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The Dynamics Shaping Smallholder Rice Farmers
Household Food Security: A Case study in Mawoma Village,
Northern Region of Sierra Leone

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Abstract

Sierra Leone is one of the poorest nations in the world and while many rural poor rely on agriculture for food and livelihoods, many of them are food insecure. Despite efforts by government and other agencies to mitigate food insecurity, it remains a challenge in some regions in the country. A comprehensive food security assessment survey conducted in 2015 reported that the Northern region was one of the most food insecure areas in Sierra Leone. The drivers of food insecurity in Africa, and in Sierra Leone specifically, have been identified and described by other scholars. However, very few explored household and cultural drivers of food insecurity as well as the drivers of food insecurity in the northern part of Sierra Leone. This thesis uses a single case study in the northern part of Sierra Leone to identify and describe household and cultural drivers of food insecurity. It involved unstructured interviews with both key informants and smallholder rice farmer household participants.

This study identifies and describes holistically, the inter-linked nature of intra-household factors, extended family, cultural practices/norms and the broader drivers that shape both household food security as well as household member food security in the case village of Mawoma. The study revealed the prevalence of food insecurity in the study area is impacted by the natural environment, community characteristics and household behaviours/preferences. Food security in this community is influenced by two sets of factors. Firstly, factors that are beyond household control and that neither community characteristics nor the individual households have the ability to mitigate them because they are poor. These factors include climate change, land availability, labour constraints, market constraints, input challenges, pests, limited financial resources and soil infertility. These factors affect land size, soil fertility and productivity and limit the total farm output which jeopardises food stability and security as many households food stock only last a few months of the year. Secondly, household behaviour and preferences significantly impact food accessibility and food utilisation and contribute to food insecurity. Household level factors such as socio-cultural involvement, patterns of food allocation, acceptance of extended family pressure and spending choices by the household head, are associated with household attitudes, perceptions and socio-cultural norms. Household level related factors have been identified by this study as key factors responsible for household food insecurity for smallholder rice farmers.

Key words: Sierra Leone, Northern region, Household food security/insecurity, preferences, socio-cultural norms, Smallholder farmers, household dynamics, external drivers.

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List of Abbreviations

FAO	Food and Agriculture Organisation
FGM	Female Genital Mutilation
GDP	Gross Domestic Product
GOSL	Government of Sierra Leone
Ha	Hectare
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
HH	Household
KI	Key Informant
MAFFS	Ministry of Agriculture Forestry and Food Security
NGO	Non-governmental Organisation
PRSP	Poverty Reduction Strategy Paper
SDG	Sustainable Development Goals
SSL	Statistics Sierra Leone
UN	United Nations
UNICEFF	United Nations International Children's Emergency Funds
US\$	United States Dollars

Chapter One: Introduction

1.1 Research background

Sierra Leone, situated on the west coast of Africa and north of the equator, has a land area of 72,325km², of which almost 75% is suitable for arable production (Larbi, 2012; Sannoh, 2015). The country borders with Guinea in the north, northeast, northwest and with Liberia in the east and southeast. There are eight major rivers flowing from the north-east to south-west where they empty into the Atlantic Ocean. About 56% of the land area is less than 150 metres above sea level. The uplands and lowlands, which constitute 78% and 22% respectively, are all suitable for crop cultivation (Larbi, 2012).

Sierra Leone has a tropical climate comprising two main seasons: the months of May to October make up the rainy season, and the dry season occurs in the months of November to April. The rainy season is the main planting season (MAFFS, 2009a), but it is also the “lean season” in which access to local food is very difficult for local people. There is an average rainfall of 3,000 millimetres (Jalloh & Njala, 2006). These features place Sierra Leone at an advantage for agricultural purposes. Two types of crops are grown in Sierra Leone: export crops, which include cocoa, palm kernel, palm oil, coffee, kola nuts, piassava and ginger; and secondly, domestic crops of rice, corn, millet, cassava, vegetables and a few others (Sannoh, 2015).

The Sierra Leone economy is heavily dependent on agriculture to meet the needs of the country’s population (Conteh, Yan, & Sankoh, 2012). About 80% of the Sierra Leone population, of which over 90% were smallholder farmers (Conteh et al., 2012), depends on agricultural activities (Siddik, Kabiraj, Shanmugan, & Kahota, 2015).

Amongst the numerous crops that are grown in Sierra Leone, the nation’s staple food crop is rice. Although there is no current data, the annual per capita rice consumption in 2012 was reported as 104kg and that was considered to be amongst the highest in sub-Saharan Africa (Conteh et al., 2012; Spencer, Deen, & Williams, 2009). Rice is the most important food crop and is mainly grown by smallholder farmers throughout the country (Statistics Sierra Leone, 2014a), with an estimated annual production of more than 200,000 tonnes, of which the majority is produced in the northern region (Conteh et al., 2012).

As of 2017, the country has not been able to meet its growing demand for rice consumption as evidenced by a consignment of 6,300 metric tons of rice donated to Sierra Leone by the

government of China to help address food insecurity challenges in the country (Kamara, 2017). In the northern region specifically, the government of Japan has implemented an agricultural development project to boost food security in the region. Achieving food security continues to be a challenge; poverty and chronic hunger continue to pose a threat to the population of low income earners (Siddik et al., 2015).

A 2009 report showed that the growing population, the effects of civil strife (conflict, Ebola outbreaks), and the vulnerability of smallholder rice farmers contributed to the inability of smallholder households to achieve sustainable food security in the northern part of Sierra Leone (Spencer et al., 2009).

Food insecurity prevails in the rural regions of Sierra Leone, where almost 80% of the country's total population live. About 90% of this population is made up of smallholder farmers (Conteh et al., 2012). These rural settings have numerous agricultural resources, vast fertile land, a favourable climate, and other natural resources as well as human capital potential (Conteh et al., 2012). Despite the fact that the rural regions are described as being the food basket for the nation (Chenoune, Belhouchette, y Paloma, & Capillon, 2016; Sannoh, 2015), they are unable to produce an adequate and sustainable food supply all year round. Some of the government initiatives undertaken in an attempt to address food insecurity in the country include: the establishment of the Poverty Reduction Strategy Paper (PSRP); Agenda for change and Agenda for prosperity (S. S. Leone, 2013); Smallholder farmers commercialisation project; and periodic intervention in the form of food supplies from the World Food Programme (WFP) (WFP, 2015a). Also, in the 2015 cropping season, when smallholder farmers were hit by unfavourable rainfall with subsequent distribution problems, government authorities distributed rice and maize seeds to farmers as a recovery support (USAID, 2016).

The government also reviewed the agricultural policy to incorporate food security, focusing on rice production, which is the country's staple food (S. S. Leone, 2013), yet food insecurity remains a threat and a key development issue throughout the country and especially in the northern region (WFP, 2015a). At the lean period of every year (June to October), only a few households would have rice stocks and in most cases, the stock for those households barely lasts beyond the second quarter of the year (WFP, 2015b). It is also ironic that, the northern region, which is the rice belt of the country (Spencer et al., 2009), with almost every household engaged in rice farming, has hardly any local stock available for consumption in the second half of the year and according to the World Food Programme (2015), the proportion of

undernourished people in the region has been increasing. Evidence of this has been shown in most annual food security assessment reports. The most recent was a comprehensive survey conducted in 2015 through the combined efforts of the Ministry of Agriculture Forestry and Food Security (MAFFS), Food and Agricultural Organisation (FAO), and World Food Programme (WFP) on the status of food security in Sierra Leone. This survey discovered that the Northern region was one of the most food insecure areas in the country.

Studies have been carried out on food security around the world indicating that there a number of issues accounting for food insecurity and these could be different from one setting and level to another (Binns & Bateman, 2016; Burchi & De Muro, 2016; Massawe, 2017; Pinstруп-Andersen, 2009). There are certain factors that influence the status of food security for smallholder rice farmers in the Northern region of Sierra Leone. These factors can be grouped into two categories. The first are those that impact on farm productivity and volume of production and are beyond household control. The second category is those factors that impact household food security due to household behaviour and preferences. There is, therefore, diversity in the dynamics of household characteristics that has a direct influence on the status of household food security. Household food security is determined by the interaction between food access, food acquisition and allocation behaviour (Pinstруп-Andersen, 2009). It is also clear that if household food security challenges are to be successfully addressed, the distributional, availability, accessibility and stability problems must be understood (Altman, Hart, & Jacobs, 2009).

1.2 An overview of food security in Sierra Leone

Sierra Leone is among the poorest countries in the world ranking 181 out of 188 nations, according to the 2015 United Nations Development Programme's Human Development Index ranking (Binns & Bateman, 2016). It is estimated that over 70% of the country's population are living below \$2 a day (i.e. below the country's poverty line) with 26% extremely poor (Binns & Bateman, 2016). Over the years, the prevalence of food insecurity has increased significantly and the Ebola outbreak was perceived to be one of the many reasons responsible for the increase in food insecurity in Sierra Leone (MAFFS, FAO, & WFP, 2015). Rice is the main staple food but the households' own production of rice only accounts for 20.7% of their rice consumption. In fact, only 4% of farmers produce rice that feeds them all-year round , some produce enough for only six months, but majority can only produce enough rice to feed the household for five months or less (MAFFS et al., 2015). This means households must

source the rest from imported rice in the markets. This high percentage of households sourcing rice from the markets is an indication of high dependency on imported rice and this has an impact on the price of the commodity. Price fluctuations, which may occur due to an increase in the global rice price, renders households highly vulnerable.

Smallholder rice farmers are vulnerable. Studies have shown that the greatest numbers within the food insecure population are rural communities working in the agricultural sector. These people engage in livelihood activities that generate very little income and, as a result, are those that are suffering extreme food insecurity. In most rural communities, the drivers of food insecurity impact various individuals differently with different intensity. Households headed by females are more food insecure than male-headed households (WFP, 2015a). In 2015, it was reported that about 3,186,187 (almost half of the country's total population), are food insecure, and of this, 608,505 people experience severe food insecurity. Also on a weekly basis, about 56.8% of households are consuming four or less food groups, 13.9% are consuming two groups or less, 36.9% are not consuming food rich in protein and 67.7% rarely eat food rich in iron (WFP, 2015a). Figure 1.1 shows the status of food security by district.

Figure 0.1: The status of Sierra Leone food security by districts

Source: (WFP, 2015a)

1.3 Problem statement

Sierra Leone is a developing country, is amongst the poorest nations in the world and many rural poor rely on agriculture. The whole country heavily relies on agriculture which provides

food and work for over 80% of the country's population. However, despite all efforts made by the government and other agencies to mitigate food insecurity in the country, food security remains a challenge in some of the regions of Sierra Leone. These challenges are increasing due to climate change and other factors. Although many studies have been undertaken to identify and describe the drivers of food insecurity in Africa more generally and in Sierra Leone specifically, very few studies have explored the household and cultural drivers of food security and none reviewed have done a study on the drivers of food insecurity in the northern part of Sierra Leone.

In addition to the perceived factors such as climate change and related factors, there are cultural characteristics specific to communities and households that lead to serious inequality in the distribution and access to nutritious food within these settings. The status of food security in such settings depends on household behaviour and preferences. Therefore, the aim of this study is to identify and describe those factors influencing food insecurity for smallholder rice farmers in Mawoma village in the northern region of Sierra Leone.

1.4 Research aim and question

The overall aim of this study was to investigate the dynamics in the factors that influence household food security for smallholder rice farmers in the Northern region of Sierra Leone. This is accompanied by a general research question: What influences the household food insecurity of smallholder rice farmers in the Northern region of Sierra Leone, and why?

1.5 Thesis Structure

This thesis identifies and discusses the factors that are influencing household food security for smallholder rice farmers in the Northern region of Sierra Leone. The thesis is composed of eight chapters. Chapter one gives an introduction to the background information of the study, the general aim of the research, the general research question, followed by the specific research question and research objective. Chapter two gives an overview of Sierra Leone, its agricultural sector and general background information about the country. Chapter three presents a review of the literature, focusing on the conceptual framework of food security and the factors that influence household food security for smallholder farmers. Chapter four explains the research strategy and thesis methodology including case boundaries, scope, methods of data collection and analysis and sampling techniques. Chapter five presents a detailed description of the case study area. In chapter six, the results of the case are presented. Chapter seven discusses the

study results in line with the literature reviewed in the third chapter of this thesis. The final chapter, chapter eight draws conclusions on the study, presents limitations and implications of the findings.

Chapter Two: An overview of Sierra Leone

2.1 Introduction

Sierra Leone is about 72,300 square kilometres and is located on the west coast of Africa (Statistics Sierra Leone, 2015). Sierra Leone extends from 7- 10 degrees north of the equator with a longitude of 10 to 14 degrees west. The Republic of Liberia borders on the east and southeast, whilst the Republic of Guinea borders the northeast, north and northwest of Sierra Leone. The Atlantic Ocean extends approximately 340 kilometres (211 miles) along the west and southwest of the country (Statistics Sierra Leone, 2013b). About 74 percent of Sierra Leone's land is potentially horticultural land, with about 80 percent of this is in the upland with low fertility, but suitable for many food and cash crops. The low lands are high in fertility but only make up about 20 percent of the total arable land (Sannoh, 2015).

Sierra Leone is divided into four regions and each of these regions is divided into districts. The districts are made up of chiefdoms and in total there are 149 chiefdoms in 14 districts. There are both district councils and city councils (Statistics Sierra Leone, 2015).

Figure 0.1: Sierra Leone showing its regions

Source: (Statistics Sierra Leone, 2013a)

In terms of geographical regions, there are four main physical regions in Sierra Leone: the Peninsula, Coastal Plains, Interior Lowlands and the Plateau. While the Peninsula has highlands that extend about 30 kilometres south of Freetown, the capital city, the hills and the high mountains in this region are from 200 to 1000 metres above the low-lying coastal area. Approximately half of the country is made up of the interior plateau region, which includes swamp areas lying less than 150 metres above sea level. The main rivers which flow westward towards the sea dissect the Interior Plateau. Sierra Leone is characterised in terms of its geographical makeup. The country's geographical features include a number of hills and mountains such as the Kambui, Nimini and Gori in the southeast of the country; and the Sula, Kangari, Loma, Tingi and WaraWara mountains in the northern part of the country (Statistics Sierra Leone, 2013b).

Due to the favourable rainfall of 2,000 to 4,000mm per annum, the country enjoys enormous water resources and there is no threat of a water supply shortage (GoSL, 2009). The principal rivers include: Little Scarcies, Great Scarcies, Rokel, Jong, Sewa, Wanji, Mano, Moa Kukuli, Bafin, Ribbi, Meli, Bagru, Mongo, Bagba, Pampana, Mabile, Wange, Tabe, Tye and Moa rivers. These rivers flow from the northeast of the country, continue to the southeast and finally to the Atlantic Ocean (Statistics Sierra Leone, 2013b). River discharges are high, with an estimated average run-off of 20 – 40% (GoSL, 2009). In addition, Sierra Leone is also endowed with many lakes found in Pujehun, Bonthe and Koinadugu districts (Sierra Agricultural Sector Review, 2014).

2.2. The Sierra Leone population

The most recent Sierra Leone Population and Housing Census, conducted in 2015, reported a total population of 7,092,113 and of these 3,490,978 are males and 3,601,135 are females. The population growth rate reported by the 2015 National census was 3.2%, which is higher than the 2.3% and 1.8% reported in 1985 and 2004, respectively (Statistics Sierra Leone, 2015). The country is characterised by its young population, as over 40% of the total national population are younger than 15 years old, with only 3.5% being 65 years and above (Statistics Sierra Leone, 2015).

The following characteristics of the Sierra Leone population are recorded according to a report by the 2015 census:

- about 68.6 percent of the working age population (i.e. 15-64) are economically active

- 31.4 percent are non-economically active
- about 83.9 percent of the working population are self-employed
- 6.2 percent are in the public sector
- 4 percent are in the private sector
- 3.8 percent are in the family trade
- 4 percent work for NGOS/Embassy/International organisations

(Statistics Sierra Leone, 2015)

The survey also shows that out of the 1,265,468 total households in Sierra Leone:

- 732,461 are agricultural households
- 310,073 are in the Northern region
- 85.4 percent of the total agricultural households are engaged in crop farming

(Statistics Sierra Leone, 2015)

This data shows that the majority of the country's population is in rural areas and is highly dependent on agriculture. It is also evident that almost half of the total agricultural households live in the northern region - the study area - and that the increasing growth rate of the population could pose a threat to national food security.

Other characteristics of the Sierra Leone population include:

- only 13 percent of the population have regular internet access
- 96.8 percent use firewood and charcoal as their source of fuel for cooking
- 86.7 percent of households use pit latrines, bush and rivers for their toilet
- only 12.9 percent use flush toilet

(Statistics Sierra Leone, 2015)

There married women have a limited say in household decision making; that is all major household decisions are made by the husbands (Statistics Sierra Leone, 2013b). Overall, 94 percent of the Sierra Leone women residing in rural areas undergo female circumcision and 40 percent of these are within the ages of 10 to 14. Both genders and a significant percentage of all age categories believe that religion requires circumcision(Statistics Sierra Leone, 2013b). The high rate of Sierra Leone women's involvement in Female Genital Mutilation (FGM) shows the high level of socio-cultural participation in the country. Meanwhile, this data also

indicates that the level of poverty within the population and the dominance of males in the household decision making process may impose household food security, resulting from a difference in priorities.

2.3 Agriculture in Sierra Leone

Agriculture is one of the most vibrant sectors in the Sierra Leone economy; it contributed over half of the annual GDP in 2013 (Statistics Sierra Leone, 2013a). Over 75% of the total national population work in the agricultural sector (MAFFS, 2009b). The main source of livelihood for more than half of the country's population is crop production and the production of food in the country is in the hands of smallholder farmers who constitute 90% of the farming population (Conteh et al., 2012). Smallholder farmers are mainly subsistence farmers who produce barely enough for home consumption (Conteh et al., 2012). According to Binns and Bateman (2016), smallholder farmers live in absolute poverty with expenditure below US\$2 a day (Binns & Bateman, 2016) and the volume and variety of crops they cultivate is severely limited by capital, inputs, labour and traditional farm tools (Sannoh, 2015). The cropping aspect of agriculture in Sierra Leone includes major food crops, major cash crops, vegetable and fruits. The major food crops comprise rice, cassava, potatoes, maize and ground nut, while cocoa, coffee, kola nut, oil palm and cashew nuts form the major cash crops (Statistics Sierra Leone, 2014b).

The livestock division of the agricultural sector includes animals such as cattle, goats, sheep, pigs, poultry and rabbits. The activities in this sector include increasing number of animals, as well as slaughtering and milking for market purposes. There is also a hunting, forestry and fishery share in the agriculture sector. The production of logs, charcoal, fuel wood, honey and beeswax are activities found in the forestry section and it provides about 90 percent of the domestic energy needs for heating and cooking. It is also believed that most rural households depend on herbs from the forest for both curative and preventive medicines (GoSL, 2009). The harvested fish and shrimps from both fresh and marine waters by both artisanal fishermen and commercial fishing companies make up the fishery section. Hunting is an activity of both tourists and domestic hunters (Statistics Sierra Leone, 2014b). In Sierra Leone, fish accounts for almost 80 percent of the total animal protein consumed, although is not evenly distributed in the country because of geographical and seasonal differences (GoSL, 2009). The country's waterways are well endowed with high value species of fish that include snapper, bream, sole, threadfins, cuttlefish, shrimps and lobsters.

Agricultural cropping takes the lead in the Sierra Leone agricultural sector (GoSL, 2009). Although no current data is available, it was reported that crops contributed 63% of the total agricultural output in 2013 (Statistics Sierra Leone, 2014a). Although there are several crops in Sierra Leone, rice is the main staple (GoSL, 2009; Sierra Agricultural Sector Review, 2014; WFP, 2015a).

2.4 Farming systems

Sierra Leone practices a shifting system of subsistence agriculture with fallowing common amongst smallholder farmers in the country. The upland cropping system consists of an average fallow period of 8.8 years (GoSL, 2009), but this period has dropped drastically due to pressure from an increasing population, which has also contributed to increased land degradation and declining yield (GoSL, 2009).

In Sierra Leone, upland cultivation activities start with brushing¹ in February. This is also known as clearing; it is the process of removing trees, grasses and other obstacles from site before cultivation. It ends with harvesting activities between October and December. Cultivation activities take the form of brushing, clearing, staking, burning, ploughing, sowing, weeding, bird scaring, rodent fencing, harvesting and the manual transfer of the harvested crop to towns and villages for storage. Lowland cropping is practiced through the reclamation of swamps and mangrove areas. It is mostly common in Kambia and Port Loko districts in the north and Pujehun, Bo and Moyamba districts in the southern region (MAFFS, 2009a). Along with the shifting cultivation, mixed cropping cultivation is also in the increase (Figure 5.8). The most commonly mixed crops are rice, cassava, potatoes, maize, millet, sorghum and ground nuts; with rice being the principal staple crop. The inland valley swamp, mangrove area and river land grass represent 10, 3, and 3 percent respectively, and each of these ecologies has its unique characteristics in terms of fertility, type of crop and constraints.

¹ This is also known as clearing; it is the process of removing trees, grasses and other obstacles from site before cultivation.

Table 0.1: Sierra Leone ecologies and their unique features

	Agro climatic Region	Ecology	Major Crops	Cropping system and pattern	Constraints
1	Rainforest	Upland	Rice, Cassava, Sweet potato, Coffee, Cocoa, Oil palm, Banana, Citrus, Plantain	Bush fallow Rice, intercropped with cassava, maize etc. Cocoa and coffee intercropped	-Declining fertility -Weed infestation -Erosion
2	Rainforest	Inland valley swamp	Rice	Annual production of rice	-Swamp development -Water control -Soil deficiencies -Iron toxicity
3	Traditional rainforest	Upland	Rice, Cassava, sweet potato, groundnut, maize, Banana, plantain, citrus, oil palm, mango,	Bush fallow Rice intercropped with cassava, maize etc.	-Declining fertility -Weed infestation -Erosion
4	Traditional Rainforest	Inland valley swamp	Rice, cassava, groundnut, sweet potato, maize	Only rice during rainy season cassava, sweet potato, ground and maize during dry season	-Swamp development -Water control

					-Soil deficiency -Iron toxicity
5	Traditional Rainforest	Boliland	Rice, Cassava	Rice planted once annually	-Low soil nutrients -High weed infestation
6	Savannah Woodland	Upland	Rice, cassava, maize, groundnut, fundi, pepper, okra, sweet potato, cashew, citrus, mango	Bush fallow Rice intercropped with cassava, maize etc.	-Declining fertility -Weed infestation -Erosion
7	Savannah Woodland	Inland valley swamp	Rice, groundnut, sweet potato	Only rice during rainy season cassava, sweet potato, groundnut, and maize during dry season	-Swamp development -Water control Soil deficiency -Iron toxicity
8	Savannah Woodland	Boliland	Rice	Rice planted once annually	-Low soil nutrients -High weed infestation
9	Coastal plain	Upland	Rice, cassava, sweet potato, maize, groundnut, oil palm	Bush fallow Rice intercropped with cassava, maize etc.	-Declining fertility

					-Weed infestation -Erosion
10	Coastal plain	Inland valley swamp	Rice, maize, sweet potato	Only rice during rainy season cassava, sweet potato, groundnut and maize during dry season	-Swamp development -Water control Soil deficiency -Iron toxicity
11	Coastal plain	Riverine grassland	Rice	Rice planted once annually	-High water level
12	Coastal plain	Mangrove swamps	Rice	Rice planted once annually	-Salinity -crabs

Source: (Jalloh & Njala, 2006)

Table 2.1 indicates that decline in soil fertility is common and that soil deficiencies are key factors affecting almost all types of crops in Sierra Leone. Smallholder farmers are constrained by the fact that they lack the crucial resources needed to ensure successful agriculture except for land, but even the land area they can cultivate is limited by what the owners (the landowning families and the Chief) could offer. Other constraints are the available capital and labour within the households (Jalloh & Njala, 2006). In Sierra Leone, cutlasses, axes and hoes are the main farm implements and labour supply comes directly from family members. Agriculture in the country is still affected by the unimproved varieties of crops, animal breeds, limited use of fertilizers and cultural practices. Worryingly, there was a drop in the sector's contribution to the National Gross Domestic Product (GDP) from 58.2% in 2009 to 50.5% in 2014 (MAFFS et al., 2015).

2.5 Rice production in Sierra Leone

Among the food crops grown in developing countries, rice is the most important crop and it serves as the staple food for over 50 percent of the global population (Seck, Diagne, Mohanty, & Wopereis, 2012). The importance of the crop is even greater in Sierra Leone, where it accounts for about 75 percent of the agricultural output and over 90 percent of the population rely on rice as a staple food (Sierra Agricultural Sector Review, 2014; Spencer et al., 2009). Sierra Leone is among the highest per capita consumers of rice in Africa (Spencer et al., 2009). The crop is rich in carbohydrate, protein, amino acids, riboflavin, thiamine, niacin and vitamins B & E (Seck et al., 2012). It is an adaptable crop that survives in both dry and wetland (Seck et al., 2012).

