agriculture's training. Kvale (1983) used the qualitative research design interviews to gather information from interviewees that should produce thorough and reliable data. The research utilized semi-structured and structured interviews and telephone interviews to investigate informant's perception of including women farmers in agricultural extension services training as well as giving women farmers access to microfinance.

All the telephone interviews were conducted in the Nuer language. Nuer is a local language spoken mostly in the Northern part of South Sudan. Member checking was employed to ensure research credibility. The interview questions were developed using the principles of the TPB (Ajzen, 2006). Informants were allowed to fully express their opinions and perceptions in their own terms as suggested by (Best & Kahn, 1993; Coll & Chapman, 2000).

Purposive sampling techniques were utilized to identify knowledgeable informants who know more about rural farmers who specialize in maize, sorghum, and rice production. To participate in the study, the participants must have met one or more of the following criteria: 1) been a farmer or had worked on the farm within the past two years; 2) been a university faculty or staff member involved in agricultural related work; 3) participated in international agricultural

research projects in rural areas in Africa; 4) been an extension person or facilitator; 5) been knowledgeable about farm cooperatives; and 6) have experience in microfinance.

The researcher engaged informants in an intensive discussion for the purpose of exploring informants' experiences with the factors that trigger food insecurity in their region. Engagement of informants in a process of clarification gave the researcher an opportunity to develop confidence about the accuracy of information the respondents provided (Galletta, 2013) regarding food security issues and the consequences of women participation in the decision making process. The engagement of informants during the interview generated helpful thoughts that enable the researcher to learn more about food security problem, environmental issues, and women's problems not only in the South Sudan, but in most developing nations in general.

Population of the Study

The target population of this study was men and women farmers in Rubkona County, South Sudan. Informants used to assess the target population included; men and women farmers in Rubkona County, farmers in other African countries; faculty and staff of the College of Natural Resources and Environmental Science at the University of Juba; South Sudan and other agricultural extension specialists; Virginia Tech Office of International, Research, Educational Development (OIREED) faculty; and Food and Agricultural Organization (FAO) of United Nations staff members. Although this study is mainly focusing on women farmers, men farmers were included in the study as men and women work on family farms together. In Rubkona County, women share farms with their husbands. When a woman is married, she has automatic equal rights as her husband on the husband's farm. If her husband dies, the land belongs to her regardless of whether they have children or not.

Rubkona County was chosen because it is endowed with substantial cultivable rich land and most citizens are farmers, but agriculture is subsistence due to lack of agricultural technologies, needed agricultural inputs (seeds, chemicals fertilizers, draft animals and/or mechanization), and markets for selling surpluses (ACF, 2008; Mercy Corps, 2011). Subsistence farmers in Rukona County work independently. These subsistence women farmers do not have any kind of cooperative bargaining influence, and their connections with markets are weak (ACF, 2008).

Additionally, Rubkona's subsistence farmers have limited knowledge about market prices. These farmers need to be empowered through agricultural training, microfinance, microgrants, and extension services. These extension services can help subsistence farmers reach service providers who can supply them with the information, credit, and market services they require to diversify and improve their productivity (United Nations, 2012). The establishment of market interactions between smallholder farmer groups and market chain actors should improve smallholder incomes. The most common crops are maize, sorghum, groundnuts, pumpkins, millet, and rice (Morton, 2007) with some beans, sesame, cassava, tobacco, and cowpeas (Barrett, 2007). Likewise, subsistence farmers use livestock as a source of wealth that provide income, prestige, social status, and cultural value (United Nations, 2012). There is very little commercial farming due to lack of markets for crops and livestock (ACF, 2008).

Participant Recruitment

The researcher started his study by submitting research and survey instruments and procedures to the Institutional Review Board at Virginia Polytechnic Institute and State University, which reviewed and approved this study. Then the researcher e-mailed a recruitment letter to informants. Afterward the researcher e-mailed consent forms to those respondents who

agreed to participate in the study. This researcher also contacted some participants by phone that could not be reached by email. In this pre-notice letter, the researcher promised to maintain informants' confidentiality on the consent forms.

The researcher told the informants that all interview tapes and notes would be strictly confidential. He would not use descriptive details that might reveal the identity of participants. Neither informant's name nor the name of village, institution, and organization would be used in the final report. The informants were informed that they would not receive any monetary or material compensation. Informants were asked to indicate by signing their names if they want to review their interview before it is published. To maintain the confidentiality of participants, pseudonyms were assigned to the research informants participating in the study. The researcher used pseudonyms for the informants who participated in the study when writing up the findings of the research study.

A total of 20 participants, 11 males and 9 females, were recruited through telephone, e-mails, and face to face meeting. These informants were comprised of farmers, university faculty and staff, international agricultural researchers, and extension specialists, microfinance staff, and women and gender development specialists. Two females and one male were interviewed in their homes. Four females were interviewed in the library. Three males and two females were interviewed in their offices. Three males and one female from Rubkona County, South Sudan who just returned to the United States (U.S.) due to the civil war, which broke out in South Sudan in December 2013 were interviewed by phone. Two of the men from Rubkona County were farmers. They grew maize, groundnut, sorghum, okra, and pumpkins both for consumption and for purchase. Dillman, Smyth, & Christian, (2009) suggested telephones can be appropriate method for data collection for individuals who are place bound.

This study does not require reaching a specific number of participant to be valid. There isn't a set number for sample size in qualitative studies (Boyce & Neale, 2006; Ary et al., 2009; Corbin & Morse, 2003). Selection of experienced participants for topic under study for data collection is more significant than increasing the number of participants (Ary et al. 2009; Patton, 2002). In this qualitative data collection, the researcher selected information-rich cases for in-depth study because qualitative researcher suggest that selecting informants based on their experience on the topic under study (Patton, 1990) is much better than choosing a specific number of participants. Patton (2002) describes information-rich cases as those cases through which a researcher can learn enough about subjects very important to the purpose of the study.

In addition to purposive sampling, snowball sampling was used in the data collection. Snowball sampling was utilized in the data collection to get more qualified people to interview. Using snowball sampling, the researcher recruited informants until he felt that the interview data were no longer producing new thematic patterns and had reached the saturation point (Ary et al., 2009; Galletta, 2013). Ary et al. (2009) defined snowball sampling as a process in which the first chosen participants recommend other people who could be suitable for the sampling.

The interviewer asked every informant at the end of the interview to suggest other individuals (Ary et al., 2009; Galletta, 2013; Patton, 2002) who could be potential for the study. Besides, purposive and snowball samplings, convenience sampling was used in the data collection. Convenience sampling is a process of choosing a sample based on availability, time, location and ease of access (Ary et al., 2009; Patton, 2002). The researcher continued interviewing a unit of informants for enriched data until no new information could be obtained plus the researcher ran out of time.

Description of Informants

In this section, participants were described using pseudonyms names. The organizations they represent were given pseudonyms names as well. Ary et al. (2009), Galletta, (2013) and Patton, (2002) suggested that it is appropriate to give informants pseudonyms names to protect their identity.

Garpan Gai, is an independent butcher business person who owns a butcher shop for selling meat. Mr. Gai, buys cattle, goats, and sheep from farmers and slaughters them and sells their meat to both the rural farmers and the town dwellers. Villagers and town people buy meat directly from him.

Amina Hamad is a research assistant for the Institute for Agronomic Research (IAR). She performs farm chemical analysis, sets up farm equipment in the field for demonstration and experimentation. Ms. Hamad also trains farmers on how to use compost, fertilizers, or organic amendment.

Dr. Cristina Frank is the associate director for women and gender in Global Food Security incorporation. Her role is to support gender collaborative research projects that support rural women farmers in Africa. She served as Water and Sanitation Peace Corps volunteer in many African countries for years.

Dr. Bush Gatkuoth, is a director for performance assessment. He is currently leading assessments of agricultural training and education institutions in East Africa for the Innovation for Agricultural Training and Education. Dr. Gatkuoth, coordinates the development of fundamental training for agriculture and natural resource sectors not only in East Africa, but also in other developing countries.

Dr. Bashir Ashim, Associate Director for Curricula Development. He leads some related food security and environmental education projects in Africa and Asia. Dr. Ashim works with rural farmers in North Africa. He organizes and trains farmers on how to apply the right inputs on their farms.

Dr. Mary Blare is the Director for Women and Gender in International Development. Dr. Blare works with stakeholders to address gender issues in international research and grant proposals.

Dr. Blare serves as a gender equity specialist on the Sustainable Agriculture and Natural Management and Integrated Pest Management projects. Dr. Blare conducted meetings with farm workers and environmentalists to discuss gender specific food security conditions.

Dr. Patroni Mamuon, a director of integrated pest management. He is an entomologist by profession. He trains extension specialists and crop scientists in East Africa on how to control crops insect pests using natural mechanism such pheromones, parasitoids without involvement of chemically ways of controlling crops pests.

Sharman Paulino, is both a farmer and a trader. Mr. Paulino owns the farm with his family. They cultivate maize, sorghum, peanuts, and beans. As a trader, Mr. Paulino buys corns, sorghum, beans, and millets from other farmers and sells them in the towns.

Kerwar Kuon, is a farmer; he was raised on the farm and worked on the farm. He grows varieties of food and cash crops on his farm. The key important food crops he cultivates are maize, sorghum, okra, and beans. The cash crops he grows are carrots, yam, and peanut. Mr. Kuon has cows, goats, and sheep on his farm.

Opinion Abraham, own a subsistence farm with her family. Ms. Abraham grows mostly rice, millets, corns, and sorghums for consumption. She helps her family with crops planting, transplanting, and harvesting.

Nyathor Gai is an extension worker for a forestry institute that provide tree seedlings and train farmers how to grow trees. She visited villages and explained to the farmers the importance of trees for income. In addition, Gai worked at XYZ, a non-profit organization that provided seeds to the farmers. Gai would visit rural areas and give farmers samples of new seeds and give demonstrations on how to plant them.

Amanda Randy, owned a farm with her mother. The key core food crops they grow on their farm are millet, rice, corn, and sorghum. Amanda and her mother also grow cash crops such as cotton, and sugar cane. In addition to growing crops, Amanda and her mother raise livestock as well as chickens.

Sara Stephen is a university researcher and a lecturer. Ms. Stephen worked as a consultant on how former soldiers can be included in training for agriculture as well as natural resource management. Ms. Stephen researches the best strategies to be used to provide jobs opportunity for the ex-combatants through agriculture, forestry, and fisheries.

