

**ASSESSING THE IMPACT OF URBAN SPRAWL ON
AGRICULTURAL LAND USE AND FOOD SECURITY IN
SHAI OSUDOKU DISTRICT**

BY

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DECLARATION

I hereby declare that this work is the result of my own research and has not been presented by anyone for any academic award in this or any other university. All references used in the work have been fully acknowledged. Any shortfalls therein are my sole responsibility.

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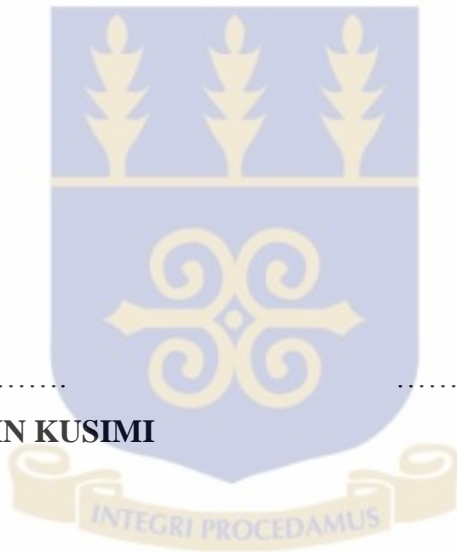
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DEDICATION

To the Almighty God who makes the impossible, possible be praised. Again, I dedicate this work to my dear wife Mrs. Faustina Dabie who provided moral and financial support, my parents Elder J. K. Dabie and Mrs. Theresah Dabie of Suma-Ahenkro, for their great sacrifice for my education. Also, to my wonderful children Richmond, Jehoshaphat, Esther, Zerubbabel and Olivia for their encouragement, love and support throughout this course.



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ABSTRACT

Shai Osudoku, a District known as the cradle of Dangme land and Krobo culture, and a predominantly farming area, is experiencing the sprawl phenomenon. Agricultural lands, which serves as the main source of livelihood to majority of the inhabitants in the District, has been encroached by the process of urban sprawl. A major result of this phenomenon is a growing sprawl at the fringes of some of its major towns. This study focuses on assessing the impact of urban sprawl on agricultural land use and food security in the Shai Osudoku District Assembly (SODA) of Greater Accra Region of Ghana. Both primary and secondary data were collected from Food Crop Farmers of four (4) major sprawling communities (Dodowa, Asutsuare, Ayikuma and Doryumu) in the District and Decentralized Government Departments of the SODA. The primary data collected were analyzed using SPSS after it was entered into the Excel software. The SPSS was used to generate charts and graphs to interpret the survey. The same was used to summarize the information collected which helped to ascertain the exact findings from the study area. In addition, a multi-temporal set of Remote Sensing data of the study area was used to study and classify Shai Osudoku District. This dataset included mainly Landsat (Enhanced Thematic Mapper) images of (1991, 2002 and 2013). Digital image-processing software ENVI 5.1 was used to process, analyze and integrate the spatial data. Geographic Information Software ArcGIS was used to produce the map output.

Contrary to the mainstream view that natural increase is the main source of increment in the population, and thus urban sprawling in the area, food crop farmers as well as stakeholders' perception was different as responses indicated that the rapid urban sprawling of SODA is as a result of migration, high price of land in the Accra Metropolis, proliferation of estate development, the District's closeness to the capital city of Ghana-Accra and the proposed International Airport site located within the District. The study also reveals that sprawling in the District is rapidly consuming farmlands in the fringe rural communities. This has resulted in some of the crop farmers diverting to non-farm businesses. Again, the study area has experienced an enviable change in the land cover for the past decades. Using Landsat satellite imagery from 1991 to 2013, the study areas has expanded by 25% of the total land over the period. Moreover, it reveals the prevalence of land litigations in the study area. Also, the

pressures of urban sprawl have negative implications on predominantly farming communities in the SODA, especially on their income. The study has implications for the sustainability of farmlands in peripheral lands and its aftermath food insecurity.

The study recommends the integration of agricultural lands into urban land use planning for efficient management and protection of the dwindling farm space. Also, policy focus should be geared towards the protection of prime agricultural lands in the Metropolitan/Municipal/District Assemblies (MMDAs) where farming is the mainstay of majority of the inhabitants, especially those at the peripheral areas of major cities in Ghana. Again, it is also critical to develop the capacity of government institutions responsible for public and private lands administration and development while harmonizing their functions under a single management authority to reduce institutional bottlenecks that promote duplication and overlapping roles in all land management institutions in the country. Urban sprawl is necessary but not to the extent of denying the rural and peripheral folks of their main livelihood asset.