Although the crop is the most important food crop in Sierra Leone, production has not been able to meet the local consumption demand, as it accounts for only 60 percent of the total annual national rice requirements (Sannoh, 2015). Rice production in Sierra Leone is in the hands of smallholder farmers, most of whom cultivate less than 1 hectare (Spencer et al., 2009) and are subsistence farmers (Conteh et al., 2012; Sannoh, 2015). Smallholder farmers in Sierra Leone face several challenges contributing to their inability to ensure sufficient food production; these challenges include input constraints, soil degradation and labour challenges. Although the government and several international organisations are trying to improve rice productivity, the efforts are handicapped and rice production in Sierra Leone is still the lowest in West Africa (Chenoune et al., 2016). Other postharvest challenges include: access to knowledge and technology, the lack of storage facilities, low value addition due to the absence of processing equipment, inability to access a market and limited financial services in the form of credit (Sannoh, 2015). The production of rice in Sierra Leone is mostly achieved without irrigation or fertilizer, and field clearing, sowing and all other farm activities are done without mechanization. In addition, the Sierra Leone rice production is also characterised by constraints on seed availability and quality, a limited labour supply and soil fertility is highly dependent on the fallow period (Chenoune et al., 2016; Jalloh & Njala, 2006).

2.6 Soil types

In Sierra Leone, the upland is dominant, but the nature of its soil is generally known to be ferralitic and shallow which results in low fertility. Other soil types such as the swamp and mangrove areas are fertile, but are frequently affected by seasonal variations and the high levels

of iron and aluminium. The decline of the country's soil fertility has also been associated with the decrease in the land fallow period (GoSL, 2009).

The soil types have developed under continuous high temperatures and years of leaching due to the heavy rainfall in the country. The high rate of runoff, and rapid infiltration of water to the lower horizons are other characteristics of the soils and this has been responsible for the lack of mineral nutrient reserves (MAFFS/MFMR,2004;Jalloh & Njala, 2006). The upland ecosystem is dominated by Ultisols and these are characterised by the dominance of Low Activity Kaolinite Clays and have very low fertility. The high acidity and associated aluminium toxicity have been responsible for the major constraints in production (GoSL, 2009).In addition, these soils are also shallow, with low structural stability and in most cases they are compacted subsoils.

Figure 0.1: Sierra Leone Soil map

Source: (Jalloh & Njala, 2006)

Conversely, the lowland soils are richer as they receive nutrients lost by uplands through leaching of water downstream. The lowlands generally have deeper subsoil with lower content of weather-able minerals, plus they have a high content of organic matter in the top soil that makes it more fertile and productive. Despite this better soil, the fertile low land forms only 10% of the total land suitable for horticulture, so most of the cropping is done in the upland soils due to land availability(MAFFS, 2009a).

The data indicates that soil quality could pose a challenge for smallholder farmers in Sierra Leone. There is continuous land degradation by leaching and high temperatures, which requires improvement that may not be affordable for smallholders.

2.7 Climate in Sierra Leone

The distribution of vegetation in Sierra Leone is influenced by both human and climate factors (GoSL, 2009; Statistics Sierra Leone, 2013b). Forest, savannah, grassland and swamp are the current vegetation communities in Sierra Leone.

Vegetation is made up of three major zones found from the South West Coast to the interior and these are: the savannah, mangroves and forest. The mangrove has more dense drainage as compared to forest and savannah zones(MAFFS, 2009a). The forest and savannah zones are fairly flat with narrow inland valleys that are seasonally swampy. While rainforest and traditional forest savannah are associated with a high rainfall and a shorter dry period, the savannah woodland is known for lesser rainfall and a longer dry season. There is a higher rainfall and humidity around the coastal area of Sierra Leone (Jalloh & Njala, 2006). Temperatures range between 23oC and 29oC, although it can go as high as 36oC towards the end of the dry season and as low as 15oC in the beginning of the season (GoSL, 2009). There is a seasonal variation in the amount of sun shine per day. The sunshine is about 6 – 8 hours per day in the dry season, while during the rainy season sun-shine hours are around 2 – 4 hours per day (Jalloh & Njala, 2006).

Table 0.1: Temperature in Sierra Leone

Source: (World Bank Group, 2017)

Due to the longer rain period and the deeper soils within the rainforest, it is mostly suited for growing cocoa and coffee. Aside from these two crops, all other crops can be grown in any of the agro ecologies.

In Sierra Leone, more cowpea ²and ginger are cultivated in the Moyamba district than any other district. Vegetables such as lettuce, onions, carrot and cabbage are prevalent in the Koinadugu district and the western area. Cashew is dominant in the northern region especially in the Kambia district (Jalloh & Njala, 2006). The change in the climate pattern is impacting on the environment and cropping. In ranking the climate change effects by country, the 2010 Environmental Performance Index of the United Nations ranked Sierra Leone 163rd out of 163 countries (Perrault, Baldeh, Wahome, & Zayid, 2013). Sierra Leone is a contributor to global warming and this is due to the limited adaptive capacity and the prevalence of poverty in the country. The use of charcoal, forest burning, burning of solid wastes, fuel from plants and transportation are the major sources of greenhouse gases (GoSL, 2009). This, therefore, means there are potential climate related threats to farmers, especially smallholder farmers who are poor. With a rain fed agriculture system and a two-season climate, there is only one cultivation period per year. This means there may be no opportunity for repeat cropping of most crops. This could be a reason for food shortage.

² This is an annual herbaceous legume found across Africa mostly cultivated for animal feed.

Figure 0.1: Average monthly temperature and rainfall for Sierra Leone from 1991-2015

Source: (World Bank Group, 2018)

2.8 The Sierra Leone Economy

The percentage of the agriculture contribution to the GDP has followed a declining trend with 54 percent, 53 percent, 53 percent, 47 percent and 41 percent for 2009, 2010, 2011, 2012 and 2013 respectively, but despite this fact, and the potential the country has in the mining industry (diamond, gold, iron ore, rutile etc.), agriculture still remains the major contributor to the country's socio-economic development occupying the majority of the Sierra Leone population (Statistics Sierra Leone, 2013a).

The effect of the 11-year civil conflict (1991 - 2002) accounted for the greatest decline in the performance of the Sierra Leone economy during the independent era (Statistics Sierra Leone, 2013a). However, the government has made several attempts to ensure improvements in the performance of the economy. The formation and implementation of the Poverty Reduction Strategy Paper (PRSP) in 2001, the introduction of the Agenda for Change in 2008, and the Agenda for Prosperity in 2013 were all measures put in place to improve the Sierra Leone economy. All of these measures have seen successes over the years. The implementation of the Agenda for Change is reported to have made improvements in the overall Sierra Leone economy with greater emphasis on agriculture, energy, infrastructure and social services

(Statistics Sierra Leone, 2013b). It is reported that the Agenda for Change encouraged a 6 percent annual economic growth between 2007 and 2012. Another, second course of action, called the Agenda for Prosperity, was launched in 2013 by the Government of Sierra Leone to ensure continuity by consolidating the Agenda for Change's achievements, with an objective of transforming the country into a middle-income country by 2035 (Statistics Sierra Leone, 2013b). However, this improvement has not yet occurred. The five year Gross Domestic Product (GDP) value was \$3,802 million, \$4, 916 million, and \$5,007 million, for 2012, 2013 and 2014 respectively, but fell to \$4,252 million in 2015 and then to \$3,716 million in 2016 (ORBYT, 2016). The sharp decline of the GDP is a result of the drastic drop in the mining activities in the country (Statistics Sierra Leone, 2014a).

2.9 Summary

Sierra Leone with an area of 72,300 km², is located on the west coast of Africa. With a population of over seven million, over 70 percent live in rural communities, engaging in subsistence agricultural activities and they are poor. The agriculture sector contributes around 50 percent to the National Domestic Product (GDP). Agriculture is practiced in a subsistence way using hoes and cutlasses; labour availability and land allocation procedures are limiting factors to the size of farm cultivated in most regions in Sierra Leone. The soil and climate factors are changing rapidly. The consistent reduction of the fallow period is a key factor accounting for the decline in soil fertility, whilst climate change is affecting the country's agriculture generally. The crop sector accounts for over 60 percent of the agricultural production. Although there are many crops grown in the country, rice is the staple crop and main carbohydrate food for the country's population. To date, only 40 -60 percent of the country's demand for rice is achieved through local production and the remaining 40% is met through importation, a factor that affects the price of rice and, therefore, the food security for the population overall. The next chapter, which is chapter three, reviews relevant literature on the study.

Chapter Three: Literature Review

3.1 Introduction

The aim of this research is to describe the underlying factors that influence food security of smallholder rice farmer households in the northern part of Sierra Leone. Literature relevant to this study is therefore reviewed in this chapter. The chapter begins with the definition and concept of food security. A review of the dimensions of food security, that is availability, accessibility, stability and utilisation is also presented. This is followed by a review of the dynamics of household food security, and then the smallholder farmers' perspective. The chapter also reviews the impact of rice on food security and this is followed by a review of the factors that influence food security generally. At the end, a summary of the chapter is made. It is worth noting that this study is based on smallholder household food security. Therefore, much of the literature reviewed is from more general studies on household food security.

3.2 The concept of Food Security

The concept of food security is only valuable when there is a clear understanding of what it means, how it interacts with food and non-food factors. In dealing with the concept, therefore, any method of measurement applied should consider local conditions.

The concept of food security was initially used to describe if a country had sufficient food to meet its dietary energy requirements and so, it was used to mean self-sufficiency at a national level. However, the early definitions of the concept focused on the global and national levels as seen from the definition by the World Food Conference of the United Nations defined food security as the “availability, at all times, of adequate world food supplies of basic food stuff, to sustain a steady expansion of food consumption and to offset fluctuations in production and prices” (Burchi & De Muro, 2016, p. 11). Even though the concept of food security is when enough food is available whether at the global, national, community or household level, (Pinstrup-Andersen, 2009) argued that what is referred to as “enough” in the definition is not clear. It is not clear whether the food is enough to meet economic demand and at what price, or whether it is enough to meet energy and nutritional requirements (Pinstrup-Andersen, 2009).

At a national level, therefore, the concept tends to focus on the supply side of the food equation, which is making sure food is available. Balance and imbalance between the population needs for food and food availability is the main focus of the approach of food security. It was, therefore, believed that, in order to maintain this balance, the supply of available food must be

higher than the population growth rate and this is the approach of the international community (Burchi & De Muro, 2016).

The issue with this definition of food security is that food may be available, but availability does not necessarily mean everyone has access to the food. Also, enough calories do not assure a healthy and nutritional diet (Pinstrup-Andersen, 2009). This means for food security as a concept to promote household or individual welfare, the distribution of available food is critical and must address food accessibility for all individuals. It was in recognition of this by scholars and researchers that the concept of food security was defined by Pinstrup-Anderson in the mid-1970s as “access by all people to enough food to live a healthy and productive life”(Pinstrup-Andersen, 2009, p. 5). Furthermore, FAO later re-examined the concept’s definition and included nutritional value and food preference.

Traditionally, food security was about the supply side, but now it has been extended by several sectors to capture other dimensions of food security. This study is, therefore, going to use the definition drafted at the 1996 world summit, which was later reconfirmed in 2009 (Ecker & Breisinger, 2012). According to this definition, food security at the global, regional, national, household and individual levels, is achieved when all people, at all times have physical and economic access to sufficient, safe and nutritious food to meet dietary needs and food preferences for an active and healthy life (Rome Declaration, 1996). When extended, the concept included “ the four pillars of food security as availability, access, utilization, and stability” and further stated that “the nutritional dimension is integral to the concept of food security”(FAO, 2009, p. 1). The terms safe and nutritious included in the 1996 summit definition means food safety and nutritional value, while the preferences shift the concept from just access to enough food to an access to the preferred food (Burchi & De Muro, 2016). This extension explains the possibility of people with equal access to food, but because of the differences in preferences, they could face different food security levels (Pinstrup-Andersen, 2009).

This study is using this definition because it embraces the multidimensional approach of the concept, namely: availability, accessibility, utilisation and stability and these dimensions have been used by researchers, aid agencies and policy makers to assess the status of food security in given areas. This definition of food security has shifted the thinking of the food security concept from the initial global and national perspective to include household and individual levels. It also shifts thinking from just the food perspective to a livelihood perspective.

Looking at food security at the macro level, macroeconomic stability; economic growth and economic distribution; public spending; governance and quality institutions are all crucial factors in ensuring national food security. Ensuring these at the macro level will depend on the aggregate food availability, sources of exchange earnings and the ability of the government to provide public services (Ecker & Breisinger, 2012). At the micro level, we equate food and nutrition security of all household members with the economic and physical access to food as well as basic household assets and public services that affect the health conditions of individual household members. However, it is important to note that individual food access, adequate food and nutrient intake is largely dependent on the intra-household distribution, resources allocation, household preferences and care given to meet individual dietary needs. In such situations, the household decision maker and the person responsible for the preparation of meals and child feeding is a key determinant of intra-household food security (Ecker & Breisinger, 2012). Gender equality and nutritional knowledge by household decision makers are crucial for allocating household resources factors. This is especially true for young children, as most health issues, such as stunted growth, also seem to be associated with a lower level of maternal education (Semba et al., 2008). Based on these dynamics about the concept of food security, in his publication *Food security: definition and measurement*, Pinstrip-Andersen (2009) concluded that if the definitions advanced for the concept of food security, especially the definition by FAO is to be met, then to be food secure must also mean meeting the recommended nutritional requirements. At that time, the FAO's estimate of 1 million undernourished people in the world was an understatement (Pinstrip-Andersen, 2009).

Figure 0.1: Food security conceptual framework in line with FAO

Source:(Gross, Schoeneberger, Pfeifer, & Preuss, 2000; Pinstруп-Andersen, 2009)

From figure 3.1, it can be seen that the dimensions of the food security concept as amended by the 2001 World summit, are hierarchical. They are necessary, but none of them is sufficient to ensure the other (Barrett, 2010) and cannot, therefore, ensure food security independent of the others. The following subsections review the four dimensions, as amended by the Food Security World Summit, to gain an insight into the role they play in the concept of food security.

3.2.1 Availability of the food

In the food security context, availability can be substituted by the terms sufficient or enough (Pinstруп-Andersen, 2009). It relates to the presence of food supply at the global, regional, national, community, household and individual levels. Food is said to be available when its supply and presence is guaranteed at the global, national, household as well as individual levels. Several definitions have been proposed for the concept.

According to Titus and Adetokunbo (2007), food availability is influenced by both domestic food output and importation. The domestic output in this sense is referring to what could be produced locally at either national or household levels, whilst importation is referring to the country level. In reality, households are highly dependent on both their ability of to use available resources to produce the food they need, as well as the availability of foreign exchange reserves to finance food importation. This is true for smallholder rice farmers in the

Northern region of Sierra Leone; they are subsistence farmers and how much they eat is highly influenced by how much they can produce.

In a deeper view of the concept, food availability is regarded as the presence of the needed amount, type, and quality from all sources and this is said to depend on production, distribution and exchange mechanisms with a focus on community and household levels (Binns & Bateman, 2016). This definition expands the concept of availability beyond food presence. Emphasis is placed on the type and quality of food in order to fulfil the requirement of the third concept of food security (nutrition). Nutrition is ensured when the right type, quantity and quality of food is made available at affordable means (Drimie & Ruysenaar, 2010).

The definition of availability by De Schutter (2014) is adopted in this study as it takes into account food quantity, food quality and time of delivery. He defined availability as “the possibility either to feed oneself directly from productive land or other natural resources, or to purchase food and includes various elements” (De Schutter, 2014, p. 4). This definition considers other players such as those involved in moving the goods (transportation) that ensure the food reaches those in need, at the required quality and quantity and at the time needed. For smallholder farmers in most developing countries, who have always been described as poor, subsistence farming is the only means of livelihood as they operate in rural communities. Their production cannot meet their food requirements and they often rely on imported food or food aid. For such imported food or food aid, availability to these rural communities could be influenced by physical means (road network) and other factors that may affect the movement of such goods to where they are wanted. Massawe (2017), in his work *Farming Systems and Household Food Security in Tanzania*, highlighted the following as being key indicators of availability: “Average dietary supply adequacy, average value of food production, share of dietary supply derived from cereals, roots and tubers, average protein supply and average supply of protein of animal origin” (Massawe, 2017, p. 25). When the above indicators are present then the availability of the food is guaranteed. However, as availability of food does not guarantee its accessibility (Pinstrup-Andersen, 2009), to ensure food security, the available food must be made accessible or must be accessed by all and at all times (FAO, 2009). This leads to the accessibility dimension of food security.

3.2.2 Access to food as a dimension of food security

Access to food security is argued to be assured when all at the global level, country level, household level as well as all individuals within the household have sufficient quality and quantity of food, either through their own production, purchase, donation/transfers or gift (Drimie & Ruysenaar, 2010; Massawe, 2017). The transfers in this context refer to remittances from friends and relatives. Gifts and grants may come from friends, relatives or aid agencies. Household food access is, therefore, the ability of a household to ensure regular food for its members through several sources that may include, but not be limited to, their own production, barter trade, purchases, borrowing or food assistance. Because of these features of food access, it is said to have both physical and economic indicators at all levels. The physical indicators refer to transport infrastructures, which include road networks and the availability of a suitable means of transportation. On the other hand, the economic access to food could be indicated by: the domestic food price level index, prevalence of undernourishment, share of food expenditure of the poor, depth of the food deficit and the prevalence of food inadequacy (Massawe, 2017).

The food security concept has also been defined as “the ability of households to obtain food from their own production and stocks, from markets and from other sources” (Titus & Adetokunbo, 2007, p. 400). This definition stresses the fact that the ability to achieve food access, especially at the household level, is based on the resources endowment as well as the household’s availability to engage with these resources.

On the other hand, the definition by Binns and Bateman (2016) describes access as not just the ability to obtain food, but also places stress on the amount being adequate, which they also argued is influenced by the price of the food and the household purchasing power. Food adequacy may also be shaped by non-market mechanisms, such as culture and household dynamics, which influence the allocation of food within settings at the household level. They defined access as “the ability of households to obtain an adequate amount of food, which depends on the price of food and household purchasing power, as well as market and non-market mechanisms through which food is allocated, and also various social and cultural factors that affect consumer preferences for different types of food” (Binns & Bateman, 2016, p. 157). This definition best describes some of the reasons for households’ food insecurity in Sierra Leone. There may be food or financial resources to acquire food in the household, but the resource allocation pattern, preferences of the household head and social hierarchy within

some communities may constrain food access for the vulnerable members of the household (Binns & Bateman, 2016).

Furthermore, Berry, Dernini, Burlingame, Meybeck, and Conforti (2015) relate accessibility to the availability of transport and the economic means that enhance food purchasing power and socio-cultural preferences at the household level. Socio-cultural preferences may cause two households with the same income level and the same number of dependants to face a different food security status based on household preferences. This definition suggests that the absence of an effective distribution network could cause food insecurity for some households, even though food may be in surplus in other communities. It further confirms that accessibility is not limited to food produced by oneself, but involves also, the process of getting the food from the market and this could only be facilitated by means of effective distribution of food.

Also, having access to food does not in itself ensure food security. It is yet to be determined whether the food accessed possesses all the nutritional value that characterises a healthy diet. Therefore, the nutritional aspect which ensures food utilisation by the body must be examined. For the purpose of this study, the definition given above from Binns and Bateman (2016) will be used. This is because it captures some of the reasons for both intra-, and inter-household food insecurity. It gives us circumstances under which some household members may be food secure with access to the household food stock, but others do not have this access. These are household food security dynamics.

3.2.3 Food utilisation as a food security dimension

Food utilisation is the nutritional aspect of food security. Food utilisation involves the selection and consumption of food as well as the ability of the body to absorb food nutrients and it is determined by diet adequacy, availability of clean water and healthcare (FAO,2009 ;Massawe, 2017). Food security is not just about the availability and accessibility of food, but concerns having food with enough nutrients to facilitate healthy living (Food security working group,1997; Young,2011;Pelletier,2002; Drimie & Ruysenaar, 2010).Based on these expectations, several researchers have proposed numerous definitions for food utilization as a concept. It has been referred to as the eventual use of food by individuals at the household level that involve the preparation and storage as well as the consumption of food (Food security working group,1997 ;Drimie & Ruysenaar, 2010). However, this definition leaves out the aspect of environment and health. No emphasis is made on the nutritional aspect of the food, which is an important aspect of utilisation. (Ecker & Breisinger, 2012) pointed out that the

concept refers to a condition of intake of sufficient and safe food, which is considered adequate according to individual physiological requirements.

Although the above definitions made mention of enough food nutrients, diet adequacy and food consumption generally, only the definition given by the World Food Programme of the FAO (2009) and Massawe (2017) recognised the importance of clean water. The other definitions overlooked clean water as an important aspect of food utilisation.

This study is, therefore, using the definition advanced by the World Food Programme because it includes all aspects of healthy living, ranging from the right selection and consumption of food as well as the ability of the body to absorb food nutrients, and it is determined by diet adequacy, availability of clean water and healthcare (WFP, 2009). This definition emphasises an adequate diet, which means the food must possess of all required nutrients for healthy living, as well as the required amount of food. Also, its inclusion of the availability of safe, clean water and healthcare for all is an important aspect of this study. This is because, even though the case study village has borehole water well, over half of the villagers are still sourcing their drinking water from the streams. In the context of developing countries, such as Sierra Leone, healthcare and water issues always form part of the index in measuring the status of household food security (MAFFS et al., 2015). The reason for this is that unsafe environments, poor infant care and feeding practices will lead to malnourishment, increased food insecurity and several health issues. Evidence for this in Sierra Leone is found in the research of Binns and Bateman (2016), presented in their work “Rural livelihoods and food security: long-term insights from Sierra Leone's Eastern Province”. It was noted that when 45% of the Sierra Leone population was food insecure, 6.5% of that proportion of the population were severely food insecure, there was a high child death rate with evidence of stunted growth in children under six and this was combined with a low life expectancy rate (WFP, 2011; Binns and Bateman, 2016).

3.2.4 Stability of food security

The concept of stability in food security refers to the constant existence of the other three concepts. Food availability, accessibility and utilisation must be constantly ongoing, and not temporal. Based on this perception, several definitions are proposed for the concept of stability. Even if the food intake is adequate today, a nation, community, household or individual will still be deemed as having food insecurity if there is inadequate access to food on a periodic basis. This is because adverse weather conditions, political instability, and rising prices all lead to the instability of the other concepts, thereby impacting the food security status (FAO, 2008).

In support of this view, Schmidhuber and Tubiello (2007), in their article *Global Food Security Under Climate Change*, argued that with the increase in frequency and severity of extreme events such as cyclones, floods, hailstorms and droughts, global and regional food security are also expected to become more variable. This was also expected to lead to fluctuations in crop yield and local food supply, and, hence, food insecurity on a wider scale (Schmidhuber & Tubiello, 2007).

The four dimensions incorporated by the Food and Agriculture Organisation of the United Nations during the Food Security World Summit of 1996 are important in the discussion of food security. For this study context, an analysis of household food security dynamics, smallholder farming and the relationship between rice and food security is also reviewed below.

3.3 Household Food Security dynamics

Knowing the dynamics of household food security is important, because this study is based on how household food security of smallholder farmers is being influenced by several factors. A household can be defined as a group of individuals, related or unrelated, who share the same dwelling unit as well as the resources and durable goods within the unit (Smeeding & Weinberg, 2001). The concept of household food security has also been defined as the ability of the household to produce and/or purchase the food required by all household members that ensure their dietary requirements and food preferences, as well as maintaining optimal nutritional status (Pinstrup-Andersen, 2009). Household food security is determined by the interaction between household food access and the household food acquisition and allocation behaviour (Pinstrup-Andersen, 2009). For a household to be food secure, it must be able to acquire the food needed by all its members at the time it is needed. The inability of a household to acquire the required food to feed its members means that household can be described as a food insecure household. A household may be food insecure for only a short time, usually experiencing food shortage seasonally or periodically. This short-term experience of food insecurity is known as household transitory food insecurity. However, in situations when there is a lack of access to sufficient and nutritious food for a long time, then it becomes permanent household food insecurity (Pinstrup-Andersen, 2009). However, different households face food insecurity status differently and household food security for its members is very sensitive to household stressors and changes over time (Altman et al., 2009).

Usually, the inability to ensure food access within the household is due to the behaviour and preferences of the household heads; household food security/insecurity is a result of the household's objectives and choices (Hesselberg & Yaro, 2006). Some of the reasons why the household may not ensure food security for all its members could be the fact that they may have the ability to acquire food, but that ability may not be translated into actual food acquisition, because household preference may not prioritise food acquisition (Pinstrup-Andersen, 2009). It is also the case that sometimes even if the food is acquired and available in the household, the intra-household food allocation may either not be based on the needs of individual members or may prioritise some members of the household to the top of the household food sharing priority (Pinstrup-Andersen, 2009; Beaumier & Ford, 2010). This idea is supported by a study carried out in Canada, which reported that in the Inuit community women are the last to eat after food has been prepared; they eat only after the men and children have eaten and most times if the food is not sufficient the women will go without food (Beaumier & Ford, 2010). It is, therefore, clear that in relation to household food security level, assuming that all those living within the same household could enjoy the same living standard is misleading (Njuki, Kaaria, Chamunorwa, & Chiuri, 2011). In support of this view, several studies have mentioned that an increase in household income does not necessarily translate to increased household food security (World Bank, 2007; Massawe, 2017) and that while food productivity is important it is not the only solution to household food security challenges (Davereux, 2001; Massawe, 2017).