Andrew Cronin is an agriculture instructor at university, and he and his wife own a small farm. Mr. Cronin works on the farm with his wife and children when he is not teaching. Cronin walks extension workers through multiple small farms to meet and communicate with smallholder farmers.

Nyeluok Omer is a staff member at a microfinance institute in the Middle East. Ms. Omer provided information and training to women on microfinance. She synthesized information gathered from the customers into a reasonable investor information document. She processed customers' loan applications as well as making regular phone calls to prospective customers.

Stephen Machar is a science teacher in primary schools and a farmer. He largely cultivates maize for household consumption. Mr. Machar also grows pumpkins, okras, papayas, but in small quantity. In addition to growing crops, he rears cattle, goats, and sheep.

Koang Biel is a structural food security and analysis officer at FAO. He provides information to farmers and from farmers to FAO stakeholders. He coordinates the work of partners active in food security and analysis. Mr. Biel leads the food security monitoring team in the field. He monitors and analyzes livelihood situations of rural farmers. He writes quarterly policy and food security bulletins.

Makuach Dador, is a farmer who mostly cultivates sorghum and maize. He also grows millet, pumpkin, okra, and sesame. Mr. Dador has cattle, goats, and sheep on his farms.

Chiengdeng Wang works at the farm with his family. He planted maize, cabbage, potatoes, and cassava for household use only. Wang also raises cattle, goats, and sheep on his farm purposely for milk, marriage, and ceremony.

Instrumentations/Materials

As mentioned previously, the instruments used in this study were semi-structured, self-administered, and structured open-ended interviews as well as secondary data sources. To guide the interviews, interview questions were developed and presented in a booklet. The first set of questions measured informants' attitude, subjective, and behavioral control factors that motivate women farmers to food security conditions (see Appendix A). The second set of questions measured informants' attitudes toward allowing women farmers to participate in environmental sustainability activities (see Appendix B). The third set of questions examines informers' beliefs about permitting women farmers to form farm cooperatives (see Appendix C). The fourth set of questions assesses informer's concerning women farmers' engagement in micro-finance for their

farm enterprises (see Appendix D). The fifth set of questions examines the informants' opinion toward women's engagement in agricultural training programs (see Appendix E). A panel of four experts with many years of experience in an international work, (environmental scientist, extension specialist, farm cooperative, and gender development specialist) was formed to look over the questions and provide feedback prior to data collection. After the initial review, changes were made based on the feedback received from the panel of experts. Questions regarding causes of food insecurity, production problems, and agricultural product marketing challenges facing rural farmers were developed.

The interview questions were constructed based on the guidelines set on the TPB model (Ajzen, 2005; 1991; Ajzen & Fishbein, 1980). The qualitative interview questions were constructed to address the behavioral intention, attitude, subjective norms, perceived behavioral control, and actual behavioral control (Ajzen, 1991; Ajzen & Fishbein, 2010) that can prevent or promote women farmers' engagement in agriculture training to become food secure.

The notion of behavior intention maintains that a person's interest to engage in a behavior is delineated by the attitudes that influence the behavior, (Ajzen, 1988; Fishbein & Ajzen, 1975; 2010). To uncover behavioral intention, the researcher asked the informants to describe the intention of women farmers' involvement in food insecurity mitigation strategies. To discover the behavioral beliefs, informants were asked to describe what they believe to be positive and negative results of training women farmers.

For normative beliefs, informants were asked to describe if other people would approve or disapprove the participation of women farmers in agricultural extension services training programs. To reveal subjective norms, informants were asked to define the individuals who would consider or who would not consider the involvement of women in agricultural extension

training services. To examine the perceived behavioral control factors, informants were asked to describe how easily women farmers can form cooperatives, participate in environmental sustainability, and practice agricultural farm enterprise (Ajzen, 1991).

Actual behavioral control was explored by asking questions about the level of self-sufficiency and flexibility the women farmers had in forming farm cooperatives, taking part in micro-grants, and engaging in community decision making processes. To unveil control factors, the researcher questioned the informants about existing control factors that make it easy or difficult for women farmers to participate in environmental sustainability, agricultural market, and capacity building activities. The researcher interviewed informants to understand the control factors that could help and/or restrain the adoption of microfinance for financing women farms enterprises.

Data Collection Methods

Two types of data collection were used: primary and secondary. In-depth semi-structured and structured interviews (surveys) were utilized to explore the attitude of informants toward women farmers' food security condition, training of women farmers through agricultural extension services, participation of women farmers in micro-finance, environmental sustainability activities, and farm cooperatives to improve the production of maize, sorghum, and rice in Rubkona County, South Sudan. In-depth interviews were conducted in a collaborative manner. The interviewer and the informants come together to form a framework of conversational understanding in which informants feel comfortable narrating their story (Corbin & Morse, 2003). The researcher used two types of interview procedures: semi-structured and structured interviews.

Semi-structured interviews. Semi-structured interviews (Corbin & Morse, 2003; Patton, 2002) were utilized to collect data from the informants from Rubkona County, South Sudan. As a result of conflict in Rubkona County, data was also collected from interviewees representing different locations, counties, and states as well as other countries in Africa that have the similar food security conditions as Rubkona County. The researcher used more formal communication and open-ended questions to allow flexibility and free flowing conversations. All telephone interviews were conducted in Nuer Language and audio recorded. Nuer is a local language spoken in the Northern part of South Sudan.

A tape recorder was used during the semi-structured interviews to enable the researcher to invest his attention by listening to the informants and give more probes where there was insufficient clarity. The researcher recorded the interviews in two different ways: first, the researcher used an Olympus voice recorder for some participants. Shortly, before the interview began, the voice recorder was turned on and placed on the table between the informant and the researcher to record the conversation. Second, the interviewer recorded some interviews using video recording camera on a lap top computer. The lap top computer was placed on the table between the researcher and the participant faced the interviewee while the interviewer sat behind the lap top computer to record the conversations.

All audio recorded interviews lasted for 30 minutes to one hour. The researcher used the recorder to capture the language used by the interviewees including the pauses and tone of voice in far more detail (Boyce, & Neale, 2006). Audio recording was a more precise method of recording the interview (Ary et al. 2009; Best & Kahn, 1993; Rose & Cole, 2002). Tape-recorded interviews provide more accurate data as well as allowing the researcher to be more focused on the interviewees (Creswell, 2009). Patton, 2002). The researcher took only a few

notes on one-on-one interviews while instantaneously paying attention to the informants' speaking to avoid slowing down informants or miss some important points.

The interviewer guided the flow of information by questioning the informants for more detail while making sure the conversation did not lose its intended purpose (Patton, 1990). The researcher used content mining questions (Creswell, 2005; Galletta, 2013; Kvale, 1996; Spradley, 1979) to ensure that complete and consistent information is obtained across various interviews. Content mining questions are questions created to explore the problems that have been raised during the interview in detail (Kvale, 1996; Spradley, 1979). The researcher used these content mining questions to understand in depth the issues an interviewee rose by exploring the causes of these problems from the informants' perspective (Kvale, 1996; Rubin, & Rubin, 1995; Spradley, 1979).

During the interview, question probes (Creswell, 2005; Galletta, 2013) were used to ask follow up questions to attain satisfactory information and get clarification if the response to the question was vague and ambiguous. Probes were used when the interviewer did not understand what the respondent had said so valuable information about the topic being researched could be covered (Creswell & Clark, 2007). In these semi-structured interviews, the interviewer was obligated to ask for clarification on matters if the respondents appeared to misunderstand or did not respond to the initial question (Creswell & Clark, 2007).

Surveys (Structured interviews). The researcher prepared survey questions that investigated the respondent's thoughts about the empowering women farmers through agricultural training and strengthening women economic development through microfinance, farm cooperative, and agricultural extension services (see Appendices D, E, and F). The researcher used these survey questions to assess informant's attitude toward providing training to

women farmers so they can become food independent. The questions were designed to examine beliefs of informants about the inclusion of women in decision making processes. The researcher developed the survey questions specifically to assess informants' conceptions of the agricultural technologies, farm inputs, and the role of women in farming practices.

The researcher e-mailed 30 survey questions to 10 informants in South Sudan who could not be reached by phone. These ten informants were contacted by phone prior to e-mailing them survey questions to complete the structured interview questions at their own pace. Dillman et al. (2009) suggested delivering surveys questions to informants' through e-mail is a better way to reach large number of informants in different geographical areas with zero cost. Informants were asked the similar questions in the similar way to make it easy to reiterate the conversation (Boyce & Neale, 2006; Corbin & Morse, 2003) (see Appendix A through Appendix F). The structured interviews were used to determine how informants feel about allowing women farmers to engage in agricultural extension services training as a means of women farmers' economic development (see Appendix F).

Secondary data collection. Some people who work for NGOs in South Sudan were asked to provide documents about agricultural development in South Sudan. Publications and data from the FAO and the Ministry of Agriculture and Forestry were used to provide information on food security, institutional frameworks, and socio-economic, demographic, market, and livelihood conditions, and risks to food security. In addition, staff of these organizations were interviewed to collect additional information on these topics.

1. **Food Security Conditions:**

- Food access, availability, and utilization, diet diversity
- Hazards and threats to food security

- Food insecurity warning, malnutrition rates, normal source of food for farmers
- FAO response to food insecurity

2. **Institutional Conditions:**

- What FAO does to help farmers alleviate food insecurity in South Sudan?
- Relation between communities and government
- Access to political decision making at the village, region, and national levels

3. **Demographic Conditions:**

- Census population data, age, gender

4. **Socio-Economic Conditions:**

- Social and political structure affecting food security such as government policies, trade regulations, fiscal policies, taxation and subsidies
- Infrastructure such as roads, schools, water, health services

5. **Agricultural Market Conditions:**

- Import and export
- Market price fluctuation and easy market access
- Major food and cash crops produce by regions
- Food utilization

6. **Household Livelihood Conditions:**

- Household economic roles, control of resources, income generating activities
- Labor supply and dependency ratio
- Landholding utilization, livestock ownership

7. **Risks to Food Security:**

- Insecurity
- Natural disasters
- Market price

Data Analysis

Data transcription. After semi-structured interviews were conducted, the tape and audio-recorded information was transferred from the Olympus Voice Recorder device into Microsoft word processing computer software. All tapes and audio-recorded interviews were transcribed verbatim. The researcher transcribed his data by typing up the recorded interviews, interview notes, and memos into Microsoft word processing document. Data was analyzed using content analysis in qualitative research design. Ary et al. (2010) defined content analysis as a process of analyzing and interpreting the recorded data in order to learn about human behavior. The researcher read over the transcription, and wrote short messages in the margin when meaningful ideas are detected. Every brief note written in the margin was again read, recorded, and categorized. Leech and Anthony (2007) suggested that it is appropriate to make note on the margin of the page when transcribing interviews.

