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Smallholder farmers and the question of food security in the Asante Akim North Municipality of Ghana

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Abstract

Smallholder farmers face a number of challenges in spite of the crucial role they play in ensuring food security. An appreciation of the far-reaching consequences these challenges have on food security will inform the formulation of policies aimed at addressing the problem of food insecurity. In Ghana, research on food (in) security issues has mostly focused on the Northern part of the country partly because of the number of development challenges that face the north. This has shadowed the food insecurity situation in the South. I have therefore attempted to understand the underlying causes of food insecurity by examining the challenges confronted by smallholders in the Wioso and Woraponso areas of the Asante Akim North Municipality in the Southern part of Ghana. The research relied on qualitative methods such as focus group discussions and semi-structured interviews in constructing data with smallholders, officials of the Ministry of Food Agriculture and other relevant stakeholders. The rights-based approach which encompasses attempts to reduce poverty through good governance and safeguarding the interests of marginalized groups constituted the main theoretical basis for this research. The research identified a number of difficulties faced by smallholders including inadequate access to credit facilities, poor access and use of modern inputs such as planting materials and agrochemicals. Concerted efforts by government, NGOs and farmer-based organizations are needed to address these difficulties. Empowering smallholder farmers so that they are able to explore other livelihood strategies and adapt to new innovations in their farming activities will help ensure food security.

Key words: Smallholder farmers, Food security, Ghana, Post-harvest lose, income

List of Abbreviations

AANM	Asante Akim North Municipal
ADB	Agricultural Development Bank
ADRA	Adventist Development and Relief Agency
BAC	Business Advisory Center
CFSVA	Comprehensive Food Security and Vulnerability Analysis
CIDA	Canadian International Development Agency
CRI	Crop Research Institute
DAES	Department of Agricultural Extension Services
DDT	Dichloro Diphenyl Trichloroethane
DFID	Department for International Development
FAD	Food Availability Decline
FAO	Food and Agricultural Organisation of the United Nations
FBOs	Farmer Based Organisations
GCB	Ghana Commercial Bank
HLPE	High Level Panel of Experts on Food Security and Nutrition
IFAD	International Fund for Agricultural Development
JICA	Japan International Cooperation Agency
MDGs	Millennium Development Goals
MoH	Ministry of Health of Ghana
MoFA	Ministry of Food and Agriculture of Ghana
NBC	National Buffer Company
NGOs	Non-governmental Organisations
NPK	Nitrogen Phosphorous and Potassium
REP	Rural Enterprises Programme
SAP	Structural Adjustment Programme
SLA	Sustainable Livelihood Approach
UN	United Nations
WAAPP	West Africa Agricultural Productivity Programme

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1 Introduction

1. 1. Background and Purpose

Food is a major issue of concern because it is a necessity rather than a want. Attempts to ensure food security also means providing for people's basic needs. Food (in) security can be seen as a global phenomenon following the FAO (2013) report which estimates that a total of 842 million people in 2011–13 suffer from chronic hunger or do not get enough food to satisfy their needs. However, compared to the estimated total of 868 million people in 2010-12, then there is a reduction. Also, the total number of undernourished has fallen by 17 percent since 1990–92 (FAO, 2013).

The MDG 1 aims at reducing the world's proportion of people suffering by hunger by half (Rigg, 2008). The SAP from 1983 to 1992 also highlighted on intensification of agriculture to ensure food security in Ghana (Seini and Nyanteng, 2005). On the local scale, approaches focus on ensuring household food security and individual's access to healthy food to maintain an active life (Slater et al, 2008).

The role of smallholder farmers in ensuring food security is significant because of the number of mouths they feed in the world. Prakash-Mani (2013) estimates that 25 percent of food supplied in the world come from smallholder farmers in Africa, Asia and Latin America. The FAO (2014) also projects that 80 percent of the food consumed in many developing countries in sub-Saharan Africa and Asia come from smallholder farms. There are hopes that if smallholder agriculture is improved, farmers can also improve their standards of living thereby reducing hunger in their local communities (Prakash-Mani, 2013).

In this thesis, I explore ways by which smallholder farms can be improved to guarantee food security. I examine the challenges faced by farmers in this

category. I also touch on how incomes of smallholder farmers can be improved as part of enhancing food security. It also has to be mentioned that this thesis seeks to contribute to the reader's understanding of food security concepts, while simultaneously; findings from this research can help policy makers in their attempts to battle food insecurity.

1. 2. Problem Statement

Following international resolve at United Nations General Assembly in September, 2000 to reduce extreme hunger, among other development related goals, member countries have adopted various strategies aimed at ensuring food security. Despite these attempts, it is noted that most of the countries, especially developing countries, are still challenged with extreme hunger and poverty (Djurfeldt et al, 2011). Indeed, many developing countries are bedeviled with the food insecurity problem (Slater et al, 2008). It has been argued that although smallholder farmers constitute the highest proportion of food producers in developing countries and therefore arguably hold the key to addressing the sorry state of affairs, they have been largely neglected by policy makers and researchers (HLPE, 2013). In the light of this revelation, the needed for more empirical studies on harnessing the potential of smallholders as a major starting point for effective policy interventions aimed at addressing the food security question becomes imperative-the gap that this research attempts to fill.

According to HLPE study (2013), although there is a compelling need for increased food production in Africa, over 80 percent of farm sizes on the continent is less than 2 hectares. These farms are owned by smallholders. Similarly, although Ghana largely relies on smallholder farmers for food supply, over 85 percent of smallholder farms in that country is less than 2 hectares (Seini and Nyanteng, 2005).

Some development watchers in Ghana posit that as result of development imbalances between the North and South in the country occasioned by some critical junctures in the nation's history, poor geographical or climatic conditions, among other causes, poverty is more pervasive in the former (the North) (CFSVA, 2012). Consequently, it has been submitted that the Northern regions are more prone to the food insecurity challenge (Seini and Nyanteng, 2005). According to Biederlack and Rivers (2009), food insecurity rates in the North range from 10 to 30 percent, whereas the rates in the South range from 1 to 7 percent. Although the above historical and natural conditions provide justification for studies aimed at addressing the problem of food insecurity in the Northern Ghana, this position ignores the fact that there are isolated cases of settlements in the South that share similar, if not worse, characteristics with the North. As a result of the concentration of research interest in the North, there are few empirical studies to date that attempt to study the nature of food insecurity in Southern Ghana and how smallholder farmers could be empowered to become active part of the solution. This study will therefore be a major attempt at filling the context gap in the food security discourse in Ghana.

Following this argument, smallholder farmers in the Asante Akim North Municipality which is located at the Southern part of the country are constrained in terms of access to resources, credit facilities and farm inputs which will help them to produce more food as part of ensuring food security. The food insecurity situation in the AANM also manifests itself in high rates of post-harvest losses. Data from the Municipal Assembly show that in 2005, maize recorded post-harvest loss of 30 percent whereas cassava recorded 27 percent (AANM, 2006). There is evidence that previous and subsequent years recorded similar losses. Giving this sorry state of affairs, the income levels of farmers are rather low and this consequently affects investment in farming activities in subsequent years.

Although addressing post-harvest losses could possibly contribute to addressing the food security challenge, there is a paucity of empirical research on the

underlying causes of post-harvest losses in the Municipality. It is further imperative to note that the challenges that confront smallholder farmers in the Municipality have not been explored in a holistic manner. Additionally, there is a compelling need for a more focused research that explores the question of food insecurity with regard to staples which are crucial to addressing the needs of a defined population and the capacity of smallholders in satisfying those needs through the application of available technology.

My selection of the two communities: Woraponso and Wioso in the AANM, for the study is based on the fact they share similar characteristics to most of the villages in the North if not worse off. Most of the inhabitants in these two communities are farmers who operate on smallholdings just like farmers in the North. Farmers in the two communities are faced with similar challenges as those in the North.

1. 3. Research Questions

My research seeks to answer the following questions:

- I. What are the underlying causes of food insecurity in the Asante Akim North Municipality?
- II. Why do output levels continue to be low in spite of modern technology and introduction of new varieties of maize and cassava?
- III. How can incomes of smallholder farmers be improved?

1. 4. The study area

1. 4. 1. Location and size

The AANM is found in the Ashanti Region of Ghana. Konongo-Odumase is the twin capital town of the municipality (AANM, 2006). Broadly speaking, the AANM can be located at the Southern part of Ghana if the country is divided into two halves- North and South. The Municipality is located in the eastern part of the

Ashanti Region of Ghana. It is found within latitude 60 30' North and 70 30' North and longitude 00 15' West and 10 20' West with a land area which extends to about 1,160 sq. km (AANM, 2006). The 2000 census estimates the population to be 142,434 for the year 2006 (AANM). Districts which share boundary with the Municipality are Sekyere East on the north, Kwahu South on the east, Asante Akim South on the south and Ejisu-Juaben Municipal on the west.

1. 4. 2. Physical background

The general land surface of the Municipality is undulating. Both the Northern and Southern parts of the municipality are characterized by heights ranging between 305 and 610 meters above sea level (AANM, 2006). The Northern part is however marked by the Akwapim-Mampong stretch which rises to about 762 meters. The Akwapim-Mampong Range is the major source of rivers and streams such as Owerri, Anum, Oyin, Onwan and Egyan which serve the municipality. There are a few waterfalls which attract tourists. Lowlands which range between 305 and 610 meters are also found in the Northern part which dip gently into the Volta Lake (AANM, 2006).

1. 4. 3. Climate and vegetation

The Municipality is found within the semi-equatorial belt which experiences double rainfall regimes. The mean annual temperature is 26 ° C (AANM, 2006). The Municipality is within the moist semi-deciduous vegetation zone. Three distinct vegetation types are however identified within this vegetation belt. These are the Open Forest, the Closed Forest and the Wooded Savanah (AANM, 2006). Trees found within the vegetation types include Wawa, Ofram, Sapele, Onyina and Kyenkyen which are mainly processed into furniture. Indiscriminate felling of trees among other acts like slash and burn, bush fallowing, bush burning and overgrazing have reduced most of the forests into secondary forests and grassland (AANM, 2006).

1. 4. 4. Soil

The Forest Ochrosol and Savanna Ochrosol are the main soil types which underlie the AANM. The Forest Ochrosol is rich with nutrients which support crops like cereals, cassava, plantain and vegetables. Cash crops such as cocoa and oil palm also thrive well in this soil type. The Savanna Ochrosol also supports the cultivation of maize, cassava, yam, groundnut and vegetables (AANM, 2006).

Below are maps showing the study area in national context and within the municipality.