Due to the above characteristics, household food security could be best measured by household consumption behaviour, recognising that household food security could be impacted by food consumption related behaviours. It could be assessed based on the frequency of food intake as well as the frequency of intake of different food items. Also, an observation of the quality consumed is also important, although it requires more time to physically observe the household during their meal (Burchi & De Muro, 2016). In addition to the above, the distribution of the available food is a critical factor if food security is to be a measure of household or individual welfare (Burchi & De Muro, 2016).

3.4 Smallholder farmers

The role of smallholder farming is very significant in the fight against hunger and poverty. Research had shown that more than 90% of the 570 million farms worldwide are owned by smallholder farmers, who predominantly rely on household labour (FAO, 2015). Smallholder farmers engage in the production of farm goods mainly for family consumption and produce over 80% of the world's food in terms of value, but 84% of their farms are less than 2 hectares (FAO, 2015). Due to their reliance on family labour, which in most cases is insufficient due to youth migrating because they think they are not able to make use of their skills in rural areas (Hesselberg & Yaro, 2006), smallholder farmers are constrained in labour, rendering most of them less productive, poor and food insecure. Agriculture in the developing world is dominated by smallholder farmers who occupy the majority of the arable land and produce most of the crops and livestock (Salami, Kamara, & Brixiova, 2010). Smallholder farmers are defined as household farmers who have limited access to means of livelihood and rely mainly on household labour to meet their subsistence lifestyle plus any market sales (Siddik et al., 2015). Smallholder farmers have also been associated with several challenges including low productivity, lack of access to market, the inability to secure loans and barriers to new technology (Salami et al., 2010). In 2011, the yield for major crops had declined drastically and agricultural support had moved from the public to private sector (Thapa & Gaiha, 2011). Above all, it was argued that smallholder farmers feel the impact of climate change and environmental degradation more than large farmers because of their limited human capital, social and financial resources as well as access to information (Hazell et al., 2007 ; Thapa & Gaiha, 2011).

In the same view, smallholder farmers have been described as farmers with low income generation, limited land supply, limited input supplies, lack of resources, lack of modern farming skills/technology, little or no training at all, low productivity, increased level of poverty and household food insecurity. Constraints in delivering modern inputs to smallholder farmers is among the principal challenges confronting smallholder farmers in Sub-Saharan Africa (Jayne, Mather, and Mghenyi, 2010; Power, 2008; and Oni, Maliwichi, & Obadire, 2010). Despite these challenges, there is empirical evidence that supports the fact that the role of smallholder farmers is vital in the economies of developing nations. Smallholder farming is the biggest single employer in developing countries and if supported they can make a sustainable contribution that provides an equitable distribution of income and demand structure for other sectors in the economy (White, 2012). In the case study country, Sierra Leone, approximately

90% of the farmers were smallholders in 2012. Over 80% of these are rice farmers and account for the country's total grain production in 2012 (Conteh et al., 2012).

3.5 The impact of rice on food security

With over half of the world's population depending on rice (Muthayya, Sugimoto, Montgomery, & Maberly, 2014), rice is a key crop as far as fighting global hunger is concerned. Because of the recognition of rice as a major crop in the global achievement of food security, the crop has become one of the most protected crops in the world and it is closely associated with food and nutrition fulfilment, especially in developing countries (Muthayya et al., 2014). In agreement with the global recognition of rice it has been confirmed that the crop is the second widely grown cereal in the world and a staple food for more than half the world's population. In recognition of rice, 2004 was declared the International Year of Rice (Van Nguyen & Ferrero, 2006). It is, therefore, assumed that if the sustainable Development Goal (SDG)'s projection to end hunger and ensure food access for all is to be achieved, the crop must be promoted and to ensure this, a decision was reached to address all constraints faced by rice-based systems (Van Nguyen & Ferrero, 2006).

Also, as the crop keeps increasing in popularity, the level of its importance in the fight against hunger also increases, but the issue of availability has been and is complex and challenging. It is with this perception that (Nwanze, Mohapatra, Kormawa, Keya, & Bruce-Oliver, 2006) see the crop having the potential to be placed in the frontline as far as fighting hunger and poverty is concerned. However, although in 2004 Peng et al. (2004) believed that if global food security is to be attained, the world must increase the annual rice production by 1%, they advocate that if crop yield is to be increased, most of the increases must come from existing cropland. This is to prevent environmental degradation and destruction that may render the world in permanent food crisis.

In an article titled Rice Production and Marketing in Sierra Leone, the importance of the crop was also acknowledged as key in the global hunger fight. It was argued that in line with the global rice consumption trend, the crop is also the staple food in Sierra Leone, and that Sierra Leone is one of the countries with the highest per capita annual rice consumption in Africa (Spencer et al., 2009). Also, a paper by Conteh et al. (2012) has shown that in Sierra Leone when we talk of food we mean rice, as it is the main staple and most important crop in the country. A person may have eaten other crops, but the absence of rice renders him/her psychologically hungry (Conteh et al., 2012). This is evidenced by the fact that a typical Sierra

Leonean, despite having eaten cassava, potato etc., without rice will say ‘I have not eaten anything’. It has also been further confirmed that the status of food insecurity is as a result of the inability of local rice production to meet the growing demand for the crop (Chenoune et al., 2016). This makes food availability and accessibility difficult, as most households cannot meet the high prices of the imported rice (Binns & Bateman, 2016). In the same view, it has been observed that smallholder farmers in Sierra Leone mainly produce rice for their own consumption. Because the Sierra Leone smallholder farmers have the lowest in yield in West Africa, they are, therefore, vulnerable to the volume of the rice they produce (Chenoune et al., 2016) and the limited possibilities of alternative sources of income to afford imported rice. Among other factors, the reason for the decline in agriculture productivity is associated with the ongoing poverty and aging farm population due to the massive migration of the rural youth into the major cities (Sumberg, Anyidoho, Leavy, te Lintelo, & Wellard, 2012). This is affecting the availability and accessibility of the staple food rice, and hence food insecurity.

With the evidence from the above literature, the world can no longer talk of global food security without mentioning rice. Rice has become a key determinant of food security in the modern-day world. However, the ability of rice and other components to address food security could be influenced by several factors reviewed below.

3.6 A review of the factors that influence food security

The conceptual framework of this study shows that food security is based on certain pillars; food availability, food accessibility, food stability and/or food nutrients that are key determinants to the status of food security at all levels (WFP, 2009). It can be seen that there are factors that affect just one aspect of food security whereas others could affect more than two of these dimensions. The following are some of the factors identified by researchers as being able to undermine the food security of smallholder farmer households: the size of household population, access to credit constraints, effects from climate change, poor extension services, poor road network and threats from pests and diseases. These factors are reviewed in the following chapter.

3.6.1 Size of the household as an influence of food security

The continuous increase in population has been identified as a major factor impacting food security at global, continental, regional, national, household and individual levels. Rice, which is currently a staple food for over half of the global population, is faced with the challenge of meeting an increasing global demand due to an increase in population (Van Nguyen & Ferrero, 2006). Asia, which is the world's leading producer and consumer of rice, projected their demand for rice to increase by over 70% in the next 30 years and this projection is based on the expected demand driven mainly by population (Muthayya et al., 2014). Seck et al. (2012) also noted that the relative growth rate in the demand of rice in Africa is as a result of the increasing growth in the African population.

In Binns & Bateman's (2016) study on rural livelihood and food security in Sierra Leone's eastern region, it was identified that householders with larger families were more food insecure than those with smaller families (Binns & Bateman, 2016). This is because the quantity stored as seed for replanting is highly influenced by the size of the family. The larger the family size, the larger the consumption rate (Chenoune et al., 2016) and as such those families may end up eating the portion of the stock that would have been reserved for seeds. That is to say, in terms of food scarcity, the consumption of seeds are a common coping strategies to combat hunger (Misselhorn, 2005). This depletion of seed stock could adversely impact the future food security of the family, as the procurement of new seeds for future production cannot be assured due to financial constraints. This will inevitably impact household food production. Smallholder farmers depend heavily on their own production for food consumption and they are poor. These constraints on their own production may mean food insecurity for the household because it is argued that food security is a result of poverty (Power, 2008). Despite the above constraints, studies have proved that there are times when extended family members become important. Extended family members sometimes provide farming assistance and in a case study in Nigeria, it was identified that extended families pursued economic activities jointly and that in cases when some members of the extended family do not have enough food to eat or seed to plant, successful members within the extended family group will offer what is needed as a gift or interest-free loan (Ekeopara, 2012).

3.6.2 Constraints in smallholder farmers accessing credit

Although smallholder farmers have the advantage of providing labour from within the household, they may be constrained by the inability to access farm inputs due to a lack of finance. The lack of sufficient funds to finance farm operations in terms of inputs, equipment and additional labour may also limit farm size. This in turn would severely constrain farm output and food insecurity in the household (Binns & Bateman, 2016). In recognising these challenges, Thapa and Gaiha (2011) advocated that unless farmers are provided with credit and marketing facilities, smallholder farmers would remain disadvantaged because new technologies require higher capital input or mechanisation.

Despite the dire need for financial support in the form of rural financing schemes and micro-credit, the status and nature of smallholder farmers in developing countries makes it difficult for funds to be entrusted to these rural communities. A study in four East African countries, namely Ethiopia, Kenya, Tanzania and Uganda, identified that the share of commercial bank loans to agriculture was very low compared to other sectors. The inability of smallholder farmers to provide the required collateral and the lack of credit history are the main reasons for them not being able to attract credit facilities (Salami et al., 2010). In emphasising the effect of the lack of credit facility, smallholder farmers in South Africa indicated that their inability to access credit was the major reason why they are not able to afford water and undertake irrigation (Von Loeper, Musango, & Drimie, 2016; Bryan, Deressa, Gbetibouo, & Ringler, 2009).

The inability of smallholder farmers to access credit from financial institutions is also highlighted as an issue in terms of influencing food security. Some institutions, as highlighted by Seck et al. (2012), require farmers to be more organised and operate in groups to be able to secure loans from lending institutions. According to this view, it implies that the remoteness of the upland environment and the lack of well-established farmer organisations may prevent rice farmers having the opportunity to access credit facilities from financial institutions. The implication is that because smallholder farmers are subsistence farmers and are poor, the inability to access credit facilities will limit the size of the farm as well as the variety of crops grown. The result is limited outputs in terms of volume and variety, and, hence, food insecurity.

3.6.3 The impact of climate change on crops

Climate change is affecting agriculture in complex and diverse ways. In addition to the direct effects of climate change on food production, caused by changes in agro-ecological conditions, it also affects the growth and distribution of income as well as the demand for agricultural produce (Tao, Hayashi, Zhang, Sakamoto, & Masayuki, 2008). Failure of the rainy season and general weather changes in Sub-Saharan Africa have a direct link to the failure of farm productivity, which in turn affects food availability at household levels (Kotir, 2011). Other researchers holding this view also highlighted that the associated effects of high temperature and the change in the pattern of rain precipitation could be one of the reasons for decreased global crop yield (Easterling et al., 2007). In reviewing the potential impacts of climate change on food security, it was asserted that unfavourable climate conditions could lead to an increase in the frequency and severity of extreme events, such as cyclones, floods, hailstorms, and droughts, which may bring about greater fluctuations in crop yields, local food supplies and create higher risks of landslides and erosion damage in those parts of the world that may be heavily affected (Easterling et al., 2007). These issues can adversely affect the availability and stability of food supplies and this will bring about food insecurity (Schmidhuber & Tubiello, 2007).

The worst is anticipated because of a faster global warming pace of 0.2°C, which is expected in the next two decades (Lobell, Schlenker, & Costa-Roberts, 2011). This will without doubt be accompanied by effects on crop growth and yield according to Lobell et al. (2011). Evidence is accumulating that climate change is, and will continue to, adversely impact agriculture and this has attracted public interest leading to the contribution of several researchers on the topic. A climate study by Peng et al. (2004) and supported by Muthayya et al. (2014), showed there is a direct relationship between rice grain yield and minimum temperature. In the 24-year experiment (1979 -2003) on temperature and grain yield, it was observed that for each 1% increase in minimum temperature, there is a corresponding 10% decline in grain production. This means, if frantic efforts are not made to address climate change and global warming issues, the world's mostly relied-on grain (rice) might be threatened, along with over half the world's population who depend on rice for their staple food (Muthayya et al., 2014). A baseline research on global warming, rice production and water use in China discussed how the challenges to rice production are also associated with the possibility of water shortages (Tao et al., 2008). While most researchers are focusing on the effects of climate change on the food system and how to minimize global warming effects, which have reduced agricultural production and productivity, others are concerned with finding out the aspects of the food system that are most

vulnerable to climate change and what can be done to reduce that vulnerability (Gregory, Johnson, Newton, & Ingram, 2009; Salami et al., 2010).

From the above discussion on the nature of climate change, it can be seen that climate change is impacting on food availability, food accessibility and food stability. There have been changes in temperature and precipitation as a result of the continued emissions of greenhouse gases, which in turn have brought changes in land suitability as well as crop yields (Tao et al., 2008). These changes will affect the availability of food in society. On the other hand, Tao et al. (2008) also anticipated that the increase in the frequency and severity of floods, hailstorms, droughts and cyclones could lead to greater fluctuations of crop yields as well as local food supplies. This will, therefore, adversely affect the stability of food supplies, hence food insecurity. Finally, the change in disease pressure from vector, water and food-borne diseases caused by climate change, also affects the utilisation dimension of food security (Tao et al., 2008). From this view, it implies that if the food system is fortified to the extent that vulnerability is reduced, some of the potential threats from climate change can be resisted.

3.6.4 The threat of Pests and diseases on crops

The impacts of pests and diseases on food security are well known (Gregory et al., 2009), especially at the household level. Pests and diseases cause damage to crops at different stages ranging from growing in the field, at harvest in storage and during transportation to the market (Alabi, Banwo, & Alabi, 2006). These have been major challenges affecting smallholder farmers. This perspective is acknowledged by the Food and Agriculture Organisation report, in which it was highlighted that the spread of trans-boundary pests and diseases is on the increase, causing significant losses to farmers as well as threatening their food security (FAO, 2017).

The inability of smallholder rice farmers from some developing countries to secure pesticides may account for their low rice output (Hilson & Van Bockstael, 2012). Up to a 30% loss in rice production was reported to be caused by rice blast disease (Seck et al., 2012), and several other bacteria and diseases have also been identified which pose threats and constrain rice productivity. Rice bugs and nematodes are some of the pests affecting rice. In Senegal, damage by birds and other animals were key factors responsible for the drop in productivity of Senegalese rice farmers (Seck et al., 2012).

Pests reduce global crop production and the loss in crop yield is huge (Frison, Cherfas, & Hodgkin, 2011). The global crop yield is reducing by 40% each year, as a result of the impact of pests (Frison et al., 2011). The incidence of weeds and animal pests are said to be negatively impacting productivity of crops grown for human consumption (Oerke, 2006). It has also been argued that “despite a clear increase in pesticide use, crop losses have not significantly decreased” (Frison et al., 2011, p. 242). Smallholder farmers, characterised by a low level of technical skills, lack of enough resources, low income generation and increased poverty (Oni et al., 2010), find it difficult to cope with the challenges of pests and diseases. Overcoming these challenges requires disease and pest control innovations (Godfray et al., 2010), which poor rural farmers, in most developing countries, cannot afford. This leads to low productivity, constraining food availability and accessibility.

3.3.5 Extension services

The importance and effect of agricultural extension programmes cannot be overemphasised. As far as the success of smallholder farmers is concerned, there is need for efficient pre- and post-harvest services to enable smallholders in high potential areas to intensify production, contribute to economic growth and reduce poverty (Poulton, Dorward, & Kydd, 2010). A sound extension system is expected to provide valuable farming information, training on farming skills and use of technology, pest management, financial assistance and more, depending on needs of these farmers. However, the limited access to agricultural-related technical assistance and the lack of knowledge about the management of soil fertility are all factors that have rendered food production vulnerable, thereby constraining the availability of food at both national and household levels (Mwaniki, 2006). Without support in the form of extension by both government and non-governmental organisations, most smallholder farmers may not be able to address these challenges, due to their weak financial conditions and this is why food insecurity in Africa has a direct correlation with poverty (Mwaniki, 2006; Power, 2008). The failure of extension agencies to inject the necessary knowledge and skills into the rural farmers is often a reason for low yield. If not for its chronic neglect, the farming sector would be able to support other sectors of the economy (White, 2012). A South African study argued that extension services for smallholder farmers have become a major concern for the United Nations but the South African extension Officers are not committed to promoting smallholder farmers as they make visitations to farmers only once a year (Von Loeper, Musango, Brent, & Drimie, 2016).

3.6.6 Access to Market

Most times, smallholder farmers with surplus production are trapped in poverty because of limited access to market (Von Loeper et al., 2016). The possibility for smallholder farmers raising their incomes from farming depends on market participation, but this is frequently difficult to achieve, due to the failures of rural markets in developing countries (Markelova, Meinzen-Dick, Hellin, & Dohrn, 2009). Smallholder farmers rely on markets for two reasons. The first reason is to access inputs, but this is a challenge for most rural communities. In Sierra Leone farmers obtain input supplies from petty traders who provide goods on loan, with a repayment of rice at harvest time. The agreed price is usually below the open market price at harvest time (Spencer et al., 2009). The other purpose is for farmers to sell their produce after harvest. However, access to market has been one of the major challenges for smallholder farmers in developing countries. Literature has recognised that market access is one of the hurdles that must be overcome by smallholder farmers, because it is a challenge for food security in Africa. However, the poor infrastructure in most of these communities are factors limiting marketing opportunities (Mwaniki, 2006). There are normally huge losses incurred by smallholders after harvest, due to the lack of access to markets and the low market prices for farm produce. This contributes to poverty and food insecurity for rice farmers in Sierra Leone (Cartier & Bürge, 2011). In support of this, (Mpandeli & Maponya, 2014) study indicated that, even when some of the farmers were successful producers, the lack of access to a formal market still meant they ran at a loss because the product perished in the storerooms.

3.6.7 Decline in soil fertility

Decline in soil fertility is a major factor reducing the productivity of food crops, and this can impact on the food security because the size of household output will be constrained (Graef et al., 2014). The decline in soil fertility may be caused by soil degradation and land use change. The mounting population in tropical and subtropical regions is continuously putting pressure on the use of land, forcing farmers to shorten the land rotation period. This decline in the use and length of the fallow period is reflected in soil fertility, farm productivity and exacerbation of food insecurity for smallholder farmers (Mwaniki, 2006).

3.6.8 Land tenure system

Land rights and management are factors determining the size of farm a farmer could cultivate in most parts of Africa and with the growing competition for land, the ability to produce food

will be affected (Godfray et al., 2010). In recognising the importance of land, it was argued that the poor world is a rural world and in terms of livelihood they rely on agriculture and land is critical to them. (Godfray et al., 2010) further emphasised that the solution to global poverty is to invigorate agriculture and ensure the redistribution of land (Rigg, 2006). However, limited land supply for agriculture has been a major factor working against smallholder farmers in Sub-Saharan Africa (Jayne, Mather, & Mghenyi, 2010).

In Sierra Leone, restricted access to land due to customary law is one of the often stated difficulties in the agricultural (Cartier & Bürge, 2011) and all lands in the provinces are under the tribal authorities (Chiefs) who manage them on behalf of the communities. Non-landowning family members who may want to use or occupy such land pay certain fees (Johnson, 2011). About half of the farmers in Sierra Leone, especially those engaged in the cultivation of bolilands pay for the land they cultivate (Spencer et al., 2009).

Land tenure security has, therefore, been described as problematic and leads to underutilisation of land. Those unable to afford the fee may not be allowed to utilise the land and this lack or limited access to traditional land by everyone has been described as one of the factors threatening food provisioning (Power, 2008; Lynch, Maconachie, Binns, Tengbe, & Bangura, 2013). Because of this weakness in provincial land management, a land reform was initiated with an objective to ensure the most productive users of land have access to the land (Johnson, 2011).

3.6.9 High transportation cost

Transport constraints are among the many challenges impacting on smallholder farmers' productivity and food security. Transportation has the potential to facilitate or hinder market access with a serious impact on the cost of foods and goods generally. For this reason, markets and improved market access have been described as critical and of immediate importance to rural poor households. With the majority of smallholder farmers located in remote areas with poor transport and market structures, it is easily perceived that high transaction costs is one of the reasons smallholder farmers fail to participate in markets (Ouma, Jagwe, Obare, & Abele, 2010). In their study Constraints and Challenges Facing the Small Scale Farmers in Limpopo Province, South Africa, they acknowledged that transportation is among the major challenges facing resource-poor farmers, as it has a spill over effect on the availability and cost of inputs (Mpandeli & Maponya, 2014). The issue of transportation is very sensitive as far as the success of small scale farming is concerned. The cost of transport is impacted both by poor road networks and the cost of fuel. These lead to an increase in transportation costs and this

translates into high transaction costs for farmers. This poses a threat to food security for smallholder farmers. Conteh et al. (2012) argued that food security remains a threat in the rural areas of Sierra Leone because of the poor rural infrastructures, such as road networks, transportation challenges and market access challenges.

3.6.10 Inability to engage in mechanised farming practice

Smallholder farmers are poor and lack technological innovations and inputs (Hesselberg & Yaro, 2006; Lynch et al., 2013). The production of rice in Sierra Leone has been described as labour intensive, due to the lack of mechanised farm tools and the lack of technology, while the poor preparation of land has led to poor yields (Cartier & Bürge, 2011). Agriculture in Sierra Leone is characterised as traditional, using farm techniques that are potentially degrading to the environment (MAFFS et al., 2015). Smallholder farmers depend on low-level traditional technology and hand tools for cultivation and this is limiting both farm size and outputs (Binns & Bateman, 2016). The effect of this is transformed into limited food available for household consumption and hence food insecurity.

3.6.11 Socio-cultural activities

Socio-cultural activities are factors identified, in the literature, as having an impact on food security. Culture has been defined as a complex set of distinctive spiritual, material, intellectual and emotional features, along with a value stream, traditions and beliefs that characterise and define a society or group of people (Conjoh, Zhou, & Xiong, 2011). In Sierra Leone, there are several prominent socio-cultural groups including the Bondo society (for women), the Orjeh and Poroh societies (both for men) and many others depending on the region. The Bondo and Orjeh are prominent in the Northern part of Sierra Leone and about 94% of females over the age of 15 are involved in this practice (Gruenbaum, Tholley, & Conteh, 2008). The Bondo, which is a female genital mutilation society is also practised in 28 African countries (Gruenbaum, Tholley, & Conteh, 2008; Bosire, 2012). During the initiation period, there are celebrations and feasting and, in most cases, families often exhaust their entire harvest to meet the cost of initiations, making their households vulnerable to food insecurity (Mgbako, Saxena, Cave, & Farjad, 2010; Conjoh, Zhou, & Xiong, 2011; Wilson, 2014). The Bondo initiation period of the year is considered a holiday in which women congregate, cook plenty of food, and prepare their finest clothes and jewellery (Mgbako, Saxena, Cave, & Farjad, 2010). This makes the occasion very expensive, thereby depleting the food stock of the participants' households.

I noted that the severity of socio-cultural activities is not well addressed in terms of its impact on economic and food security status of the household. Almost all literature on the topic is more concerned with other human right issues, such as the right of a child and health. However, the impact of the socio-cultural activities on household food security is emphasised in this current research.

3.6.12 Youth migration

Youth migration from the predominantly agricultural rural communities has the potential to adversely impact on agriculture in developing countries. This is because smallholder farmers in most developing countries rely on household labour (FAO, 2015). Able young men are leaving the rural areas and migrating to the cities in search of jobs and other opportunities, making the required labour for agricultural purposes insufficient (Hesselberg & Yaro, 2006). In support of this, (Sumberg et al., 2012) argued that the movement of young people from rural to urban communities is a key issue responsible for the decline in agricultural production. In Sierra Leone, migration, especially among the youth, is demonstrating a rural-urban transition, and this is drawing productive youth away from farming. The result limits household labour and constrains self-sufficiency in basic foodstuffs. In cases where the family labour is in short supply, with limited or no means of hiring external labour, farm size and productivity will be constrained (MAFFS et al., 2015; Binns & Bateman, 2016).