Classification of data. All the transcript data were classified into groups, the researcher reread the order of the items to make sure that the information was properly categorized (Galletta, 2013). The transcripts were broken-down into separate sentences and paragraphs. Subsequently, the interviewer analyzed and studied the transcripts to understand the similarities and differences of transcribed data. The categories of transcribed data were recognized through reappearing thoughts from the data and from information gained by reading the text. This classification of data was permitted for a more effective figure of groups (Strauss & Corbin, 1994). All categories were given names based on the data they represented to determine the

circumstances and the context in which they happened as suggested by (Strauss & Corbin, 1994). The data were read multiple times, in order to analyze and find constructs, themes and emerging patterns. All the transcript categories were examined and the researcher grouped the most closely related items and left separate unrelated transcripts. The researcher revisited the original transcripts to ensure that every piece of information was categorized. As the data were properly grouped into meaningful units, the researcher coded the data (Creswell & Clark, 2007).

Coding of qualitative data. The researcher started analyzing data by coding the transcripts. After transcribing data, the researcher identified codes and documented those codes in the codebook. The researcher broke the text into phrases, sentences, and paragraphs and assigned labels to every unit. Label is the exact words the respondents said during the interview (Creswell & Clark, 2007). The researcher allocated code phrases to manuscript sections in the left margin and wrote ideas in the right margin of the page. The interviewer cautiously read the transcribed data, line by line, and separated the data into important logical data units. Codes are the thoughts, opinions, ideas, and suggestions the respondents brought up during the interviews and represent a core level of connotation (Creswell, 2009; Creswell & Clark, 2007; Galletta, 2013).

The researcher named the codes to display the data from which the code originates. The researcher identified codes, knew where codes came from, what meaning the codes carry, and how the codes correlate with other codes. Galletta (2013) defined coding as the process of marking the units of data with codes, explanatory phrases, and group names. The researcher assigned a code to transcripts that closely answered specific research questions. The researcher did this process of coding again and again until all the data were segmented and the primary coding finalized. Throughout the coding processes, the researcher kept a list of all the codes

created and utilized in the research study. Subsequently, the codes were used again to latest subdivisions of data each time the researcher come across suitable information.

In the coding processes, the researcher extended his data segment coding approximately from only one phrase, to a complete sentence, to a paragraph, and subsequently to several pages. Each participant's answers to the research questions were interpreted to explore the experience of informants.

Document analysis. The researcher used document analysis in data collection to find additional information about farmers in Rubkona County. Document analysis is a widespread variety of written of text-books, journals, publications, conference papers, magazines, and newspapers written by public, private, and personal documents to understand women role in agriculture (Ary et al. 2009; Creswell, 2002). The researcher used journals articles, World Bank's reports, and NGOs conference papers, UNDP, UN, and FAO written documents about agriculture and food security history in South Sudan to draw a big picture about informant's experiences and thoughts. The researcher used the FAO documents that describe women's role in agriculture, women farmers' records from the Ministry of Agriculture in South Sudan, report from Action Contre la Faim (ACF) on Rubkona County background information. The published documents were reviewed as secondary data source to enable the researcher can gain additional insight into the informants' experiences about rural agricultural development.

Memoing (Reflexivity)

The researcher engaged in memo writing about he learn from the data he collected. Often times he wrote memos to himself when the he found an interesting idea. This researcher recorded the interviews, and wrote a brief summary of ideas gleaned from interviews shortly after the

interview was concluded. Any relevant thought that an informant brought up during the interview pertaining to the research questions was considered.

The researcher wrote reflectivity and kept the notes as instrumental in the analysis of the data. Moreover, the researcher wrote memos about what he learned from the data throughout the total course of doing qualitative data analysis. The researcher wrote memos when interesting information was found and recorded that reflectivity as supplementary data to be analyzed. The researcher typed up a memo for each interview answer that was applicable to the research questions that were asked in the semi-structured interviews. The researcher used inductive analysis when writing memos to explore in-depth the research questions that were investigated.

Validating of Data

Galletta (2013) stated that the fundamental of a good study is based on the reported evidence on the validity of the data collected and the results of data analyzed. The researcher examined the validity of the data collected for the research and the research data analysis results (Creswell, 2005; Creswell & Clark, 2007). Validity was used to ensure that data collected from the informants are correct, trustworthy, and sincere. Validity in qualitative research occurs when the researcher collects data from reliable sources and analyses data accurately without too many errors (Creswell, 2005; Galletta, 2013).

Checking qualitative validity was utilized in this study to evaluate the accuracy of the information acquired through qualitative data collection. Creswell & Clark, (2007) defined checking qualitative validity as a method of checking the reliability and credibility of the information the researcher attain through qualitative data collection processes. Member checking validity was used in this study. The researcher provided summaries of the data results back to informants who had participated in the study and probed respondents concerning whether the

findings are an exact expression of their experience. The researcher asked each informant to review the transcribed information provided during the interview for confirmation as well as trustworthiness as recommended by (Berg, 2007 & Hatch, 2002). Member checking validity was used to explore and evaluate the informants' narratives, give informants chance to correct errors, provide opportunity to informants to sum up the finding of data collected (Angen, 2000).

Disconfirming evidence was employed in order to be aware of unexpected outcomes that may occur at the time of data collection. Galletta, (2013) described disconfirming evidence as a reported data that exhibits a perception that is different from information that was scientifically proved. Disconfirming evidence was employed to authenticate the correctness of the data analysis the researcher may present in the data analysis report. The researcher requested different committee members to examine the data that was collected and analyzed for the study validity. Different researchers were asked to review the content area of the analyzed data for credibility and sincerity. The researchers included advisors, committee members, peers, and other researchers who may have qualitative research background.

Chapter Four:

Results

Introduction

The study examined food security, extension services, agricultural, gender inequality, microfinance, farm cooperatives, and education while applying the Theory of Planned Behavior (TPB) to investigate culturally specific attitudes, subjective norms and perceived behavioral constructs in relation to women economic development through agricultural production. One-on-one interviews and documents were analyzed (see Appendix D) to answer the five research questions. A total of 21 informants were recruited, 12 males and nine females. Eight females and four males were interviewed face-to-face and three informants filled out survey questionnaires with the same questions as the in person interviews. Two informants declined to participate in the study.

Semi-structured interviews were coded using Atlas.ti qualitative analysis software. After all the transcribed data were uploaded on the Atlas.ti, the researcher coded the text. The codes were classified into preliminary, focused, and code family (see Appendix C). In preliminary coding, the researcher coded all the main points the respondents brought up. In the focused coding, the researcher categorized the preliminary codes that carry the same meaning. In the code family, all the focused codes were condensed and given one code that closely answers the themes.

Findings revealed that subsistence farmers in Sub-Saharan Africa are facing numerous food security and agricultural challenges. The major food security challenges identified were gender inequality, lack of capital, inaccessibility to extension, underdeveloped infrastructure, poor education, and lack of income generating opportunities, water, farm inputs, politics, healthcare

and poverty. This chapter will discuss these issues by utilizing research questions as identified by the informants and supported by the document analysis.

Research Question 1: In what way subsistence farmers in Rubkona County in South Sudan are food security or food insecure?

This research question explored the factors that threaten food security and undermine agricultural production. When asked to describe how they felt about food security and agricultural conditions of small farm holders, the informants provided the following answers: A list of questions that was asked in the semi-structured interviews are available in Appendix. Findings indicated that political instability, low agriculture production, barriers to market access, wars, and climate variations are the main food security challenges in South Sudan. South Sudan International Organization for Migration (IOM) Humanitarian reported that 33, 300 displaced people are sheltering in the UN compound in Juba, 50, 000 people in UN compound in Rubkona town and 33,700 in UN compound in Koch County in Unity State. 70, 400 are sheltering in UN compound in Akobo in Jongeli state and 5,900 displaced persons in UN compound in Bor town in Jongeli state (IOM, 2015). South Sudan Crisis by USAID stated that the violence is continuing to displace people and obstruct humanitarian assistance (USAID, 2015). “FAO in Emergencies from prevention to building back better” by FAO, 2015 found that low levels of agricultural production and rising food prices caused severe food insecure (FAO, 2015). In the article titled “Plan of Action for Southern Sudan” by FAO, (2010) found that crop production depend on rain water and farmers are heavily depending on climatic conditions. The article titled, “Achieving Food Security in Africa: Challenges and Issues” by Mwaniki, (2006), described factors that undermines access to markets in Africa and suggested optional food security intervention that

would mitigate poverty and permit small holders and stakeholders to create activities that would generate wealth.

Conflicts.

- ❖ “Political instability is severely undermines farming and schooling in Unity State.”
- ❖ “People are being killed indiscriminately in Rubkona County in South Sudan.”
- ❖ “The whole population of Greater Upper States was displaced, houses were burned to ground and livestock were looted as a result of war.”
- ❖ “South Sudanese have never been able to eat healthy food and get better healthcare due to the conflict.”
- ❖ “Some farmers are afraid to cultivate because some of the agricultural land had been contaminated with the landmines from previous wars that led to independent of South Sudan.”
- ❖ “Cattle raidings are very common in pastoralist communities in South Sudan and its triggers severe insecurity.”

Low agriculture production.

- ❖ “All the subsistence farmers in Rubkona County are lacking agricultural tools and this causes them to cultivate only small plot just for the household consumption.”
- ❖ “Vast majority of farmers use old technology by cultivating land using the hoe which cannot cultivate a big farm.”
- ❖ “Farmers do not plant if the rain does not come and if the rain comes raining and farmers started planting crops; but if it stops raining the plants will die because there are no irrigation systems.”