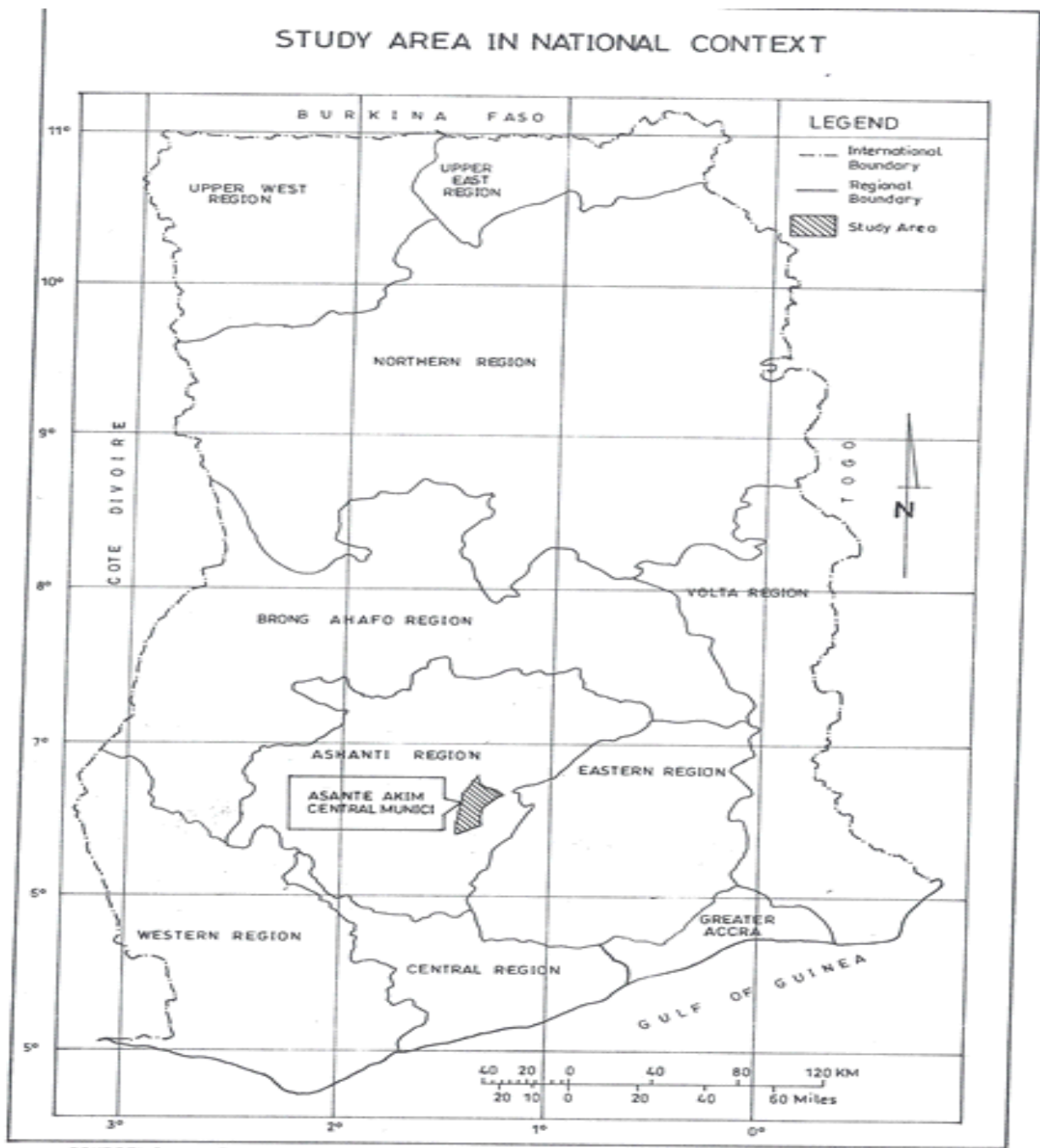
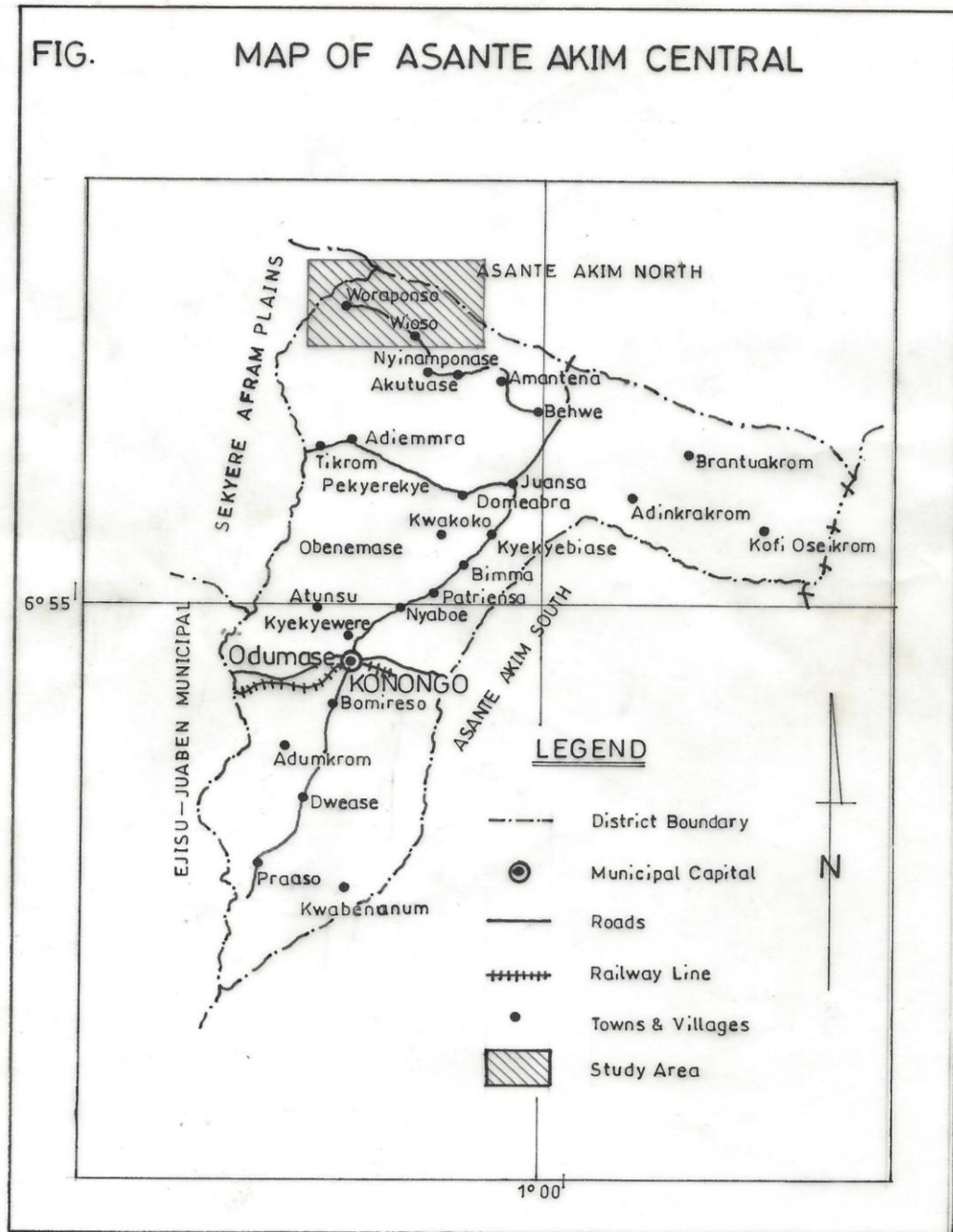


Figure 1: Study area in national context

FIG. MAP OF ASANTE AKIM CENTRAL



SOURCE: Asante Akim Central Municipal Assembly

Figure 2: Map of Asante Akim Central Municipality showing Wioso and Woraponso.

2 Theory and literature review

In this section, I discuss the theoretical focus of this study. The rights-based approach to food has been adopted as the main theoretical framework. However other approaches such as the FAD, entitlement and interdependence and the SLA have been employed to complement the rights-based approach. Also discussed in this chapter is theory surrounding alternative livelihood strategies.

Over the years, availability of food has been a major concern to farmers, governments and consumers. Hence, various attempts are made by farmers to increase output. However, Sen's (1999) definition of food security maintains that production and availability are not enough to tackle the deprivation of a proportion of the population. He makes this clear when he asserts that:

What is crucial in analyzing hunger is the substantive freedom of the individual and the family to establish ownership over an adequate amount of food, which can be done either by growing the food oneself (as peasants do), or by buying it in the market (as the nongrowers of food do)

(Sen, 1999 p. 161)

Key to Sen's definition is access to enough food by the growing population especially the poverty stricken ones. According to the FAO (1996, p. 152):

Food security exists when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

There are several definitions for smallholder agriculture in terms of their sizes, level of technology employed among others. According to the HLPE (2013), smallholder agriculture is usually considered as a major source of income for households which engage with family labour and simple farm tools to grow crops, rear animals and practice fish farming. Smallholdings should be differentiated

from commercial holdings in which the latter engages the services of hired labour (HLPE, 2013). Smallholder agriculture has been described in terms of size by Prakash-Mani (2013) who maintains that smallholder farms in Africa, Asia and Latin America generally cover less than two hectares of land area. However, HLPE (2013) points that defining smallholder agriculture in relation to farm size alone is insufficient and problematic. This is because smallholdings are small because it becomes difficult for the farmers to convert the scarce resources to generate any substantial returns that will ensure sustainable livelihoods of farmers. Because of this situation, smallholder farmers usually resort to off-farm activities to supplement their sources of income (HLPE, 2013).

2. 1. Theorizing food security

Various concepts which explain food security stem from food availability to poverty and livelihood frameworks as indicated by Yaro (2004). Following this point of view, Yaro (2004) categorizes these theories into Food Availability Decline (FAD) approach, Rights-based Approach, Entitlement Failure and Livelihood Failure.

2. 1. 1. Food availability decline (FAD) approach

As a basic necessity, food availability has been given a major attention. Attempts to eradicate extreme hunger and poverty as highlighted in the MDGs (Rigg, 2008) call for improved methods of farming. Mechanization of agriculture in Europe and North America and investments in green revolution technologies in Asia are therefore seen as ways to increase food production to feed a nation's population and also export the surpluses (Yaro, 2004). Sub-Saharan Africa's story has been described as not encouraging in the literature. This is because it is the only region which is bedeviled with hunger, threats of famine and vulnerability (Devereux & Maxwell, 2001 and Djurfeldt et al, 2011).

The FAD approach holds that inadequate food supply is a necessary factor for causing food insecurity (Fine, 1997). The FAD approach is concerned with climatic conditions in which farmers find themselves, enhancing resource acquisition, improving prices of farm produce and market avenues and facilitating technological advancement in agriculture (Yaro, 2004).

Though availability is very important, it is seen by other scholars as not sufficient to solve the food insecurity situation of some people. Sen (1999) indicates that even in the midst of abundance food, people starve because they do not possess the purchasing power. Yaro (2004) also indicates that availability of food may still be matched with increasing cases of malnutrition, diseases and unequal access to food.

The FAD approach has been criticized for its focus on collective supply rather than the contributions made by the individual smallholder to ensure availability of food (Fine, 1997). Yaro (2004) argues that this approach does not explain how individuals have access to enough food. It also has to be added that it is misleading to assume that technology always leads to increase in supply of food. The climatic conditions and the general attitude of farmers towards technology and new methods should be considered. Supply of food is also affected by other factors such as the political environment which the FAD approach does not tackle. The gaps left by the FAD approach led to the emergence of the entitlement and interdependence approaches (Yaro, 2004).

2. 1. 2. Entitlement and interdependence

The FAD approach fails to adequately offer explanations to the paradox that in the abundance of food, a significant number of people are food unsecured in many developing countries (Yaro, 2004). Sen (1999) postulates that to study food security, one needs to go beyond looking at food availability to consider the general economy and also the political and social environments which make it possible for people to have access to food. Therefore the entitlement approach

emerged to consider a broader sense of food security other than production and agricultural expansion which are the concerns of the FAD approach.

The entitlement approach takes into consideration, food production, ownership of resources, the prevailing socio-economic and political conditions in the society (Yaro, 2004). According to Sen (1999) who is known to be the harbinger of the entitlement approach, institutions such as trade unions, political parties, nongovernmental organizations and the media also have influence on policies which affect food security.

Osmani (1993) summarizes the entitlement approach under the endowment set, the entitlement mapping and the entitlement set. To produce food, a person needs a set of resources otherwise known as endowments. These resources are assets such as land, labour, capital, knowledge gained from education and the person's own skills. The person's membership in a community also means other endowments such as culture and practices and the state laws (Osmani, 1993). The entitlement set refers to the products obtained from engaging the resources into production. The entitlement set usually depends on the combination of resources or the endowment set that a person chooses (Osmani, 1993). Simply put, the endowment set refers to the inputs whereas the entitlement set denotes the outputs. The connection between the inputs and outputs is known as the entitlement mapping (Osmani, 1993). Example is given as the relationship between the amount of resources employed on a farm and the output realized from cultivation. It can be noted that changes in one can affect the other.

Yaro (2004) identifies a person's endowment as the resources which are converted to produce food or which can be exchanged for food. To transform these endowments into production requires knowledge, technology, skills and experience (Sen, 1999). The ongoing discussion as summarized by Sen (1999) is that to satisfy one's entitlement to food, the endowments which are mainly land, labour and capital should be put into production or one's income in an

employment can give her access to food. This has been described as interdependence because people who are not directly into food production but in other sectors such as industry and services also have access to enough food because they are able to use their incomes to command for food (Sen, 1999). The idea of interdependence introduces the concept of exchange conditions which are the presence of effective supply and demand marked by certain prices (Sen, 1999). The entitlement approach focuses on an individual's purchasing power which gives him or her access to enough food (Yaro, 2004). This is interpreted by Sen (1999 p. 162) when he asserts that:

Food is not distributed in the economy through charity or some system of automatic sharing. The ability to acquire food has to be earned. What we have to concentrate on is not the total food supply in the economy but the entitlement that each person enjoys: the commodities over which she can establish her ownership and command.

Yaro (2004) also views the food security problem through the interplay of demand and supply. This means that the two conditions must be effective. Once food is supplied it should be demanded to boost production. Though having the purchasing power is crucial, it can be said that it is not an end on its own. Yaro (2004) notes that food insecurity may also occur when there is ill health, loss of land and labour, fall in incomes, food price hikes and loss of employment. Also, unforeseen contingencies such as flood, bush fires and drought may cause food prices to increase leading to food insecurity.

Unemployment is also noted as a major cause of food insecurity under this approach. This goes to reveal that even in the presence of abundant food, people may not have access because of changes in their employment statuses (Sen, 1999). This can be linked to seasonal crops such as maize. During off-seasons, farmers who grow only maize are unemployed and that puts them in the position to be food unsecured since during this time, such farmers do not earn income which will give them access to enough and healthy food.

A nuanced way of viewing food security from political dimensions of this approach links food insecurity to powerlessness of some group of people (Keen, 1994). This is where victims do not possess the voices to fight for their rights. Another margin is noted where the more powerful ones cause people to be food unsecured as a result of the former claiming more endowments (Keen, 1994).