3.6.13 Limited financial resources

Poverty is prevalent among smallholder farmers in developing countries where over 70% of the food insecure population live in rural settlements (Mwaniki, 2006) revealed that poverty has been the root cause of food insecurity in developing countries. This is so because poverty limits farm size, as well as reducing the ability to buy food that is not produced. The ability to diversify and consume a variety of food with the required nutrients could also be impacted by the degree of poverty and rising food prices, especially because the staples pose serious challenges for both urban and rural communities (Altman et al., 2009). A Canadian study argued that among other factors, poverty is making food insecurity an urgent public health issue (Power, 2008). Living in extreme poverty renders people unable to afford their daily needs and is a major barrier to food security (Beaumier & Ford, 2010). Acknowledging the importance of the relationship between poverty and food security, South Africa, in their commitment to alleviate poverty, pointed out that achieving food security must be considered a key component of that commitment (Altman et al., 2009). Because of the interaction between

poverty and the other factors that impact food security, one can argue that food insecurity is a result of poverty.

3.7 Summary

Food security has been widely researched, but none among those reviewed above have holistically researched the factors impacting household food security. Most literature reviewed emphasised how the identified factors impacted farm production and productivity, but how this resulted in household food insecurity is less documented. It is clear from the literature that food security is attained when the four pillars (availability, access, utilisation and stability) are all ensured collectively, and not just some of them. The attainment of one or two of these pillars does not guarantee food security, especially at household level. Household food availability, for instance, does not guarantee food access, quality or stability to all members of the household. The role of poverty is huge in undermining household food security.

Several factors have been identified by others as impacting food security generally. These factors constrained the amount of food a household can produce, how it is allocated within the household, the variety and quality of this food, and how long this food could last the household. Literature has also shown that different households could be impacted by the drivers of food insecurity differently based on preferences.

As the previous chapters have presented the background to this research and relevant literature, chapter four, which is the next chapter presents the research methodology, data collection methods and analysis techniques used in the process.

Chapter Four: Research Strategy

4.1 The research approach selection

This study is a qualitative single research case study. The use of a case study is considered appropriate, because it is a community study and community case studies are an appropriate approach in food security related research (Beaumier & Ford, 2010). This is because the qualitative case study approach allows in-depth analysis of the processes and conditions shaping the dimensions of food security; namely access, availability, utilisation and stability of food (Power, 2008; Beaumier & Ford, 2010). Creswell, Hanson, Clark Plano, and Morales (2007, p. 245) defined a case study research approach as “a qualitative approach in which the investigator investigates a bounded system (a case) or multiple bounded systems (cases), through detailed in-depth data collection involving multiple sources of information (e.g., observations, interviews, audio-visual material, and documents and reports) and reports a case description and case-based themes” (p. 245). The case study builds an in-depth contextual understanding of the dynamics of the dimensions that are influencing the food security of smallholder households in the case site. The case relied on multiple data sources including interviews, direct observation and participant observations pertinent to the phenomenon of the study (Creswell et al., 2007).

A single case was chosen because the study focuses on a single concern (food security) of a single village, which the researcher intends to intensively describe and analyse within its context. The researcher intends to explore this setting and draw inference on the status of food security in the northern region of Sierra Leone. Studies have confirmed that single case studies can identify and intensively describe the existence of phenomenon (Gustafsson, 2017). Based on the nature of the research question, a case study approach is considered appropriate for this study. This study asked the question: What influences household food insecurity of smallholder rice farmers in the northern region of Sierra Leone, and why? This is both a ‘what’ and ‘why’ question focusing on a contemporary issue in a rural setting in the northern region of Sierra Leone, over which the researcher has little or no control so a qualitative case study approach is appropriate for this research (Yin, 2013).

4.2 Case and research site selection

The study focused on smallholder rice farmers and how the status of their food security is influenced by diverse factors that are both external and intra-household. Rice is the staple food

in Sierra Leone (Binns & Bateman, 2016; Conteh et al., 2012; Spencer et al., 2009) and it is grown by smallholder farmers who constitute over 90% of the farming population in Sierra Leone (Conteh et al., 2012). In addition to this, studies have shown that the northern region constitute 35 percent of the country's total population (Statistics Sierra Leone, 2015) and it has been described as one of the highest rice producing districts in the country in the past and the Port Loko District is one of these districts (Spencer et al., 2009). Despite this the region is highly food insecure (WFP, 2015a). This study continues from previous survey research conducted in Sierra Leone. A comprehensive food security and vulnerability analysis study was conducted in October 2015 by the World Food Programme of the United Nations to assess the state of food security in Sierra Leone. In that survey, the northern region was identified as the most food insecure in Sierra Leone and Port Loko District as the most food insecure in the region (Figure 1.1). In addition to this, Koya Chiefdom in the Port Loko District was classified as a severely food insecure Chiefdom and it is in this Chiefdom that Mawoma, the case village is situated. This village is occupied by almost 100% smallholder rice farmers and they are poor. It is for these reasons that the Mawoma village was selected as the site for the study.

4.3 Collecting the data

This section gives a detailed description of the data collection process applied in conducting this research. It involves the preparations undertaken to ensure successful field data collection. This started with the preparation of an interview guide, seeking approval from key informants, the local authority in the case village and all participants. The three data collection techniques used in this study (interview, observation and field notes) are also discussed in this section. Also, some of the challenges faced in accessing the participants are discussed at the end of the section.

The data collection started on 20th of June, 2017 and ended on the 19th of August of the same year. The process involved collecting both primary and secondary data to ensure relevant information needed to answer the research question were collected. In collecting the primary data, the researcher developed interview topics and questions, guided by literature and the same questions were asked across participants. The interview topics were developed based on the research question and aim and they were the basis of the interview guide. With participants' permission, semi-structured interviews were conducted with open-ended questions to ensure in-depth data on the topic. Open-ended questions allowed richer and more extensive information to be obtained from respondents (Yin, 2011). The interviews were digitally

recorded to ensure a more accurate retention of the responses from participants which is in line with recommendations made by Yin (2011). The conceptual framework of this study (Figure 3.1) and the knowledge gained from previous literature reviewed guided the interview preparation and this enhanced smooth interactions between the researcher and the participants. While recording the interviews on an audio recorder given by Massey University, the researcher made detailed notes as well as maintaining a field diary to increase the accuracy of response retention. Both Stake (1995) and Yin (2011) highlighted that in order to increase accuracy in collecting data using a recorder, it is important to maintain a diary in which field notes are made alongside digital recording (Stake, 1995; Yin, 2011). Undertaking interviews in the field, in the participants' place of work, or in the case of the farmers their homes, created the opportunity to observe the physical condition of farmers' housing structures, sources of drinking water, means of transport, road network, farms and farming systems. While all key informants from the Ministries were interviewed in the English language, the village authority and the farmers were interviewed with the local dialect-Themne as this is the only language these farmers understand. It also the local dialect for the researcher and this made easy for the researcher to read and interpret questions for participants.

In order to ensure the collection of rich and detailed data from the field, a direct observation data collection technique was applied during the field research. While in the field, the researcher observed and took notes on behaviours, the method of sharing food within households in the community. In addition,, the physical challenges of transportation, as well as personally witnessing the decomposition of farm produce awaiting buyers were also observed (Figures 5.4 and 5.11.). This observation process, therefore, enabled the acquisition of additional information relevant for the study. This is in accordance with Gillham (2008) and Yin (2013) who emphasised that in qualitative data collection observation provides a means of additional information.

Written documents played a very important role during the data collection process, as they formed the secondary source of data for this study. From each of the key informants interviewed, especially those from the Ministries, the researcher was asking for reports and related documents on the topic interviewed. Background on the Sierra Leone agriculture, cropping, status of food security, government reports, maps and statistics of regions and communities were accessed through these secondary sources.

The data collection was done in the wet (rainy) season and this made access to the study site difficult. However, having been born in the region gave the researcher an advantage as a bike and a rider was offered by a relative to facilitate movements to and from the village. As there is no guesthouse in the village, the researcher was hosted in the nearby town of Masiaka, some kilometres away from the village. For most of the time, the researcher and his rider were caught by rain and properly soaked. The rainy season was not a good experience during this data collection, especially when operating within a given timeframe. Transport for interviews conducted with the Ministries was not challenging as a car was provided by family members of the researcher and the rain was never a challenge.

4.4 Sampling

This study is a qualitative case research and as such, a qualitative sampling technique based on purposeful and snow ball sampling principles was used. A purposeful sample method was used to select rice farmers in the northern region based on the fact that rice is the staple cultivated by smallholder farmers, who constitute about 90% of the rural population. The north has been reported to be one of the most food insecure regions in the country (WFP, 2015a). This study purposefully selected three levels of participants. These were participants from the government ministries, the village authorities and the smallholder rice farmers. As the research objective is to investigate the drivers of household food insecurity of smallholder rice farmers in the northern region of Sierra Leone, the researcher carefully selected ministries and officials that are concerned with national food security so that to get an overview of the status of food security at national and regional levels. It is based on this perception that the Ministry of Agriculture, Forestry and Food Security, and the Ministry of Health and Sanitation, and Statistics Sierra Leone were selected. For this same reason, officials of these ministries at district levels were selected, because they deal with food security issues at district levels. They reside in the northern region, which is the case study area and have a high level of interaction with smallholder rice farmers on a daily basis. It is on this basis that specifically these governmental officials were selected from the Port Loko district which is the case district.

At the village level, the Chief, Medical Officer, Youth Leader and the Women's Leader were purposely selected, because they live in the community, are aware of the prevailing food challenges in the village and at the same time are familiar with household challenges within the community. Lastly, smallholder rice farmers were selected from: land owning households, non-landowning households; large and smaller sizes household, so as to get a representative of

major characteristics of the village. Ten (10) rice farmers made up of five men and five women (each from a different household), were purposely selected from land owning families and ten (10) from non-landowning families with the same composition; this was done with the help of the village Chief. The mixture of men, women, landowning families and non-landowning families was done to get a gender balance and to assess the interaction between landowning and non-landowning families. This is because the study focus was on smallholder rice farmers. These farmers are land users with households consisting of male and female members. The rationale for this sampling method was to be able to see the dynamics of the drivers of food insecurity across the different profiles of households within the village, as participants with diverse characteristics are more likely to be impacted by different forces and can provide in-depth and detailed information in a study (Curry, Nembhard, & Bradley, 2009).

Using the snowball sampling technique, the key informants interviewed at the Ministry levels referred me to their appropriate staff at the district level and the Chief helped in identifying the twenty smallholder farming participants in the village. The above discussed sampling strategy was successfully carried out, interviews were conducted and relevant information capable of answering the research question was collected. The potential bias with this method was that those who referred me might have chosen their relatives with the expectation of incentives, but it was made clear that their participation was voluntary and unpaid. In addition, the basis of participation in terms of family size and land ownership were also spelt out clearly.

4.5 Research Participants

This study involved a total of thirty-two participants comprising eight government officials from the Ministries of Agriculture; Health and Sanitation; and Statistics Sierra Leone. Five of the interviews were at a national level and they were interviewed to gain an overview of factors shaping food security in Sierra Leone generally and the northern region specifically. Three government officials at the district level were interviewed to provide information on the status of food security and the possible factors influencing food security for smallholder rice farmers in Port Loko district. At village level, there were four key informants, made up of the Chief, the Chairlady, the Youth Leader and the Medical Officer. These key informants also fit different profiles. The key informants from the Ministries are government officers (Directors) who are involved and are rich in agricultural information in the country and are conversant with farmers' challenges as well as the status of food security in Sierra Leone. The village authorities run the local affairs of the village and were considered appropriate because of their

perceived familiarity with the community, household profiles and the current issues and challenges within the community. These people were interviewed to get an insight into the status of food security in the village, as well as the unique characteristics of the people and the community. Finally, twenty smallholder farmers were interviewed from ten households each comprising a male and a female selected on the basis of the above criteria given to the chief.

4.6 Data Analysis

The findings of this research were analysed using qualitative data analysis methods. The interview data consisted of 32 audio-recordings together with field notes made during observations. The interviews were conducted within a timeframe of around 60 minutes. Because of this, and given the timeframe of the report, the researcher did not transcribe the interviews. The researcher listened to each of the interviews, then noted and summarised the key themes and information considered important in addressing the question and objective of the study. The field notes were then transformed into themes.

This process of data analysis began with going over the field notes as well as listening and re-listening to the recorded interviews so as to be familiar with the data and build explanations about the case as recommended by Yin (2011). During the process of listening and reading of the field materials, the data was summarised and organised in a way it could make sense for the study. Secondary material was also included. The issues that emerged from the data were put into groups according to categories. The interviews were listened to over and over to make sure every aspect of the emerging themes was captured. The issues which emerged were grouped into two main categories: those that impacted on production output and those that impacted on the household food reserves. This data was then interpreted and translated into a meaningful message that ensures a logical sense of the research findings. To further ensure the sense of the findings, an explanation was given for each of the grouped issues, describing them in the context of food security and then drawing conclusions with inferences to the study data. This method of analysis agreement with scholars who highlighted that the process of data description, classification and connection help the researcher in drawing empirically based conclusions (Dey, 2003; Yin, 2009).

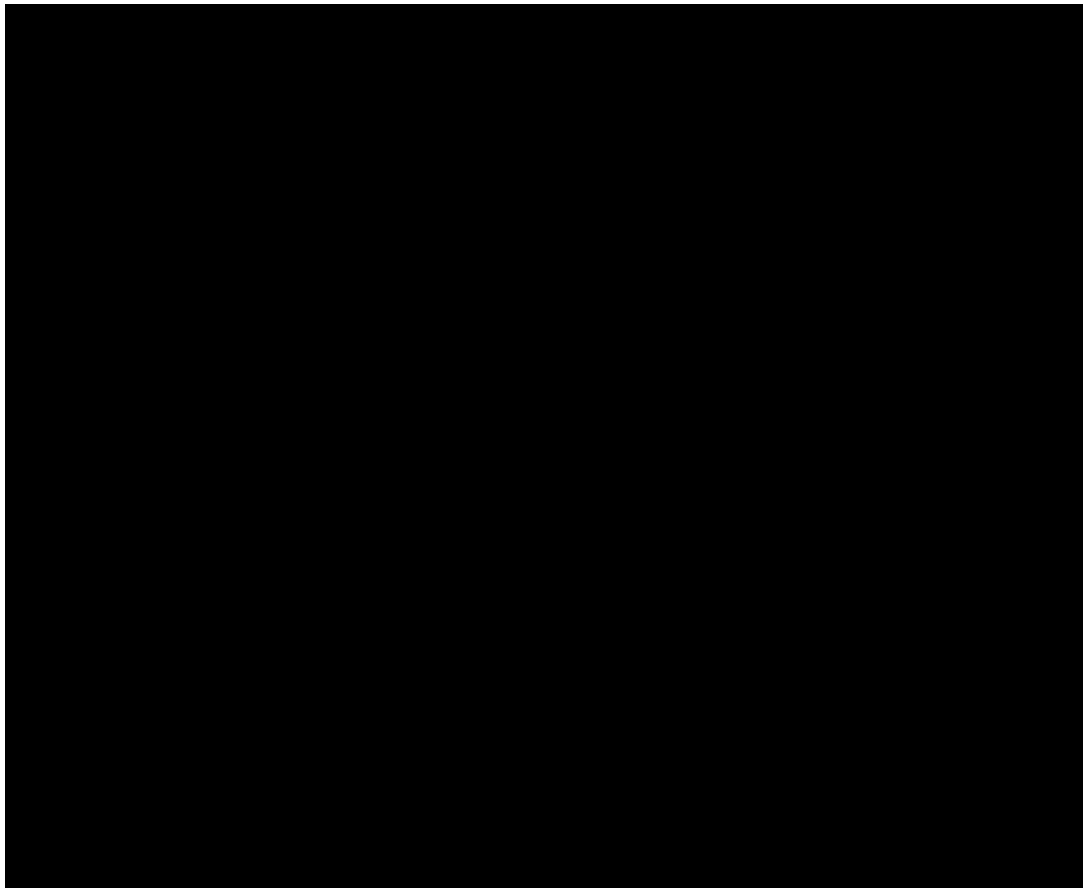


Figure 0.1: Qualitative data analysis as a circular process

Source:(Dey, 2003)

4.7 Ethical considerations

According to the Human Ethics Committee, Massey University criteria, this research was assessed as a low-risk (Appendix 1). In addition to these criteria, the researcher considered other ethical principles before the research was conducted. The ethical considerations relate to subject matter as well as its methods and procedures. First, an information sheet containing a detailed description about the researcher, the research topic and the purpose of the research was prepared signed and given to all participants. The information also contained details of the supervisors that could be contacted in the event a participant wished to obtain more information from the supervisors regarding the study. As the farmers could not read and write, the researcher, as a native speaker of the research community dialect, translated the documents for each of the village participants into the local language.

Before conducting the interviews, written consent to record the interview was sought, also the purpose and process of the research was explained to participants (See Appendix 3). Also,

while literate participants read and signed the informed consents, it was the responsibility of the researcher to read and interpret the informed consent for all participants in the village, because they could not read and write. During the field work, verbal consent was also obtained before carrying out observations and photographing key community identities. Each of the informed consent forms explained the purpose of the research, and that their participation was voluntary and no payment in the form of wage is involved. In line with the Massey University Human Ethics Committee, participants were informed about their right to decide whether to take part or decline. Throughout the researcher's interactions with participants, the rights of participants were observed in terms of cultural values and confidentiality, and they were assured that their names will never be used in the production of this report without their consent. Also, the participants were informed that the information collected is to be used for academic purpose, would not pose harm to them and that the information collected will be kept in a secure place for a period of five years before being destroyed. Relationships between men and women are culturally sensitive within the community particularly among married women and young men. In this light, the researcher was accompanied by the village youth leader, who was cautioned about confidentiality, and his presence built confidence in the minds of the married men in the community.

4.8 Summary

This chapter provided a clear description of the research methods used in this study. The study is a qualitative single case study. The case site was selected because it is made up of almost 100% rice farmers reported to be food insecure by research conducted in Sierra Leone in 2015. The sampling techniques applied in selecting key informants and households were purposive and snow ball sampling techniques. Semi-structured interviews, direct field observations, note taking and secondary resources were used in collecting the field data for this research. In analysing the data, the interviews were repeatedly listened to, followed by identification and description of the data to get an overview of the raw data. Data were then classified in order to identify and define relevant categories, upon which connections were made based on their relationships. The amended and approved food security framework by (FAO, 2009) was used as a guide in assessing the impact of the factors influencing food security in the community. The code of conduct of the Massey University Human Ethics Committee was taken into consideration and followed throughout the entire process of this research.

A detailed description of the case study is presented in chapter five, which is the next chapter. This chapter describes the context of the case study. The physical as well as the social characteristics of the case study are described in detail.

Chapter Five: Case study description

5.1 Introduction

In this chapter, the context of the case study undertaken is described. This study focuses on the dynamics of the dimensions that influence the food security for smallholder rice farmers in Mawoma village in the northern part of Sierra Leone. The chapter describes the demographic and physical features of the northern region, the Port Loko district and the case village. In addition, the chapter includes: location of Port Loko district in the north, location of the case village – Mawoma, population of Mawoma village, the physical structure, the cropping pattern in the village, cultural activities, livelihood activities, and land and land use system in the village. Sierra Leone is a tropical country with two main climate seasons. The seasons consist of an intense rainy season, which occurs from May to October, and a dry season, from September to April. The lean period coincides with the rainy season and this is the time when access to locally produced food is extremely difficult (MAFFS et al., 2015).

The Northern Province is one of the four provinces of Sierra Leone, usually simply referred to as the North, because it is located in the northern geographic region of Sierra Leone (Figure 5.1). This region is highly mountainous with mangroves along the coast. There are different types and heights of mountains, hills and valleys, as well as wet lands. In addition, there are unique and endangered species. One of Sierra Leone's most popular tourist attractions, Outamba-Kilimi National Park, is located in the Northern Province.

Figure 0.1: Map of Sierra Leone showing the Northern Province

Source: (Pratt, 2016)

There are five districts in the Northern Province and these are Kambia, Port Loko, Bombali, Koinadugu and Tongolili districts. The region has an area of 35,936 km² (13,874 square miles), which is 49% of the total area of Sierra Leone (Taylor, 2011). The total population is 2,502,805 representing 35.4% of the national population (Statistics Sierra Leone, 2015). There are seven ethnic groups with significant populations in the region and these are the Temne (also called Themne), the Limba, Kuranko, Mandingo, Yalunka and Fula. The Temne form the largest ethnic group in the northern region. The Northern Province is a Muslim dominated region with over 70% adherents, while Christianity forms the minority (Taylor, 2011).

Koinadugu district in the north is well known throughout Sierra Leone for livestock agriculture; however, crop production is the main source of livelihood for the rest of the districts in the north. Rice is the main crop, and agriculture in this region is in the hands of smallholder farmers (Jalloh & Njala, 2006). The majority of the roads in the rural parts of the province are in very poor condition and this makes it difficult for farmers both in terms of accessing inputs and when trying to sell their produce.

The northern region is known for several socio-cultural activities. These activities are tribe-based cultural activities and some of these are also based on gender (Conjoh et al., 2011). The most prominent cultural activities for men in the northern region are the Orjeh, Poroh and Gbangbanni. The Poroh and Orjeh are the secret societies for the Temne tribe, while the Gbangbanni society belongs to the Limber tribe. The Bondo female secret society is common for all tribes all over the northern region. Whilst the Poroh, Orjeh and Gbangbani secret societies are sources of youth unity and interactions for men, the Bondo society is a Female Genital Mutilation (FGM) association, in which girls and women are circumcised. In the northern region, the Bondo society also creates a high level of interaction among members of the communities. Initiations into these secret societies are done immediately after harvest in the dry season and involve celebrations and festivities in their respective communities.

Due to the influx of mining companies into the country and the perceived opportunities in the major cities, there has been a high migration rate amongst youth from the villages to urban centres (Maconachie & Binns, 2007; Maconachie, Binns, & Tengbe, 2012).

5.2 Port Loko district location in the north

Port Loko district is situated in the Northern Province (see Figure 5.2) and it is the most populated district in the north. Port Loko is one of the five districts that make up the northern region of Sierra Leone. This district is one of the leading rice producing districts in Sierra Leone. It has 11 Chiefdoms and its capital town is Port Loko. The case village is in the Koya Chiefdom. Although Lunsar is the district's largest town, other major towns include Masika, Lungi, Pepel and Gbinti. The district shares borders with the Western Area to the west, Kambia District to the north, Bombali District to the east and Tonkolili District to the south. The total size of the region is 5,719km² (2,208 square miles).

The district has a population of 614,063 living in about 87,723 households (Statistics Sierra Leone, 2015). The Temne is the district's largest ethnic group and it is dominated by Muslims. The district is governed at local level by a district council, which is headed by a District Council Chairman elected by residents. According to MAFFS et al. (2015), Port Loko district is one of the districts with the highest percentage of severely food insecure households (MAFFS et al., 2015). Port Loko is also said to be among the districts with the highest proportion of chiefdoms with food insecurity (Figure 1.1) and the Koya Chiefdom in which the case village is situated is one of these Chiefdoms.

Figure 0.1: Map of Port Loko in Sierra Leone

Source:(O. S. Leone, 2015)

Crop production is the main source of livelihood in the Koya Chiefdom and indeed throughout the district. Crops such as rice, cassava and sweet potato are the main source of livelihood for over 80% of population in the district (OCHA Sierra Leone, 2015). Port Loko district is also known for bauxite and iron-ore mining. Mining companies, such as London Mining are major employers in the area.

5.3 The location of the case village – Mawoma

The data was collected in Mawoma village (Figure 5.4) in the Koya Chiefdom. Koya is one of the Chiefdoms in Port Loko district. The Chiefdom has a total population of 85,206. Of this, 40,120 are males and 45,086 are females (Statistics Sierra Leone, 2015). The Chiefdom headquarters is Songo but the most popular town is Masiaka, which is located 40 miles (65 km) from the capital city Freetown. Mawoma village is located at an elevation of 457 meters above sea level. The village has coordinates of 9°34'0" Win DMS (Degree Minutes Seconds) or 9.56667-09 and 11.5333 (in decimal degrees). The position of the village is KL25 and its joint Operation Graphics reference is NC29-09 (Getamap, 2018).