- ❖ “Natural environment and soil exhaustion are the utmost things that deteriorate agricultural development and cause severe food security issues to most rural subsistence farmers in Sub-Saharan Africa.”
- ❖ “The agricultural soil is becoming poor due to mono-cropping.”
- ❖ “Crops die due to insufficient rainfall.”
- ❖ “Young plants die out when the rain stop raining. When crops are planted some time they do not germinate because some insect eat seeds in the ground.”
- ❖ “The soil is not productive anymore because small farmers grow same crop on the same piece of land every year.”
- ❖ “Agricultural production is very low in Sub-Sahara Africa.
- ❖ Farmers cannot afford to buy fertilizers while living in very difficult dry conditions.”
- ❖ “Lack of technology limit the agricultural development of small farm holders in Sub-Sarah Africa.”
- ❖ “Rice is the main food crops my community but the acidity of the soil undermines successful rice production.”
- ❖ “Acidity of the soil demoralizes successful crop production. Acids on the soil does allow crop to grow healthy.”
- ❖ “The timing of the rain where farmers use to know when to plow and know when to plant is now changing, so the rain may start raining early or may be delayed by a month.”
- ❖ “Exploration of natural resources such as mining and production oil is damaging agricultural lands that belong to subsistence farmers who live in the countryside.”

- ❖ “The ground is sandy so it is difficult to grow; and if millet grows there are caterpillars that attack it.”
- ❖ “Excessive rainfall flooded crops and lack of rain reduces agricultural production by drying up the crops” and “if the farmers did not grow enough food one season or that year, then the farmers would be starving.”

Barriers to market access.

- ❖ “Village markets do not exchange so they do not make money.”
- ❖ “Farmers do not produce surpluses so they have nothing to sell, but to create this surplus they need inputs that they cannot afford.”
- ❖ “Village markets do not have market chains so they cannot generate money.”
- ❖ “Lack of good roads prevents agricultural markets.”
- ❖ “Insecurity on the roads blocks traders from traveling.”
- ❖ “Selling to the people that have the same level as you is more like trading”.
- ❖ “Village traders are exchanging money, but nobody is getting that wealthy on it.”
- ❖ “To profit there must be guarantee buyers that come from the outside to generate wealth.”
- ❖ “In my community we grow more rice but it does not have a market because there is more rice imported from foreign nations. So people who live in towns buy imported rice, but rice grown locally is consumed by the community.”
- ❖ “The luckiest farmers that have tomato crops that get through the whole growing season without the pest destroying it may still have their tomatoes rot because prices at the markets are poor and it would cost farmers more money in transportation to get their commodities to the markets than they would earn.”

- ❖ “In most cases women would have middlemen come to their farms to buy commodities, but the women would have to take very much lower prices.”

Research Question 2: What could be the necessary conditions required for South Sudanese small farm holders to increase their agricultural productivity and food security?

This research question explored the necessary conditions and enabling environment required for South Sudanese small farmers to increase their agricultural productivity and food security. The solution to food security conditions in South Sudan rests in expanding food availability, food justice, and food sovereignty. Since most food insecurity in Sub-Saharan Africa is related to poverty; it is better to mitigate poverty and generate income for the affected people. “Extension in Sub-Saharan Africa: Overview and Assessment of Past and Current Models, and Future Prospects” article by, Davis, (2008) suggested that it is important to provide farmers with information about how the various options would potentially increase income and yields, protect household food security, improve fertility of soils, and assist in alleviating the effects of climate change while improving agricultural productivity. The article titled, “Achieving Food Security in Africa: Challenges and Issues” by Mwaniki, (2006), simultaneously underscore the factors that undermines food production in Africa and suggested optional food security intervention that would mitigate poverty and permit small holders and stakeholders to create activities that would generate wealth. The informants’ quotes are listed in the following section in bullet points.

- ❖ “Training farmers how to use compost on their farms could improve soil fertility and increase crops yield.”
- ❖ “Training farmers to use only non-chemical fertilizers on their farm would increase soil fertility and agricultural productivity.”

- ❖ “To increase food productivity, small farm holders need help from life scientists to address things like poor soil and environmental calamities.”
- ❖ Amanda Randy said, “Farmers need to have better seeds and must have access to inputs to have better food production.”
- ❖ “Farmers who hope to achieve food security must consider food quality, but not just food quantity”.
- ❖ “Farmers must consider producing food quality, which include foodstuffs that have protein and micro-nutrients like beans, eggs, fish, and meat.”
- ❖ “To achieve and remain in a food security state, farmers must adopt new technology and have unlimited and equitable access to inputs.”
- ❖ “To improve food security subsistence farmer in Sub-Saharan Africa must have access to improved drought resistant seeds, appropriate technology, and extension education.”
- ❖ “Small farmers should be informed about how to get fertilizers for their farms.”
- ❖ “Availability of inputs and water are necessary for meeting small farm holders’ food security needs.”
- ❖ “Tomato pests are big problems in Sudan, Ethiopia, Kenya, Uganda, and Tanzania, so I strongly recommend small farm holders in Sub-Saharan Africa to go for grafting”. He added “grafting can increase the yield and healthiness of crops.”
- ❖ “When farmers grafted a high-yielding tomato shoots on disease-resistant rootstock, the healthy tomatoes would grow even in soil suspected to be infected with disease.”
- ❖ “Tree plantings where there are none would be helpful for the subsistence farmers as they would hold soil and prevent soil erosion.”

- ❖ “The burning of forest by rural farmers should be banned because it causes soil erosion and fire destroys all the healthy plants and wild animals.”
- ❖ “To improve food security conditions, the hunting of wild animals should be forbidden to conserve wild life and avoid extinction.”

Research Question 3: What role could small farm holders directed agricultural extension services play in improving food security in Rubkona County in South Sudan?

This research question explored factors that could influence informants’ perception to participate in extension education that can improve food security and agricultural challenges in South Sudan. The findings have indicated that the main function of agricultural extension services is to elevate agricultural development, increase food security, recuperate rural incomes, and recommend agriculture as a stronghold of pro-poor economic empowerment. Article titled “From "best practice" to "best fit": A framework for designing and analyzing pluralistic agricultural advisory services worldwide “stated that agricultural advisory services can enable farmers to engage in agricultural production to settle issues related to farms and endeavor to acquire information, knowledge and technologies to convalesce their incomes and living standard (International Food Policy Research Institute, 2006). According to “Extension reform for rural development, Vol.1-5: Case studies of international initiatives” extension can plays a role in promoting innovative technologies to take sustainable agricultural development to the next level and safeguard the environment (Rivera and Alex, 2004). Informants’ answers to the aforementioned questions are listed in quotes and bullet points below. The article titled “measuring empowerment cross-disciplinary perspectives” the writer suggested that agricultural extension work is to focusing on increasing production, improving yields, training farmers, and transferring technology (Narayan 2005). Below is the list of the informants’ quotes.

- ❖ “Extension specialist could train and share knowledge with farmers to increase the farm experiences.”
- ❖ “Extension specialists have the capability to influence farmers to adopt new technology.”
- ❖ “Extension specialists have the knowledge to transfer technology from scientists to farmers and increase the ability of the farmers to organize themselves.”
- ❖ “Extension services could connect farmers with different organizations that maybe of interest to help.”
- ❖ “Extension specialist can provide some sort of training that could make inputs more available.”
- ❖ “Extension specialist can educate farmers on the right inputs.”
- ❖ “Extension specialist can train farmers so that they are not using too much pesticide and not wasting their money on inputs on the farms.”
- ❖ “Extension specialists could help farmers improve the quality of nutrition and the knowledge of harvesting”.
- ❖ “Extension specialist can help farmers get micronutrients and protein need in their food.”
- ❖ “extension service can introduce nutritious food to farmers
- ❖ “Extension specialists could help farmers in the development and implementation of sustainable farming to address economic barriers.”
- ❖ “Many respondents stated that extension services could help farmers address economic issues.”
- ❖ “Extension specialists can provide training and information to farmers to access markets.”

- ❖ “I train subsistence farmers to stalk tomatoes so they are not on the ground where soil-borne diseases cannot get them.”
- ❖ “The scientists create the knowledge, transfers the knowledge to extension.
- ❖ Extension specialist transfers knowledge to the farmers and then the farmers apply technologies to their farms”.
- ❖ “Extension services can connect local farmers with businesses, none-governmental agencies as well as government agencies”.
- ❖ “Extension services can connect local farmers with people that can bring in knowledge, ideas, hope, and strategies to build farmers’ capabilities.
- ❖ “Extension services can be valuable broker in making connections.”
- ❖ “Extension services can seal the holes and gaps in the chain that need to be built and identify the solution perhaps outsiders can come in or wait for the local community to reorganize to transform those gaps.”
- ❖ “Extension services can provide the abstract of learning about technological changes in agriculture.”
- ❖ “Agricultural extension services can help farmers develop and implement sustainable farming initiative to address environmental, economic, and cultural barriers for subsistence farmers.”
- ❖ “Agricultural extension services can transfer technology from scientists to farmers through on-farm demonstrations.”
- ❖ “Extension specialists have the capability to organize farmers and build farmers’ capacity through training”.

Research Question 4: What role could female farmer cooperatives play in improving food security in Rubkona County in South Sudan?

This research question investigated factors that motivate informants to participate in farm Cooperatives targeting women in farming. The results of the study have shown that farm cooperatives are principle motivated corporations and participatory driven associations that can pull it members out of poverty. “Cooperatives and the Sustainable Development Goals A Contribution to the Post-2015 Development Debate A Policy Brief,” by ILO, (2015) indicated that farm cooperatives normally support democratic principles that are socially inclusive. In addition, “Working out of Poverty. Report of the Director-General, International Labour Conference, 91st session, Geneva”, reported that cooperatives have the capability to create activities that can bring in a wide range of community organizations that could support potential opportunities for employment and social inclusion (ILO, 2003). Informants’ answers to the question are listed below in quotes.

- ❖ “Farm cooperatives would empower women in farming economically.”
- ❖ “Farm cooperatives can allow women to learn leadership roles, earn money, and become self-employed.”
- ❖ “Farm cooperatives could enable women to eradicate poverty and maintain food security.”
- ❖ “Farm cooperatives would help women farmers develop critical thinking.”
- ❖ “Farm cooperatives would enable women farmers to support children schooling.”
- ❖ “The farm cooperatives would help women develop leadership skills, organizational skills, and track outside ports in the way that a single woman cannot.”