The entitlement approach, despite its broader look has been criticized for its lack of focus. It is bent on general rather than specific causes of food insecurity (Sen, 1999). The approach's inability to touch on how victims of food insecurity make ends meet has been identified as a weakness (De Waal, 1989 and Davies, 1996). Accordingly, it has been established that victims do not survive at the mercy of demand and supply (De Waal, 1989 and Davies, 1996). According to Yaro (2004), the entitlement approach tackles food insecurity as an economic failure within a system though it leaves questions about the system itself unanswered. The entitlement approach basically studies food security based on the balance between an individual's endowment set and entitlement set which makes it problematic when trying to consider a bigger population size (Yaro, 2004). Also, the approach's reliance on causes of food insecurity looks shallow (De Waal, 1989) since livelihood approaches go beyond causes of food insecurity. Therefore Davies (1996), De Waal (1989) and Yaro (2004) suggest a broader framework which will deal with the complex network of economic, social and political as well as the historical processes which underpin vulnerability discussions.

2. 1. 3. Sustainable livelihood approach (SLA)

The SLA seeks to answer questions which could not be attempted by the entitlement framework to study food security. The SLA delves into how poor men and women make ends meet by converting the available assets into production (Farrington et al., 2002).

A livelihood comprises the capabilities, assets, both material and social resources, and the activities required for a means of living.

(Yaro, 2004 p. 27)

According to Chambers and Conway (1992), a livelihood's sustainability depends on how it is able to utilize the available assets and resources while at the same time preserving them for further usage in the future. Borrowing Yaro's (2004) term 'People-in-Places Paradigm', the SLA is concerned with the geographies of people and places. The approach understands that people at different places are faced with different opportunities, therefore to study a group of people means a proper knowledge about their ecological and political economy as well as their perceptions and history. Based on this assumption, it can be said that because of different climatic conditions prevailing in the Southern and Northern parts of Ghana, smallholder farmers in the two areas are exposed to different capabilities, assets and resources. As Yaro (2004) puts it, a people-in-places paradigm examines diversified opportunities in different geographical locations whether local, national or global with different groups of people who come under different authorities.

Another concept which is associated with the sustainable livelihood approach is vulnerability (Yaro, 2004). This refers to how a livelihood is susceptible to shocks and stresses as well as ways to cope with such contingencies (Chambers, 1989). A livelihood is therefore vulnerable when it is easily exposed to unforeseen contingencies with little efforts to recover. Moser (1996) and Farrington et al (2002) note that an individual household or community may become vulnerable as a result of economic, political and ecological changes. DFID (2002) also identifies the following as causes of vulnerability: changes in the assets and natural resources of a community, changes in prices, production and employment opportunities, migration, illness or disease, natural disaster and conflict. These may also lead to changes in peoples' food security statuses. A person who is more vulnerable to shocks is more likely to be food unsecured.

Ahmed and Lipton (1997) contend that adjustment programmes, through their changes in policies which affect agriculture and other livelihood alternatives influence sustainable livelihoods. In people's quest to sustain their livelihood options, their decisions are not only affected by their own choices but also by external factors such as institutional policies. The case of the SAP of Ghana offers a good understanding of the effects of institutional changes on the livelihoods of smallholder farmers (Seini and Nyanteng, 2005).

2. 1. 4. Rights-based approach to food and development

I have adopted the rights-based approach as the main approach to study how food security is ensured through smallholder farmers. However, the other approaches described above are used as complements.

The rights-based approach extends beyond enhancing food security through the individual's attempt of converting available assets into production. Thus, rights-based approaches encompass attempts to reduce poverty through good governance and how to ensure the interests of the marginalized (World Bank, 2000, Johnson and Start, 2001, Johnson and Forsyth, 2002). Both the entitlement and sustainable livelihood frameworks only touch on the struggles that individuals go through in order to make ends meet without blaming authorities which might be the root cause of food insecurity (Yaro, 2004). The rights-based approach has elements of legality as opposed to Sen's idea about the entitlement approach (Yaro, 2004).

This approach maintains that food security is enhanced under conditions where economic, social, political and cultural rights are held in high esteem (Yaro, 2004). By inference, a democratic state is more likely to ensure food security than a state under dictatorship rule. Viewing food as a basic necessity means that individuals' rights are hampered when they do not have access to enough food or materials needed for cultivation. To ensure food security under the rights-based approach means defining food insecurity by the very people who are affected by

it. This also means taking food discussions from the center to the grassroots level. Li (2007) argues that decision-makings often do not achieve any good results when the 'local' people are not key participants. This calls for the attention of the rural poor and smallholder farmers to participate in decisions regarding food security.

Participation is involvement in people's development of themselves, their lives, their environment.

(Mikkelsen, 2005 pg. 54)

DFID (2000) notes that participation is a tool which equips individuals with voices to fight for their rights. These rights include economic (job), social (good roads, water) and cultural rights (food, housing and resources such as land). Key to participation is empowerment (Yaro, 2004) through which individuals develop their livelihoods. According to Haddad and Oshaug (1999), Johnson and Forsyth (2002) these rights also pave way for security, productivity and sustainable development.

The task of ensuring food security in rural communities does not rest on smallholder farmers in the communities alone since they are subject to policies and laws at the local, national and international platforms (Yaro, 2004). This calls for the removal of all barriers which restrict access to resources. Yaro (2004) describes these barriers as the norms, rules, cultures and policies. In this context, these barriers could be inadequate access to land, social amenities, farm inputs, credit facilities and lack of the enabling environment to encourage smallholder farmers to produce more.

According to Yaro (2004) access to resources is a step towards ensuring food security and also reducing poverty. This means that attempts at expanding individuals' entitlement set and enhancing food security are seen as a global

phenomenon which should not rest on the shoulders of the smallholder farmer alone but all the appropriate levels.

The rights-based approach, unlike the other concepts, takes a broader look at food security by ascertaining that enhancing human rights has positive connotations with ensuring food security. This goes with recognizing the works of smallholder farmers and providing them with the necessary assistance. Therefore all the appropriate levels from local to global are charged with securing the political, economic, social and cultural rights of individuals. Yaro (2004) identifies that limitations to access and use of resources, incongruous policies and restrictions to human rights devour the rights-based approach to food security.

2. 1. 5. Alternative livelihood strategies

Many smallholder farmers in developing countries are vulnerable because of the small sizes of their farms, their low levels of income, the seasonal nature of their occupation and the ill-methods used in cultivation.

As a way to battle these challenges it is appropriate to study how smallholder farmers are empowered to identify different livelihood strategies to tackle their vulnerability situations. According to Yaro (2004), people at different locations respond to shocks through different diversification, adaptation and coping strategies because different places are endowed with different resource base and livelihood opportunities. Therefore, it is important to identify local capabilities of specific places in order to empower them. Yaro (2004) maintains that multifaceted approaches are required to deal with the root causes of livelihood challenges. Among such approaches include empowering smallholder farmers with political capital as used by Yaro (2004). When farmers are empowered politically, they contribute to decisions which affect their livelihoods.

The level of a person's endowment sets determines how vulnerable she or he is. The higher a person's endowment set, the higher her or his level of adapting and

managing livelihood threats (Swift 1989, Davies 1996, Devereux 1999). Yaro (2004) describes the entitlement set as wealth. This means that a person with more wealth is able to diversify his or her livelihood opportunities than a poor person. Hence the needs of the poor are different from that of the rich (Yaro, 2004) which suggests that livelihood frameworks should consider different capabilities.

The focus of livelihood framework is that attempts at reducing livelihood threats also mean reducing poverty and food insecurity situations. Such attempts include not only empowering farmers politically and economically but also ecologically, socially and culturally to realize all their livelihood opportunities (Yaro, 2004).

Larsson (2001) maintains that income and agricultural diversification are seen as strategies to tackle livelihood threats posed to smallholder farmers by climatic conditions and market failures. Hence, his view is that by diversifying, the focus is not only on incomes but also environmental gains. With this, he notes that mixed farming is more environmentally friendly than monocropping. According to Larsson (2001 p.153):

... the term 'diversification' refers to combinations of farming on the one hand and various other off-farm or non-farm activities such as employment, crafts, trade etc. on the other, i.e. 'inter-sectoral diversification' or 'income diversification.

The term 'de-agrarianisation' as used by Bryceson's (1996) is seen as synonymous to diversification. Bryceson's (1996) uses de-agrarianisation to refer to the situation where rural dwellers are gradually shifting from agriculture as the main source of livelihood to other sources.

Diversification may be either engaging in mixed farming methods or resorting to 'nonfarm' sources (Reardon et al, 2007 p. 115). However, as Reardon et al (2007) note, decisions concerning engaging in nonfarm activities is basically done at the household level but influenced by the environment within which such decisions are taken. In line with Yaro's (2004) idea, Reardon et al (2007) posit that the

endowments pertaining to a geographical space as well as goals to diversify also affect the decisions. Also, because of differences in the endowment set, rich people diversify by usually engaging in capital intensive activities whereas poor people are limited to labour intensive options (Reardon et al, 2007). The endowment set which has been referred to as “capacity variables” include financial, human, social, physical and organizational capital (Reardon et al, 2007 p. 133). Based on these lines of reasoning, Reardon et al (2007 p. 115) distinguish two major factors: 'pull', motivated by 'accumulation objectives' and lower risk to nonfarm activities in relation to farm activities and 'push' as a result of handling risks, enduring shocks or doing away with unanticipated contingencies which occur in the agricultural sector. Such push factors may include massive fall of incomes of farmers who deal in seasonal crops to levels which cannot sustain them during off-seasons as well as unfavourable natural occurrences and market failures which cause farmers to resort to nonfarm strategies to supplement incomes from farming activities.

To put in another way however, Reardon et al, (2007) postulate two paradoxes to explain how people diversify. The “meso paradox” explains situations where individuals with high incentives to diversify are limited because the resource-poor environments where they find themselves make it difficult to diversify (Reardon et al, 2007 p. 139). The “micro paradox” which occurs at the household level has been explained as “poorer households have a high incentive but a low capacity to diversify successfully...” (ibid). This means that even if households diversify, they still produce at low levels in such nonfarm activities which make the income enhancing motive of diversification quite misplaced. It is therefore suggested that to understand the complexities relating to diversification strategies, one has to understand the complex differences which exist between places.

3 Methodology

This chapter deals with the methodological part of this study. Qualitative methods such as focus group discussions and semi-structured interviews which are the main methods employed are discussed. Also discussed in this section are the ethical considerations, the limitations to this study and others relating to methodology.

This thesis began with a background study of food security issues in relation to smallholder farmers. Two Ghanaian villages; Woraponso and Wioso which belong to the AANM of Ghana were selected for the purpose this study. In 2012, the AANM was divided into the Asante Akim Central Municipal and Asante Akim North District. This followed the Ghanaian government's directives to create new districts out of larger ones to enhance policy implementation (AANM, 2006). Even though Woraponso and Wioso are within the newly created Asante Akim North District, the office of the MoFA which monitored the two communities until 2013, is within the Asante Akim Central Municipal. Since there exists a spread of data, which does not follow the new divide of the region, I decided to base my research within the demarcations of the old assembly, the AANM. Contextually, I focused on smallholder farms which produce two major staple crops- cassava and maize in the two communities. Figures show that in the AANM, smallholder farmers form 72 percent of the number of farmers (AANM, 2006).

3. 1. Sampling

Sampling constitutes an important part of research. It is mainly concerned with selecting a subset out of a larger group (May, 2011) to participate in a research. Deciding on the people to recruit for this research was a bit challenging regarding questions of who to recruit? How many people to recruit? Which institutions to include? However, I was guided by the aim of the research when selecting sampling techniques.

With my position as the researcher, I was present in all appropriate quarters to collect data. Information collection was done with three different groups. These were smallholder farmers in Wioso and Woraponso, opinion leaders in these two communities and officials of MoFA in the AANM. I chose the two communities because they are basically farming communities where most of the inhabitants, if not all are smallholder farmers. The stratified sampling technique was used to select farmers based on the fact that as a group, they share common characteristics (May, 2011) such as small farm sizes and the challenges they face on their farms. The purposive sampling technique was adopted to select farmers from this group of smallholder farmers. This was done based on my own judgement (Parfitt, 2005) and with the help of the office of the REP where I had served as an intern. The REP have contacts with farmers in these two communities through advisory services and workshops organised by the REP for small scale entrepreneurs including farmers. The REP therefore served as gatekeepers (Valentine, 2005) when selecting smallholder farmers.

Opinion leaders or key informants from the communities studied were considered to be part of this research because they had fair idea about food security situation and smallholder agriculture in the communities. They serve as mouthpiece for community members in many cases. Some of them were also smallholder farmers. The first point of contact was a former Assembly member for the two communities who in turn helped to suggest people who could be interviewed as in line with the snowballing method (Valentine, 2005).