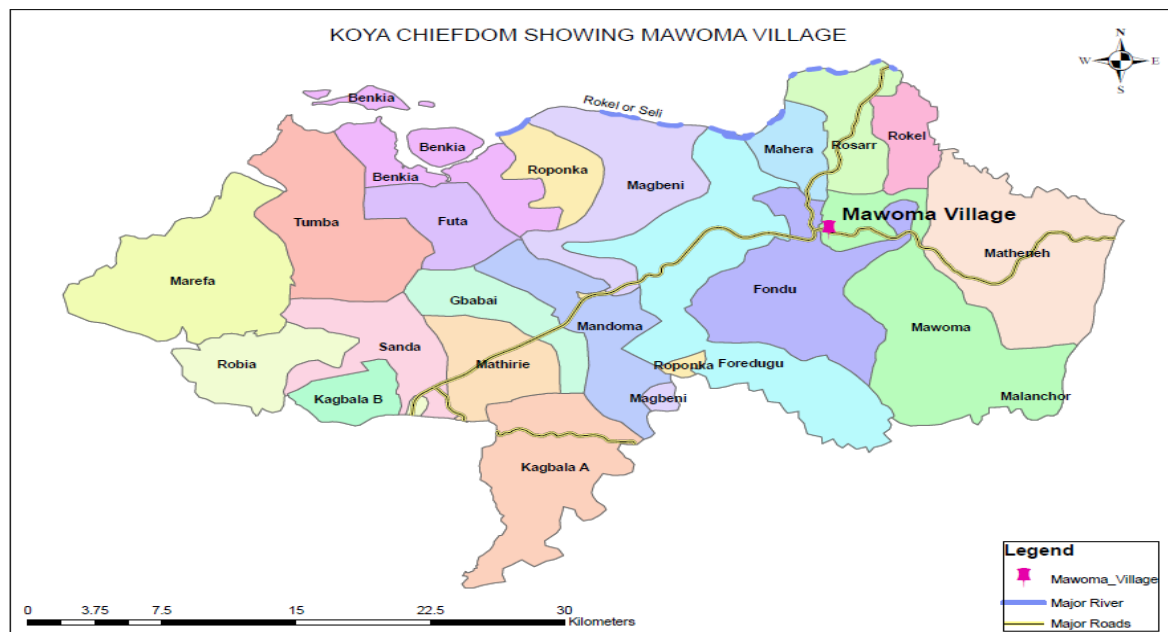


Figure 0.1: Koya Chiefdom showing Mawoma village

Source: (Author, 2017)

Mawoma experiences a humid tropical climate with two distinct seasons. The two seasons are the rainy season, which lasts from May to October and the dry season extending from November to April. Because of this, the village experiences seasonal changes in temperature

and in the amount of water available to plants. Before fluctuation in the weather conditions due to climate change, the village like other parts of Sierra Leone had an annual rainfall average of about 3,000 mm (Jalloh & Njala, 2006). Today, this cannot be determined as there is a disruption of the rainfall pattern in the village. The village is currently facing constant changes in the rain pattern every year and this affects the cropping calendar.

The monthly average temperature ranges from 23 °C to 29 °C, although it can rise to as high as 36 °C. Sunshine hours vary from season to season. In the dry season, the sunshine per day is 6 – 8 hours per day, while in the rainy season it can be as low as 2 hours per day (Jalloh & Njala, 2006).

5.4 Population of Mawoma village

Although there is no formal record of the population at village level, according to the Chief, there are 890 people in Mawoma village consisting of 84 households. There is an average of 10 people living in each household, which in some cases includes extended family members. The population is made up of 326 males and 564 females. This population, especially the youth proportion, is reducing every year as a result of the outflow of youth into the city. Due to this flow of youth into major towns and cities, there are more women and children than men in the village. A large proportion of the male population is made up of old men, most of whom cannot do major farm work. This has affected the labour force needed to undertake agricultural activities in the village.

Almost all the adult population have no primary school education. However, over 90% of the children aged 6 years and above attend the only primary school in the village (personal observation). Apart from the health officer and the nurses, all the people in the village are smallholder rice farmers.

5.5 The physical infrastructure

Mawoma has minimal infrastructural development. The only means of commercial transportation is the use of bikes Okada³. The roads leading from the village to the farms are deplorable, so are those leading to major towns. Due to the poor road network, there are no

³ This a local name for commercial bike riding in Sierra Leone.

commercial vehicles running into this village. This makes it difficult to move produce from the farm to the village, as well as to the market. The movement of people and goods is mainly by means of bikes (Figure 5.5).



Figure 0.1: The only means of transport into the village

Source: (Author, 2017)

Houses in the village have walls built from mud bricks while the roofs are made from of imported zinc (Figure 5.6). However, the kitchens are built from mud bricks and thatch roofs. Very few houses have one room for two people, the rest of the households are living in three to five people per room. The sleeping houses and kitchens are built from local and imported materials. Although there is borehole water well as a source of drinking water, many are still fetching water from streams for drinking, cooking and washing purposes. The toilet facility is poor. Although some houses have pit toilets, the majority of the residents use the bushes as toilets.



Figure 0.2: Village housing

Source: (Author, 2017)

The village has certain structures that are communally owned and these are: the mosque, the school, health centre, borehole water well and streams (see Figures 5.7 and 5.8). These resources are collectively owned by all members of the community. The village health centre serves Mawoma and its surrounding villages. This is headed by the Health Officer in charge. In addition to the health centre, there is a primary school comprising classes one to six. This operates the same calendar and curriculum as any other public primary school in the country. The school is run by seven teachers. Five of these are government paid teachers and two are community paid teachers. The community teachers are untrained and unqualified and are paid through contributions made by parents of the school children. As the village is predominantly Muslim, the only religious structure in Mawoma is the mosque which is headed by an Imam (religious leader) appointed by residents in the village.



Figure 0.3: Mawoma Primary School

Source: (Author, 2017)



Figure 0.4: Mawoma Health Centre

Source: (Author, 2017)

5.6 The cropping pattern

Mawoma practices farming both in the upland and low land. The Upland is the most popular and almost every farmer practices upland farming. Very few farm in the swamp land. Both upland and swamp land are rain fed irrigated and are cultivated once a year. In the upland farming area, the major crops are invariably grown together. Crops like millet, corn, cassava, sweet potato and other vegetables are normally grown in mixed stands. Despite this, rain fed upland rice dominates over all other crops (Figure 5.9). The reason for the mixed or intercropping is to better utilise the limited available household labour with the goal of ensuring the availability of food for a longer period. Women mix several crops together with rice seeds to ensure diversity of crops, which they normally harvest as they need, especially vegetables. The lack of adequate knowledge of how much of each crop should be mixed together is normally a challenge with this cropping pattern. The farmers pay more attention to rice, so rice occupies the largest area of the farm followed by cassava, ground nut and potato.

For some households, cassava and potato are mainly grown as sole crops at the end of the rains and the beginning of the dry season. In the past 3-5 years, there has been an increase in the proportion of cassava stands intercropped with rice, because cassava leaves can be sold as vegetables to those within the community without cassava farms. As groundnut is now

considered a cash crop for most households, the crop is becoming increasingly important in the village.

Despite the effort applied by most farmers, these crops do not do well, due to the decline in soil fertility. Soil fertility has greatly dropped due to the change in the fallow practice. Previously, the forest was left to fallow for a period of 10 to 15 years. By so doing the accumulated leaf and other decayed plant materials composted and, thus, fertilized the top of the soil. However, due to increased pressure on land, the fallow period has been reduced, resulting in a decline in soil fertility.



Figure 0.1: Mixed cropping cultivation of rice maize and cassava

Source: (Author, 2017)

5.7 Cultural activities in the Northern region

The Northern region culture is famous for the Bondo, Poro, Orjeh and Paramount Chief celebrations. While the Bondo, Poro and the Orjeh society celebrations happen every year, the Paramount Chief's celebrations occur only on coronations and funerals of Paramount Chiefs. As in almost all rural communities in the northern region, Mawoma village holds certain values and cultural practices in high esteem. These cultural practices are normally transferred from one generation to another. Prominent among these cultural practices are the Bondo and the Orjeh societies. The Orjeh is the secret society for males, while the Bondo is practice by females.

With the Orjeh society, the youths are initiated voluntarily and almost every youth in Mawoma village belongs to this society. Because of its social flavour and the high cultural value attached

to this activity, every male youth in the village is proud to be a member. In the dry season when all harvesting and all other farm work is complete, the Orjeh society is a major source of social life in the village. During this period, celebrations are organised with neighbouring towns and villages invited to the occasion. These people will be hosted for a week or more and during this period, abundant food will be prepared to make sure every guest eats well. With these celebrations, every village household contributes towards the feeding of the guests, regardless of whether you are a member or not. Goats, sheep, chickens and other domestically raised animals will be reserved for these celebrations. Therefore, a lot of resources, both cash and non-cash, are spent during these activities. This may consume a large proportion of food stock in most households.

On the other hand, there is the Bondo society which is a traditional secret society for females. Bondo is the name given for the initiating secret society of women in Sierra Leone. Different tribes and regions have different names for the practice. The Temne in the Northern region call it Bondo. It is a traditionally held belief that when a woman is initiated she commands respect within the community, and is permitted freedom of movement and association, especially when the Bondo ceremony is in session. Initiates of the Bondo society (Female genital mutilation) are also said to have powers within their communities, making them able to mediate social relations and conditions women live in (Wilson, 2014).

Bondo is best described as an authoritative group owned entirely by women. It grooms teenage girls into adulthood and wedlock, as well as parenthood. These young girls are initiated through circumcision. Thereafter, they are taught about many things including medicinal herbs, motherhood and how they could become perfect homemakers. Upon entering their teens, or sometimes as young as ten, the girls are initiated, and most times this is done forcefully. The event is perceived as a way of signifying the completeness of their womanhood. During the Female initiations (Bondo), tens and sometimes hundreds of young girls are taken for three months or more to a sacred place, where male access is forbidden. It, therefore, serves as a traditional training period for girls. Despite the government and other NGOs' efforts to discourage these activities because of its perceived health and economic effect, the village still holds this practice in very high esteem.

In Sierra Leone, the prevalence of female genital mutilation (Bondo) in girls and women (15 – 45 years) is estimated at 90% (Wilson, 2014). Although there is no current data available, in 2008, 95.2% of females among the Themne tribe, who are predominantly found in the Northern

Province, were members of the Bondo society (Statistics Sierra Leone & Macro, 2009). According to the United Nations International Children's Emergency Funds (UNICEF) classification on the prevalence of female genital mutilation, Sierra Leone is classified as a Group one country. That is, it is amongst countries with more than 80% prevalence of female genital mutilation (Wilson, 2014). In Sierra Leone, there is more prevalence of this activity in the rural areas than in the urban areas. The Northern region has the highest prevalence of female genital mutilation.

Like the Orjeh society celebrations, this practice also has financial implications and puts pressure on the rural poor. The costs can be huge according to (Bosire, 2012). The cost ranges from registration fee, payment to the Sowe⁴ and her helpers in the bush, food for the initiates and other society members residing with them. The food at this time is special food, full of meat and fish richly prepared. Also, as there are celebrations, there needs to be sufficient food for all present. There is, therefore, a cost for food, musicians and celebrations. Because most of the population are living below \$2 a day (Binns & Bateman, 2016), this initiation cost is a burden on the household resources. In addition to the above costs, there is also a healthcare cost. There is always the possibility of complications that may require healthcare assistance, either immediately or in the future. These activities are traditionally done in the dry season immediately after harvest. Frequently, families in rural communities use their whole harvests to meet the cost of initiation. The result of these actions pushes rural families into further poverty.

During the initiations (circumcision) period, hundreds of friends and relatives are invited and as in the Orjeh society, plenty of food will be prepared and served to the guests. These are annual events in the village calendar and it is part of the way of life of the people in the village. When one village organises the event, every neighbouring village is expected to attend and there is a lot of preparation put in place by the community.

⁴ The traditional head of the female genital mutilation society

Figure 0.1: Ceremonial Bondo Masquerades performed in public

Source:(Bosire, 2012)

Figure 0.2: Bondo initiation proceedings

Source:(Wilson, 2014)

5.8 Livelihood activities

The livelihood activities undertaken in Mawoma village have not changed since the first time the author visited the village nine years ago. The livelihood activities discussed in this section refer generally to those activities that households engage in to meet their basic needs. In the case village, agriculture is the predominant livelihood activity.

5.8.1 Food production as a livelihood activity

In the case village, food crop production is the main livelihood activity; all households rely directly on crop production to meet their food and non-food needs. Food production is carried out using the slash and burn shifting cultivation method referred to as bush fallowing. Upland farming makes up almost 80% of the cropping area for the case village. These uplands have mixed vegetation comprising mainly trees, shrubs and grasses at different growth stages. The community practises bush fallowing: a system in which the farmers clear the bush or forest that has been growing long enough to become fertile through branches and leaves that have accumulated and decayed on the soil surface over the years. The land is cropped for two to three years and then allowed to become fallow again. In the past, the average fallow period was 8.8 years (GoSL, 2009), but due to pressure on the land (Forkuor & Cofie, 2011), this has dropped considerably to as short as three years. Before cultivation, trees and grasses are cut down to clear the area. The felled trees are taken home as firewood for the preparation of food. In those few bush areas that have reached the forest stage and grown into trees; the trees may be burnt down and used as charcoal as well as firewood. This charcoal is then sold to get income to buy food items or address other household needs. After the hard work of slashing, burning and clearing the bush, planting starts in the early months of the rainy season.

The current practice is mixed cropping. As youth migration has become prevalent, mixed cropping has become more popular. Those with limited labour supply believe the practice could reduce the effect of labour shortages in most households. The crops normally planted as mixed cropping in these farms include: rice, which is the principal crop, cassava, corn and beans. Other crops such as sweet potato and ground nut are planted separately to prevent their vines from affecting rice growth. Rice is the staple food, so more attention is attached to this crop than any other crop on the farm. However, some farmers fear that the growth and productivity of rice would be affected by other crops which stop them from practising mixed cropping. Millet, sorghum and other vegetables are also some of the crops grown by some households. Rice cannot feed the households all year round, because most farmers cannot grow enough due

to production challenges and the voluntary depletion of rice stock in the dry season as a result of socio-cultural activities. Therefore, the other crops are expected to address the lean period but most of them could still be too immature for consumption during the lean months.

The size of the farm cultivated in the case village and the variety of crops depends on the availability of labour and land size available to the household. However, the average farm size per household is 1.5 hectare. Farming activities are carried out with the use of traditional farm tools which include hoes, cutlasses, knives and axes. The cutlasses and axes are used during the slashing and clearing, the hoes for ploughing and the knives to harvest. Sometimes hoes and cutlasses are also used to uproot cassavas and potatoes. The use of modern farm implements is not practised.



Figure 0.1: Livelihood activities showing the decline of vegetable quality

Source:(Author, 2017)

The firewood (left) and the vegetables (right) and charcoal (bottom) in Figure 5.12 are some of the business activities the villagers participate in. However, like most vegetables and perishable produce in the village, the degraded garden eggs shown in the photo (right) are as a result of the existing constraints in accessing an organised market.

5.8.2 Other livelihood activities

Petty trading, though at a very small scale, is another livelihood activity in the case village. A few of the women buy food stuff such as fish, vegetables, Maggie⁵ (a famous cooking ingredient used for seasoning in West Africa), salt etc. from the petty traders that occasionally come from bigger towns and then sell on as retail to the neighbourhood within the community.

Also, although there is no salaried work or structured labour for wages, the men in the village form rotational work groups. They normally sell their labour through these groups and it is a source of income for most households. Members of the community form these working groups. Households with three or more work force members benefit most because they could direct these groups to their own farm. For households with just one representative, the option is usually to sell and earn income to feed the family. The other importance of these groups is that, during the hunger months, they could be the only source that ensures enough food for the workers. Each time these groups work for someone, enough food will be prepared, and this is the only time most of them could eat to full satisfaction. The disadvantage is that those household members who cannot work are not benefiting from this.

⁵A famous cooking ingredient used for seasoning in West Africa



Figure 0.2: Group work as a livelihood activity

Source:(Author, 2017)

Figure 5.13 shows food for work as a livelihood activity in the case village. The sale of labour amongst youth guarantees food and income for some boys in the village. However, the researcher (wearing black and maroon striped Lacoste polo shirt) who was sitting and observing the farmers eat noted that communal eating does constrain food access to the weaker ones in the team. While the stronger ones take a handful and at a faster rate, the weaker ones cannot take that much and, hence, may be unable to access the amount of food they actually wanted.

5.9 Land use and land tenure system

In Sierra Leone generally, the land acquisition in the rural settings is different from the way it operates in the urban area. In the urban areas, there is an outright sale of land and ownership can be transferred from one person to another. There is no communally owned land as in the rural areas. Land in these settings is owned either by individuals, families or the Crown (GoSL, 2009).

In the case village, land is not individually owned and the ownership is inherited through lineage. Therefore, land in this village is either owned by families or by the chief. The right to use the land is gained by seeking permission from either the landowning family or the authorities (the chiefs and other stakeholders) (Unruh & Turray, 2006). A person or group of persons wishing to secure land do so by leasing or renting the land from the owners. Land sought from the chief is cheaper (normally just a cola nut/token as a sign of respect to the authority) but due to community pressure on such land, the supply is always limited. The size

of the land allocated to an individual or group is determined by the available land as well as what the authority is willing to release at that particular point in time.

In the case village, landowning families assign land use rights to others by rent or mortgage. If land is assigned by rent, the payment could either be upfront in the form of cash or later with an agreed number of bushels of rice to be paid immediately after harvest. The size of the land assigned depends on the excess of land within the family and the unanimous decision taken by the family heads. Within extended families, the allocation of land is usually done by the leadership of the family.

Because of the decline of land quality by human activities and the shifting cultivation system of the upland farming, people are no longer able to cultivate the size of land desired. Most times, the most fertile farms are reserved for the family, even if it cannot be fully utilised by members of the family. The less fertile areas are made available to people outside the family circle. This limits the average size of land by farmer to 1.5 ha (Unruh & Turray, 2006). Apart from the limitation in terms of size, the choice on the use of the land is also subject to the approval of the owners. For example, changing to permanent cropping or any proposed development of the land must have the consent of owners: either the Chief or landowning families.

5.10 Summary

The case site is a rural setting with a population of 890, of which 326 are males and 564 are females. These people are poor. Subsistence agriculture is their major source of livelihood. The ownership of agricultural land is in the hands of a few individuals in the village of which the Chief is crucial. Farm areas are determined by the ability to pay for them, either in cash before or several bushels of rice after harvest. Because the community is poor, the average farm size is normally 1.5h. Constraints, such as transport and access to a market for inputs and selling produce, have major impacts on the people's lives.

This case study also found is a high reliance on cultural and social-cultural practices. There are both community and family ties which impact different members of the community differently. Secret societies for males and females and their important celebrations are some of the socio-cultural involvements posing threats to household food reserves, which in most cases result in household food insecurity in Mawoma village. The results of this study is presented in the next chapter, chapter six.

Chapter Six: Research result

6.1 Introduction

The research result chapter presents the findings of the data collected in Mawoma village, in the northern part of Sierra Leone. This chapter seeks to answer the question: How are smallholder rice farmers impacted by the dynamics of the dimensions of food security in the northern region of Sierra Leone? In this research, the focus is on the food security of smallholder rice farmers' households. This chapter will identify the dynamics of the diversity of the dimensions that are shaping the household food security of smallholder rice farmers in Mawoma, in northern Sierra Leone. All the farmers interviewed are smallholder rice farmers residing in the case village. The findings are presented in two sections showing how household food security is influenced by different factors at different levels.

The first section in this chapter will describe the factors that influence the total amount of food produced by smallholder rice farmers in Mawoma village, the case village. These factors have been identified at all three levels of my interviews. This information is derived from the responses of senior officials from the Sierra Leone government representing the Ministry of Agriculture, Forestry and Food Security, the Ministry of Health and Sanitation, Statistics Sierra Leone, and district Administrative Officers, as well as respondents from the case village. These findings record the factors affecting food security based on their impact on productivity. They give a broader picture of how production is affected by several factors in the village. The second section highlights the factors that impact on the available food stock after harvesting. These factors are influenced by the dynamics of the household. Household responses to the environment, household behaviour and preferences are key elements within these factors. Therefore, this section will describe specifically, the household dynamics of the dimensions that influence the food security of smallholder rice farmers in the case village. At the end, the chapter will be summarised based on the findings described.

6.2 Section I: Factors that impact on the total amount of food produced by households in the case village.

Farmers' ability to retain high food stock levels is dependent on the total amount of food they can produce in a year. The possibility of meeting their production potential is also influenced by several factors - most of which are out of the control of the farmers. While some of the factors are natural, others are because of behaviour, preferences and the financial position of

smallholder farmers. These are important factors in the food security of households, as they determine the food supply (availability) to both households and the community generally. The research identified factors which influence the volume of output by smallholder rice farmers in the village. These are outlined below.

6.2.1 The influence of land allocation on the total amount of food produced by smallholder rice farmers in Mawoma village

The method of land allocation within the community greatly impacts the size of farms cultivated, as well as the total output by smallholder rice farmers in Mawoma village. In the rural setting of Sierra Leone, land acquisition and allocation are based on the land tenure system. Land is owned by local authorities and families. The Paramount Chiefs hold the land in trust for the chiefdom. The different areas within the chiefdom (besides the community land) are in the charge of landowning families who can trace their ancestry back to early arrivals in the area. Landowning families have surnames such as Kanu, Kargbo and Kamara. The community land is under the authority of the Chief.

Whoever wishes to acquire land goes either through the chief or landowning families. Usually, these landowners (the chief and families) decide on the size of land to be assigned to the individual. In most cases, villagers are more comfortable in sourcing land from landowning families than from the authorities. This is due to the greater level of interaction with these families. The other reason for this is the perceived high pressure on community land. As there is no outright sale of land, permission is given to build or cultivate upon request. This permission is sought through the chief or landowning families. Normally, a cola nut (token) is given to the authority as a sign of respect demonstrating a request for land from the landowners. As the Chief oversees the entire land under his area of command, including those owned by families, he is involved in all land dealings within his area of authority. In addition, all land disputes are settled by the Chief.

Landowning families assign land use rights to others by rent or mortgage. For land assigned by rent, it could either be in the form of an upfront payment of an agreed amount of cash, or an agreed number of bushels of rice to be paid at the end of the harvest season. The size of the land assigned depends on the excess of land within the family and the unanimous decision taken by the family. Within extended families, the allocation of land is usually done by the leadership of the family. Because of the shifting cultivation system of the upland farming, in some communities it is difficult to assign the exact size of land that each one desired. Most

times, the most fertile farms are reserved for the family, even if it could not be fully utilised by members of the family. The less fertile land areas are made available to people outside the family circle.

Due to this system of allocating land, some farmers cannot cultivate the size of land they wished to cultivate; limiting the average land area cultivated per household to 1.5 hectares. As one respondent from the Ministry of Agriculture explains:

Studies have shown that the farm size is 1.5 hectares per household and this is not enough to feed the household throughout the year (KI 2).

Limiting this size of land to the dictate of the owners and the ability to pay the lease or rent constrains household total food output. This impacts on the amount of food available in the households, hence leads to food insecurity.

6.2.2 Drop in total output because of a change in the rain pattern

Farmers interviewed stated that the change in the rain pattern has brought a drop in their farm output. The shift in the rainfall pattern had caused disruptions of the planting seasons and this had resulted in a drop in agricultural production and subsequent high rate of poverty amongst farmers in the village. The village is exposed to the impact of rainfall variability, frequency and the intensity of extreme weather conditions in the country. This has posed a high risk for smallholder rice farmers who depend entirely on rain-fed agriculture. Excessive rainfall following dry spells often results in flooding for most farms around this village.

In the past, the agricultural season started along with the start of the rainy season, which is in May every year, with prior clearing and burning starting in March. With the change in the weather pattern, the rain now commences as early as February and March, making it difficult for farmers who are used to the old farming calendar to adjust. The implication of this for the farmers is that by the time they start cultivation, most farms have already flooded and this affects the production potential of farms. A respondent had this to say:

Over the years, the changes in the weather conditions have become a challenge for us. Formerly, the agricultural activities started in May, but we are now experiencing fluctuations and these fluctuations are negatively impacting our farm output (KI 6).

The drop in production as a result of the changes in the weather is contributing to the prevailing food insecurity for smallholder rice farmers in the case village.

6.2.3 Birds and animals constantly posing threats to crops

The constant destruction of crops by wild birds and animals is seriously contributing to the drop in the productivity of smallholder rice farmers in Mawoma village. All smallholder rice farmers interviewed complained of their crops being disturbed by pests. In the case village, the major pests to their crops are animals and birds. Predominant amongst these are rats, birds, monkeys, antelopes and bandicoots. These animals and birds invade farms, eat and destroy newly emerging rice, fully-grown rice, and other crops. The worst among these are the birds and the bandicoots. To prevent these animals from destroying the crops means the whole farm needs to be fenced. The farmers, therefore, are left with the dilemma to either cultivate a small portion of land that they can fence or cultivate as much as they can and leave the farm at the mercy of these creatures. What makes it worse for these farmers is that it is difficult to mitigate the casualties of some of these pests such as the birds. In expressing the stubbornness of the bandicoots, a farmer interviewed explains:

We have troublesome creatures here called bandicoots; they will start destroying the rice right at the nursing sight up to the time it is harvested. If the farm is too big to be fenced, the years' work will just be shared between the animals and ourselves (HH 8.2).

Another farmer in a sympathetic manner with tears welling in her eyes explains her situation:

My cassavas and groundnut have all been destroyed by the bandicoot. I cannot at the moment boast of any benefit out of the entire year's labour. I had no money to pay people to fence the plot; they have, therefore, been all destroyed by these creatures (HH 3.2).

6.2.4 The use of traditional farm tools by smallholder farmers limits their farm size and output.

Among other factors, farm size impact the volume of output farmers can produce. The use of traditional farm implements by smallholder rice farmers in the case village has been identified as a key factor responsible for their inability to cultivate the larger size of land they would have liked to cultivate. As it limits the size, it also limits the yield and food availability. Access and stability are thereby impacted and hence food insecurity in the household.