- ❖ She also argued, “Farm cooperatives would enable women find guarantee buyers of their products.”
- ❖ “Farm cooperatives would allow women in farming to become part of larger network of all these other women and the organization.”
- ❖ “Local people would be able to bring outsiders to small women groups in that small isolated region because they were part of larger network.”
- ❖ “Farm cooperatives would enable farmers to have connection with outsiders.”
- ❖ “Women farmer cooperatives can advance the economy.”
- ❖ “Farm cooperatives can increase the prosperity of farm and self-sufficiency.”
- ❖ “Farm cooperatives can improve food security and reduce poverty.
- ❖ “Farm cooperatives can support gender equality”.
- ❖ “Farm cooperatives would enable women farmers to learn management skills and through cooperatives women would have a chance to learn how to run business and interact with people in other businesses”.

Research Question 5: What role could female farmers’ microfinancing play in improving food security in South Sudan?

This research question explored the role of microfinance in sustainability and profitability of farm and how it would help female farmers improve food security and agricultural challenges they are facing on their farms. The finding of the study indicated that microfinance enable women in farming to gain financial sustainability and economic empowerment. In the article titled “Microfinance: A tool for Poverty Alleviation” Chawla mentioned that microfinance could help women farmers diminish severity of poverty in the households (Chawla, 2013). “Closing the Credit Gap for Formal and Informal Micro, Small, and Medium Enterprises” by International

Finance cooperation (IFC), the microfinance can help women in farming with combination of short-term, medium, and long-term funding procedures to fully finance farm enterprises, which focus on investing money on agricultural technologies such as machineries and storage equipment (IFC 2013). Respondents' quotes are listed in bullet points in the subsequent section.

- ❖ “Microfinance can help women in farming end poverty”.
- ❖ “Microfinance would enable women farmers expand their farm enterprises.”
- ❖ “Microfinance would enable women to eliminate poverty by creating self-employment.”
- ❖ “Microfinance would provide a lot of opportunity for women to become independent and take more leadership role in the maintenance of their own home and their family.”
- ❖ “We would put together cooperative arrangement with each other and used each other collateral to intervene together so we hold multiple people accountable for the debts.”
- ❖ “I helped women how to get the fund started and how to utilize the start of fund and I helped women with budget planning.”
- ❖ “Microfinance women participant’s children have a better life and when women have huge responsibility like that their mentality is on elevating and micro-finance allows its staff to teach that sometimes.”
- ❖ “Microfinance targeting women is really empowering and moving forward in bringing up the opportunity for more questions and to questions why things are in the way they are”.
- ❖ “Microfinance for women help women finance their restaurant enterprises, sewing clothes business, and maybe buy land for agriculture”.
- ❖ “Microfinance would enable women to gain more responsibility both in the household and outside the community.”

- ❖ “Women in need of microfinance should form a group so there would be a group to cook foods to sell at weddings and celebrations.
- ❖ “The group dynamic has to show that it is more likely to be paybacks so that could be positive part of microfinance.”
- ❖ “Making microfinance available to women would help women buy insurance, buy children clothes, and pay children schools”.
- ❖ “Microfinance gives women opportunity to become self-employed.”
- ❖ “Microfinance would help women buy insurance.”
- ❖ “Money should be lent to a group of women so that the group can put in money and withdraw money.”
- ❖ “Microfinance could pull women out of poverty if women used the money to buy chickens and then sold the eggs and then after that she would have more money to buy a goat or a cow whatever she can afford.”
- ❖ “Microfinance services help women farmers become economically stable and financially independent.”
- ❖ “Microfinance can promote female farm enterprises and empower women through training.”
- ❖ “Microfinance would enable women to make investments.”
- ❖ “Microfinance recipients can send their children to schools and be able to pay school fees.”
- ❖ “Microfinance would enable women in farming to have access to health services.”
- ❖ “Microfinance assistant seekers should have some training and some personal characteristics to qualify for the loans”.

- ❖ “Subsistence farmers must have some sort of training and management skills before receiving bank loans.”
- ❖ “Women need to be trained how to use microfinance and the purpose of microcredit before taking out loans.”

Researcher’s reflection on the interviews

The theory of planned behavior was realized in the study and provided insights on the implications for creating extension services in rural communities where people are bound by cultural norms and perceived behavioral controls. Almost all the informants interviewed expressed the need for extension services and interventions that educate the population and minimize gender bias. This indicated that the normative beliefs of the informants are positive toward the influence extension services can have on small farm holders as it relates to the use of new technologies to improve food security and agricultural development and the increased role women can have in agricultural production. The question remains, are these normative beliefs indicative of the beliefs of the actual small farm holders or if not, can they be transferred to them? It is imperative to answer these questions before investing in extension services to rebuild the agricultural community and expand it from subsistence farming to profitable enterprises. It will require paradigm shifts or changes in subjective norms in order for extension services to be effective at influencing subsistence farmers’ intentions to engage and usage behavior.

Additionally, the researcher noted that informants held positive attitudes toward engaging women in agricultural extension services education. Informants’ behavioral beliefs suggested that the inclusion of women farmers in agricultural extension education would mitigate women marginalization. The language used by informants as they shared their knowledge and lived experiences with the researcher about food security demonstrated these positive attitudes toward

behavioral beliefs. The positive attitudes were beneficial in the recruitment of the informants as well as their participation in the interview. This observation is noted because participation in a study that is not commissioned by the South Sudanese government may come with certain consequences if deemed detrimental to the public perception of said government. To this end, the informants were curious and asked many questions about the purpose of the study and the motives of the researcher for data collection and intentions for dissemination of findings, which is an example of the influence of subjective norms.

The researcher also observed that the informants were well prepared for the interviews and very deliberate in the way they answered the questions. An example of how these control beliefs impacted the interview was when one of the informants provided the interviewer with detailed information about the handicap policies that affect food security in Sub-Saharan Africa prior to the official interview; however, she refused to elaborate on any of those policies during the interview. Although she was not in South Sudan and her comments would not be traced back to her, she still employed personal controls as it relates to what information she would share for public consumption. It is the researcher's belief that attitudes, subjective norms, and perceived behavioral control were very prevalent in all the interviews, but at varying levels, which implies that the findings should be used with caution. However, the findings and the aforementioned observations are beneficial in that they provide insights into what may occur and the considerations that should be taken in to account when working with the actual farmers.

Summary

The aforementioned results provided insights into the behavioral, normative, and control beliefs that limit substance farmers' engagement in extension services that target food insecurity. Moreover, due to cultural norms, women are systematically discriminated against in relation to

obtaining basic education, civic engagement, and autonomy to make decisions about the farming enterprise. Beliefs influence a person's capacity, adjust people behavior and encourage individual physiological transformations. Interview results have shown that attitudes, subjective norm, and perceived behavioral control influence the intention of informants to support agricultural training for subsistence farmers. The findings indicated that behavioral beliefs are the key drivers that motivated informants to eradicate poverty, decrease infant mortality and remove gender gaps in education to foster equity.

Chapter Five:

Discussion, recommendation, and conclusion

All the discussions, recommendations, and conclusion summaries were described using the concepts and principles of the theory of planned behavior models (Montano & Kasprzyk, 2008; Werner & Ward, 2004; Ajzen, 1991; Cozby, 2009; Conner & Sparks, 2005) and the theory of reasoned action models for behavioral beliefs (Montano & Kasprzyk, 2008; Trafimow, Sheeran, Conner, Finlay, 2002). This chapter starts with a brief review of the purpose of the study, research design and methodology, and the results of the study. The relationship among the results, the research questions, and the themes were illustrated. This chapter concludes this dissertation with recommendations and next steps for future research and practice

The purpose of the study

The purpose of this study was to explore food security and agricultural challenges basically for women subsistence farmers, and examine the feasibility of using agricultural extension and development services to alleviate food security conditions in Rubkona County in South Sudan.

Review of the research design

The interview protocols used during semi-structure interviews are provided in the Appendix. In-depth one-on-one semi-structured interviews were conducted with key informants who engaged in farming and agricultural research. These informants were sought and agreed to participate in the study to express their own opinions of subsistence farmers' food security and agricultural conditions. University faculty, international agriculture researchers, and farmers were recruited to answer numerous questions relating to their lived experiences in farming, food

security and agricultural development in Sub-Saharan Africa. The interviews were tape recorded and then transcribed, coded, and analyzed using the following themes: (a) Food security and agricultural conditions; (b) agricultural extension services; (c) enabling environment for food security and agricultural conditions; (d) farm cooperatives; (e) microfinance.

The transcription and coding procedures of the interviews led to classification and categorization of data for themes. The researcher used data displays to examine and describe information the informants disclosed. To support or refute the information informants provided, document analysis was used to provide further information about food security and economic conditions of the subsistence farmers in South Sudan.

Review of the themes

The informants who agreed to participate in the study expressed many insights of the food security experiences. Consequently, themes started to appear in the areas of food security, agricultural extension, markets, farm cooperatives, microfinance, and education. These themes are discussed in details in the subsequent sections.

Discussion

Challenge to food security and agricultural production

The interview results have demonstrated that political instability, low agriculture production barriers to market access, and climate variation are the main food security challenges in South Sudan. All the informants' answers had revealed that subsistence farmers' food security and agricultural conditions are unfavorable. When informants were asked about how they felt about food security and agricultural conditions of small farm holders, a large number of informants have indicated that subsistence farmers are food insecure due in part to political instability, low agricultural productivity, and lack agricultural markets in South Sudan. This is explained below.

Political instability. In South Sudan, food deliveries from humanitarian assistance to the severely affected population remain inconstant due to continued insecurity and handicap policies (FAO, 2014). The findings indicated that the behavioral control factors that lead to starvation, malnutrition, and undernourishments are triggered by political hostility. Interview results have indicated that a very large part of the population of Unity State states was displaced, houses were burned to ground and livestock were looted as a result of war. Human Rights Watch (HRW) (2015) reported that the government of South Sudan forces “killed, beat, and raped scores of civilians, particularly women, burned homes and food stocks in over two dozen small towns, villages, and settlements, and stole tens of thousands of cows, goats, and sheep, as well as clothes, food, cooking utensils, and other materials in Unity State.” FAO, (2010) and IFPRI, (2008) stated that an unstable social and political environment that can be traced to civil wars and conflict caused serious food insecurity in the country. To regain stability and get farmers back to work, it is recommended that government agencies and governmental extension organizations should review the effectiveness of government policies on the life of farmers and small businesses in the country.