The MoFA of Ghana is an institution which was included in this research. I considered MoFA because it is in charge of Agriculture in Ghana. It provides extension services for farmers. The study therefore sought to know the various attempts by MoFA to address some of the challenges faced by smallholder farmers. From my previous experience in my bachelor's programme as a novice researcher, I knew it would not be easy to get Agricultural officers to interview because of their tight schedules. However, with the help of a friend who worked

with MoFA, I had the first contact. The snowballing technique (Valentine, 2005) was used to reach out to other interviewees from MoFA.

3. 2. My role as an investigator

My internship with REP had equipped me with some knowledge about farmers. It was realised from the group discussions that their main focus was on government to address their challenges for them and this was not different from what I noticed during my period as an intern. With my role as the researcher, I had to direct them to achieve the aim of this study. However, this was done at the comfort of interviewees. Communication was not a problem because I spoke the same dialect- Twi (Ghanaian Language) with the interviewees. With Agricultural Officers of MoFA, English language was occasionally used to explain some issues well.

3. 3. Interviews

Interviews are methods used by social researchers as ways to produce conversations with people on a topic or a general issue by seeking for their interpretations (May, 2011). According to Valentine (2005 p. 111), interviews:

...take a conversational, fluid form, each interview varying according to the interests, experiences and views of the interviewees. They are a dialogue rather than an interrogation.

Interviews have been differentiated from questionnaires in the sense that whereas the latter is rigid with specific questions which respondents follow, the former to some extent, allows people to express their own ideas about the “complexities and contradictions” on a topic (Valentine, 2005 p. 110). Expressed in another way by May (2011), interviews are seen as sensitive and people-oriented, allowing interviewees to construct their own accounts of their experiences by describing and explaining their lives in their own words. An interview allows the researcher and the interviewee to engage in more discussions than questionnaires would create (Valentine, 2005 p. 110).

May (2011) identifies four types of interviews employed to conduct social research. These are the structured interview, the semi-structured interview, the unstructured/focused interviews and the group interview/ and focus group. Semi-structured interviews were employed to gather information from government /agricultural officers of MoFA in AANM of Ghana and opinion leaders / key informants in the communities selected.

With this type, I had the opportunity to go beyond the specified questions to ask more questions for clarity though not all answers could be probed further as indicated by (May, 2011). Semi-structured interviews also gave me the opportunity to enter into dialogue with the interviewees which added to the quality of my interview (May, 2011). Following Mikkelsen's (2005) claim that not all questions for semi-structured interviews are set in advance, interviews did not follow any strict order of questions. This made it possible for a lot of issues relating to the topic to be discussed. Five officials of MoFA were recruited for interview. Two opinion leaders each were recruited from the two communities.

3. 4. Focus groups

Focus group method was adopted as the main research method for this study to explore groups' (smallholder farmers) standards around food security issues (May, 2011). According to Cloke et al. (2004 p. 160),

As an interview technique, group discussions allow researchers to draw out interaction between participants and make direct comparisons between the experiences and opinions narrated in the group.

According to May (2011), the ideal number of participants may vary between eight and twelve. Mikkelsen (2005) also suggests that six to eight people are good for focus group interviews. Two group interviews were organised. The first group which was made up of smallholder farmers in Woraponso had eight members and the second group which composed smallholder farmers from Wioso was made up of ten members. Participants were made up of a mix of males and females with majority of them above forty five years. This was because majority of the youth

had migrated to larger towns and cities to be engaged in other economic activities such as mining, and trading. Unlike other methods, participants in focus groups have the freedom to engage one another in a discussion for a period between one and one and half hours (May, 2011).

As it has been mentioned earlier, the REP helped to recruit smallholder farmers for the focus groups. This office had conducted a number of workshops with smallholder farmers and other rural dwellers engaged in other economic activities. Such workshops included preventing cassava from going bad after harvest, for example processing cassava into gari¹.

3. 5. Gathering material and conducting interviews

Group discussions and interviews with opinion leaders were fixed on Tuesday. Tuesdays are set aside as market days and also days when community members usually have communal labour in the two communities. Community laws prevent farmers from going to farm on Tuesdays. Interviews in the two communities were fixed on the same day because of the short distance between the two and the short span of the interviews. With the help of opinion leaders, venues were arranged for the group discussions. In Woraponso, a place was arranged in a building close to the market center and the heart of the village for the focus group discussions. This was because group discussions were held on market day which made it easier for the participants to reach out to the venue for the sake of proximity. In Wioso, the community center was selected as venue for the group discussion. This was under a tree where elderly people usually relax or have meetings concerning the community. Each group discussion lasted for approximately one and half hours.

Though interviews with MoFA officials were scheduled for three days, it was possible to carry out on one day because all interviewees were available and ready on the same working day. With officials of MoFA, some of them invited me to their offices for interviews whereas others preferred open places to avoid high

¹ Gari is a kind of staple food/meal common in West Africa which is prepared from cassava dough

room temperatures. Interviews with opinions leaders were held in their homes or where they would suggest. Interviews with MoFA officials and opinion leaders took approximately, thirty minutes each.

Arrangements were made for audio recordings of all interviews. Some staff members of the REP accepted to help with the audio recordings and data collection process.

3.5.1. Opening

I started all interviews and group discussions by introducing myself. Interviewees in turn introduced themselves to me. The whole data collection process was explained to interviewees. With focus groups, discussants helped to suggest appropriate rules with regards to timing and minimizing noise.

3.5.2. Body

Open-ended questions were used to ask general to specific questions in all interviews. For focus groups, areas which were discussed included the nature of smallholder agriculture, causes of food insecurity, challenges faced by smallholder farmers and their occupation and other livelihood strategies adopted by smallholder farmers.

Officials of MoFA were asked to tell about their general impressions on smallholder farming in AANM, ways that MoFA support smallholder agriculture and what could be done to improve smallholder agriculture as a way to enhance food security.

Interviews with opinion leaders in the communities focussed on the causes of food insecurity in the communities and specific problems faced by smallholder farmers in the communities. All interviews were directed towards achieving the aim of the research.

3.5.3. Closing

All interviews and discussions were closed with a summary of the major points. Interviewees were thanked for their participation. They agreed to be contacted again in future when the need be. Phone calls have been used to contact interviewees for top-up information.

3.6. Ethics

Ethical consideration has been highlighted as a very important component of qualitative research (Cloke et al, 2004). This assertion is also noted by Mason (1996) when he maintains that qualitative methods raise more ethical concerns than quantitative methods when it comes to protecting the privacy of interviewees. Following this, permission was obtained from all interviewees before audio recordings of interviews were made. Use of names in interviews was avoided. To deal with the issue of power relations which is a major concern of ethics (Finch, 1993), discussants were allowed to set rules for focus group interviews. In addition, to avoid issues of exploitation and harm as mentioned by Cloke et al (2004), the whole research was explained to all interviewees.

3. 7. Limitations

Though attempts were made to cover all weaknesses with the methods used in this research, there were some limitations. Focusing on just two communities means inadequate potency for generalization. However, there is the possibility that findings from this research could be transferred to understand similar cases. Partiff (2005) describes the purposive sampling as based on human judgement. This idea raises the question of biases which occurred when using the technique because interviewees were selected based on my previous contact with some of them while an intern at the REP and the help of the REP staff. Another challenge

was that with focus groups, it was realised that more eloquent participants dominated discussions. Though noise making was not a major problem, the openness of the venue led to other people who were smallholder farmers but not part of those recruited joining discussions by whispering into the ears of some of the recruited farmers. These people stayed for short times and left. It was later realized through a grapevine communication that some of them were there to know if government officials were there to supply them with farm inputs.

4 Smallholder farmers and food security: Voices from Asante Akim North Municipality

This chapter presents the analysis of the information obtained from focus group discussions with smallholder farmers who grow maize and cassava in Wioso and Woraponso, interviews with Agricultural Officers of MOFA in the AANM and key informants from the two communities. This was done firstly, by transcribing the materials gathered through audio recordings of all interviews while at the same time translating the language from Twi to English. The analysis was supported by information from literature. This was done by relating it to theoretical perspectives. It looks at the underlying causes of food insecurity. The inductive approach (Mikkelsen, 2005) was used to analyse materials obtained from interviews conducted. Thus, general conclusions were made out of the information gathered. Thematic coding method was used to analyse information obtained from interviews because of its potential to reveal the “richness of the phenomenon” (Mikkelsen, 2005 p.181). The analysis was therefore done in line with themes associated with food security/insecurity by relating them to theoretical standpoints. The chapter opens with an overview of smallholder agriculture in the municipality.

4. 1. Agriculture in Asante Akim North Municipality

Agriculture in Ghana has the traditional outlook. Seini and Nyateng (2005) point that the use of traditional planting materials, primitive farm tools such as cutlasses and hoes as well as inadequate use of chemicals to control weeds characterize the farming system in Ghana. The slash and burn method is the commonest way of clearing land for farming. This assertion still dominates the agriculture in Ghana

as evident from my interviews. When asked in an interview about the nature of agriculture in the AANM, agricultural officer 4 indicated that:

Agriculture is still characterized by primitive tools. The only mechanization here is the hand operated sprayer (locally known as knapsack sprayer) which is used to administer agrochemicals onto cocoa, citrus and sometimes for the control of weeds and pests or insects but for land preparation, they are still using their hoes and cutlasses.

(Agricultural officer 4, 2014).

His idea confirms findings by HLPE (2013) that level of technology and other resources are key to defining the types of farms. Smallholder farms are small because of low level of technology involved with the use of traditional tools and inadequate access to resources.

The AANM covers 1,160sq km land area which is four and half percent of the size of Ashanti Region (MoFA report, 2012). Out of this land area, about 13,000 hectares are under cultivation of staple food crops namely maize, cassava, plantain, cocoyam and yam (MoFA report, 2012). Farming is the major economic activity in the municipality. The 2000 population census reveals the population of AANM to be around 126, 500 (MoFA report, 2012). Out of this figure, males and females constitute about 64,200 and 62,300 respectively (MoFA report, 2012). The census further indicates that about 88,500 of the population are farmers who operate on either small scale or large scale (MoFA, 2012). A survey in 2006 indicates about 54 percent of the population was engaged in agriculture (AANM, 2006). This shows that the number of farmers increases over time. In an interview with Agricultural Officer 3, he commented as follows:

Smallholder agriculture in the municipality is encouraging because in every farming season, the number of farmers is either increasing or being maintained.

(Agricultural officer 3, 2014).

4. 2. Maize and cassava cultivation

Maize and cassava are the two dominant staple food crops in the AANM. The local meals which are prepared with maize include banku, kenkey, porridge and akple. Cassava is used mainly to prepare fufu, gari, kokonte and yakeyake. These two crops are sometimes used to prepare pastries.

Maize and cassava are usually cultivated on the same piece of land by a method called inter-cropping. Cassava is usually planted a few weeks after the maize has been planted. There are two main seasons in a year for the cultivation of cassava and maize. These are the major and minor farming seasons. The major farming season which coincides with the major rainfall season extends from March or April to June whereas the minor farming season which also meets the minor rainfall season is from August to November. Maize is planted with seeds of two to four per hole. Cassava is planted with the cassava sticks.

According to the AANM (2006) report, farms are usually on small scale with most of them being less than two hectares as defined by (Prakash-Mani, 2013). This was also realised from my interview with farmers. All of them farmed on less than two hectares of land.

4. 3. The roles of MoFA and other stakeholders

The DAES of MoFA under the government of Ghana is responsible for giving technical backstopping to farmers. Al-Hassan (1997) maintains that such extension services in Ghana circulate around growing of crops, control of weeds through regular weeding, how to use fertilizers, right time to harvest maize to avoid pest attack among few others.

Field officers from MoFA in the AANM usually meet farmers once in every two weeks. They also pay home visits to give talks on improved nutrition and proper

sanitation (MoFA report, 2012). Aside from that, they communicate on telephone with farmers when they have problems. However, some of the smallholder farmers in the two communities had had no contacts with these officers before. When asked about how frequent farmers have contacts with MoFA officials, farmer 11 put it this way:

I have never had any contact with them. Usually when they come here, they meet cocoa farmers, not we the cassava and maize farmers.

(Farmer 11, 2014).

Following responses from the other farmers who also participated in the group discussion, it is imperative to mention that smallholder farmers' contact with MoFA is low. It was realised that MoFA's interest falls more on farmers who cultivate cash crops such as cocoa at the expense of the staple food crops.

There are few stakeholders who work in collaboration with the MoFA to render extension services to farmers. Some of them are engaged in projects/programmes. An example is the WAAPP which runs a cassava project in a different community in the municipality. JICA also collaborates with MoFA on different projects in the municipality. The collaboration equips farmers with new ideas of farming.