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GLOSSARY

AACA	Addis Ababa City Administration
AMA	Accra Metropolitan Assembly
CARE	Cooperative for Assistance and Relief Everywhere
CASA	Centre for Advanced Spatial Studies
CFSVA	Comprehensive Food Security & Vulnerability Analysis
DWDA	Dangme West District Assembly
DESA	Department of Economic and Social Affairs
DFID	Department for International Development
ECA	Economic Commission for Africa
EEA	European Environment Agency
EPA	Environmental Protection Agency
EU	European Union
EUA	Extended Urban Area
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GIS	Geographic Information System
GLTN	Global Land Tool Network
GLSS	Ghana Living Standard Survey
GSS	Ghana Statistical Service

IPCC	Intergovernmental Panel on Climate Change
ISSER	Institute of Statistical, Social and Economic Research
LAP	Land Administration Project
LI	Legislative Instrument
MMDAs	Metropolitan/Municipal/District Assemblies
NLP	National Land Policy
MOFA	Ministry of Food and Agriculture
OECD	Organization for Economic Cooperation and Development
RS	Remote Sensing
SSA	Sub-Saharan Africa
SODA	Shai Osudoku District Assembly
SPSS	Statistical Package for Social Scientists
UN	United Nations
UNFAO	Food and Agriculture Organization of the United Nations
UN-HABITAT	United Nations Human Settlement Programme.
UNFPA	United Nations Population Fund
UA	Urban Agriculture
USA	United States of America
USDA	United States Department of Agriculture

CHAPTER ONE

BACKGROUND OF THE STUDY

1.0. Introduction

The United Nations (UN) (2008) has indicated that, by 2010, the world's urban and rural population was at par and it is projected that by 2025, the proportion of urban communities would have increased to as high as 62.9 per cent. According to the same report, globally, the level of urbanization is expected to rise from 52 per cent in 2011 to 67 per cent in 2050. The UN report further stated that within this period, the world population is expected to increase by 2.3 billion, passing from 7.0 billion to 9.3 billion. Again, "The United Nations Population Division projected that by 2030, each of the major regions of the developing world will hold more urban than rural dwellers and by 2050, two-thirds of their inhabitants are likely to live in urban areas" (Montgomery, 2008). Urbanization results in dramatic transformation of land use. According to Mutuga (2009), expansion of urban areas has been in a lot of cases unplanned and haphazard – a phenomenon referred to as urban sprawl. Urban sprawl is alarming, since more land is taken up by urban areas, which may result in encroachment into agricultural land in the peripheral areas.

Urban sprawl simply means the excessive spatial growth of cities. It also refers to the physical outward expansion of cities characterized by low densities, separated land uses and Car-dependent communities. Urban sprawl involves the conversion of open space, wetland, semi-natural and natural vegetation and agricultural land into built up (Atu *et al.*, 2013). As Wolman *et al.* (2005), put it, urban centres grow and develop either as planned, semi-planned or unplanned. He continued that urban sprawl occurs as land resources are consumed to accommodate new urbanization. Urban sprawl is when the expansion of housing and other infrastructure is partially guided or not guided at all. Wolman *et al.* (2005) again posited a new terminology for urban sprawl—'Extended Urban Area' (EUA), that is, the census-defined urbanized area plus the new urbanized area. The new area includes one mile grid cells that contain 60 or more dwelling units from where about 30% of workers commute to the urban area. Hasse and Lathrop (2003), have suggested that, sprawl affects cities in developed as well as developing nations. They said that in the advanced countries where there is proper spatial

organization in terms of zoning, the impacts of sprawl in relation to social and environmental cost still create several planning challenges. For instance in New Jersey, between 53% and 60% of prime farmland was lost to urbanization from 1986 to 1995 while impervious surfaces increased by some 9.2% statewide.

According to Atu *et al.*, (2013), urban sprawl is one of the most challenging threats to agriculture in the world today. They further said that sprawl is a form of development that typically occurs in cyclical bands, surrounding large urban centre worldwide. The literature goes on to say that, often times urban sprawl development originate as disconnected developments and single family homes established outside urban areas well beyond city limits but usually within commuting distance to the city centre. They further stated that, over time, the areas between the disconnected settlements and the urban centre begin to be filled with residences, large ware outlets and other businesses, parking lots and manicured lawns until a dense suburb is created. Urban sprawl, agriculture land and food security are strongly correlated. The reason being that since the land is fixed in supply; the expansion of towns/cities reduces the available surrounding lands meant for agriculture. It should also be noted that when the agricultural land is reduced, food production and supply may also reduce.