Low Agricultural Production. The lack of electricity in rural areas prevents subsistence farmers from implementing and adopting the latest technology for enhancing agricultural inputs (FOA, 2009, 2010, WFP, 2009). Research findings have revealed that all the subsistence farmers in South Sudan are lacking types of agricultural tools, and this causes them to cultivate only small plot just for the household consumption. In addition the results have shown that small farm holders in Rubkona County use old technology. They cultivate land using hand hoe which cannot cultivate big farm, this becomes a problem because farmers do not produce surplus. The results of food security research asserted that lack of improved technology limit agricultural

development of small farm holders. ACF (2008) that reported small farm holders in Rubkona County lacks access to seeds as well as agricultural tools because the farmers lost their native seeds they used to grow due to the wars and displacements. The reported indicated that small farmers have small garden plots for household consumption.

The findings indicated that the behavioral control factors that lead to low agricultural production were infertility of soil, lack of water and insufficient inputs. FAO, (2010) and IFPRI, (2008) stated that poor harvest, poverty, failed rains and pasture shortages together with an unstable social live reduce agricultural productivity and cause serious threat to food security in South Sudan. The environmental hazards and droughts that come from the deficiency of recurrent rains are blamed for poor harvests and livestock health and food insecurity in many parts of the South Sudan (FOA, 2010; IFPRI, 2008). Literature has shown that disturbances of the health and nutritional status of rural farmers can decrease farmers' capability to take on more constructive and innovative actions that can engender food and revenue (Fan & Pandya-Lorch, 2012; FAO, 2012; IFPIR, 2014; UNDP, 2012). To raise agricultural productivity, small farm holders need improved seeds, improved technology, and plenty of water for households, farms, and livestock.

Barriers to access market. Findings indicated that although most farmers do not produce surpluses, even if they did, they cannot market their farm products because they are unable to reach potential customers in the urban areas as direct consequences of undeveloped infrastructures (FAO/WFP, 2009). Lack of paved roads limits the availability and movement of commercial vehicles to small rural villages (USAID, 2009; Mwangi, Shen & Snyders, 2013). Interview results have shown that the cost of transporting excess products from subsistence farms to the markets is consequently prohibitively expensive. Transportation becomes even more

difficult in the rainy season when the roads are muddy and costs of transporting produce are much higher during the rainy season (UNDP, 2012). The poor road infrastructure, scarcity of transport, and high cost of transporting agriculture products discourage subsistence farmers from producing surplus food even though there are severe food shortages of food in the country (Ayel, 2010; Mercy Corps, 2011).

Necessary environmental conditions to improve food security and agricultural education

The findings revealed that facilitation of agricultural markets, nutritional intervention, capacity building, good governance, and gender sensitive development could be helpful approaches to be used to improve food security and agricultural education. Interview results have shown that all the informants had interest in creating a positive environment that could promote food security and agricultural productivity. During the interviews, all the informants cited that strategies that can address markets, nutrition needs, capacity building, good governance, off-farm employment and gender development need to be addressed to be food secure and promote agricultural production.

Access to market. The findings have shown that the establishment of agricultural markets in collaboration with supply chains could generate income for farmers. Miguel and Brito, (2011) stressed that in supply chain management, businesses set up coalitions with members of the identical chain to build up their competitive advantage through effective operation of each chain participants. Informants have stated that establishment of agricultural markets would enable small farmer holders to think critically about what they would want to produce, how they could make investments, how they would get inputs to use on the farms, where they will be selling products, and how they would find people to work collaboratively with them. Dorward, Kydd and Poulton, (2006) stated that agricultural markets must have

enough inputs and interconnected marketing systems to rise farm production and sell commodities to guarantee buyers a competitive price.

The study results indicated that that creation of agricultural markets would enable subsistence farmers to form groups and then initiate scales of economy by collectively selling their surpluses. Respondents pointed out that some farmers would be able to sell their products in places where other farmers are unable to reach. Literature stated that businesses should work together to have an uninterrupted and effective flow of goods and services (Chan & Paulraj, 2004; Cooper et al., 1997; Mentzer et al., 2001). Findings revealed that accessibility of markets would help farmers find information concerning products that are needed and available market prices. Kottler and Keller, (2012) stated that businesses that engage in supply chains transfer raw materials to constituents to finished products to the end users. The outcomes of the study have substantiated that accessibility of markets can enhance the ability of the producers to transform from more subsistence farming to enterprise agriculture if South Sudan becomes stable.

Community Participatory approach. The interview results have shown that community participatory practices should be the better way to help poor farmers increase agricultural productivity because it could create learning networks. Hailu (2011) described the learning networks as a method of learning by doing, sharing knowledge, and experience with other people. Learning networks could combine teams of people and organizations who are willing to share their experiences and knowledge with small farm holders (Narayanasamy, 2009, 2002). These learning networks can bring together farmers, extension workers, traders, and many others organizations who are involved in the production and sale of agricultural goods and services. To increase food security sufficiency and agricultural productivity, local community farmers must

utilize a participatory approach to learn from one another and form network with other advance organizations.

Gender Development. Interview results have shown that women must be treated as men as they are equal food producers, income earners, and caretakers of household food security to achieve better food security and better agricultural productivity. Several informants had pointed out that agricultural productivity increases and the economy booms when women are given the same chances as men. Adenegan, Adams & Nwauwa, (2013) and Jayne, Haggblade, Minot & Rashid, (2012) found that the empowerment of women could produce powerful advantages on every aspect of economic development. Women's education and empowerment would keep fertility rates in check, increase economic productivity, and enhance economic management capacity (Bieri & Sancar, 2009; Jayne et al., 2012; Gutierrez, 1995). Also, because women do much of the work and are important in farming, any agricultural extension and development services must have gender development goals.

Role of Extension services in food security and agricultural development

The qualitative interviews results found that extension specialists can help farmers with very practical things about the way farmers can plant, the way farmers can plough, and the way farmers can harvest their crops and store. Similarly, the results of the interviews have shown that agricultural extension services can play important role in sharing scientific research knowledge with farmers through either formal or informal education. Literature stated that agricultural services has the capability and knowledge to settle farm related issues and create knowledge networks to share information, knowledge and technologies with farmers to increase the well-being of farmers and improve food security (International Food Policy Research Institute, 2006).

The findings have indicated that extension specialists have the capability to influence farmers to adopt new technology. Rehman, Garforth, McKemey, Yates, (2008) strongly implied that attitude toward a technology had significantly influenced the intention of farmers to adopt the new technology. The attitudes and behavioral beliefs influenced the intention of informants to use improved technologies that the extension services can introduce. Findings showed that the behavioral beliefs that were significant in influencing intention to engage in extension services were sharing of knowledge, work with other businesses, and create network of buyers. Borges, Lansink, Ribeiro and Lutke, (2014) found that extension workers must recommend that these technologies are acceptable to the farmers to build up their intention to use the improved technologies. From the results of the interviews, the researcher has learned that extension specialists can connect farmers with different organizations to add value by collaborating with company that specialize in supply chains. Robbins and Decenzo, (2001) found that supply chain management involves the transfer and delivery of goods and services from supplier to manufacturer to warehouse to wholesaler to retailers to consumers.

The results of the study have revealed that extension specialist can provide some education and training that can make the right inputs more available for farmers. Birner stated that improvements in food security requires information, education, and collaboration with others (Birner et al., 2006). Based on the results of the study, the researcher believes the extension services can work with farmers to improve the quality of nutrition, training, identify and address factors that may constraints agricultural development.

Role of Farm Cooperatives in food security and agricultural development

Informants have shown both positive and negatives responses toward forming farm cooperative to improve women farmers' food security conditions and boost agricultural

productivity. When asked about how they felt about forming farm cooperatives, most informants stated that formation of farm cooperatives could be working well with subsistence farmers. Respondents believe that this approach would empower women farmers to be more financially independent, and have greater roles in household decisions and in community development decisions. Interview results concluded that farm cooperatives would enable women to create employment opportunities and maintain food security. International Labor Organization (2015) found that cooperative farms play an imperative role in providing employment opportunity to women in cooperative farming. In collaboration with other small businesses and enterprises, cooperative farms are the greatest substantial sources of employment for women in farming and young people (ILC, 2007). For example, cooperative farms employed 77, 400 people in Kenya, (Wanyama, 2007), 28,000 jobs in Ethiopia (Lemma, 2007), and 9,500 jobs in Egypt (Aal, 2007).

The findings have revealed that interviewees believed farm cooperatives promote good governance that treat their members equal. Literature has shown that women farmer cooperatives produce trustworthy and impartial governance that can ran cooperatives activities in good faith (Bibby, 2014; International Cooperative Alliance, 2013; International Labor Organization, 2003; The World We Want, 2013; Develtere, Pollet & Wannyama, 2008). Literature asserted that farm cooperatives governance contribute effectively in transforming agricultural production from being more subsistence to more enterprises to enhance rural farmers' food security (International Labor Organization, 2015; The World We Want, 2013).

The outcomes of the interview have indicated that interviewees thought that farm cooperatives can promote gender equity, equal engagement, and collective management. In cooperatives, all members in theory have equal rights in the management of cooperatives including capital management (ICA, 2013; International Labor Organization, 2015; The World

We Want, 2013). Implementation of cooperatives principles eradicates women discrimination in the households and wider societies while fostering favorable policies (ICA, 2013) that promote gender equity.

Study results have shown that interviewees agreed that farm cooperatives could develop women's leadership and management skills. Literature indicated that cooperatives leaders demonstrate transparency, take equal responsibility, accept accountability, and encourage cooperative members to fully participate in cooperatives affairs (ICA, 2013; ILO, 2015). Moreover, good cooperatives leaders stay alert and response quickly to the needs of the farmers and the wider community (International Labor Organization, 2003). Likewise, effective cooperative leaders respect the law and show the true image of the cooperatives' identity through their principles that advocate gender equality (International Labor Organization, 2003).

Role of microfinance in food security and agricultural development

The findings have revealed that accessibility of microfinance to small farm holders would enable women farmers to eliminate agricultural challenges while increasing food security through self-employment. Yunus, (2003) divulged that micro-credit could deliver financial and business services to very poor persons to generate self-employment and income. In addition, the interview results also have indicated that microfinance could enable women in farming to increase agricultural production and farm enterprises. Literature revealed that microfinance can decrease national and regional poverty, physical deprivation of commodities and income attainment (Calgaovski, Gabor, Germany & Humphreys, 1991). Several informants have indicated that microfinance can empower poor small farm holders to engage in community development activities. Kumarmangalam & Vetrivel, (2010) reported that microfinance enable

greatest number of poor small farm holders to generate incomes, build up business enterprises, and place of residences gradually over time.