Agriculture in Mawoma village is still labour intensive. Farmers, especially smallholder farmers, are still using low-level traditional technology to grow rice in both uplands and in swamps. Farmers use hand tool implements such as hoes and cutlasses in their cultivation.

These types of tools require manual labour and with most households in the study village having only two or three active workers, they can only cultivate a limited size of land, due to the lack of mechanised farm tools. The impact of this is that production is limited by the farm size and volume of output. This most times results in only a small amount of food stock being available for the household and hence food insecurity.

The use of tractors and other modern farm tools is not practiced by smallholder farmers in the northern Region of Sierra Leone. Most of the farmers interviewed stated that they cannot afford to hire tractors and other modern farming implements and that field clearing, sowing, transplanting, weeding and harvesting are all done manually without any form of mechanisation. This makes the volume of rice produced dependent on the number of workers available. This is what a farmer had to say:

There are tractors, but the cost of hiring these tractors is very high for me. How can I hire a tractor when I don't even have enough to eat? (HH 5.1)

In addition to the cost of hiring the tractors, it must also be fuelled by whoever hires it. This makes it difficult for smallholder farmers to afford. With the use of traditional farm tools by farmers in the case village, households depend primarily on family labour for cultivation. This influences the extent to which farmers' produce could last during the year.

6.2.5 Yield drop as a result of the change in the forest fallow period

The dramatic change in the forest fallowing period from 10 or 12 years to three years has greatly reduced the soil fertility of the farms in Mawoma village. The negative change in the soil fertility has in turn led to decreased yield levels for most farms in the village, constraining the food stock level of households.

Forest fallowing is a subsistence agricultural approach in which land is cultivated for a period and left uncultivated for several years in order to restore its fertility. As stated in the case description, almost 80% of the cropping area is found in the uplands and these have mixed vegetation, dominated by forest regrowth made up of shrubs, trees and grasses at differing stages of growth. This forest is left for a period to enrich the soil, as the accumulated leaves and branches on the soil surface will automatically become manure in the top soil. As part of the forest fallowing practice, the farmers clear the forest that had been left for a very long time and had become fertile. This land will be cropped for about three years and then be allowed to fallow again.

The farmers in the case village explained that due to the increase in the farming population, which led to more farms being cultivated, the forest is no longer left fallow for the long period it used to be. Today, the longest time they may allow a forest may be three years instead of the usual 10 to 12 years, and it is greatly impacting the soil fertility. This is because, those youths that decide to stay in the village upon maturity will form their own family unit, separate from their parents, and cultivate their own farm. This is also adding pressure on the available family land. In the past, households with a work force of five for example, would all be supportive working for the head of the household. This is not the case in some of the households today; what prevails in some cases is that the family will share the available land according to the work force in the household with each having a portion. This divides the land once worked on as one farm, making it difficult to allow fallowing. In addition to the increased number of farmers due to early household divisions, there are also other activities degrading the land in the community. Cutting wood and burning charcoal are other activities that degrade the land at Mawoma village. This practice contributes to the poor harvest, limits the household food stock and hence creates food insecurity in the households. A farmer interviewed explained the situation:

During the days of my father, we were all working on one farm. Today, each mature boy child wants to have his own farm, and this is constantly depleting the family reserved land, making it difficult for us to allow the forest to fallow for a long period. Because of this the forest can no longer generate fertilizer on its own. When forests were left for 12 years to fallow, the old leaves and trees that died every year were sources of fertilizer for the soil, but this is missing nowadays because of premature forest farming (HH 5.1)

Forest fallowing, therefore, was identified by almost all the farmers interviewed as being responsible for poor soil fertility with subsequent lower farm yield. This is adversely impacting on the total amount of output and the food security of smallholder farmers in Mawoma village

6.2.6 Youth migration influence on household food production

The high rate of youth drifting from the village to the cities has made most households unable to undertake large scale farming. This inability to embark on large scale farming impacts on the output volume and the household food stock volume. As such the food security of such households is not assured.

The majority of the farmers interviewed identified youth migration as being a factor impacting on the food security for their households. Some explained that they cannot farm large plots of land because they are old and the elder sons who were supposed to have taken over from them have all gone to bigger towns and cities in search of opportunities. With an average household size of 10 members, there could only be 2 or 3 active members in some households that could provide the family labour; the rest are dependants relying on the effort of the few active members. The high level of urbanisation in this area has been created by a shift into the mining companies and into the cities by the youth who should be providing labour for the households. Most of the youth migrate and permanently settle in the cities engaging in small trading or doing odd jobs and ignoring the agriculture sector.

Although labour could be exchanged for food or money in the case village, affording this is another challenge. Smallholder farmers in the village are subsistence farmers and they are poor. This makes it difficult if not impossible for them to hire labour. As such, these farmers rely on whatever labour is available within the household. This limited labour supply within the household along with the inability for smallholder rice farmers to source external labour support is limiting their ability to expand their farms. A farmer interviewed shared his constraints:

I really want to cultivate a bigger size of farm but I am the only one doing all the farm work. I have no money to hire labour. Sometimes I have to sell the little rice I have to acquire labour and when these workers are hired, they must be provided with sufficient food if I am to get the best out of them. This is greatly impacting on our household food stock and no doubt the reason for us not being able to maintain food all-round the year (HH 4.1).

At times when the family labour is in short supply and the hired labour is unaffordable, farm sizes and output would be severely constrained. This shortage of labour for tasks such as clearing, planting, weeding and harvesting are negatively impacting the scale of farm operations as well as outputs. Even though some farmers may have enough land available for cultivation, the inability to source labour with the household combined with the lack of financial resources to hire labour prevent them from fully utilising the intended size of land. A female household member explained:

As I am talking to you at the moment, my husband is old, and I am not well. Our elder sons have all left us. We are here with the younger ones who cannot do anything. We have so many children to feed but we can't work. We do hire labour, but we cannot hire enough to cultivate

a large farm because we have limited financial resources to hire and feed workers. At the end, we cannot produce enough to feed the family (HH 5.2)

It is, therefore, clear that the amount of rice stored as seed and for consumption purpose varies from household to household and it is highly dependent on the size of the household labour force within households.

6.2.7 Constraints in accessing farm inputs

The constraints in getting farm inputs prior to the production period had been identified by the interviewed farmers as a key influence on both farm size and yield. The lateness of these inputs, or sometimes not getting them at all, prevents the farmers from being able to cultivate the intended size of the land. Furthermore, the failure to access inputs such as fertilizer may adversely impact the growth and yield of the crop.

Most key informants and farmers interviewed stated that farmers are facing difficulties in getting farm input on time. The major farm inputs referred to here are seedlings, fertilizer and other chemicals. These inputs are brought to the village by petty traders whose movement to the village is determined both by their ability to source these inputs from major cities and their current working capital. It is also determined by the profitability of alternative lines of business undertaken by these petty traders. The farmers attest that sometimes the Ministry of Agriculture do supply some of these inputs, but most times they arrived too late to be applied.

When farmers get seedlings very late, it means that they will start cultivation very late too, and for some this means they will end up eating some of the seeds they were supposed to have planted. For inputs like fertilizers and chemicals late application may also mean less impact on the crop and may also expose the crop to being overcome by weeds. For most farmers, the size of their farm depends on their ability to acquire seeds, because there is not enough stored from previous harvests. Also, because these farmers are poor, they rely on these minor traders providing inputs in the form of credit payable after harvest. Farmers also echoed that sometimes the inputs like seedlings supplied by the Ministry of Agriculture are dead seeds that cannot germinate. This is what a key informant in the case village recalls:

Previously, we used to get help from the government. The government used to give us rice seeds in the form of soft loans. These loans require no collateral and attract little or no interest at all. With these seeds, I am hopeful that this year I am going to cultivate such and such size of land. Only to find out that after forest clearing and broadcasting some of these seeds won't

grow at all. By the time I find alternatives, it will be too late for me and so my household is exposed to continuous hunger for that year, because rice is our staple (KI 9)

However, some farmers explained that there are times when the inputs may be brought to the village on time, but could be very expensive for them to afford. A household member explained:

The first thing is that we don't have matured forest and we don't have enough money. If we had enough money, we could have bought fertilizer to improve soil fertility (HH 5.2).

These constraints posed by poverty make it difficult for some farmers to cultivate the intended farm size and even some with larger farm sizes would not get the expected yield. As a result, the household food stock is also impacted and this is responsible for the food insecurity of most smallholder farmers in the village.

6.2.8 Constraints in getting a market for their produce influences smallholder food security.

Sometimes, smallholder farmers depend on the sale of crops such as cassava, potato and vegetables to buy rice, which is the main staple, or to meet other household expenses. Selling these crops at attractive prices is always difficult as most goods perish or become degraded in value before reaching the markets. This limits the amount of rice they could have bought for home consumption.

Smallholder farmers in the case village explained how they often find it difficult to sell their perishable crops. Farmers produce crops such as garden eggs, cassava, okra, potato, tomatoes as a livelihood strategy to reduce the pressure on rice. There is no market in the village and buyers do not frequently visit the village to buy these items. Even when buyers visit the village, they always determine the prices they want to pay for the goods. These prices are frequently far less than the prevailing prices for the goods in big towns or the periodic monthly or fortnightly markets. Because of this, farmers may want to take their goods to the periodic market, but the distance involved is long. This makes it difficult for the farmers in this village to sell even when they need to. Unfortunately, there are no means of preservation and while some of these crops could attract better prices, they are short lived and lose value because they are not fresh. Due to the distance and the long intervals between the periodic markets, the goods rot before they actually reach the market. Because of this, farmers are left at the mercy of the exploitative petty traders. One farmer explained:

I don't have money to take my harvests to the markets in the big towns, so if these traders come I can sell at any price they offer instead of them perishing in my hands. (HH 9.1)

This also impacts the household food stock, as a lower income is realised from the sales of these crops, and prices are determined by the few buyers that come to the village. The sale proceeds from these crops could have complemented the main staple (rice), but have been rendered incapable due to these constraints. The result is that the food stock level will be depleted to address other household needs, hence increasing food insecurity.

6.2.9 Accessing credit facilities from financial institutions

The inability of smallholder farmers to secure loans from financial institutions limits their capability to practice improved farming methods. Modern agriculture involves the use of technology and this involves costs that cannot be afforded by all smallholder farmers interviewed, because they are poor and lack what it takes to secure loans from banks or micro finance institutions.

Borrowing money from financial institutions requires the submission of collateral security that will act as guarantor for the money borrowed. In the case of default, this property will be converted into cash to settle the arrears. All smallholder rice farmers interviewed in the case village are poor. Their livelihood profile is characterised by poverty and the lack of valuable assets to be used as collateral security for banks and other financial institutions. This renders them vulnerable. Although some may have the advantage of providing labour within the household, there is still a need for modern technology in order to improve productivity. This is, however, constrained by the inability to secure credit from financial institutions. The petty traders who could have intervened only operate with limited capital that cannot address the needs of these farmers. Even when the petty traders attempt to intervene, the cost of funds could be too high for the farmers. Those interviewed expressed the need for agricultural financing from banks and micro finance institutions, but the nature of their circumstances makes it impossible for them to access such loans. With no other assets to provide as collateral in loan contracts, land would seem the most appropriate in the rural areas. However, there are challenges in using rural lands to secure loans.

As the banks are operating in the major cities in the country, they are not interested in long term agricultural loans. The reason for this is that there are two major issues associated with the use of rural land as collateral to secure bank loans. The first challenge is that banks in the

cities find it difficult to use rural land. In the event of default it will be difficult to find a market for rural lands, as in most cases rural lands cannot be sold due to local laws. Secondly, from the perspective of the landowners and chiefs, banks are perceived to be exploitative and there is a widespread perception within the rural communities that banks seize lands even after repayment of the loans. Therefore, collateral consideration is a key setback denying loan opportunities to smallholder farmers. An interviewee stated:

There are banks and micro finance institutions in Sierra Leone, but all of these require collateral to secure the loan. Smallholder farmers have no form of security and are, therefore, constantly denied credit facilities (KI 5).

Although there is some form of borrowing that mitigates this challenge, it is on a very small scale and most times very exploitative. Petty traders meet farmers during the production period and lend them money for commodities at a very high cost. The Petty traders speculate future prices and lend money to farmers to be repaid in bushels of rice after harvest. The challenge with this form of borrowing is that the money given to the farmer is always far below the prevailing price of the rice during the harvest period. For a small amount of money, the farmer will end up repaying a large proportion of his harvest. This will further constrain the availability of household food stock for the following year.

To minimise this speculative borrowing, farmers sometimes borrow from within the community. However, this borrowing is most times limited to food stuff. They may borrow cups of rice, palm oil and sometimes money to address household needs. Because the volume of this borrowing is very small, it cannot address input or production needs. A female household head explained her constraints:

Sometimes, if I don't have enough food to feed my children, I will borrow from my friends to ensure I cook for the kids even if it is not sufficient. A few days later I fend and pay the lender. The only thing is that I always try to pay the current loan before seeking another one (HH 9.2).

6.2.10 Limited financial resources

Smallholder farmers in Mawoma village are finding it difficult to buy the food that they do not produce, because they have limited financial resources to meet these costs. This impacts the nutritional value of their diet because their meals are dominated by the carbohydrates which they produce. All the farmers interviewed in the case village pointed that they are food insecure and that poverty is the first factor responsible for their food insecurity. These smallholder rice

farmers are subsistence farmers and are poor. Most of them cultivate mainly to feed themselves with nothing to be offered to the market. These people have no other skill that would have been able to give them additional sources of income. Everything they do is based on their subsistence farming. In this village, little fruit is eaten, because mangoes and oranges are available for just one or two months in the year and this the only period when there is free fruit. Also, almost all those smallholder farmers interviewed said they do not eat meat because they cannot afford it. A household member explains by saying:

I can't remember eating meat since this year started because it is expensive. What I can boast of is the tiny fish that is sold within the village. It is cheap and so we can afford it, but meat, no! (HH 7.2)

The constraints experienced in trying to meet school expenditures, the purchase of modern farm tools, meeting the high costs of food items, acquisition of fertilizer and seedlings are all evidence of the limited resources within smallholder farmers' households. Because these farmers have no alternative sources of income, the pressure from all household needs is placed on whatever little crop had been produced that year. In the end, the household food stock is depleted, leaving the home with an amount of food that may only serve for just a few months in a year. Also, the nutritional value that could have been derived from the purchase of meat, vegetables and fruit will be missing in the home. The result is a high rate of malnutrition among children in the village. The village health Officer explained by saying:

Because of the limited financial resources, most people in this village rely on cassava, which they will just cook, pure palm oil and share among household members. This is the case of most pregnant women that deliver in this clinic. They give birth to malnourished babies, because the mothers have not been eating the right quality of food during pregnancy (KI 9).

While the effect of not being able to afford goods, for instance seedlings, fertilizer, tools etc., limits the volume of yield produced by a household, other outlays such as school expenses and the high cost of food diminish the available household food stock because there is no alternative source of income for the households. This leads most households to be food insecure.

6.3 Section II: Factors influencing food accessibility within the household.

Even though there is some amount of food in the household, there are factors identified as having an influence on the accessibility and distribution of this food within the household. Some of these factors are based on the behaviour and beliefs, practices and preferences of the

household decision makers. Thus, even though there is food in the house, these dynamics prevent access to food for all or some members of the household.

6.3.1 The hierarchy within household food distribution renders some household members food insecure despite others being food secure.

The method of sharing food within households, which prioritises the husbands and elder sons, creates food insecurity for most people within the household. In Mawoma village, like in many rural communities in Sierra Leone, there is a household hierarchy in the distribution of food. In this village, the food is shared according to the household hierarchy and procedures of food distribution. This research discovered that while many households were experiencing regular seasonal food shortages due to various factors, others experienced food insecurity within the household due to household behaviours and priorities. This had been caused by the inequality in distribution, and hence, access to nutritious food for some of the most vulnerable members of the household. Within some of these households, food may be available at some points in time, but access is impacted. The household behaviours and practices are causing hunger in some of the households, not because of the lack of food in the house, but because of the structures that control the distribution of food within the household.

For the households interviewed, the priority in the distribution of food is the husband followed by the elder sons, the other children, the aged and then the wife. With this method of food sharing, while some members eat enough, others eat just to survive, while sometimes others could not access food at all. Most women explained that they are sometimes left with nothing to eat after sharing the food according to the household defined hierarchy. Others said they are only left with the burnt portion of the food that sticks to the bottom of the pot (locally called ‘gbana’). But as it is also believed that this ‘gbana’ gives extra sexual power to men, men also do get a share of it, worsening the status of the wife’s food security. When asked how this food sharing is impacting her food security as an individual, she says:

I am the one that prepares the food but most times I don’t eat at all. With a family of 13 people, the four cups I most times cook cannot adequately address our hunger. What I do is to give to the husband and children, even the ‘gbana’, sometimes I take just a handful and leave the rest for the children (HH 6.1).

It is also the practice in some households that aside from the father and the elder son, whoever is absent at the time of dishing the food will not get a share of that food for that day. When

asked why so much priority is placed on the husband in terms of food access, a woman with a smile responded that, he is the man and does the hard work in the home. Also, if a visitor comes during the time they are eating, it is a common practice that the visitor joins the husband eating at the table and not any of the others. Another woman interviewed explained:

In dishing food in my household, my top priority is my husband, I make sure his food bowl is very attractive as it is possible a stranger may meet and join him eating (HH 9.2).

Another added that:

Because the food I prepare is most times not enough, it will only be distributed to those present at the dishing time. Those that are out will have to wait for tomorrow's meal. (A rowing canoe gathers no leaves) (HH 8.1)

Also, for some households, after dishing the food for the husband and the elder son, the rest will be given food in one bowl and allowed to eat together. This communal eating is practiced both at household levels and for hired labourers in the farms. The effect of this method of food sharing is that the strong will eat more than the weak ones, thereby exposing the weak to hunger (Figures 5.12 and 6.1)



Figure 0.1: Communal eating among children, a challenge to individual food security

Source: (Author, 2017)

This illustrates one of the distinctions between food availability and accessibility at the household level. While there is food stock available in the home, the distribution pattern makes some members of the household vulnerable and they face individual food insecurity.

6.3.2 Influence of Cultural activities on household food stock

Involvement in the socio-cultural activities in the village, immediately after the harvest months, has been identified as a major influence on the food stock of most households. The traditional activities such as female circumcision, secret societies and other cultural activities normally take place in the dry season immediately after harvesting the major crop, rice. The period after harvest is the festive season and this is the time when occasions are held for the performance of secret societies such as the “orjeh” society (This is a traditional secret society kept by men in the northern region).

6.3.2.1 The Orjeh and Poroh society (Men’s secret society)

These are secret societies kept by men. The youths at a certain age are initiated voluntarily. Almost every youth in the rural settings in the north belongs either to the Orjej or the Poroh secret society. In as much as they are secret societies, they also serve as a socio-cultural activity that brings members together after the harvest season. Membership is through initiation, but due to the value attached to this activity, the youth in this region are proud to be part of this. The non-members are considered inferior; their interaction is limited and are most times referred to as women. Because of this youth in the rural areas want to become members of these secret societies. In the dry season, ceremonies and performances are organised from one village to another. When these activities are organised in one village or section, people will come from all directions in that Chiefdom to attend to the event. The village will be flooded with friends and relatives, as well as non-relatives. It is the responsibility of the host village to feed the guests throughout their stay in the village. Contributions in the form of rice are imposed on all residents to help feed the guests to ensure there is enough food to eat. One woman said this:

During the “Poroh” or Ojeh performances, or during the inauguration of the head of the female secret society (“The Soweï or Didgba”) in the village, we are normally taxed to contribute a certain amount of rice either by house or household. At those moments, even if you are not a member you must contribute (HH 7.2).

The exorbitant food preparation during these activities generally interferes with the food stock of many households in the village.

6.3.2.2 The Bondo society (Female genital mutilation society)

This is a traditional female secret society. Upon entering adolescence and sometimes as young as ten, the girls will be initiated, most times forcefully signifying the completeness of their womanhood. During the Female initiations (Bondo), tens and sometimes hundreds of young girls are taken to sacred places forbidden for male access for three months or more. During this period, the ‘Digba’ (the female initiator) will teach these girls (Figure 3) how to handle their homes and husbands after marriage. It is, therefore, serving as a traditional training period for girls. However, government and human activists are working on discouraging this practice. In most urban cities, it is now undertaken at a moderate scale, but is still considered of key cultural value in the rural communities and Mawoma is not an exception.

During this occasion, it is the responsibility of every family member, friends as well as neighbouring towns and villages to attend these ceremonies. As this is the period of plenty, abundant food is provided twice or more every day and of good quality. Food is provided for all guests. Sometimes, one may not have a child in the initiation, but because it is being organised in the village, people would come and the burden of feeding these guests (even the uninvited) will be upon the organising village. One woman also said:

When someone I know, either relative or friend attends this occasion, I would do all I could to provide food for them. This is because in the event I fail, they will discuss me on their return, saying I couldn’t even provide food for them. I sometimes even borrow if what I have is not enough, just to please them (HH 8.1).

The impact of these cultural activities on the household food security is huge. Even for homes with good harvests, the large amount of food consumed during these activities will leave most homes in food deficit for the rest of the year. Socio-cultural activities are, therefore, threatening the food security for smallholder rice farmers in the case village.

6.3.3 The depletion of household food stock by extended family pressure

The existing connections and ties between rural households and their extended families has been identified, by all levels interviewed, as a major factor contributing to the food insecurity of most households in the northern region. One thing that characterised the rural communities in the northern region, and Sierra Leone generally is that they operate outside the immediate family circle. They operate under the larger extended family circle. The rural poor share concerns and interests of each member of the extended family. Most extended family members may be far from other family members; they only come together for serious family issues, or when they are in dire need of help from the other family members.

The farmers interviewed in the case village stated that during the harvest period family members from both the husband and the wife will come and visit. They will bring items such as salt, soap etc. as gifts to the host family. They may stay for weeks and some will stay till the end of the harvest. On their return, these visitors will be given huge amounts of rice and other food crops depending on the yield for that year. Sometimes there is a competition between the husband and wife. In situations when there are visitors from both the wife and the husband's families, the wife may want to give as much to her family as is given to the husband's family. This situation is even worse when the husband marries two or three wives. During the production period, the family is left alone to struggle, and no one will come from the cities to help. One farmer that had been so affected by this practice explained:

This is the production period. I am here suffering with my wife and children and none of my extended family members care. When it is time to harvest, they will come from all directions in the name of visiting us. Some will come with fish as gifts. At the end of the harvest I have no option but divide the little proceeds amongst us. It is a must because if you fail to do so, the rest of the extended family members will hear about it and they will not be happy with you for a long time (HH 8.2).

By so doing, despite the fact that there may be a good harvest, the amount of rice that could have been added to the household food stock is given away to those extended members of the family. In the end the household will be left with only a small quantity of food, which will not last them all year-round, thereby exposing the home to food insecurity.

6.3.4 The food stock of most households is affected according to the preference attached to certain household expenditures

For most households with no alternative sources of income, everything they spend comes from the sale of agricultural produce and this affects the quantity of food left for household consumption. This is another factor that explains the dynamics of the factors that influence household food security. Although this factor is reported by the majority of the farmers interviewed, there are still others whose household food security is not in any way influenced by this factor. Most of the farmers interviewed identified school expenditure as negatively impacting the amount of produce they could reserve for household consumption. The difference in impact of school expenditure is determined by whether or not a household has school going children and how many. Those households with many school going children are more likely to sell their food stock to meet these expenditures than those with few or no school going children at all.

In the case village, farmers interviewed explained that school expenditures which include school fees, uniform, books and periodic contributions do interfere with the household food stock. The beginning of the school calendar is in September of every year and this month is within the lean period. This period is when the old food stock has generally finished and the new harvest is yet to come. In order to ensure the children go to school, household heads borrow money from speculative lenders. Crops are sold in advance, usually at a price far below the prevailing prices during the harvest. Upon harvest, these loans must be paid to secure next year's borrowing opportunity. For those who incur school expenses occurring during or after harvest, they sell the rice in order to meet these expenses. With these priorities, even when the harvest may be good for the year, food access to household members is constrained. This is because rice is the only stock most smallholder farmers have. One farmer explained:

There is nothing I could reserve for household future food. Now we are ten in number and these people need to be fed and meet the children's school expenditure which includes fees, books, pens and uniform. So, there is nothing to store for future hunger (HH 7.1)

Farmers work hard to educate their children with the hope that these children will grow up and liberate them from the chronic hunger and poverty. This is not always the case; most times after spending so much on their education they drop out of school and become an added burden on the households. Farmers, in explaining the school expenditure constraints stated that the issue of school dropout is even worse with girls, who are prone to teenage pregnancy, which brings additional pressure to the household food security. This is what a key informant said:

Sometimes we deprive the home in terms of food and spend so much on our children's education, hoping that they will be our insurance, but in the end they bring no change in the family. Especially the girl child; many a time the result we get is teenage pregnancy and all we have sacrificed will just go in vain. (KI 11)

It is, therefore, clear from the case village that school expenses impact on the total harvest of most households, thereby rendering them food insecure.