The low level of contact between farmers and MoFA officials has negative effect on output levels. As a way of ensuring high productivity, there should be regular contacts between smallholder farmers and MoFA officials. Farmers need to be educated on the best farming practices. This also means empowering them to take the right decisions on their farm management which is the primary focus of the rights-based approach and the livelihoods framework (Yaro, 2004).

4. 4. Land

Land is seen as the utmost resource needed for any agricultural venture. Access to land is therefore important to improve production. In their study, Seini and

Nyanteng (2005) point out that increase in land area in part accounted for increase in food production in the 1990s. According to Seini and Nyanteng (2005), in Ghana, about 85 out of 100 farmers are smallholders whose land areas do not exceed 2 hectares. Figures in the AANM also show that about 70 percent of the farmers are smallholders who farm on less than 1.2 hectares of land. It is noted that only about 6 percent of farmers in the municipality cultivate more than 2 hectares (AANM, 2006). This means that a greater proportion of farmers in AANM are smallholders.

There are several ways through which farmers acquire land for farming. A study by HLPE (2013) indicates that land is usually owned by family groups where women play active roles in the production, processing and marketing of farm produce. This study also confirmed that the most common system of land acquisition in the AANM is through family holdings or through inheritance. The findings differ slightly with the HLPE report in that the element of control is clearly distinguished from the ownership. Thus, whereas ownership is collective, male members hold the land in trust for such collectives. In effect, males wield greater power in determining how land could be leased or utilized. According to Agricultural officer 1,

Because land is usually owned by families, it is difficult for individuals to farm on about two hectares of land. After sharing a piece of land among family members, each one is left with a small piece of land to farm on.

(Agricultural officer 1, 2014).

However, residents in communities where they do not originate usually acquire land through hiring. When asked about the conditions attached to hiring, farmer 3 who owns land through this means commented as below:

When a landlord gives out about one acre plot (0.4 hectares) of land to a farmer, at the end of the farming season they divide the harvest or money realized from the

sale of farm produce into three. The farmer takes two-thirds and the landlord takes one-third.

(Farmer 3, 2014).

In other situations, farmers pay rent to landlords rather than sharing the farm produce. Agricultural officer 2 maintained that land acquisition through this means is quite expensive and sometimes controversial when she expressed it this way:

When it comes to land, our office does not have control over it. We once rented a land for one of our cassava projects with smallholder farmers in one of the communities in this municipality. The landlord took GH¢ (Ghana Cedis) 200.00 (approximately \$78.43-US Dollar on 2014-03-14) as rent for a one acre plot (0.4 hectares) over a period of six months. Later, it was not possible for the project to last within the six months schedule because of a mixture of some new varieties. When the six months period was due, the landlord insisted that the cassava be harvested prematurely so that he could use the land to cultivate teak trees.

(Agricultural officer 2, 2014).

The conditions described above show that land acquisition is a problem for some farmers in the municipality. The livelihoods framework as explained by Yaro (2004) indicates that a person's endowment set determines how she or he is vulnerable. As a step of reducing poverty and ensuring food security, access to resources is very important. Inadequate access to land by some of these farmers is a disturbing situation since they are limited in terms of their endowment set. This situation in part can be blamed for food insecurity situation in the municipality.

In spite of controversies and unusual conditions which may be attached to land acquisition, it was realized from the group discussions that some farmers have free access to land in the deep forest zones bordering the communities. It also came to light that their soils are fertile for the production of maize and cassava. Though access to land is not much of a problem, farmers are sometimes faced

with conflicts relating to identifying borders with neighbouring farms. Sometimes, farmers quarrel over the same piece of land.

Another situation was that some of the farms are on mountainous areas where there are no conjoining roads to market centers. Farmer 1 had this say:

Climbing of the mountain is not only the problem. Imagine that you harvest maize from a 5 acre piece of land. Since there are no roads, it is another problem bringing the cobs home.

(Farmer 1, 2014).

The rights-based approach to food security maintains that to ensure food security, is to ensure the rights of people (Yaro, 2004). When the social rights of farmers are improved through the provision of social amenities such as roads, the food insecurity problem will be reduced because good roads can prevent produce from going bad on the farm. Likewise, access to health facilities and good drinking water puts the smallholder farmer in a position to increase output. Other rights are economic in nature which entails access to credit facilities. The idea is that enhancing human rights means enhancing food security.

An experience from Asia indicates that rice exporting countries have more rice because more land is used for its cultivation (Dawe, 2014). However, it was established in this study that even in the presence of abundant land, farmers cannot operate on large scale because of locational problems, distance from farms to market centers and homes, lack of funds to hire labour and purchase modern inputs as well as low level of technology.

4. 5. Access and use of modern inputs

Access and use of modern inputs is very important for agricultural production. Dawe (2014) links Philippines and Indonesia's success story of becoming self-sufficient in the production of rice to adequate access to high yielding varieties

and fertilizers as well as access to irrigation projects. However, this study revealed that there are some reasons why smallholder farmers who grow maize and cassava in the AANM do not either have access to or do not use modern inputs. Inputs have been categorized under fertilizers, agrochemicals and planting materials. According to MoFA report (2013), though agricultural inputs such as fertilizers, agrochemicals and agricultural machinery were available on the market at subsidized prices, the prices were still high enough to keep farmers including maize and cassava farmers away. Privatization plays a role in ensuring availability and distribution of inputs. Seini and Nyanteng (2005) note that the private sector is unable to import fertilizers in larger quantities. Moreover, it can also be blamed for the unequal distribution of fertilizers. My interview with Agricultural officer 5 revealed that:

We (MoFA) used to sell some of these inputs to farmers but now it is in the hands of private enterprises so we only prescribe by writing for some of the farmers to go to the market to buy themselves.

(Agricultural officer 5, 2014).

It is fair to mention that the private sector's involvement in the distribution of farm inputs is a way of providing quality service to farmers through competition among themselves. With the exception of fertilizer which is on low supply as noted by Seini and Nyanteng (2005), other agro-products are available on market at all times. However the profit motives of private entrepreneurs cannot be ruled out. This has made inputs dearer on market for smallholder farmers though most of them are subsidized. Inadequate access to farm inputs contributes to food insecurity. Government and other stakeholders are tasked with ensuring that prices of farm inputs are reduced to the minimum. This is in keeping with the rights-based.

4. 6. Fertilizer

Fertilizer application enhances soil fertility. According to findings by Seini and Nyanteng (2005), there has not been any massive change in the number of farmers who have adopted inorganic fertilizers whereas even the few ones who use fertilizers do so at minimal levels. Seini and Nyanteng (2005) indicate that on average, fertilizer utilization on maize farms is 5.4kg/ha. However, they note that the use of inorganic fertilizer on maize farms has increased twofold over the 1990's. The use of inorganic fertilizers on cassava farms is insignificant (Seini and Nyanteng, 2005).

The general application of fertilizer by the farmers concerned in this research is low. Smallholder farmers linked this to the high prices of fertilizers in spite of government subsidies. Under the Government of Ghana fertilizer subsidy programme, three types of fertilizers had their prices trimmed down. These were NPK 15:15:15, Urea and sulphate of Ammonia. According to MoFA report (2012), the increase in production of some major crops such as maize, plantain and some vegetables such as tomatoes, watermelon etcetera in the municipality was as a result of the programme.

Agricultural officer 1 had this to say about fertilizer utilization:

Only few farmers use fertilizers because of the cost involved. It would have been good to use fertilizer for maize but utilization is low. The good aspect is that some of them cultivate the new hybrids of maize and they plant in lines so they only need to apply fertilizer to boost production.

(Agricultural Officer 1, 2014).

In the group discussions, Farmer 14 said: *I have only applied fertilizer on my maize farm and not cassava* (Farmer 14, 2014). When asked to compare output levels of when fertilizer was applied and when fertilizer was not applied, farmer

17 answered by saying: *The application of fertilizer leads to very high output* (Farmer 17, 2014).

In the other group, farmer 6 had this to say:

We do not apply fertilizer on our maize and cassava farm. We sometimes apply fertilizer on our cocoa and plantain farms but not cassava and maize.

(Farmer 6, 2014).

When asked about fertilizer application on cassava, none of them had done it before. The majority of them did not know about the importance of fertilizer to cassava production. Few others knew that fertilizer could be applied to cassava and maize but they were constrained financially. Agricultural officer 2 confirmed this when she said that:

In one of our projects named the West African Agricultural Productivity (WAAP) in a different community within the municipality which was under the sponsorship of the Australian government, farmers were encouraged to apply fertilizer in the cultivation of cassava but farmers expressed surprise because they did not know that fertilizer was meant for cassava too.

(Agricultural Officer 2, 2014).

Agricultural officer 4 also had this to say:

In this area, farmers usually apply fertilizers on vegetables, not cassava and maize. It is our duty to demonstrate to them how to apply fertilizer but they decide to apply on their selected crops.

(Agricultural officer 4, 2014).

When asked about the reason which accounts for this, he said:

They know that the soil is already fertile and also the cost involved is high so they will not use the fertilizer especially on maize and cassava but on vegetables. Since

vegetables are cultivated all year round, they need fertilizer to replenish the nutrients in the soil.

(Agricultural Officer 4, 2014).

Farmer 6 described how he applies fertilizer on his maize farm as follows:

I plant my maize in lines with one foot by two feet intervals. I apply the fertilizer one week after planting. I use fanta /coca cola bottle-top to measure. I measure two bottle-tops for each maize seedling. I allow a space of one inch from the maize seedling and circulate the fertilizer around the maize by putting it in small holes I create around the maize. I then cover the small holes. This is to prevent the fertilizer from being washed away by rains.

(Farmer 6, 2014).

It was realized that lack of purchasing power was a major reason why some farmers did not apply fertilizer on their maize farms. However, with regard to cassava, ignorance can be blamed for lack of fertilizer application. It can be established that low fertilizer use leads to low output as confirmed by the smallholder farmers themselves. Low output also leads to food insecurity. A way to improve output levels, which is the major concern of the FAD (Yaro, 2004), is to encourage fertilizer utilization. This can be done by reducing prices to the level which can be patronised by smallholder farmers or by providing farmers with credit facilities to cater for the cost of fertilizers. Education needs to be intensified by the office of MoFA on the importance of fertilizer and how to apply it. This confirms the argument that empowerment is significant in ensuring food security as postulated by the rights-based perspectives (Yaro, 2004).

4. 7. Agrochemicals

The control of weeds, pests and diseases is very significant in agriculture because of its impacts on output and storage. Seini and Nyanteng (2005) point that application of pesticides on both maize and cassava farms are negligible in their study areas. This research revealed that not all maize and cassava farmers applied weedicides and pesticides/ insecticides. Only a few farmers applied agrochemicals

on their farms. When asked why the others do not use them, farmer 10 had this to say:

The introduction of weedicides has led to low output of cassava and maize as compared to our traditional system of clearing weeds by the use of cutlass and hoes.

(Farmer 10, 2014).

In furtherance of this, farmer 12 said:

What I know is that at the early stages of cassava and maize to shooting times, if you are not careful and they come into contact with weedicides, it leads to low output or wither. However, if they do not come into contact with the weedicide, it is likely that there will be a normal output.

(Farmer 12, 2014).

When asked about his take on this, informant 1 said:

We have the selective and non-selective methods. The selective method separates food crops from weeds when applying weedicides. When using the hand-operated sprayer, you have to take off your hand when you get to a crop. This is what some farmers do not know so they spray everywhere.

(Informant 1, 2014).

Informant 3 indicated that:

When cassava starts shooting, it is advisable that no weedicides are applied because when they come into contact with rains it can cause tubers to get rotten.

(Informant 3, 2014).

Farmer 8 complained:

I have not used any agrochemical on my farm before and I will never use it because overtime agrochemical deteriorates the nutrient levels in the soil. Now

because of the application of agrochemicals, our soils are no more growing mushrooms and cocoyam which is another staple food crop.

(Farmer 8, 2014).

Farmer 1 contributed by saying:

Agrochemicals affect the tubers of cassava. The tubers lose much of their starch contents which makes it difficult to prepare fufu [local diet] with it because it becomes easily broken.

(Farmer 1, 2014).

Despite heated debates among respondents on the negative consequences of the use of agrochemicals, others acknowledged the significance of agrochemical.

Farmer 9 had this to say:

Agrochemicals are very useful. When I introduced agrochemicals on my maize and cassava farm, it led to increase in output but the most important thing is how to use it.

(Farmer 9, 2014).

Farmer 2 expressed his view by saying:

Agrochemicals are very helpful but it depends on how you use it. For example, I do not use weedicides throughout the farming season. I only apply weedicide for the first time and start clearing the weeds by using our usual cutlass and hoe the next time the weeds appear.

(Farmer 2, 2014).

A good number of the farmers supported a claim that continual use of agrochemicals will have negative effect on the soil's richness.