Atu *et al.* (2013), identified that in Calabar in Nigeria, between 2002 and 2012, there has been outgrowth of Greenfield residences on the urban periphery developed by the government, and the private sector for their workers or by property developers for rent or sale. They continued that, although all cities in Nigeria are experiencing sprawl, Calabar's case is quite exceptional because of the scale and type of development on some of the city's most agriculturally productive land. They again stated that in the past decade, the city's built up area burst outward in an explosion of sprawl that consumed former agricultural land at a break-neck pace. Moreover, over 5, 200.09 hectares of the former agricultural land at Ekorinim, Esuk Utan, among others have been converted to low density residential, commercial and industrial uses as these areas are merged with the urban areas. This action, according to the literature displaced over 1200 farmers, which led to food shortage especially among the displaced farmers and the nearby communities. According to Nwafor (2006), the expansions into peripheral agricultural lands reduce the spatial extent of agricultural land and fragment them leading to reduced and smaller patch sizes of less than 1hectare per farmer.

Addis Ababa, the capital of Ethiopia is also a victim of urban sprawling (Tegenge, 2000). Pankhurst (1962), said, the overall trend and picture of Addis Ababa's population and spatial growth pattern is the most accelerated growth rates in the world. This accelerated growth is also accommodated by the conversion of agricultural and forest land to urban settlement. Pankhurst (1962), hinted that the country lost about 400 metric tons of food in the early 1960's due to urban expansion. In the process of creating open space in the inner city of Addis Ababa, urban displacement and relocation of the occupants to the periphery of agricultural and forestland became necessity which resulted in dispossession and dislocation of farmers (AACCA, 2000).

In Ghana, the situation is not different. Ghana is regarded as an agricultural country, largely due to the high proportion of land and labour used in agricultural activities and the contribution made by this sector to Ghana's Gross Domestic Product (GDP) (ISSER, 2000). In Ghana, in terms of provision of income, employment, food security and export earnings, agriculture is the single largest sector of the economy. It contributed 23.1 per cent of GDP in 2012, (Mongabay, 2013, Government of Ghana, 2013). Ghana has a total land area of 238,537 square kilometres, 18.39 per cent of which constitutes arable and permanent crop land area (FAO, 2011). According to the FAO (2011), Ghana's agriculture is dominated by smallholder farmers. It is estimated that about 31 per cent of the farm holdings in Ghana are less than 1 hectare, 55 per cent are less than 1.6 hectares while only 18 percent are more than 4.0 hectares per farmer (Ministry of Food and Agriculture-Ghana, 2002). According to MOFA-Ghana (2002), agriculture in Greater Accra Region is predominantly on a smallholder basis. The report further stated that about 90% of farm holdings are less than 2 hectares in size, although there are some large farms and plantations, particularly for mangoes and bananas located in Dangme West (now Shai Osudoku District), and to a lesser extent, rice, maize and pineapples. Moreover, the report mentioned that about 70% of the total food produce in Ghana comes from the small holder farmers. This signifies the importance of smallholder farmers to the family, regional and national agricultural production as well as ensuring food security to the economy of Ghana.

Again, according to Ghana Statistical Service (GSS) (2010), approximately 51.5 per cent of the country's population was living in urban areas. Since 1921 when the first formal census

was conducted, the population of Ghana has grown steadily. The increase in population has gone in *tandem* with increase in the proportion of the total population living in urban centers, that is, settlements with a population of 5000 or more (UNFPA, 2007). According to Ghana Statistical Service (2007), from as low as about 9 percent in 1921, the proportion of the total population urbanized almost tripled to reach 23 percent in 1960, and more than doubled to reach 49 percent in 2007. The report goes further to say that there has been a gradual percentage increase of the number of people living in urban areas from 1948 to date as well as their corresponding total populations. It continued that, whereas only 9.4 percent of the total population lived in urban areas in 1931, the population increased to 13.9 percent in 1948, 23 percent in 1960, 28.9 percent in 1970, 31.3 percent in 1984 and 43.9 percent in 2000. In sum, it is evident that, by 2000, the number of urban settlement had increased about nine folds from 41 in 1948 to 369 in 2000 while the corresponding population increased almost fifteen times from 570,597 persons in 1948 to 10,278,636 in 2000.