6.3.5 Constraints in accessing transportation to move goods limit the flow of food stuff in and out the village

One of the dimensions influencing food security generally is the availability of food. Availability is ensured by the extent to which goods and people can be moved from one place to another. This is determined by the available means of transportation in the area.

Although Mawoma is not worst off in terms of road network, as compared to other places in the northern region of Sierra Leone, farmers interviewed explained that there are no commercial vehicles coming into this village. The only means of transport in the village is bike riding commonly called 'Orkada'. They explained that these bikes cannot take heavy loads and are very expensive. The refusal of the commercial vehicles to enter remote villages is due to the poor road network and this is the situation with the case village. This makes it difficult to move food into and out of the village. The few petty traders, who do manage to take goods to the village using the bikes, are faced with the high cost of transport imposed by bike riders. This cost is normally transferred to the consumers resulting in a high cost for food stuff in these communities. One of the respondents stated:

Most times people may want to take their goods to the city for better prices, but due to the poor road network we couldn't get vehicles to carry these goods. The worst is that these goods may be too much for a bike to carry. At the end we are left at the mercy of petty traders who determine prices for our goods (KI 9).

While farmers are selling their produce at very low prices, the prices for imported goods brought to the village are very high. This adversely impacts on household food security, as household income is hit at both ends.

6.4 Chapter summary

This case result has clearly identified the interlinked nature of the drivers of food insecurity in the village. Food security at the household level is very critical and unique in nature and the factors influencing availability and access are very dynamic and to a very large extent interlinked with each other. Poverty has been critical in this study and food at the household level is facing threats in diverse ways. In addition to poverty, household behaviour and preference have been identified as a key determinant to household food security in the study area. There are therefore factors that influence the amount of food available in the household, as well as those that occur due to hierarchy and preferences within the household. Household behaviour and preferences are, therefore, key determinants to household food security. While those factors affecting farm productivity impact food availability, the findings show that household dynamics greatly impact food accessibility, nutrition and stability.

The chapter that follows is the discussion chapter (chapter seven). This chapter discusses the research results alongside literature. This chapter shows where the research findings corroborate or contradict other studies, among other things.

Chapter Seven: Discussion of the research result

7.1 Introduction

This study examines the diversity and dynamics of the dimensions that impact on smallholder household food security in the Northern region of Sierra Leone. The main focus of this study is on smallholder rice farmers. Detailed descriptions of the study area, its characteristics, the status of food security and contributing factors have been made in the case description and result chapters. This chapter presents the findings highlighted in the aforementioned chapters and discusses them in light of the literature reviewed. The chapter is structured under key headings pertinent to the research objectives, as well as placing the research findings within a broader literature while at the same time answering the research question. This chapter begins with an analysis of the characteristics of the case. It is followed by sections describing the underlying factors that influence the food security for smallholder households in the study area. These factors, as presented in the findings, are classified into two sections with poverty being a key player on both categories. There are those that impact on the volume of production resulting in constrained food availability and food stability, and then those imposed by household dynamics in behaviour and preferences. These set of factors adversely influence household food accessibility and utilization. This chapter answers the question “What influences household food security of smallholder rice farmers in the Northern region of Sierra Leone, and why?”

7.2 The features of the study area

This section describes the unique characteristics of the study so as to present the context by which the findings can be interpreted, analysed and related to other studies. This study is about a village, in a developing African country that depends on subsistence agriculture for their livelihood. This village is far from the cities and bigger towns. It has a poor road network and lacks transportation facilities. The village is dominated by adults aged 50 years and above who lack primary school education. There is no formal employment opportunity in the village and the only source of income is agriculture. The majority of youth have left the village, migrating to bigger towns and cities.

In the past, farm lands were left fallow for a period of between 10 to 15 years before being used for agricultural activities. However, this fallow pattern has changed, shortening the fallow period to as short as five years. The village had for many years been characterised by low farm

yields, resulting in hungry low-income earners who have difficulty meeting their daily monetary needs.

Almost all the children from the age of 6 and above attend the only primary school in the village and parents contribute to the salaries of some of the teachers. Many parents find it difficult to meet school expenses that include subsidising the teachers' salary, purchasing books and making other contributions. Upon entering secondary school level, the child leaves for the big city where they can acquire secondary education. Youth migration to the cities is common in this village, leaving the aged with the farm work.

The village is also facing difficulties in accessing a market. This is the result of a poor road network and unreliable transportation. This makes it difficult to access food stuff not grown in the village, as well as agricultural inputs which need to be purchased from other markets. Farmers in the village rely on traditional farm implements for all agricultural activities. Household labour is the only source of labour for most farmers in the village.

The village attaches much value on their socio-cultural activities, which are part of their moral and community values. There are three prominent cultural groups in the village which are the Orjeh and Poroh societies for men and the Bondo society for women. Interactions and recognition in the village are determined by your membership status in these cultural activities. There is land in the village, but access to the land is determined by either the chief or the landowning families. Land access can also be determined by how much one can offer, especially when dealing with landowning families.

In examining the factors influencing food security in the study area, the study shows that the people in this village are poor and food insecure, and that the high rate of food insecurity in this village reflects a problem of both production and household behaviour and preferences.

7.3 Factors influencing the food security of smallholder farmers in Mawoma village

The study revealed that there are two broad categories of factors associated with the food security of smallholder rice farmers in the case area. In this study, the inter-linked nature of intra-household factors, family, cultural practices/norms and the broader drivers that are shaping household food security and household member food security are identified and described. This has not been done in other research which explored food security. Some studies have identified focusing on the broader drivers but very few have looked at the intra-household

and none that have been reviewed have looked at the external and household drivers in a holistic approach.

This approach of investigating the drivers of food insecurity brought out the significance of cultural norms and practices around celebrations and the impact that they have on food reserves and the households in the northern part of Sierra Leone. Nobody else has highlighted the significance that this can have on impacting food security. A lot of others highlighted many of the other factors identified in this study, such as climate change, pests, market, transportation, and the land tenure system as threats to food production but none clearly illustrate and describe specifically and/or in detail how these factors could impact on household food security.

The first set of factors impact the volume of production, over which the household has little or no control. These factors impact the size of the farm a farmer can cultivate, and consequently also yield. This broader category comprises sub categories such as: physical and environmental factors, institutional factors, local community factors, and household economic factors. The second broad category is the household decision factors. This category comprises those factors that impact both household food stocks and accessibility of the available food by household members. The factors under this category influence both the volume and quality of individual consumption within the household. These factors are under the direct control of the household and the community in which they find themselves. This is in line with Titus and Adetokunbo (2007), who stated that ability to achieve food security, especially at the household level, is based on the resources endowment as well as the household's ability to engage these resources in such a way that access is ensured for all household members. The resources endowment falls under those factors outside the household control, but how well these resources are utilised depends on the hierarchy and preferences within the household. The above categories of factors contribute to either insufficient food availability at both national and household level, or insufficient access to food by households and/or individuals. From the case study, it is clear that poverty impacts on most of the factors. For example, in the case description, it was identified that some of the community activities, such as burning of charcoal and wood cutting do degrade the environment, exacerbating some of the impacts of climate change. As climate change is affecting produce and productivity, the result is increased poverty and food insecurity for farmer households.

7.3.1 Factors associated with household farm production volume

These are factors that have an impact on the productivity of smallholder rice farmers and, therefore, have an impact on household food security. As stated above, these can be sub categorised, based on the nature of their impact on food security. There are those that fall under physical environmental factors (i.e. climate change and pests), institutional factors (constraints in accessing a market and transport), local community factors (i.e. external family pressure, youth migration, land allocation, the effect of fallowing), and household economic factors (limited financial resources, traditional farm tools, constraints in accessing credit facilities). Most of these factors are beyond the control of the farmers.

7.3.1.1 Drop in total output because of a change in the rain pattern

This research clearly illustrates specifically how climate change, in particular the change in rain pattern, impacts directly on the food security in terms of how it impacts on the amount of food that is able to be produced. The change in rain pattern is one of the significant factors responsible for the decline in output in the case study area, as the agricultural practice is rain fed only. The rain variability and frequency combined with the intensity of extreme weather events, such as changes in rainfall pattern, have led to disruptions in the planting seasons and a decline in the total farm output for smallholder farmers in the case study village. The effect of this is that decreasing farm output is experienced every year, limiting the total food available for consumption at the household level. Also, as availability is constrained due to the declining output, it means that the limited food available may only serve the household food requirement for a few months of the year, hence constraining the stability of food in the household. Because of the limited food reserve, access to the food by all members of the household becomes a challenge as food becomes insufficient.

This implication reflects Schmidhuber and Tubiello (2007) and Easterling et al. (2007)'s reviews on Global Climate Change Under Food Security and Food, Fibre and Forest Products respectively, in which they argued that unfavourable climate conditions could lead to an increase in the frequency and severity of extreme events, which may bring about greater fluctuations in crop yields and local food supplies. In expressing the severity of the effects of the change in rain patterns, Kotir (2011) highlighted that the failure of the rainy season and weather has a direct link with the failure of farm productivity in Sub-Saharan Africa.

The impact of climate change is recognised by scholars who highlight that climate change affects agriculture in complex and diverse forms (Tao et al., 2008). It has a direct effect on production, distribution of income and demand for agricultural products (Tao et al., 2008). The

impact of this has brought a decline in farm harvests, resulting in low food stock for smallholder farmers after harvest, which in turn results in failures in the four pillars of food security (availability, accessibility, stability and utilisation). The results of this research finding have revealed that the village has consistently faced a drop in yield ever since the change in rainfall pattern started, and this has been a major reason for the prevalence of food insecurity in the community. This corroborates with Easterling et al. (2007) who reported that the change in the pattern of rain precipitation and high temperatures could be one of the reasons for the decrease in global crop yield. Although these scholars reported the effect of climate change on agriculture and food security, none of these actually described how household food security is impacted.

7.3.1.2 Birds and rodents constantly posing threats to crops

This study described pests' impact on farm productivity and household food security. While several studies recognised the effect of pests on crop production, none of these clearly described how the impact of pest could result to household food insecurity. Threat from pests, such as rodents, birds and insects, is one of the factors affecting the total farm output of smallholder farmers in the case study. A decline in harvest is an outcome of these destructive pests. On an annual basis, crops such as rice, cassava and potato have been destroyed before they were harvested. A study carried out in Senegal by Seck et al. (2012), which discussed some of the challenges facing rice production in Africa, highlighted that rodents and small ruminants (pests) are the key factors responsible for the drop in productivity of Senegal rice farmers. Studies have highlighted that pests and diseases are threats to food crops and that they cause damage to crops at different stages (Alabi, Banwo, & Alabi, 2006; Gregory et al., 2009). Each pest poses threats at different times within the crop life cycle. The birds attack the rice at the broadcasting and harvesting stages, the bandicoots at crop maturity stage, and the insects before and after harvest. This impacts the output volume farmers could realise after harvest, resulting in limited food stock available for consumption and, as such, access by all members of the household to the required amount and quality of food is constrained by the limited food supply.

This decline in productivity caused by pests has made an impact on the total quantity of rice stock a household could obtain in the case village. This is continuously limiting the available food stock, making it impossible for a household to have food access at all times, as well as disrupting the food supply chain, which affects food stability in the village. The dimensions of

food security are adversely impacted, and this has contributed to the prevalence of food insecurity in the households of the case village. This supports the FAO (2017) report on Plant, Pest and Diseases, in which it was mentioned that pest and diseases are causing significant losses and a threat to the food security of smallholder farmers. Due to the state of poverty in the study community, farmers find it difficult to address the prevailing issue of pests; this has subjected them to annual losses in crop yield and ultimately food for the household. This existing relationship between poverty, pest and food security was also recognised by Godfray et al. (2010), who stated that overcoming the challenges of pests and diseases requires disease and pest control innovations, which cannot be financed by the poor rural farmers in developing countries. As productivity is impacted, it means household food availability and accessibility is constrained and the end result has been the prevalence of the ongoing food insecurity in the study village and a continuing cycle of poverty.

7.3.1.3 Constraints in accessing a market for their produce influences smallholder food security

Poor access to a market, for inputs to grow crops and for the sale of produce grown, contributed to the status of food insecurity for smallholder rice farmers in this research village. Farmers in the case village faced challenges in accessing agricultural inputs on time, due to the lack of a structured market in the village and this impact on the volume of output. Also, due to poor market structures, some of the farmers' produce which they could have sold to acquire food either perished or degraded in value. This exposed the farmers to a status of food insecurity.

Whereas scholars have highlighted the importance of access to a market for smallholder farmers (eg. Von Loeper et al., 2016), the impact felt by the constraints on agricultural inputs has been less documented in relation to the impact on food security. In Markelova et al. (2009) study on the role of collective institutions in improving market access for the rural poor, it was argued that the possibility of smallholder farmers raising their incomes from farming depended on market participation. But in developing countries, due to the failures of rural markets it is most often difficult for smallholder farmers to achieve this. This corresponds with the findings in this study, which revealed that accessing a market for the acquisition of inputs and the sales of produce is one of the key factors impacting smallholder rice farmers in the study village. Mawoma is situated in a place far from the market. Findings revealed that the main staple food in the case study is rice, but because of low yield farmers sometimes rely on the sale of crops such as cassava, potato and vegetables to buy rice when the household stock has run out. However, the study further revealed that selling these crops at attractive prices is

always difficult as most goods perish or degrade in value before reaching the market. This limits their possibility to increase income, which they could have used to buy rice for home consumption.

As less income is realised from the sales of these crops, this impacts the household food stock. Farmers accept prices which are determined by the few buyers that come to the village. Sale proceeds from these crops are, therefore, relatively small and hence cannot complement the main staple (rice). Also, due to the low income realised from the sale of produce, the consumption of a variety of food that could have ensured a nutritional balance becomes impossible; hence food insecurity. This concurs with studies carried out by (Cartier & Bürge, 2011) in Sierra Leone and (Mwaniki, 2006) in Tanzania, in which it was observed that access to a market is one of the hurdles that must be overcome by smallholder farmers if they are to progress. These authors agreed that there are normally huge losses incurred by smallholders after harvesting, due to the lack of access to markets and the low market prices for farm produce which in turn is contributing to poverty, and food and nutritional insecurity for rice farmers in Sierra Leone.

7.3.1.4 Constraints in accessing transportation to move goods limit the flow of food stuff in and out the village

Transport constraints exacerbate food insecurity for smallholder farmers as transport needs to be linked to provide access to inputs and markets for their produce in a timely manner. Transportation constraints in term of access and cost seriously influence the status of food security in the case study. As highlighted in sections of the case description, bike riding is the major source of transportation in the village and this adversely impacts the movement of goods and people to and from the village because of the remoteness of its location. When the buyers visit the village, if at all, most of the produce may have perished or degraded. In a study by Ouma et al. (2010) on the role of transportation as a determinant of smallholder farmers participation in the market in Central Africa, it was highlighted that smallholders are unable to participate successfully in the market because of the high cost of transportation that emerges from remote locations and poor market structures. It was also argued in Mpandeli and Maponya (2014) study that the ills of transportation have a spill over effect on the availability and cost of inputs, as was also found in this study. With this case study, it was identified that commercial vehicles are refusing to enter the village because of the poor road network and this is constraining the supply of both agricultural inputs and basic food items for the village.

As argued in the case description chapter, transport costs increase prices of imported food items brought into the village. This is because the few minor traders who manage to take goods to the village using the bikes pay the high cost of transport, which is naturally transferred to the consumers, resulting in high costs for food stuff in these communities. The impact of this rolls over onto the status of household and individual food security in the study area. This finding supports the literature, which reports that food security is a challenge in the rural areas of Sierra Leone because of poor infrastructure, such as the road network, transportation challenges and market access (Conteh et al., 2012).

7.3.1.5 Youth migration impacts on available household labour and food production

Youth migration was identified as an influential factor regarding food security in the case study. The study indicated that there is a high rate of youth migration from the village to major towns and cities. It further revealed that because the community in the study area is made up of poor smallholder farmers they rely mainly on household labour. This finding has also been reported by Siddik et al. (2015) in their study carried out in Sierra Leone. They describe smallholder farmers as having limited access to other forms of livelihoods and rely mainly on household labour to meet their subsistence needs and for market sales. This study also shows that migration of the able-bodied-men into the cities, leaving the old and weak parents who cannot do much farm work hampers food production activities both in farm size and crop varieties. Even though some farmers in the case study may have land for cultivation (land owning families and relatives), the inability to source labour within the household combined with a lack of financial resources to hire labour prevent them from fully utilising the intended size of land. This had severely constrained productivity, resulting in a minimal output, which in most cases is not enough to meet household consumption requirement in terms of food volume, food accessibility, food quality, and consumption frequency, thus resulting in food insecurity for the household. The issue of smallholder farmers' reliance on household labour was also emphasised by the Food and Agricultural Organisation of the United Nations (FAO, 2015). Similarly, in Ghana Hesselberg and Yaro (2006) studied the extent and causes of food insecurity context. They reported that insufficient labour, due to youth migration, constrained smallholder farmers resulting in less productivity, poverty and food insecurity. The Mawoma case findings also support the literature, which reports that young people's migration from the rural to the urban areas and hence loss of labour is one of the reasons for the drop in agricultural productivity (Sumberg et al., 2012)

7.3.1.6 The influence of land allocation on the total food produced by smallholder rice farmers in Mawoma village

Access to land has been critical as far as farming in the case village is concerned and it has been a major influence on food security for smallholder farmers in the village. Not everyone in the village owns land. There are very few land owning families, the Chief being the most important. This means those without land must source land from either the Chief or the land-owning families. Findings in this study revealed that some of the farmers are constrained in accessing land for cultivation and due to the procedures involved frequently cannot secure the size of land they may wish to cultivate. They highlighted that, most times payment in the form of rice or cash is involved in securing a piece of land for farming purposes. The impact of this is that the limited output harvested from the small amount of land available constrains household food availability, food access for members of the household and household financial stability. Also, because of the limited size of land, farmers cannot cultivate a variety of crops, which means they may not be able to obtain balanced nutritious food; hence balanced nutrient utilisation is constrained. This has affected food provision in the village and has been the reason for the prevalence of food insecurity in the study village.

Although several scholars acknowledge land availability as a constraint affecting the smallholder farmers' volume of production, very few relate this to food security. For instance, findings from a study by Spencer et al. (2009) on the economics of rice production in Sierra Leone noted that about half the farmers in Sierra Leone pay for the land they cultivate. In another study on the socio-economic factors affecting smallholder farmers and household food security, smallholder farmers were described as farmers with limited inputs supplies, limited land supply and low income generation, (Oni et al. (2010). However, they failed to fully document how limited land could translate to food insecurity at household levels.

Most smallholder farmers in the case study are left with the only option of cultivating on a limited size of land, due to land use rights, and this is responsible for the low yearly yield. The impact of this is that the limited output harvested from the small available land constrains household food availability, food access for members of the household and household financial stability. Also, because of the limited size of the land for some, farmers cannot cultivate a variety of crops. This in turn constrained the possibility of a variety of food that could have ensured a balanced and nutritious diet; hence the nutritional balance is constrained. This has contributed to the prevalence of food insecurity in the study village. This finding agrees with Power (2008), who highlighted that limited access to traditional land (the land accessed from

local authority and land owning families) through rent, lease on kindly permission is a threat to food security. However, while my study also supports this, I argued that it is not just land that constraint food security. While some authors look at only one factor as a reason for food insecurity, this research is highlighting that it is not a sensible way to look at it, but in fact there are a whole lot of other drivers impacting on food insecurity in addition to land constraints.

7.3.1.7 The decline in yield as a result of the change in the forest fallow period

The decline in yield, as a result of shortening the land rotation period, is among the factors which were significantly associated with the drop in total output of farming production in the case study village. The style of farming where mature children cultivate the same plot of land as their parents has changed in the study village. In the past, a farmer and his children worked together on the same plot of land until the child was aged about 30. Today, most male children in their 20s want to work have a share of the family land and work independently from their father. The consequence for families where children have not migrated is that the available family land has to be divided by the number of working aged people within the family. Even though one may expect that youth migration may have at least lessened the pressure on land, the division of the land within families has put increased pressure on the land and the result is a reduction in the fallow period. Smallholder farmers in the case village no longer allow the land to lie fallow for the usual 10 to 12 years. This has in turn resulted in a decline in the soil fertility with a corresponding drop in productivity in the study area.

These same findings are reported elsewhere in the Tanzanian study by Graef et al. (2014), who highlighted that the decline in soil fertility is a major factor in reducing crop productivity. This research identified that the decline in soil fertility in the case area seriously impacted the total farm output constraining household food stock reserves. The impact on soil fertility due to a shorter fallow period results in poor farm yield and limited food stock available for the household. This limited food stock in most cases lasts for only a few months, exposing the household to constrained food accessibility and instability. Thus, according to the world summit definition of food security, the impact of this change in the fallow period has rendered them food insecure. This finding is in line with a study by (Mwaniki, 2006) who reports that due to the mounting population in tropical and sub-tropical Africa, land had been put under pressure by the shortening of the land rotation period, which has led to a decline in soil fertility, low farm productivity and an exacerbation of food insecurity for smallholder farmers

7.3.1.8 Limited financial resources

This research revealed how poverty is associated with and contributes to other drivers of food insecurity. Among all the factors identified as being influential for food security/insecurity, poverty is key and interrelated to all other factors. The study revealed that the farmers in the case area are poor and this poverty is constraining their ability to secure inputs, hired labour, land, food purchases, use of improved farm tools and their ability to afford transportation cost to the markets. These constraints caused by the lack of financial resources impact on the size of farm they cultivate and the volume of productivity, as well as the quality of food they eat. In this study, it was also revealed that the community members could not afford nutritious food because of poverty.

The result further highlighted the significance of eating not only the appropriate amount of food, but also the type of food with good nutritional value, because evidence from the data illustrated that the people may have rice to eat but, clearly, they do not have choices of other food components. In some cases, households sell items such as vegetables, chickens and other things that could have been sources of protein and other food nutrients. These items are sold at very low prices in order to acquire rice which is the staple food, preventing them from consuming nutritious food items and this had resulted to the prevalence of anaemic conditions in both pregnant women and children under the age of five in the case village. This study corroborates findings from other studies which highlighted that, due to poverty food insecurity poses urgent public health issues and that living in extreme poverty prevents people from being able to afford their needs, thereby constraining food security (Power, 2008; Beaumier & Ford, 2010). This shows that poverty impacts the food security in both developed and developing countries. The severity of poverty cannot be overemphasised in this study where farmers have no alternative sources of income. Whatever is spent or consumed comes directly or indirectly from farming. The financial pressure from all household needs, ranging from school fees for children, health and food, to other inputs, are all placed on the farm output. The inability to sufficiently finance farm operations is, therefore, limiting all the household livelihood activities resulting in poverty spilling over to the food security status of the household. It is in view of this that it was reported that in their attempt to alleviate poverty, South Africa believed achieving food security should be part of the strategy because the two are related (Altman et al., 2009). With money, these people could have been in a position to buy meat, as well as the fruit they do not grow; but due to the lack of financial resources in the case study village, eating fish, fruit and meat is not a practice at most times of the year. Financial constraints, therefore, limit quantity and quality as well as the frequency of food

consumption and this negatively impacts on the four pillars of food security namely food availability, accessibility, utilization and stability.

7.3.1.9 The use of traditional farm tools by smallholder farmers limits their farm size and output.

Although scholars have highlighted lack of mechanised farm tools as a major constraint facing smallholders in Sierra Leone and other parts of the world, little has been documented on its impact on household food security, as seen in this research. Agriculture in Mawoma village is still labour intensive. The village is dominated by smallholder rice farmers. They are poor farmers who mainly depend on the use of traditional farm tools, such as hoes and cutlasses for their farming activities. This corresponds with the study by Hesselberg and Yaro (2006) and Lynch et al. (2013), who reported that smallholder farmers are poor and as such cannot afford the cost of technological innovations as well as implements. This concern has also been expressed by MAFFS et al. (2015) who described agriculture in Sierra Leone as using traditional farming techniques with environmental degradation potential. Results from the study area show that the continuous decline in crop output is due to the farm size being influenced by the lack of mechanised farm tools. They cannot afford to hire tractors because they are poor, and the available household labour is not enough to meet the labour requirement for a larger piece of land. The result is limited farm size, low yield and consequently, the household food stock is adversely impacted, accounting for the food insecurity in the case village. This finding supports a study by Binns and Bateman (2016) who pointed out that the reliance on low-level traditional technology for their cultivation is limiting both size and productivity for smallholder farmers in Sierra Leone. Without sufficient productivity, the food stock available at the household level will be limited, which also means the required amount and quality of food will not be ensured. It is also true that the prevalence of poverty cannot be overcome, with the result that food availability, accessibility, continuity and quality is constrained at individual, household and community levels because of low productivity.