Farmer 6 maintained that:

...sometimes, it becomes difficult to find a labourer to work for you even at the beginning of the farming season and also when your strength cannot do all the work by yourself, the weedicide helps to go faster because it takes a shorter time

to do the same work which could have taken three or more labourers to do. He however added: I agree that everything that has advantages has disadvantages also.

(Farmer 6, 2014).

Farmer 7 added his voice by saying that: *I use weedicides because it would be difficult to clear a large area without applying weedicides* (Farmer 7, 2014).

Agricultural officer 2 had this to say when asked about farmers' use of agrochemicals:

Most of them lack funds to purchase the right agrochemicals so they usually use any agrochemical they come across. They call any agrochemical as poison and they think that any agrochemical can be used for different purposes.

(Agricultural officer 2, 2014).

The study on the use of weedicides was not different from some of the findings on the utilization of fertilizer. Weedicide usage is low because many smallholder farmers cannot afford them. What needs to be emphasized again is ignorance on the part of some of the farmers. This is because they do not know the importance of the weedicide. Some even use the wrong chemicals just because they are all chemicals. As it has been indicated earlier, the uses of agrochemicals like weedicides have the tendency of enhancing output and ensuring food security thereon. MoFA's contact with smallholder farmers need to be frequent so that they will be acquainted with new ideas as the rights-based concept advances. It is also important that farmers are sensitized on the negative implications of the use of chemicals on their health. Adding to this, access to credit facilities by smallholder farmers should not be ignored.

4. 8. Planting materials

The uses of modern planting materials have direct impacts on the farmer's output. A survey conducted by Seini and Nyateng (2005) indicates that the use of new

seeds and planting materials has improved among maize and cassava farmers. This was supported by the fact that majority of older farmers and middle-aged farmers changed from the use of traditional planting materials to modern materials while the younger ones were already familiar with the modern inputs.

Beside the local type of maize which smallholder farmers in the two communities studied grow, some new varieties which they usually call 'agric' were mentioned. Among the new or modern varieties were 'Obaatanpa' and 'Laposta'. It was however realized that most of them preferred the local one to the new variety. Farmer 15 had this to say:

I have used obaatanpa for two years but it cannot be stored for a longer time after harvest as compared to our local type so I have decided to plant the local one this year.

(Farmer 15, 2014).

Farmer 13 added her voice by saying that: *The new varieties lead to higher output than the local one but the local one lasts longer* (Farmer 13, 2014).

Smallholder farmers explained why they preferred the local type of maize to the modern varieties in spite of the high yield of the latter. Farmer 17 commented as follows:

If you want to consume the maize within a short time or sell, the new varieties are recommendable for planting but market is a major problem after harvest. By the time you find somebody to buy your maize, the obaatampa would have been attacked by insects and already gone bad. Sometimes, buyers have our maize almost for free.

(Farmer 17, 2014).

The story of maize is similar to cassava. Beside the local cassava sticks, some farmers were introduced to new hybrids of cassava which they call 'agric type'. It was noted that whereas the local type takes between one and two years to mature,

the 'agric' hybrid takes about six months to mature. The 'agric' hybrid yields higher than the local one but the latter lasts longer than the former. When asked which one they preferred to plant, farmer 14 had this to say:

The local ones are more delicious than the 'agric' hybrids. If you put the agric tubers on market, people do not buy because it is not as starchy as the local one. It is easily broken when you prepare fufu with it. The agric tubers are best suited for gari processing.

(Farmer 14, 2014).



Figure 3: Picture of a smallholder farmer on his cassava farm in the AANM-

Source: MoFA report (2013)

Agricultural officer 1 had this to say:

We have introduced them to the new varieties of maize and cassava but adoption rates are low especially the cassava. They still prefer the indigenous cassava because they say it is better to prepare fufu with it than the new varieties. We even advise them that they shouldn't only think of what they will eat but also how to make more profits by growing the new varieties. Presently, the breweries are

making use of cassava for beer so it is advisable that they grow fast growing and high yielding ones to serve the market. Surprisingly, only few people like the new varieties.

(Agricultural officer 1, 2014).

This means that though the indigenous cassava types yield lower as compared to the modern ones, farmers still like the former because of its sweetness and its longer span as compared to the latter.

It can be said that the introduction of new varieties of cassava and maize is important to increase output levels and promoting food security. However, farmers point that these new hybrids do not last longer. This needs a multi-dimensional approach to tackle the situation as the livelihood perspectives specify. The establishment of new factories which use cassava and maize for brewing, making pastries would be helpful. Gari processing should also be encouraged. Silos would also save the crops from going bad. This will help preserve cassava and maize for a longer time. Farmers can therefore plant new varieties to serve the markets while the local ones can be grown on subsistence basis since they prefer to eat the local ones themselves. Private entrepreneurs and other consumers should be encouraged to demand more of cassava and maize and their products so as to encourage farmers to produce more. This can be done at the local, national and international levels (Yaro, 2004).

4. 9. Crop output

Based on the survey conducted by Seini and Nyanteng (2005), it can be said that outputs have increased in relative terms for both maize and cassava farmers since the middle of the 1980s. The reasons which have been given to the increase in output include expansion of land, introduction and adoption of inorganic fertilizers and new varieties of seeds and planting materials as well as young farmers being consistent with new methods of farming (Seini and Nyanteng, 2005).

This research could not cover output levels of maize and cassava in the two communities studied due to time constraint. However, it was realized that bush fire is insignificant when discussing output and food insecurity situation in the AANM. This was because of campaigns led by MoFA and Department of Forestry against bush fires (MoFA report, 2012). The following figures represent output levels of cassava and maize in the whole municipality for the years 2010, 2012 and 2013.

Table 1-Cropped area and yield for maize and cassava in the AANM for the year 2010.

CROP	MAIZE	CASSAVA
CROPPED AREA (HECTARE)	5,424.0	4,553.0
TOTAL PRODUCTION (mt)	11,331.0	64,021.0
AVERAGE PRODUCTION PER HECTARE	2.1	14.1

Source: MoFA report (2010)

Table 2- Cropped area and yield for maize and cassava in the AANM for the year 2012.

CROP	MAIZE	CASSAVA
CROPPED AREA (HECTARE)	11,788.0	4,872.0
TOTAL PRODUCTION (mt)	15,324.4	97,440.0
AVERAGE PRODUCTION PER HECTARE	1.3	20

Source: MoFA report (2012)

Table 3- Cropped area and yield for maize and cassava in the AANM for the year 2013

CROP	MAIZE	CASSAVA
CROPPED AREA (HECTARE)	3,642.4	2,557.8
TOTAL PRODUCTION (mt)	4,734.5	46,040.4
AVERAGE PRODUCTION PER HECTARE	1.3	18

Source: MoFA report (2013)

The tables above indicate increase in output levels of maize and cassava for 2010 and 2012. The figures also confirm that increase in land area dedicated for the production of maize and cassava accounted for the increase in output levels. Also, it was revealed that entry of new farmers into the occupation partly accounted for the increase. In terms of average output for cassava, there was an increase from

14.1 to 20 (mt) which means yield for cassava also improved when comparing the two years. However, average output for maize declined from 2.1 (mt) in 2010 to 1.3 (mt) in 2012. This also means that though an increase in land area led to an increase in output levels of maize, in terms of yield, there was a decline due to deficient methods of farming.

For the year 2013, there was a massive decline of land area dedicated for the production of maize and cassava. This is explained by the fact that the AANM was divided into two by the government of Ghana. The new districts created were the Asante Akim Central and the Asante Akim North. The office of MoFA which was originally in charge of these two districts now takes charge of only Asante Akim Central Municipality. Therefore the figures for 2013 represent only Asante Akim Central. However, by comparing the average output figures for 2012 and 2013, it can be seen that the yield was quite stable for maize but there was a decline in average output for cassava from 20 to 18. This is explained by the fact that falling prices of cassava and maize for both years discouraged farmers from producing more. Intensifying farming is a way to improve yield. However, this has to go with increasing prices of maize and cassava in order to motivate farmers. The FAD reveals that improvements in technology go with the intensification of farms which have the effects of improving food security situation.



Figure 4: Picture showing harvested cassava tubers in the AANM - Source: MoFA report (2013).

Increase in the production of maize and cassava from 2010 to 2012 can also be attributed to different projects and programmes which had taken place in the municipality. The Root and Tuber Improvement and Marketing Programme led by MoFA, targeted improvements in production, processing and marketing of cassava in the municipality (MoFA report, 2012). This programme led to the introduction of improved cassava planting materials which many smallholder farmers in the municipality benefited from (MoFA report, 2012).

The Block Farm Project which was also a MoFA initiative, aimed at increasing the production of maize and other crops in the municipality. Many farmers who benefited from this project were provided with inputs such as seeds, fertilizer, weedicides and insecticides (MoFA report, 2012).

4. 10. Technology

Technological advancement also has significant impacts on food production which is one of the major issues of concern by the FAD approach (Yaro, 2004). Low

levels of technology usually correspond with low levels of output. The use of simple tools for farming as indicated by an agricultural officer suggests that output levels are still low in the municipality.

However, the story about technological advancement cannot end with farm tools. The introduction of new varieties of maize such as Dada-ba, Mama-ba and CIDA-ba adds to the story. According to Aryeetey (2000), adoption of the new varieties led to a rise in the total production of maize from 296000 t in 1977-1978 to 1 million t in 1997-1998. For cassava also, new hybrids were developed by the CRI. These hybrids were not only able to withstand pests and diseases but also very high yielding. The newly introduced hybrids of cassava had a potential yield of 10t/ha (Aryeetey, 2000).

Smallholder farmers in the AANM confirmed that new hybrids of maize and cassava yield higher than indigenous ones. However, in terms of storage, the indigenous ones last longer than the new varieties. Lack of financial needs denied farmers access to new varieties of maize and cassava.

Beside the introduction of new varieties of planting materials and agrochemicals, technology has manifested in the methods used by smallholder farmers to plant their maize and cassava. This method is the lining and pegging.

Agricultural officer 5 maintained that:

We educate them on the right planting distances by the use of the line and peg method. It has been proven that on the same piece of land, when lined and pegged can yield five bags of maize but when not pegged and lined may yield only three bags of maize.

(Agricultural officer 5, 2014).

It was discovered that farmers easily adopted this method because of low costs involved in it, high output levels and the fact that it was easily understandable.

Farmers confirmed that the line and peg method had helped to improve their output levels. Lining and pegging has become one of the criteria for selecting farmers for awards of farmers' day in the municipality.

It has to be emphasized again that technology cannot be left out when discussing ways of ensuring food security. Technological developments such as tractor, power tiller and irrigation will have to be encouraged in order to increase output levels. Technology also goes with education to empower farmers on the importance of new technologies and how to use them as the rights-based perspectives point. The cost involved in applying modern technology on farms calls for assistance from richer countries and governments.

4. 11. Agricultural credit

Access to credit facilities is a major issue of concern to many farmers including smallholders. In their study, Seini and Nyateng (2005) established that most credit facilities which were available to smallholder farmers were withdrawn due to the reason that the smallholder farmers could not pay back their loans. Since access to credit is seen by many as inseparable from agriculture, other sources were established to provide farmers with credit. IFAD and a number of NGOs assist farmers with not only credit but also inputs, seeds, fertilizer and seedlings (Seini and Nyanteng, 2005). ADRA have been cited by Seini and Nyanteng (2005) as one of the institutions which perform some of these duties in the Bolgatanga and Kassena Nankane districts of Ghana. Technoserve is part of the NGOs in charge of providing credits to farmers towards building storage facilities (Seini and Nyateng, 2005). GCB and ADB also provide farmers with credit facilities. The establishment of rural banks in Ghana in the 1970s was also to boost access to credit by farmers (Seini and Nyateng, 2005). Seini (2002) also identifies personal savings and credit raised from family members and friends as a principal sources of income to farmers.

In the AANM, it was established that it is easier for smallholder farmers to have access to loans in groups than individuals. On the issue of access to loans, farmer 6 had this to say:

The problem is that the banks do not allow enough time for repayment. They start demanding for repayment within a short time, sometimes weekly or monthly or at a time when you have not even harvested your crops. We would have wished for a longer repayment time. Since we can't pay within this short time, it keeps us away from having access to credit facilities.

(Farmer 6, 2014).

Farmer 2 added:

Aside the short time for repayment of loans, one major issue is that the banks require us to pay a deposit before we can open bank accounts. This is a problem since we mainly depend on market for our farm produce for our financial base. In many instances, we do not have access to loans because we do not have money to pay as deposits.

(Farmer 2, 2014).

Farmer 18 put it this way:

Money is everything in farming. From buying of inputs to storage, we need money. In this community, access to money is the problem. Because of lack of money, we cannot cultivate large farms, we are only limited to smallholdings.

(Farmer 18, 2014).