Currently, the proportion of the population living in urban areas in Ghana is 12,575,998 (50.9%) (GSS, 2012). According to the same report, Greater Accra has the highest proportion of urban population (90.5%), followed by Ashanti (60.6%) while Upper West has the lowest proportion of urban population (16.3%). The problem however is that, as urban population increases, the people's demand for land becomes higher for residential and industrial purposes. The Ghana Statistical Service (2010) has attributed the rising trend in urbanization to the following demographic factors: rural urban migration, natural increases in towns and cities, and re-classification of towns and cities. Villages grow into towns once they have attained the threshold population of 5000 or more persons which is the census definition of an urban centre in Ghana.

Of late, there has been an increase in residential estates on the urban periphery developed by government as well as the private sector for their workers or by property developers for sale, (Ghana Statistical Service, 2010). There is evidence of urban sprawl in many cities in Ghana such as Koforidua, Accra, Wa, Tamale and others. In the writings of (Peprah, 2014), it was evident that urban sprawl has caught up with the Wa Municipality. He quoted that "the sustainability of livelihoods that depend on agricultural lands has become threatened by urban sprawl. As the built up area increases, it reduces farmland, sand winners scoop the surface soil

and farmers are pushed to use marginal lands”. In his case study area – Wa – Ghana, urban sprawl has increased by 34 percent between 1986 and 2011 resulting in 47 percent increase in bare land and 10 percent reduction in vegetation cover (Aduah and Aabeyir, 2012). This is due to the fact that the population of Wa has increased from 98,675 in 2000 to 127,284 in 2012 (Ghana Statistical Service, 2012, Wa Municipal Assembly, 2012).

Attua and Fisher (2010) provided an empirical account of historical and future land-cover changes in and around the New Juaben Municipality. Using Landsat satellite imagery from 1985 to 2003, the study found that the urban core expanded by 10% and the peri-urban areas expanded by 25% over the period.

In a related development, it became evident from Zana *et al.* (2013) that the rapid urbanization of Tamale is as a result of increased commercial activities and its strategic location. They mentioned that rapid urbanization of Tamale sparked up a succession syndrome where prime agricultural lands have been converted to other land uses believed to be the highest and best use. “Urbanization is necessary but not to the extent of denying the rural folks of their main source of livelihood, being farming” (Zana *et al.* 2013).

In all these cases, urban and peripheral agriculture are seen as under serious threat. Urban agriculture’s contribution in particular to the economy of Ghana cannot be over looked. According to Mougeot (2000), “Urban Agriculture (UA) is an enterprise located within or on the fringe of a town, a city or a metropolis, which grows, processes and distributes a diversity of food and non-food products, using largely human and material resources, products and services found in and around that urban area, and in turn supply in human and material resources, products and services largely to that urban area”. Corbould (2013) stated that urban agriculture produces 15 to 20 per cent of the world’s food supply and could play a major role in achieving global food security. In Ghana, UA has considerable potential to improve food security, but as urbanization proceeds, food insecurity issues in the cities like Accra and its environs are sure to increase (Corbould, 2013). Corbould, (2013), again stated that around 90 per cent of fresh vegetables and pineapples consumption in Ghana’s capital comes from production within the region. Drechsel (2007) has outlined the following as significance of urban agriculture to the economy of Ghana. It supplies more than 80 per cent of spring onions

and lettuce consumed in Accra. Secondly, an estimated number of 200,000 people who patronize restaurants and street food in Accra benefit from urban produce every day. Moreover, it is an avenue for growing medicinal plants such as Aloe Vera, Marsh Mallow, Great Burdock, Pot Marigold, Chamomile, Siberian Ginseng among others, and for domestication of short-cycle species such as grass cutter and mushroom. On the macro level, Corbould (2013) stated that the contribution of UA to the Gross Domestic Product (GDP) may be small, but the importance for certain commodities, such as vegetables and meat might be substantial. Apart from direct economic impact, there are also indirect social benefits that derived from the economic gains, such as the possibility to pay school fees, acquire more household assets and pay for better health care and livelihoods support (Corbould, 2013). He again mentioned that many women in Accra are gainfully employed by marketing and processing of urban and peripheral products.

Moreover, officials of the Agricultural Extension Services in Accra Metropolitan Assembly (AMA) interviewed in 1995/1996 suggested that approximately half of the residents in Accra are involved in UA (Obosu-Mensah, 2002). Obosu-Mensah (2002), however mentioned that, urban sprawl, contamination threats and uncertain legal status of land are challenges confronting urban farming in the Greater Accra Metropolitan Area. These factors limit the production and stability of these food sources and consequently cause food insecurity, he added.