Semi-structured interviews have revealed that microfinance enable small farm holders save and insure their assets and family members. The results are consistent with literature. Ashford and Hall, (2011) and Lakwo, (2010) found that the microfinance enable poor farmers to have access to savings, health, and property insurance plan. According to Ashford and Hall, (2011) and Cheston, (2002) microcredit usually prepares small farm holders for future investment.

The interviewees thought that women in need of microfinance should, form a group so there should be a group of women that come together and maybe for a big party so they can cook a lot of food for wedding and then sell it. Nevertheless, the group dynamic has to show that it is more likely to be payback so that could be positive part of microfinance. Literature has shown that most of the microcredits loans are pay out on group lending basis (Chawla, 2013). A past payment history of the group is reviewed in order for the group to qualify for new loans (Chawla, 2013).

Microfinance assistant seekers should have some sort of training and management skills before receiving bank loans. Literature indicated that training helps local farmers build up self-confidence, encourage farmers to help one another, and enhance the advancement of community skills in agriculture (Duveskog, 2006; Davies, 2006). After gaining practical experience, the learners can transform that knowledge into applicable, stable, and retrievable knowledge, where it is appropriate for practice in the learners' environment (Kolb & Kolb, 2005; Keeton, Sheckley & Griggs, 2002; Ndoeye, 2003). Training would able small farm holders to understand more about microfinances and develop understanding (Kolb & Kolb, 2005). Microfinance training

would enable women to gain more decision-making power in the household and outside the community (Duveskog, 2006; Kolb & Kolb, 2005).

However, critics of microfinance argue that microfinance could place small farm holders at more risks and debts. Several informants disapproved making microfinance accessible to women in farming while others have shown uncertainty about giving microfinance loans to women. Some interviewees said loans are occasionally taken by men in the household and is not empowering to the women, or cultural customs disallow women from using of the loans because of lack of social mobility and decision-making authority in the home. Several respondents also indicated that women would not be able to meet the requirements for microfinance because the culture does not allow them to travel to different places for business purposes. These findings are consistent with literature. Ashford and Hall (2011) found that microfinance can be more risky for small farm holders' economic position. Informants and literature agreed that microcredit can put women farmers in excessive debt (Ashford & Hall, 2011) if they cannot pay back the loan on time.

Recommendations for future research

This study offered a number of imperative food security interventions for additional research in food security, agricultural training and development on hypothetical bases. The recommended topics for future research include the role of extension services in food security and agricultural development, the role of farm cooperatives in food security, the role of microfinance in food security and the role of female farmers in food security, and the role of education in agricultural development to better assist small farm holders to understand their food security conditions. This future research to implement what has been presented in this study should be done in South Sudan by future researchers. Due to the unrest in the region, this study

was hypothetical in nature; however, it is recommended that the planning process be initiated in order to be more rapidly implemented once the country is stabilized. The recommended plan for implementation of extension services for Rubkona County based on the findings of this study are:

Cultural responsiveness. To influence small farmers to adopt new technology, the agricultural extension specialist must be culturally sensitive to the norms of the area and work with the community to improve the standard of living instead of completely changing their way of life. It is recommended that the specialist working in the area is authentically embedded into the community. For example, owning a small plot within the community where he or she can apply the new technologies on his or her own farm first to demonstrate the benefits of the new practices. It is then that the specialist can begin to engage the other farmers and encourage use of the new technologies. By interacting with farmers in their traditional way of living, the agricultural extension specialist can influence the normative beliefs of small farm holders to work towards the community's own goals, to improve food security and agricultural development.

Economic development. To build rural farmers economic power, village markets must be established where rural farmers can sell commodities such as firewood, fish, milk, meats, fruits, roots, and wild fruits such tamarind beans to make money. It is recommended that community leaders provide land for farmers to sell their products. The researcher understands that people do not generate large amounts of wealth in village markets because they do not have a value chain, but people do make small amounts of money. To create strong economic development and generate large amounts of wealth, village markets should be connected with outside companies and corporations that can buy their commodities. Ultimately, activities that

can generate money for the community must be promoted to increase the economics of rural people. Women farmers should contribute money, cook foods and sell it to the people occasionally, particularly, during holidays and special events to generate money.

Agricultural training. To have brighter future and economic independence, collaborative and participatory training that promotes sustainable agricultural training is needed to address food security constraints. To improve agricultural training, both youth and adults, should be enrolled in formal traditional classes where they can be taught how to read and write. It is recommended that community leaders and government officials provide land for constructing training centers and schools for children and adults. Children and youth training programs should go beyond reading and writing and include trade, business, research, and other careers to achieve successful food security. Similarly, adults should be enrolled in vocational agricultural training classes to learn basics English, Math, and agricultural skills and be encouraged to form associations where they can address community-related economic issues.

Farm cooperatives. To develop a market for their goods that will add value and reinforce decision-making power, networks for women farmers are needed. It is recommended that extension specialists should work with the farmers to understand the process of developing and managing the cooperative. Through this participatory approach, the extension specialist will find out what kind of farm cooperatives farmers want to create and what they want to achieve. It is also recommended that the extension specialist provide technical support to farmers to create the structure and plan for the farm cooperatives. Extension specialists should work with farmers to determine bylaws to aid in decision-making, meeting structure and function, member correspondence, and establishing a business plan for growth. Additionally, it is recommended that bylaws and other understandings that explain how farm cooperatives should be run must be

in writing or in other culturally responsive formats. Finally, the extension specialist could also facilitate connecting cooperatives members to buyers interested in their products.

Microfinance. Women farmers are lacking access to capital to support their farms. To make microfinance accessible to poor women farmers, it is recommended that extension specialists who work with women farmers to create and disseminate viable loans. Microloans should have low interest rates that would encourage continued enterprise investment, revenue generation, and loan payback. The institutions offering microcredit and savings should not seek collateral as a qualification for microfinance as rural women farmers do not have something valuable the microfinance institution should hold except for land. The extension specialist that provides information to the farmers should make sure that the payment plan is fair and affordable. To encourage women farmers to participate in microfinance, women farmers must be trained first before receiving microfinance credits. Women farmers who are interested in participating in saving and credits should be informed about the qualification, interest rate, payback, risk, and benefits. Finally, extension specialists must work with borrowers to make sure borrowers are using money for the intended business and helping borrowers with business plans, budgeting, and management.

Recommendation for practice

This study was focused on Rubkona County, South Sudan. The population of farmers in this county is facing severe food insecurity. Agricultural development, market interventions, import food policies, agricultural research, and socio-cultural are recommended for practice.

Agricultural Development. South Sudanese rural populations, especially women, lack access to health services and education. Governmental offices should establish clear principles for achieving development, food security, health services and education for rural and agricultural

development which would encourage economic growth. It is recommended that government-funded agricultural extension organizations should carry out these objectives and policies to make sure the aforementioned services reach the target population.

Market Intervention. Governmental organizations create guidelines that regulate the prices of commodities, input prices, accessibility of microcredit, set prices on commodity imports, export dividends as well as management of natural resources. For example, the high price for purchasing fertilizers affect farmer decision making and purchasing ability related to fertilizers. It is recommended that extension organizations must stay aware of market price fluctuation to make sure that they are suggesting appropriate technologies that match the present needs of small farm holders.

Imported food policies. Government policies that promote the import of cereal grains at prices on the international market are often opposed in nations that produce those crops because international markets outcompete local markets. Hence, small farm holders are not going to adopt technology production that focuses on producing more of those crops due to less demand for the local products. Practitioners should examine the policy context and recommend import policy that grows local markets. By growing local markets, small farmers will be better able to invest in technology improvements.

Research. Agricultural research organizations in Sub-Saharan Africa are facing numerous issues that range from inexperienced scientists, inadequate funding, and absence of resources for research to varying responses from subsistence farmers. Extension specialists could address some of these issues but the technologies presented would have to meet the needs of the small farmers if it is to be adopted. It is recommended that identification of problems in the study

should first be considered when hoping to coordinate extension activities, research and cultural responsiveness to ensure technologies are appropriately aligned with traditional methods.

Research Sociocultural Elements. Sociocultural components make the role of extension difficult in Sub-Saharan Africa. Diversity in languages and illiteracy hamper the effectiveness of communications between extension and small farmers regarding technologies. Role of men and women are often culturally different which can impact the nature of agricultural development schemes in different localities. In South Sudan, the male farmers often leave the farm work to women, go to war, or sometimes find nonfarm jobs. Thus, it is recommended that future research should address the need of female farmers.

The cultural variations and resources of diverse groups of subsistence farmers could impact adoption of new technologies. Subsistence farmers usually adopt mostly low cost technologies. Hence, future research is recommended to focus on customary practices and affordable technologies that can meet the needs of poor small farm holders.

Limitation of the study

Because of the current civil war and lack of communications infrastructure (reliable telephone, and internet service), it was impossible to directly interview South Sudanese rural subsistence farmers, extension services staff, and government and nongovernmental organizations in Rubkona County. Instead, the researcher interviewed available informants from those who worked with the farmers from the South Sudan Ministry of Agriculture and Forestry (MoAF), University of Juba, and staff from Food and Agriculture Organization of the United Nations (FAO) in South Sudan. In addition, the study relied upon secondary sources of data including journal articles, documents from Ministry of Agriculture and Forestry, Food and Agriculture Organization of United Nations, and University of Juba.

Ary, Jacobs, and Sorensen (2010) defined secondary data source as a hand-me-down explanation of documents written by someone who may have heard about an event from others but did not directly experience it and the data have been previously presented somewhere else. Data were collected from different areas as a result of conflict in the Rubkona County. The researcher of the primary research may be an independent researcher and the organization that hired the researcher may control the data. Hence, the secondary data must be examined carefully because the original sources of the data may be dubious. Furthermore, the researcher must analytically examine the validity and reliability of the data given.

The secondary data may not meet the researcher's needs. The secondary researcher must rely on secondary data that is exhibited and categorized in a manner that is akin to the needs of the research. The researcher may not get the full version of the research to gain a firm understanding of the study. This is partly because some study providers supply free research abstracts and then charge expensive fees for the entire research report.

A further limitation of secondary data is that initial researcher may have been biased in the collection of data. This partiality could bias the secondary researcher's research. The challenge to the secondary data source is that the researcher must comprehend numerous limitations and assumptions that primary research had taken while gathering information. Data collected from books, journals, and surveys may also not be relevant with current conditions. Therefore, future researcher should collect data directly from farmers.