In the interview with the agricultural officer 2 about the role of MoFA in assisting farmers to have access to credit facilities, she had this to say:

Our office lacks funds to give out loans to farmers. What we do is to partner projects which are sponsored by government, Non-governmental Organizations or international donors. For example, the West Africa Agricultural Productivity Programme (WAAPP) under the sponsorship of the Australian government runs a cassava project in Agogo (a town in the Asante Akim North Municipality).

Fertilizer, cassava sticks, insecticides, weedicides, transportation and all costs are borne by sponsors but farmers only have to provide land for the project. After harvest, the farmers sell and keep the money.

(Agricultural officer 2, 2014).

The discussion revealed that though availability and access to loans have improved in recent times in the municipality, conditions attached to loans deter farmers from applying for such loans. Also personal savings and other sources of credit are not enough to boost production.

According to Yaro (2004), wealth means empowerment and empowerment also means security. This shows that these concepts are related. Equipping smallholder farmers with credit facilities is very important because the study revealed that access to credit is a major problem but money is needed in all farming activities as a farmer confirmed. The livelihood framework just like the rights-based approaches stresses on easy access to credit facilities by smallholder farmers (Yaro, 2004). Farmers should be provided with long term loans which will allow them, a longer time for repayment. This is a major step in the right direction of ensuring food security by smallholders.

4. 12. Irrigation

Agriculture is mainly rain-fed in Ghana. The few irrigation projects in the country are basically used on rice and vegetable farms. The number of maize and cassava farmers who benefit from irrigation dams is very minimal (Seini and Nyanteng, 2005).

The research revealed that there is no irrigation project in the two communities studied. There are few instances where farms are sited near streams and rivers but such farms are mainly vegetables. Smallholder agriculture in the municipality is mainly at the mercy of the weather. MoFA depends on information from the

meteorological department to educate farmers on when to expect rains for their crops. Agricultural officer 4 had this to say:

When it comes to information on when to expect rains, MoFA and the farmer are both handicapped. We all rely on the unreliable information from the meteorological department. The validity of advice we give to farmers depends on the validity of information coming from the weather station.

(Agricultural officer 4, 2014).

Agricultural officer 3 had this to say:

...because information from the meteorological department is not always accurate, we advise farmers to plant according to the farming seasons. These are the major farming season which is from March/April to June and the minor farming which is from August to November. These are the times that they have much rainfall for their crops.

(Agricultural officer 3, 2014).

To most of the farmers, access to rains is very critical because any unfavorable weather conditions lead to total disappointment for them.

Irrigation facilities in the country should be increased to benefit smallholder farmers. The cost involved in modern irrigation facility requires governments and donors to fund such projects. Enough water is needed by crops to grow. Therefore inadequate supply of water has negative effects on the food security situations of a community.

4. 13. Storage

Storage is a major problem for farmers in developing countries. Smallholder farmers in the two communities studied defined lack of proper storage methods as a major underlying cause of food insecurity. Farmers were asked to tell how they store their harvested maize and cassava. Farmer 4 had this to say:

When I harvest my corn, I peel off the husks on the farm before bringing it home. In about a week or two, I remove the kernels from the cob. I then dry it and apply insecticide on the grains. I put them into sacks, seal them and keep them. This method helps the grains to last longer, especially the new varieties.

(Farmer 4, 2014).

Farmer 17 explained his method as follows:

Before I store my maize, I do not peel off the husks. I dip the tip and bottom into chemical such as DDT. This method also keeps insects away and at the same time, it lasts longer.

(Farmer 17, 2014).

When asked about the harmful effects of the DDT, it was explained that the DDT does not come into contact with the grains because the husks are not peeled off. Also, the DDT cannot remain in the corn for over one year so it can be eaten after a year when the DDT is no more active. Camphor is another chemical which farmers use to store their maize.

Farmer 12 explained his method this way:

I harvest my maize early enough to prevent it from becoming dry on the farm. This also prevents pests and insects attack. I do not apply any chemicals on it.

(Farmer 12, 2014).

It was realized however, that majority of them go by traditional method of storing maize because of lack of funds to buy insecticides. They store maize on huts usually built in kitchens. The heat in the kitchen reduces the rate at which insects attack the kernels. They believe that it is better to prepare food with maize stored with this method than when chemicals are applied on the grains. However, the problem associated with this is that it becomes difficult to store in larger quantities since building huts is one problem and getting enough space is another.

With cassava, there was no proper storage method mentioned. Some people put the tubers into water which helps to preserve it for up to three days. In not very common situations do some people peel the cassava and dry to prepare 'kokonte' which is also a Ghanaian meal. Also when cassava is processed into gari, it lasts longer. Farmer 10 had this to say about storing cassava:

As for cassava, after harvesting, you have to consume all within three days or sell. Otherwise, you have to leave it on the farm unharvest for some time but with this, not all soils can sustain the cassava for a long time.

(Farmer 10, 2014).

The two communities studied lack modern storage facilities to preserve cassava and maize. MoFA's task is to demonstrate to farmers on how to construct a storage facility. The interview revealed that there was one silo built in one community in the municipality but it was out of reach of smallholder farmers in the communities studied. Also the research could not confirm whether the silo was still in existence. It has been established in this study that poor methods of storing cassava and maize account for high post-harvest losses in the municipality which is a major cause of food insecurity. Smallholders are handicapped when it comes to providing modern storage facilities for their crops. Such storage facilities as silos should be provided by governments. Farmers can also mobilize funds to procure machines which can be used to process cassava and maize.

4. 14. Marketing of food crops

Access and proximity to markets serve as major reasons to boost production. This is because amounts realized from the sale of farm produce can be invested in farm management. The perishability of some farm produce makes it pertinent for market centers and farms to be close. This also calls for good road networks from the farms to the markets.

This study revealed that access to market is a challenge to cassava and maize farmers in AANM. The main market center where farmers sell their maize and cassava is Konongo, the municipal capital. Some of them travel as long as Accra, the country's capital to sell their maize and cassava. Beside transportation cost, the short span of the farm produce especially cassava is a threat to farmers. Smallholder farmers in the municipality link their inability to produce on a large scale to lack of reliable markets. Farmer 13 had this to say:

We always incur losses rather than profit because if we harvest our crops, it is difficult to find people to buy. The people we find are not ready to buy at the price we set. They come with their own prices. This is a great disincentive to us but you would rather accept their prices than to let your food-stuffs go bad.

(Farmer 13, 2014).

Farmer 6 commented:

We are ready to produce on a large scale to ensure food security but aside low access to modern inputs we are also faced with lack of market opportunities. As I speak now, I have a cassava farm which has been left unharvest because of lack of market. Some of them are getting rotten in the soil and it is very sad.

(Farmer 6, 2014).

When asked about the ways through which MoFA helps farmers to have access to market, agricultural officer 3 had this to say:

We had a silo in Agogo where we advised farmers to send their grains. Once you keep your maize there, buyers go there to buy without even contacting you but surprisingly farmers in other communities do not participate in this. They prefer to sell their produce in Konongo on market days where they have created their own markets.

(Agricultural officer 3, 2014).

Key informant 4 attributed the situation to the poor state of roads in the farming communities. He had this to say:

The absence or poor state of roads is a reason why farmers do not have access to markets. A lot of farm produce start going bad on the farm because there are insufficient means to transport them to the market centres.

(Key informant 4, 2014).

The tables below show the wholesale food prices of maize and cassava in Ghana for periods from 2009 to 2013.

Table 4- Average wholesale food price for 2009 and 2010

COMMODITY	AVERAGE PRICE (GH¢- Ghana Cedi)	
	2009 (yr)	2010 (yr)
Maize (100 kg)	25.00	54.00
Cassava (91kg)	4.00	5.00

Source: MoFA report (2010)

Table 5- Average wholesale food price for 2011 and 2012

COMMODITY	AVERAGE PRICE (GH¢- Ghana Cedi)	
	2011 (yr)	2012 (yr)
Maize (100 kg)	64	120
Cassava (91 kg)	14	20

Source: MoFA report (2012)

Table 6- Average wholesale food price for 2012 and 2013

COMMODITY	AVERAGE PRICE (GH¢-Ghana cedi)	
	2012 (yr)	2013 (yr)
Maize (100 kg)	120	75
Cassava (91 kg)	20	18

Source: MoFA report (2013)

Though the figures show increase in prices of cassava and maize from 2009 to 2012, the increments were not high enough to encourage production. Increase in prices can be attributed to increase in demand for maize and cassava over the said

years. It is important to note that prices of farm inputs might have also increased over the same periods. The figures also show a drop in prices of maize and cassava in 2013. This was explained by the forces of demand and supply. Firstly, an increase in the supply of maize as a result of increase in output levels led to excess supply over demand. This resulted in a drop of the price of maize. Secondly, since people consume more maize than cassava in the country, consumers decided to buy more maize than cassava which also meant less pressure on cassava. This also accounted for a fall in the price of cassava. In addition, farmers explained that for fear of post-harvest losses, they had to reduce the prices of cassava and maize by themselves.

As a way of encouraging smallholder farmers to produce more food to secure a nation, minimum prices should be instituted by governments. To reduce the cost of production, subsidies on farm inputs must be encouraged. Increase in prices of farm produce will lead to increase in incomes of farmers. This will have the combined effects of the farmers themselves being food secured because they have the purchasing power. When incomes are invested on farms it will lead to expansion of farms and output to guarantee a nation's food security. This is what Yaro (2004) indicates that more wealth reduces vulnerability and poverty while ensuring food security.

4. 15. Alternative livelihood strategies

For cassava and maize farmers, December, January, February and some parts of March and November can be described as off-season. These are the times after the minor farming season and before the major farming season. Farmers were asked about what they do during the off-season. Farmer 16 said:

In fact, during off-season, we do nothing. This is the time when we spend the money realised from the sale of our maize and cassava. If our incomes are high we could engage in trading or other activities during this time of the year but this

amount is woefully inadequate. Only few people have something doing during off-seasons.

(Farmer 16, 2014).

Below is the comment of farmer 13:

Some time ago we had a workshop on how to process gari and pastries by the Business Advisory Center (BAC) of the REP in the Municipality. This is what kept most of us especially the females engaged during the off-season and it was very helpful. Unfortunately, after three or four months the business collapsed. This is because, we did not have the machine to grind our cassava into cassava dough. We were transporting to a nearby town to grind but drivers and passengers complained of the unusual scent as a result of the water which comes out of the cassava dough. Eventually, drivers did not allow us to travel with the cassava dough. Beside the distance, it was too heavy to be carried on the head. We have been calling for help with the provision of the grinding machine so we can process everything by ourselves here.

(Farmer 13, 2014).

The limited number of farmers who are occupied during off-seasons are mainly engaged in the cultivation of other crops such as vegetables and plantain. However, others complained that they had dreams of raising snails, planting mushrooms and rearing animals such as grass-cutter but they lacked the capital base to start such ventures. As a way to deal with shocks, MoFA also encourages farmers to practice backyard gardening of other crops, vegetables, livestock and poultry (MoFA report, 2012).

It was realised though this study did not delve much into diversification strategies that the major nonfarm activity which some smallholder farmers are engaged in is trading. However, this one can be linked to the “micro paradox” as devised by Reardon et al (2007) because incomes realised is no far better than incomes from farm activities.

The multifaceted approach as maintained by the livelihood framework and the rights-based approach needs to be applied to tackle farmers' situation of being

redundant during off-seasons. The political capital of farmers need to empowered so that they can make wise decisions concerning their livelihoods (Yaro, 2004). This can be done by expanding the endowment sets of farmers. In effect, political, economic, ecological, cultural and social rights of farmers have to be strengthened. Diversifying from farm activities to rural non-farm activities is a strategy which will keep smallholder farmers engaged even in off-seasons. This will help create more wealth for farmers in order to improve their food security situations and take them out of poverty (Yaro, 2004).

5 Findings and Conclusion

The issue of food security is of global concern. The MDG 1 for instance has stressed the need to reduce by half, the number of people who suffer and die from hunger and extreme poverty by the 2015 deadline (Rigg, 2008). This has partly urged many countries especially in the developing world in pursuing diverse strategies, programmes and policy interventions in order to reach this target. However, it has been observed that the contributions of smallholder farmers to solving the food insecurity menace have received little attention in the AANM.

Given the essential role that smallholder farmers play in ensuring food security, this study set out to examine the causes of food insecurity, the extent to which smallholder farms can be improved to guarantee food security as well as the key challenges confronting small holder farmers in southern Ghana and how incomes of smallholder farmers can be improved. The research therefore attempted to find answers to the following questions: What are the underlying causes of food insecurity in the Asante Akim North Municipality? Why do output levels continue to be low in spite of modern technology and introduction of new varieties of maize and cassava? How can incomes of smallholder farmers be improved? In Ghana, the issue of food insecurity is largely prevalent in the north, however I set out to explore the issue from a different geographic scope (southern Ghana), as most previous studies have focused on the north to the neglect of the south although the south also experiences some level of food insecurity.