7.3.1.10 Constraints in accessing farm inputs

Smallholder farmers are facing serious constraints in accessing farm inputs, the study revealed. Interviews and observations in this study showed that these farmers are poor and are finding it difficult to access inputs, such as seeds, fertilizer and other chemical inputs required for successful agriculture practices. This research describes in detailed how these constraints had led to food insecurity in the case village. Other studies acknowledge the constraints, but how they impact on the food security of smallholder farmers is never discussed. For example, Jayne

et al. (2010), Binns and Bateman (2016) and (Power, 2008) all argued that limited input supplies is a major constraint limiting the size of farm cultivated, but were silent about how this could lead to household food insecurity.

Findings from the case village revealed that the farmers are poor and they mainly rely on petty traders to buy input supplies on credit and repay with rice at the harvesting period. Supporting this study, a previous study by (Spencer et al., 2009) reported that in Sierra Leone most farmers obtained input supplies from petty traders (who provide farmers with credit) and repay with rice at harvest at agreed prices that are usually below the open market price for the rice at harvest time. In the case study, these constraints are adversely impacting on the size of the farm a farmer could cultivate, making it difficult for some farmers to cultivate the intended farm size; In addition to the limited farm size due to seed inputs, inputs such as fertilizers are also unobtainable due to the poor financial status of these farmers. The result is low farm output and hence, limited food stock available for household consumption. As there is not sufficient available food, access to the available food by all in the household is also not guaranteed. Food stock may, therefore, last for only a few months of the year affecting food stability and, hence, the household food insecurity in the case village. In their study in Sierra Leone, Binns and Bateman (2016) also highlighted that the inability of smallholder farmers to access farm inputs could constrain farm outputs resulting in household food insecurity.

7.3.1.11 Accessing credit facilities from financial institutions

This research looked at credit inaccessibility as a constraint to smallholder rice farmers and how this has posed a threat to the status of household food security in the study community. Most studies reviewed only looked credit limitation as a challenge facing smallholder farmers in developing countries and that the ability to access credit could improve productivity. Access to credit facilities could allow smallholder farmers to meet input and labour costs (Massawe, 2017). In the case village, constraint in accessing credit was found to be a key factor impacting on the food security of smallholder farmers. The farmers in the case study cannot secure loans from financial institutions. This is because they cannot meet the set standards of the lending financial institutions in terms of collateral and volume of operation. This is in line with a study carried out in four developing countries in which Salami et al. (2010) argued that the inability of smallholder farmers to provide collateral security combined with a the lack of credit history are reasons preventing access to credit facilities.

Because of this inability to access credit compounding their poverty status, smallholder farmers in the case village are unable to meet the cost of inputs, modern farming technology and hired labour. This is impacting the size of farm they cultivate and, in the end they only produce limited output. That limited output will only assure a small amount of household food stock, which may last for only a short period in the year and not all household members can access enough. This is a finding that is consistent with a study carried on Smallholder Farming in Asia and the Pacific: Challenges and Opportunities by (Thapa & Gaiha, 2011), although they did not capture the aspect of household food security. They argued that due to the high capital required to meet new technology and inputs, unless smallholder farmers are provided with credit they will remain disadvantaged. Likewise, in a study carried out in Sierra Leone, Binns and Bateman (2016) highlighted that the lack of funds to finance farm operations, in terms of inputs, equipment and labour, limits farm size and constrains outputs, as well as exposing the household to food insecurity.

7.4 Section II: Factors influencing food accessibility within the household

While many researchers on factors influencing food security only look at the broader challenges, which are generally known, this study goes beyond the broader drivers of security. This section of the chapter discusses the interlinked nature of household factors, family and cultural practices and norms at the household level. Although some of these drivers have been looked at in a narrow context by few studies, none have described holistically the impact on household food security by inter-household preferences, as well as the family culture and socio-cultural norms.

In the case village, even though there is some amount of food in the household, there are factors identified as having influenced the accessibility and distribution of such food within the household. Some of these factors are based on behaviour and beliefs, practices and preferences/priorities of the household decision makers. Thus, even though there is food in the house, these dynamics prevent food access for all or some members of the household. To a very large extent, the farmers have direct control over some of these factors. Understanding the diverse pattern of household behaviour and consequences associated with household decision making has been a major interest for this study. This section, therefore, shows households' behaviours in terms of food sharing/distribution, households' preferences in terms of food acquisition and other spending options as well as socio-cultural involvements. These are intra-

household factors and they have a direct influence on household food stock, individual consumption volume and the nutritional quality of the food consumed.

7.4.1 The hierarchy within the household food distribution renders some household members food insecure, despite others being food secure

The impact of household hierarchy and the food sharing pattern is described in this study because this was identified as a significant driver of household food insecurity in the study community. The dynamics in the distribution of food within the household has an implication on the status of food security for members of the household (Pinstруп-Anderson, 2009; Beaumier & Ford, 2010). Findings from this study revealed that household food security is significantly impacted by household hierarchy and food sharing pattern. In this study, some of the household members (mostly the men and children) are the first to be served and are provided with the best part of the meal. The women mostly eat the left over, which in most cases is neither sufficient nor nutritious. Women in the case study village most times go to bed without food while their husbands may have eaten until they are full. There is a prevalence of food insecurity based on this inequality in the distribution and access to nutritious food for some of the most vulnerable members of the household. This study supports findings by Beaumier and Ford (2010) in regards to food security among Inuit women in Canada.

Also, the result revealed that communal eating where children of different ages are combined and served food could prevent weaker children from getting sufficient access to the available food in the household. The children, in this instance, may see the food but the amount and quality of the food they can access depends on their ability to dominate the rest of those eating. Hence, although there is food stock available in the home, the distribution pattern makes some members of the household vulnerable, facing individual food insecurity because not all those living within the same household enjoy the same equality. Although less linked to individual and household food insecurity, studies undertaken by Njuki et al. (2011) on linking farmers to market, and gender and intra-household dynamics in Southern Africa, Burchi and De Muro (2016) on food availability and food security in Germany, and Massawe (2017) on farming systems and household food security in Tanzania all highlighted some of the dynamics and inequality in accessing resources within households. It is therefore, also clear that household dynamics in accessing resources are evidenced in both developed and developing nations.

7.4.2 Influence of Cultural activities on household food stock

The impact of socio-cultural activities has been a major contributor to household food insecurity in the study village. Although literature reviewed showed that some scholars are aware of the socio-cultural practices existing in Sierra Leone and their impact on food stock (Bosire, 2012; Gruenbaum et al., 2008), the impact of these costs on individuals and household food security has been less documented. In fact, none of those reviewed has looked at the effect of these cultural activities on household food security in the northern region of Sierra Leone. In the research area, almost all members of the community are part of one or more secret societies and all females aged 15 years and above are members of the Bondo secret society. This is in line with the national statistics on the participation of women in the Bondo society in Sierra Leone, which reported that 94% of females over the age of 15 years are involved in Female Genital Mutilation (FGM) practice (Gruenbaum et al., 2008).

Previous literature has also highlighted that during the initiation periods, plenty of food is prepared for those attending the feasts and celebrations (Wilson, 2014). Likewise, in this study, findings revealed that when these cultural activities are organised in the village, all other surrounding villages attend and there is always a need to feed them. Everyone wears their best clothes and valuable jewellery and abundant food is always prepared and consumed. This is a time of food stock depletion. As these activities are conducted immediately after the harvest, sometimes the entire year's harvest is prone to be consumed within these festivity periods. This finding agrees with studies carried out by Mgbako et al. (2010), Gruenbaum et al. (2008), Conjoh et al. (2011) and Wilson (2014) on the socio-cultural factors affecting the spread of HIV/AIDS and the eradication of Female Genital Mutilation (FGM) in Sierra Leone, which emphasised the cost of the activity and its impact on household food stock as families frequently exhaust the entire harvest to meet the cost of initiations. The effect of this in the study area is severe, as it was identified that most times before or immediately after these cultural celebrations only a few households are left with food stock to feed the family. As the available food reserves are depleted, household members' food access becomes a challenge and household food stability becomes impossible. The people are thereby left to worry for food the remaining months of the year. Hence there is a prevalence of food insecurity for smallholder farmer households in this village.

7.4.3 The depletion of household food stock by extended family pressure

Results from this study revealed that extended family is more of a curse to their livelihood than a blessing. The inflow of visitors to this community during the harvest by members of the

extended family is posing a threat to the status of food security in the case study. It was reported that when members of the extended family visit, on their return, they are provided with a share of the year's harvests including rice, cassava, potato etc. and this normally depletes the household food stock. It implies that even though the harvest would have been good, giving this much to extended family members always reduces the available food for the household and members of the household are not able to access as much food as they desire. Within the first few months of the year, the households have usually run out of food reserves, resulting in the prevalence of food insecurity for smallholder rice farmers in the study community.

The impact of extended family on households in the study area is contrary to what is observed in the literature. In a study on the impact of the extended family system on the socio-ethical order in Nigeria, Ekeopara (2012) highlighted that extended family is important as it contributes in the form of farm assistance and sometimes provides food to the less unfortunate members of the extended family unit.

7.4.4 The food stock of most households is affected according to the preference attached to certain household expenditures

Preferences and priorities for certain household expenditures have been identified as having a critical impact on the food access of members within the households in the study area. School expenditure impacts the food stock of smallholder farmers in the case study village due to the number of children and the priority to educate them. It is reported that although some farmers produce the same quantity of yield, those with school going children are more likely to face a severe food shortage than those with fewer kids.

In their review of international and global food security and sustainability, Berry et al. (2015) perceived household preference influencing household food availability, accessibility and stability. Preference could cause dependants of two households with the same income and household members to face a different status of food security due to the diversity in their preferences. Results from the case further showed that while some families may not send their child to school because of limited financial resources, other families sell part of their food reserves to fund school expenses. Those who chose child education as a preference reported that school expense is one of the factors that often make them run out of food within the year. However, this finding has not been well researched by previous researchers and there is limited literature to support this circumstance in the study area.

7.5 Chapter summary

Food security at the household level is very critical and unique in nature and the factors influencing food availability, food access, food quality and stability are very dynamic. Most of these factors are interlinked, with poverty being the most influential. Based on these research findings, I will also argue that the role of poverty in undermining household food security cannot be underestimated, as it has a spill over effect on most other factors influencing food security at the household level. Food security at the household level is facing threats from two different places. There are those threats that impact on production and productivity constraining the total amount of food a household could secure from harvest; a household has little or no control over these factors. The other category of factors is actually within household control. These are activities that pose threats to the available food due to the distribution pattern and preferences within the household and socio-cultural involvements. With these factors, food availability may be ensured but accessibility, utilization and stability are seriously constrained. Household behaviour and preferences are therefore, key of household food security. While those factors affecting farm productivity impact food availability, the findings show that household dynamics in terms of food distribution, behaviour and sociocultural preferences greatly impact food accessibility, nutrition and stability. Figure 7.1 summarizes the interactions discussed above:

Chapter Eight: Conclusion and Recommendation

8.1 Introduction

The purpose of this research was to investigate and answer the research question, “What influences household food insecurity of smallholder rice farmers in the Northern region of Sierra Leone, and why?” In an attempt to answer this question an objective was set: by the end of the research, the study must be able to identify and the researcher must be able to discuss the factors that influence household food security for smallholder rice farmers in the Northern region of Sierra Leone. With this objective in mind, a qualitative single case study approach was found to be both useful and appropriate in achieving the set objective, which in turn, answers the research question. The research used the food security conceptual framework as a guiding instrument for investigating the factors impacting household food security and the aspect of the dimensions impacted. In addition to the framework, the study also shows empirical evidences and to what extent the study agrees with previous literature on the topic. This research has also provided empirical evidence that shows that availability of food in the household does not guarantee food access to all and food access in itself does not guarantee food security at the household level. The study further discovered that household behaviour and preferences are key influencing factors for household food security.

This chapter gives a summary of the key research findings based on chapter seven’s research findings and discussions. This chapter also provides a conclusion of the study, recommendations, the policy implication of the findings and suggestions for further research. In conclusion, a summary of this chapter is made.

8.2 Research conclusion

The prevalence of food insecurity in the study area is associated with the natural environment, community characteristics and household behaviours/priorities. Food security in this community is, therefore, influenced by two sets of factors. Firstly, there are those factors that come from the external environment and due to poverty smallholder farmers in the study village farmers cannot mitigate the impact from these external drivers. Examples of these external drivers of food insecurity in the village include climate change related factors, land constraints, labour constraints, market constraints, input challenges, pests’ threats, limited financial resources and soil infertility. These factors are defined by the natural environment and neither community characteristics nor the individual households have any control over them. Because these factors affect land size, soil fertility and productivity, they limit the total

farm output, which in turn affects the food stock a household could have as reserve and in turn their ability to mitigate the impact of external drivers. This has resulted in limited household food stock availability, while access of food for all is seriously constrained. Also, as this limited food reserve only lasts in the household for a few months within the year, household food stability is jeopardised, which has accounted for the prevailing food insecurity in the study community.

Secondly, the study has shown that household behaviour and preferences significantly impact food accessibility and food utilisation and, therefore, account for the prevalence of food insecurity in the study. These household level factors such as socio-cultural involvements, patterns of food allocation, acceptance of extended family pressure and the household head's spending decision making are associated with household attitudes, perceptions and subjected norms. Because different households have different behaviours, preferences, and food allocation hierarchy and patterns, factors related to household behaviours and preferences, therefore, impact different households differently. Household level related factors have been identified, by this study, as being key factors responsible for within household food insecurity for smallholder rice farmers, within the study community. This study further revealed that two households, with the same sources and level of income, number of dependents and within the same prevailing economic environment and resource pricing, could experience a different status of food security based on their behaviours and preferences. With this category of factors, the household heads have the option to either conform or not. Household decision makers are the key determinants to the occurrence of these events, so these events are described as factors that are controllable by households. Here, households' subjected norms reduce the available food stock, constrain or sometimes deny food access and food quality to some members of the household. The fact that even when there is availability of food in certain households, some members of the household still go to bed hungry suggests that at household level the availability of food is far from ensured in terms of food access and utilization. In some circumstances in this study, even when there was food in some households, access to that food by all was constrained by household preference and subjected norms.

8.3 Recommendations

Based on the findings of this study and in the hope of improving the status of food security in the region, this study makes two categories of recommendations. The first category includes household/farmer level recommendations, which aim at guiding household behaviours and subjected norms towards an improved status of food security. The second category of recommendation is at the policy level and these are aimed at policy makers from the government, local and international humanitarian organisations. These recommendations suggest how the status of food security could be improved for smallholder rice farmers in the study region.

8.3.1 Household level recommendations

This research revealed that household attitudes in terms of preferences, perceptions and subjected norms adversely impact on the food security status in the study community. There is need for a behavioural change campaign in the community to shape household and community norms, attitudes and preferences, so that household food distribution, preferences/priorities and cultural involvements could be guided towards improving household and individual food security. Households should maintain gender equality and the right to food by all household members at all times, to ensure access to nutritious food by all members of the household.

Also, attention should be given to other cash generating crops, such as groundnuts, potato and cassava; the sales of which could be used to address both food and non-food needs. The inclusion of non-farm sources of income streams could also provide additional income to spend on non-food items such as meeting school costs, health and clothing. These will lessen the pressure on the main staple food (rice) and prolong food stability in the household.

8.3.2 Policy recommendations

In a community where everyone holds strongly to the norms and cultural practices, government and non-governmental organisations should facilitate community awareness campaigns on the impacts of these practices on the wellbeing of households and individuals in the community. This campaign would educate household heads on their responsibility to adapt a food distribution practice that ensures food access for all in the household. Prioritising food stock to household consumption and forgoing the use of food stock in conforming to community norms should also be part of the awareness campaign. As far as the study community is concerned, any government or non-governmental policy aiming at improving the status of household food security should ensure households' subjected norms and preferences are given the utmost

attention as these were found to have a significant influence on household food security in the study area.

Even though most farmers are constrained by the size of land they secure, there is sufficient land within the community under the ownership of land owning families and Chiefdom authority. Government and local authorities should revisit the land distribution method and ensure those with the ability to cultivate have access to as much land as they may require.

Looking at the location of the study site, there is a need for government and humanitarian organisations to ensure the availability of community infrastructure, such as markets, good roads and access to credit from financial institutions. The presence of this infrastructure could help farmers improve their production capacity, add value to farm production, as well as reducing transaction costs and losses associated with produce.

8.4 Implications of the study

It is an established fact that the northern region, where the case village is situated, is the most food insecure region in Sierra Leone. Addressing this issue requires an understanding of the diverse factors that influence the status of household food security in the region. The findings of this research have, therefore, helped in identifying and providing a clear understanding of the dynamics which drive household food security in the case study area. Those interested in addressing the food security status in the region will find these findings useful. Likewise, policy makers might consider using these finding as an appropriate tool in the formulation of policies that aim at addressing food security for smallholder farmers. Furthermore, any intervention strategy and programme designed and successfully implemented in the region based on these findings could be appropriate in solving similar food security challenges in similar community settings elsewhere.

8.5 Further research recommendation

Based on the findings of this study, which has identified and described the diverse drivers of food insecurity, researchers may want to attempt to solve these challenges by seeking further answers as to what could be done to address the drivers of food security for smallholder farmers. Future research should, therefore, be guided by how the causes of household food insecurity in the northern region could be addressed.

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Appendices

Appendix 1: Ethical Evaluation



Date: 28 April 2017

Dear Komrabai Kamara

Re: Ethics Notification - 4000017664 - New Application

UNDERSTANDING THE DIMENSIONS THAT ARE SHAPING THE DYNAMICS OF FOOD SECURITY AT INTRA AND INTER HOUSEHOLD LEVEL IN MAOMA VILLAGE, NORTHERN REGION OF SIERRA LEONE

Thank you for your notification which you have assessed as Low Risk.

Your project has been recorded in our system which is reported in the Annual Report of the Massey University Human Ethics Committee.

The low risk notification for this project is valid for a maximum of three years.

If situations subsequently occur which cause you to reconsider your ethical analysis, please go to <http://irms.massey.ac.nz> and register the changes in order that they be assessed as safe to proceed.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

A reminder to include the following statement on all public documents:

"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research."

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Dr Brian Finch, Director - Ethics, telephone 06 3569099 ext 86015, email humanethics@massey.ac.nz.

Please note, if a sponsoring organisation, funding authority or a journal in which you wish to publish requires evidence of committee approval (with an approval number), you will have to complete the application form again, answering "yes" to the publication question to provide more information for one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

Yours sincerely

Research Ethics Office, Research and Enterprise

Massey University, Private Bag 11 222, Palmerston North, 4442, New Zealand T 06 350 5573; 06 350 5575 F 06 355 7973
E humanethics@massey.ac.nz W <http://humanethics.massey.ac.nz>

Appendix 2: Participants Information Sheet



MASSEY UNIVERSITY

COLLEGE OF SCIENCES
TE WĀHANGA PŪTAIAO

Understanding the dimensions that shape smallholder rice farmers' household food security: a case study in Northern Region Sierra Leone

INFORMATION SHEET

My name is Komrabai Sheriff Kamara. I am a Sierra Leonean born in Kassiré, Samu Chiefdom, Kambia district, Northern region of Sierra Leone. I am a student in the Institute of Agriculture and Environment in the College of Sciences, Massey University, New Zealand. As partial fulfilment for the award of the Master in AgriCommerce, I am undertaking research on smallholder farmers' household food security and would like to invite you to participate in the exercise. The topic of my study is, the dimensions that are shaping smallholder farmers' food security in Sierra Leone and as a specific case I will focus on food security of small holder rice farmers in Maoma village in the northern region of Sierra Leone. Before deciding to participate in this research, carefully read this document.

It is my intention to interview Officers of the Ministry of Agriculture, Ministry of Health, Statistic Sierra Leone, district administrative Officers, notable village heads and smallholder rice farmer household members in Maoma village. The research participants have been selected because they have information on food security and what is influencing food security at a national, regional, district, village and/or household level. Maoma is the study village and has been selected because it is situated in the leading rice producing region but households continue to face food insecurity.

You have been identified as a potential participant for this study. Please note that it is a voluntary decision for you to make. The interview which will take around 60 minutes and with your consent will be recorded using a digital voice recorder. The recording may be transcribed by me to enable analysis but no quotes will be attributed to you directly without your consent. Your answers to the questions will provide information that will help to bring out the diversity of the dimensions that shape household food security in the village. The interviews will be conducted at a time and place most convenient for you. If for any reason a question is asked that you are not comfortable with, you may decline. You also have the right to ask questions about the research, as well as to clarify any doubt you may have. You may have access to the information you will provide and your name will only be used if you wish it to be included in this study. It is also your right to withdraw from participating in the research at any time.

**Te Kunenga
ki Pūrehuroa**

Agriculture & Horticulture Group – Institute of Agriculture and Environment
Private Bag 11222, Palmerston North 4442, New Zealand T +64 6 951 7806 F +64 6 355 7948, <http://www.massey.ac.nz>

All information given will only be used for the purpose of this research and other academic uses. It is only during the time of storage that I and my supervisors will have access to the information. The recorded interviews will be stored for a period of five years and then will be destroyed.

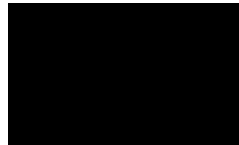
If you feel this research may cause you any form of harm, you are at liberty to raise concern and I will be ready to discuss it with you prior to the interview. However, there is no anticipated harm of any type to any of the participant of this study.

This research has been ranked low risk according to the evaluation of the peer review but has not been reviewed and approved by the Massey University Human Ethics Community. However, the above named researcher is responsible for the ethical conduct of this study. For confirmation or any concern on the conduct of this research beyond the research, please feel free to contact Dr Janet Reid and Dr Nick Roskrug. The contact details for myself and my supervisors are included below:

Dr Janet Reid
Senior Lecturer
Institute Agriculture and Environment
Massey University
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Komrabai Sheriff Kamara



Regards,
Komrabai Sheriff Kamara

**Te Kunenga
ki Pūrehuroa**

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Appendix 3: Consent form



MASSEY UNIVERSITY

COLLEGE OF SCIENCES
TE WĀHANGA PŪTAIAO

Understanding the dimensions that shape smallholder rice farmers' household food security: a case study in Northern Region Sierra Leone.

PARTICIPANT CONSENT FORM - INDIVIDUAL

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree/do not agree to the interview being sound recorded.

I wish/do not wish to have data placed in an official archive.

I agree to participate in this study under the conditions set out in the Information Sheet.

Signature: _____ Date: _____

Full Name - printed _____

**Te Kunenga
ki Pūrehuroa**

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Appendix 4: Interview guide

Participants' interview guide: The same questions were asked across all key informants and participants

Name of respondent

Gender:

Name of household head

Gender:

Household size:

Number of male:

Number of female:

Name of the village:

Name of Chieftdom:

Name of District:

How long have you been in this village?

As indicated from the information given to you, I am Komrabai Sheriff Kamara, a Master of AgriCommerce student in the institute of Agriculture and Environment in the college of Sciences, Massey University, New Zealand.

What are the factors that are influencing on the food security of your household?

This question was expected to provoke a lengthy discussion on the drivers of food insecurity in the households.

Based on his responses, the following sub questions may come, if not captured by his discussion:

1. Is food shortage common in your household?
2. How do you cope with food shortage when it happens in the household?
3. How easy is it for you to get food from the market, and which food stuffs are obtainable from the market?
4. What are the most important causes of food shortage in your household?
5. What are the factors that determine what you eat in your household? (There is need to probe how the social surrounding such as neighbours, friends and community influence the type of food people eat in the district)

6. How do you normally get food besides your own production for consumption in the house?
7. What are the difficulties to get food for home consumption?
8. What are the lean months in the year? Are they the same for each year? If so why?
9. What, if any are the major traditional/socio-cultural activities that consume significant amount of food in your household?
10. What time of the year do you usually find it difficult to buy food because of high prices?
11. What type of crops do you grow?
12. Can your production address your food security?
13. How do you get food that you do not produce?
14. What are the difficulties that you are facing in buying foodstuff?
15. In the past 30 days did you worry that your household would not have enough food to eat?
16. In the past 30 days, did it happen that you or any member of the household was not able to eat the kind of food you would have preferred to eat because of lack of resources?
17. In the past 30 days, did it happen that you or any household member had to eat some food that you really did not want to eat because of lack of resources?
18. In the last 30 days, did it happen that you or any household member had to eat a smaller meal than you felt you need because there was not enough food?
19. In the past 30 days, did it happen that there was no food to eat of any kind in your house, because of lack of resources to get food?
20. In the past 30 days, did it happen that you or any household member went to sleep at night hungry because there was not enough food?
21. In the past 30 days, did it happen that you or any household member went a whole day and night without eating anything at all because there was not enough food?
22. In the past 30 days, are you aware of households in this village had to eat limited variety of food because of lack of resources?
23. How has your standard of living changed over the last five years?
24. How do you get access to land and water?
25. Is there enough land available for you to cultivate?

26. What are the main problems associated with crops/livestock production in the household?
27. How do you address crop diseases?
28. What are the main changes that have taken place in the way you make a living over the last five years and what is responsible for these changes?
29. What measures do you take at any time you are faced with serious food insecurity in the past two years?
30. What are the challenges in in getting information from government and other extension workers?