Conclusion

This research seeks to identify and examine the food security issues currently affecting small farm holders' agricultural development in Rubkona County, South Sudan and propose extension programs to improve food security. Food security occurs when all people have reliable

stable access to an adequate magnitude of affordable secure and healthful food all the times (Food and Agriculture Organization, 2006). To be food secure means that everybody in the household is willing to obtain and eat his or her preference food that satisfies their nutritive needs every single day (Food Security Network, 2014).

The use of semi-structured interviews in qualitative research design was found useful in exploring the informants' experiences in challenges to food security and agricultural productivity not only in South Sudan, but also in Sub-Saharan Africa. In-depth one on one semi-structured interviews were conducted with farmers and international agriculture researchers. The TPB and TRA were used to investigate how informants' insights of food security and agricultural development influence their attitudes and behavioral beliefs.

Furthermore, the strategies small farm holders use to deal with food security and agricultural challenges were explored and intervention of food security challenges were suggested. The study objectives were investigated using semi-structured interviews format in qualitative research design. A discussion of literature review similar to the research objectives concerning food security and agricultural challenges were provided. An explanation of search results and relationship with other literatures similar to the research topic being investigated in this study is given.

The results of this study are largely related to the broader studies done on effects of food security and agricultural challenges in the lives of wider subsistence farmers in Sub-Saharan Africa. Participants acknowledged that food security and agricultural challenges are results of conflicts, climate variations, barriers to markets, and gender inequality. The majority of informants agreed that extension services, farm cooperatives, microfinance, and education could be used as a food security and agricultural intervention. However, some informants held different

opinions on strategies that could be used to overcome the aforementioned shortcomings of food security and agricultural conditions.

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Appendix A: Semi-Structured Interview Questions

Gender Role Interview Questions for Informants

Tell me about yourself

- a. Could you describe the role of men on the farm in South Sudan?
- b. Could you describe for me the role of women in agriculture in South Sudan?

Food Security Interview Questions

Food Security and Agricultural Challenges

1. What are your perceptions on women farmers' food security and agricultural conditions in South Sudan?
 - a. What would make it difficult or easy for the subsistence farmers to achieve food security?

Farm Cooperatives Interview Questions

1. What are your perceptions on the formation of farm cooperatives targeting women farmers?
2. What would make it difficult or easy for the women to form farm cooperatives?

Agricultural market Interview Questions

1. What do you think about the establishment of agricultural market in rural communities?
 - a. What would make hard or easy for the subsistence farmers to create agricultural market?

Microfinance Interview Questions

1. What is your attitude toward making micro finance access to women farmers?
 - a. What would make it difficult or easy for the women in farming to access microfinance ?

Education Interview Questions

1. What impact could education have on cultural norms and religious rules?
 - a. What would make it hard for women farmers to receive education?

Agricultural Extension Interview Questions for Extension specialists

1. What role could agricultural extension services (Researcher) play in the development and implementation of sustainable farming initiatives for women farmers?
 - a. What would make it hard or easy for the women farmers to receive agricultural training?
 - b. What role could extension specialist plays in resolving conflicts and builds peace and reduces violence?
 - c. What role could agricultural extension specialist play in the economic development of rural farmers?

Appendix B: Secondary Data Collection

FAO Staff member will provide documents on:

1. Food Security situation
 - Food access, availability, and utilization, diet diversity
 - Hazards and threats to food security
 - Food insecurity warning, malnutrition rates, normal source of food for farmers
 - FAO response to food insecurity
2. Institutional Information on:
 - What FAO does to help farmers alleviate food insecurity in South Sudan?
 - Relation between communities and government
 - Access to political decision making at the village, region, and national levels
3. Socio-economic and Demographic Information on:
 - Social and political structure affecting food security such as government policies, trade regulations, fiscal policies, taxation and subsidies
 - Census population data, age, gender
 - Infrastructure such as roads, schools, water, health services
4. Agricultural market conditions
 - Import and export
 - Market price fluctuation and easy market access
 - Major food and cash crops produce by regions
 - Food utilization
5. Household livelihood Information on:
 - Household economic roles, control of resources, income generating activities

- Labour supply and dependency ratio
 - Landholding utilization, livestock ownership
6. Risks to Food Security due to:
- Insecurity
 - Natural Disasters
 - Market price

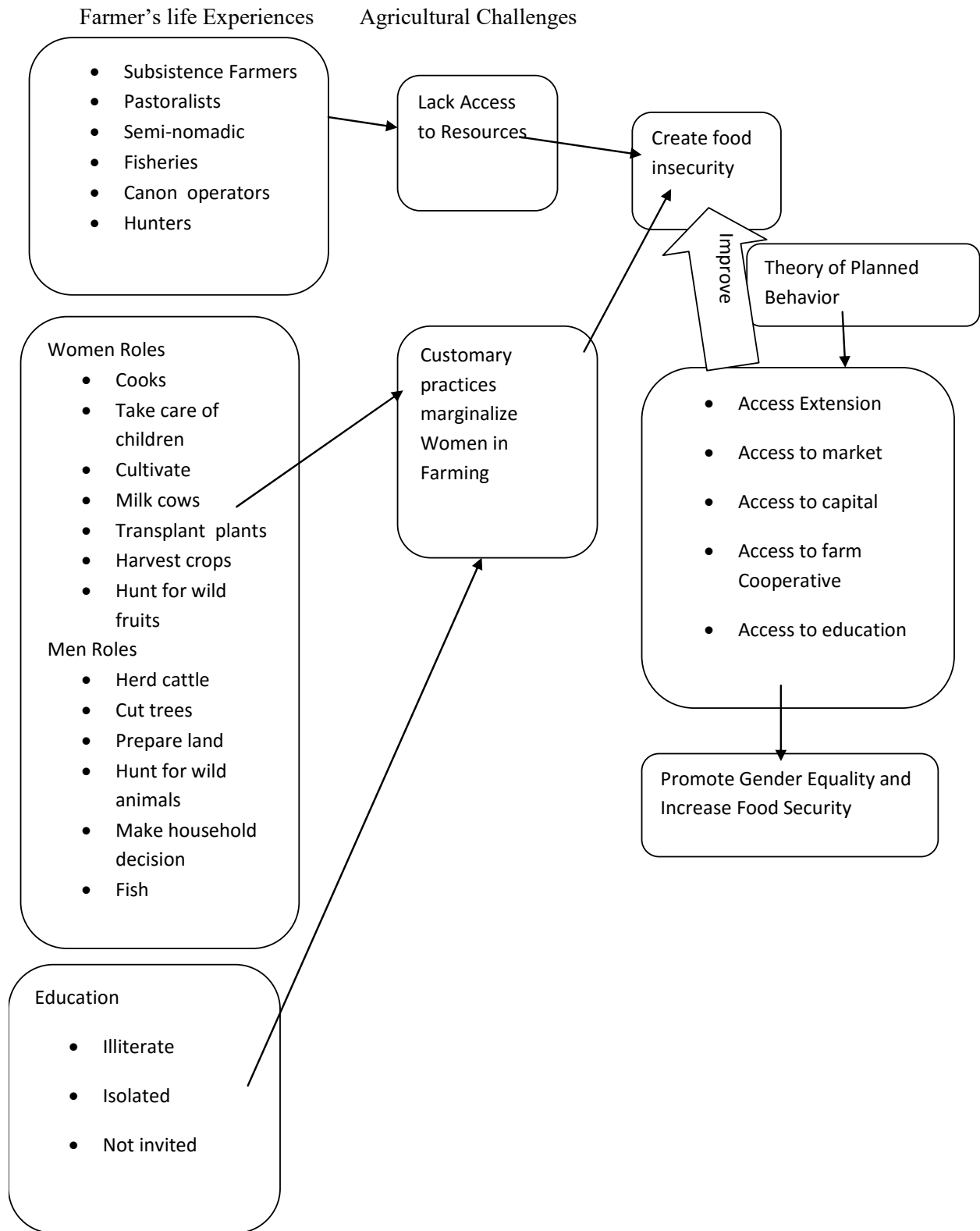
Appendix C: Coding Analysis

Qualitative Coding Analysis

	Preliminary Coding	Focus Coding	Coding Family
Food Security and Agricultural Issues-FSAI	<ul style="list-style-type: none"> • Conflict • Displacement • Poor roads • Lack of markets • Absent of value chain • Land degradation • Lack of agricultural machineries • Lack of irrigation • Mono-cropping • Soil infertility • Lack of fertilizers • Weather variability • Absent of capital • Soil erosion • Deforestation • Pests • Cattle-raiding • Cattle-herding 	Lack access to resources	Food security and agricultural challenges
<u>Gender Role-GR</u>	<ul style="list-style-type: none"> • Political activity • Decision-making • Household Laws • Men roles • Women roles • Customary practice • Illiteracy • Religion beliefs • Cultural norms 	Customary Practices	Impact food security

Necessary Conditions to increase Food Security and Agricultural development-NCIFSAD	<ul style="list-style-type: none"> • Drought resistant seeds • Soil fertility • Community stability • Collaborative work • Availability of capital • Irrigation systems • Farm machineries • Forestation • Grafting • women in decision making • Decrease excessive use of pesticides 	Improve food production	Increase food security
Microfinance targeting Women Farmers-MTWF	<ul style="list-style-type: none"> • Poverty eradication • Self-employment • Insurance • Feed family • Generate income • Secure land • Support Children • Support households • Access to capital 	Self-sufficient	End Gender Inequality
Farm Cooperatives- FC	<ul style="list-style-type: none"> • Democratically controlled • Develop leadership skills • Promote gender equality • Increase income • Community development • Bylaws 	Economic development	Empower women in farming
Agricultural extension services-AgExS	<ul style="list-style-type: none"> • Train farmers 	Broker	Agricultural production

	<ul style="list-style-type: none"> • Capacity building • Facilitate • Communicate • Provide information • Demonstration • Organize • Share knowledge • Link farmers to organization • Transfer technology 		
Education-Edu	<ul style="list-style-type: none"> • Question Religion • Question Cultures • Develop thinking skills • Choose good partners • Raise children • 	Change behavior	Equity
Agricultural Marketing-AM	<ul style="list-style-type: none"> • Lack of Network • Lack of Value added • Lack of Value Chain • Price uncertainty • Transportation cost • Lack of storage 	Lack access to markets	Increase food insecurity



Appendix D: Documents Analysis

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