The first conclusion drawn from this study indicates that the various challenges facing the smallholder farmers are the very factors that precipitate food insecurity in the studied communities. It was discovered that factors such as inadequate access to credit facilities, poor access and use of modern inputs such as planting materials, fertilizer and agrochemicals, small farm size together with low level of technology as well as the continuous dependence on rain instead of developing irrigation systems significantly affected the yields/output which endangers food

security in AANM. Of particular relevance is the issue of access to credit. While there exists opportunity for many of the farmers to obtain loans from the Banks in the Municipality, conditions attached to loans deter farmers from applying for such loans. This therefore has the potential to affect the increase in production of the farmers.

The second conclusion drawn from this study indicates that these factors identified above have radically served as a great deal of challenge for the small holder farmers especially in their attempt to improve upon their farms by increasing their productive capacity. The low productivity of the farmers as the study revealed is also linked to the lack of access to market for the produce of the farmers. The only market for the cassava and maize farmers is Konongo, the municipal capital. Inability to sell much in Konongo sometimes compels some of these small scale farmers to travel as far as to Accra, the capital city of Ghana. However the high transport cost sometimes serves as a challenge with respect to selling their products in Accra. In this regard, many of the farmers experience post-harvest losses which in turn threatens food security in the study area as cassava and maize remain perishable crops.

Thirdly, smallholder farmers, in their quest to make better their livelihoods by improving their incomes through diversification strategies are constrained in terms of capital opportunities. This study revealed that most of the smallholder farmers are ambitious to carve alternative income earning opportunities out of their incomes to be in the position to withstand food insecurity and other livelihood threats but their incomes are woefully inadequate. These diverse set of complex factors affecting the smallholder farmers, call for a change in policy praxis and institutional support in order to improve smallholder farms thereby enhancing food security and incomes of the farmers.

Long term measures of improving food security situation will include empowering smallholder farmers by letting them realise their human rights

through investing in their education and health. It is through education that they would explore other livelihood opportunities and readily accept new innovations. Strengthening their physical capital by bringing health facilities to their doorsteps is also very important. Government sectors such as the MoFA, the MoH and Adult education are charged to expand and intensify their services to benefit smallholder farmers.

Considering that nonfarm activities can impact changes on farm activities, I have decided to delve into “Developing the Rural nonfarm Economy and its consequences on Farming Activities” in future.

6. References

- AANM, 2006. *Asante Akim North Municipal Assembly*. [Online] Available at: http://www.ghanadistricts.com/districts/?news&r=2&_id=18 [Accessed 4 February 2014].
- Ahmed, I. I. and Lipton, M., 1997. Impact of structural adjustment on sustainable rural livelihoods: a review of the literature. *IDS Working Paper 62*.
- Al-Hassan, R., Famiyeh, J., A. and Jager, A., D., 1997. Farm household strategies for food security in Northern Ghana: a comparative analysis of high and low population farming systems. In: A. Okyere, G. Benneh, and W. Tims, ed. *Sustainable Food Security in West Africa*, London: Kluwer Academic Publishers. pp. 130–152.
- Aryeetey, E., 2000. A diagnostic study of research and technology development in Ghana. *ISSER Technical Publication No. 60*. Legon: University of Ghana, Institute of Statistics, Social and Economic Research.
- Biederlack, L and Rivers, J., 2009. Comprehensive Food Security and Vulnerability Analysis. In: Nyantakyi-Frimpong, H., 2013. 'Food Security in Northern Ghana: Policy issues in Historical and Contemporary Contexts' *Backgrounder, 62*.
- Bryceson, D. F., 1996. Deagrarianization and rural employment in sub-Saharan Africa: A sectoral perspective. *World Development*, 24(1), pp. 97-111.
- CFSVA, 2012. *Focus on Northern Ghana*. Rome, Italy: United Nations World Food Programme.
- Chambers, R., 1989. Editorial introduction: vulnerability, coping and policy. *IDS Bulletin 20*, pp 1-8.
- Chambers, R. and Conway, G., 1992. Sustainable rural livelihoods: practical concepts for the 21st century. *IDS Discussion Paper 269*.

- Cook, I., Crang, P., Godwin, M., Painter, J. and Philo, C., 2004. *Practising human geography*. London: Sage Publications.
- Davies, S., 1996. *Adaptable Livelihoods: Coping with Food Insecurity in the Malian Sahel*. Houndmills: Macmillan Press.
- Dawe, D., 2014. Rice self-sufficiency: A question of geography? *Rice Today*, 13(1).
- Devereux, S., 1999. 'Making less last longer': informal safety nets in Malawi. *IDS Discussion Paper 373*.
- Devereux, S. and Maxwell, S., ed. 2001. *Food Security in Sub-Saharan Africa*. London: IDS, ITDG Publishing.
- De Waal, A., 1989. *Famine that Kills: Dafur, Sudan 1984–1985*. Oxford: Clarendon Press.
- DFID., 2000. *Realising Human Rights for Poor People: Strategies for Achieving the International Development Targets*. London: Department for International Development.
- DFID., 2002. *Introduction to Sustainable Livelihoods & its Relationship to Project Work*. DFID, [Online] Available at: <<http://www.livelihoods.org/info/Tools/SLProj1b.ppt>> [Accessed 7 February 2014].
- Djurfeldt, G., Aryeetey, E. and Isinika, A., C., eds., 2011. *African smallholders: Food crops, markets and policy*. UK: CAB International.
- FAO, 1996. Rome Declaration on World Food Security. In: Desai, V. and Potter, R., B., ed. 2008. *The Companion to Development Studies*. Britain: Hoober Education.
- FAO, 2006. Projected undernourishment in the developing world. In: Desai, V. and Potter, R., B., ed. 2008. *The Companion to Development Studies*. Britain: Hoober Education.
- FAO report, 2013. *The state of food insecurity in the world: The multiple dimensions of food security*. [Online] Available at:

- <<http://www.fao.org/docrep/018/i3434e/i3434e.pdf>> [Accessed 25 January 2014].
- FAO, 2014. *Linking farmers to moving markets*. [Online] Available at: <<http://www.fao.org/news/story/en/item/179362/icode/>> [Accessed 25 January 2014].
- Farrington, J., Ramasut, T. and Walker, J., 2002. Sustainable livelihoods approaches in urban areas: general lessons, with illustrations from Indian cases. *Overseas Development Institute Working Paper* 162.
- Finch, J., 1993. It's great to have someone to talk to: ethics and the politics of interviewing women. In: Hammersley, M., ed, *Social research: Philosophy, Politics and Practice*. London: Sage.
- Fine, B., 1997. Entitlement failure? *Development and Change*, 28, pp. 617–647.
- Haddad, L. and Oshaug, A., 1999. How does the human rights perspective help to shape the food and nutrition policy research agenda? *Food Policy* 23 (5), pp 329–345.
- HLPE, 2013. *Investing in smallholder Agriculture for Food Security*. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security. Rome. [Online] Available at: <<http://www.fao.org/docrep/meeting/029/mi035e.pdf>>.
- Johnson, C. and Start, D., 2001. Rights, claims and capture: understanding the politics of pro-poor policy. *Overseas Development Institute Working Paper* 145.
- Johnson, C. and Forsyth, T., 2002. In the eyes of the state: negotiating a 'rights-based approach' to forest conservation in Thailand. *World Development*, 30 (9), pp. 1591–1605.
- Keen, D., 1994. *The Benefits of Famine: a Political Economy of Famine and Relief in Southwestern Sudan, 1983–1989*. Princeton, NJ: Princeton University Press.
- Larsson, R., 2001. *Between crisis and opportunity: Livelihoods, diversification, and inequality among the Meru of Tanzania*. Ph. D. Lund University.

- Li, T. M., 2007. *The will to improve: Governmentality, Development, and the practice of politics*. London: Duke University Press.
- Mason, J., 1996. *Qualitative researching* London: Sage.
- May, T. ed., 2011. *Social research: Issues, methods and process*. UK: Open University Press.
- Mikkelsen, B. ed., 2005. *Methods for development work and research: A new guide for practitioners*. New Delhi: Sage.
- MoFA, 2010. *Ministry of food and Agriculture, Asante Akim North Municipal-Konongo: 2010 Annual Progress Report*. Ghana: s.n.
- MoFA, 2012. *Ministry of food and Agriculture, Asante Akim North Municipal-Konongo: 2012 Annual Progress Report*. Ghana: s.n.
- MoFA, 2013. *Ministry of food and Agriculture, Asante Akim North Municipal-Konongo: 2013 Annual Progress Report*. Ghana: s.n.
- Moser, C., 1996. *Confronting Crisis: a Comparative Study of Household Responses to Poverty and Vulnerability*. Washington DC: ESD.
- Parfitt, J., 2005. Questionnaire design and sampling. In: Flowerdew, R. and Martin, D. ed., 2005. *Methods in human geography: A guide for students doing research project*. England: Pearson Education Limited.
- Prakash-Mani, K., 2013. *Enabling food security through smallholder farming*, [Online] Available at: http://media.cgd.swissre.com/documents/RDM_FoodSecurity_SmallholderFarming_Prakash_Mani_Jan20131.pdf > [Accessed 25 January 2014].
- Osmani, S. R., 1993. *The Entitlement Approach to Famine: an Assessment*. Working Paper 107. Helsinki: World Institute for Development Economics Research.
- Reardon, T., Berdegue, J., Barrett, C., B. and Stamoulis, K., 2007. Household income diversification into rural nonfarm Activities. In: Haggblade, S., Hazell, P., B. R. and Reardon, T., 2007. *Transforming the rural nonfarm economy: opportunities and threats in the developing world*. Baltimore: The Johns Hopkins University Press.

- Rigg, J., 2008. The Millenium Development Goals. In: Desai, V. and Potter, R., B., ed. 2008. *The Companion to Development Studies*. Britain: Hooder Education.
- Seini, A. W., 2002. Agricultural growth and competitiveness under policy reforms in Ghana: *ISSER Technical Publication No. 61*. Legon: University of Ghana.
- Seini, A. W. and Nyanteng, K. V., 2005 Smallholders and Structural Adjustment in Ghana. In: Djurfeldt, G., Holmen, H., Jirström, M. and Larsson, R., ed., 2005. *The African Food Crises: Lessons from the Asian Green Revolution*. UK: Biddles Ltd, King's Lynn.
- Sen, A., 1999. *Development as freedom*. UK: Oxford University Press.
- Slater, R., Sharp, K. and Wiggins, S., 2008. Food Security. In: Desai, V. and Potter, R., B., ed. 2008. *The Companion to Development Studies*. Britain: Hooder Education.
- Swift, J. 1989. Why are rural people vulnerable to famine? *IDS Bulletin* 20 (2), pp. 8–15.
- Valentine, G., 2005. Tell me about...: Using interviews as a research methodology. In: Flowerdew, R. and Martin, D. ed., 2005. *Methods in human geography: A guide for students doing research project*. England: Pearson Education Limited.
- World Bank, 2000. *World Development Report 2000/2001*. New York: World Bank.
- Yaro, J. A., 2004. Theorizing food insecurity: building a livelihood vulnerability framework for researching food insecurity. *Norwegian Journal of Geography*, 58(1), pp. 23-37

6.1. Interviews

Agricultural Officer 1. 2014. *Personal interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Konongo, 14 March 2014.

Agricultural Officer 2. 2014. *Personal interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Konongo, 14 March 2014.

Agricultural Officer 3. 2014. *Personal interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Konongo, 14 March 2014.

Agricultural Officer 4. 2014. *Personal interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Konongo, 14 March 2014.

Agricultural Officer 5. 2014. *Personal interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Konongo, 14 March 2014.

Farmer 1. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Woraponso, 18 March 2014.

Farmer 2. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Woraponso, 18 March 2014.

Farmer 3. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Woraponso, 18 March 2014.

Farmer 4. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Woraponso, 18 March 2014.

Farmer 5. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Woraponso, 18 March 2014.

Farmer 6. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Woraponso, 18 March 2014.

Farmer 7. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Woraponso, 18 March 2014.

Farmer 8. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Woraponso, 18 March 2014.

Farmer 9. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Wioso, 18 March 2014.

Farmer 10. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Wioso, 18 March 2014.

Farmer 11. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Wioso, 18 March 2014.

Farmer 12. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Wioso, 18 March 2014.

Farmer 13. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Wioso, 18 March 2014.

Farmer 14. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Wioso, 18 March 2014.

Farmer 15. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Wioso, 18 March 2014.

Farmer 16. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Wioso, 18 March 2014.

Farmer 17. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Wioso, 18 March 2014.

Farmer 18. 2014. *Focus group interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Wioso, 18 March 2014.

Key informant 1. 2014. *Personal interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Woraponso, 18 March 2014.

Key informant 3. 2014. *Personal interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Wioso, 18 March 2014.

Key informant 4. 2014. *Personal interview*. Interviewed by ... Theophilus Effah-Abedi. [Tape recording] Wioso, 18 March 2014.