1.1. Statement of Research Problem

According to Zana *et al.* (2013), in Ghana close to 60% of the populations are involved in agriculture as a major source of employment to the populace. Depriving the sector of land in any part of the country therefore brings an increase in the unemployment rate and food shortage. The research problem of the study is that agricultural lands, which serve as the main source of livelihood to most of the inhabitants within the Shai Osudoku District Assembly (SODA) has been encroached through urban sprawling. Whereas urban sprawl is a global problem, most current studies have focused on major cities in Africa such as Addis Ababa, Calabar, Tamale, Wa, Kumasi, Koforidua among others. There is a gap in the study of urban sprawl in metropolitan/municipal and a developing district. Accordingly, this work will study

urban sprawl in the context of developing districts: narrowing it down to the SODA in the Greater Accra of Ghana, to assess urban sprawl's impact on agricultural land use and food security.

A reconnaissance survey conducted in the study area with some opinion leaders in January, 2014 revealed that the agricultural land space has significantly changed over the past ten to twenty years. With this, there is the need to find out the decadal change in the agricultural land resulted from urban sprawling using Landsat satellite imagery. Lerise *et al.* (2004), posit that, rapid urbanization, population pressure, shelter, infrastructural, industrial and commercial needs of fast growing cities have stretched the land delivery system in Greater Accra Region to almost its elastic limit. Peprah (2014), also mentioned that rapid urban sprawl has adversely affected development efforts in many cities in Ghana. He continued that one of these is changes in land use subsequently leading to decreased agricultural land in favour of the provision of residential accommodation in most urban setups. According to Peprah (2014), this is reflected in the form of dormitory and satellite towns that are being developed in the urban peripheries which were supposed to be agricultural lands in the urban setting.

The key problem of the urban sprawl process is the rapid conversion of large amount of prime agricultural land to urban land uses (mostly residential construction), in the urban periphery (Lerise *et al.*, 2004). The consequences may be unavailability of prime agricultural lands and low agricultural productivity. This development could greatly affect crops that are grown in quantities, especially those for export.

Apart from the likelihood danger looming over the food crop farmers over land space, there could also be suspected food insecurity in the near future in the study area due to rapid loss of farmlands to government and private estate developers. Food insecurity would lead to low standard of living that emanates from low income of farmers. In this case, affected farmers would have to adjust their livelihood by shifting to different ventures. There are traces of these situations in the Shai Osudoku District Assembly. The current sporadic urban sprawling in the SODA needs to be researched because as (Jedwab, 2011), puts it "there is a possibility

of local small-holder farmers becoming urban poor people through the elimination of farming livelihoods”.

Land tenure system is perceived as a one of the contributory factors for the rapid urban sprawling in the study area. For fear of losing a land that belongs to individuals or families, landlords sell a large parcel of land to individual tenants, private estate developers, government agencies and other land users. Perhaps, this is done by the landlords to avoid future land litigations. Moreover, in Ghana, most traditional structures put men in the fore front in land ownership. In terms of land acquisition and ownership, it needs to be investigated to ascertain whether indeed women are relegated to the background.

According to UN-HABITAT (2008), “rather than applying crisis management through ad hoc responses, African governments should consider how they can strategically position themselves for changing urban food requirements and the need for supply strategies and systems in the short, medium and longer term so that they will continue to be able to feed their increasingly urban societies. Policies are needed in the protection of the peri-urban agricultural land, land rights and agricultural livelihoods of the poor. Solutions can then be found in stimulating urban and peri-urban agricultural production; improving infrastructure to facilitate inputs into agriculture and outputs from agriculture to cities; and better water management to convert the non-productive territories of the continent to food production for internal use and future export”. In this respect, the role of stake holders such as the District Assembly, Agriculture Extension Officers and Traditional and Opinion Leaders need to be elicited to find out what they are doing in providing livelihood security to the food crop farmers.

Growth in urban population goes with no equivalent growth in land supply (Olima and Washington, 2003). Land is fixed in supply and does not in any way increase with increasing population growth. Olima and Washington (2003) emphasized that the pressure exerted by increase in population and rapid urban sprawl deprive other sectors such as agriculture of the needed land. Agricultural lands, they say, are most affected by rapid urban sprawl and its functions of demand. Land uses for residential, industry and commercial tend to dominate agricultural lands in the bid for space in the urban setup (Lerise *et al.*, 2004). This dominance

tends to deprive farmers of arable land to cultivate thereby reducing agricultural land, especially those meant for food crop production. The traditional structure of the economy with agriculture as the largest sector has begun to change of late, and agriculture now only provides 21.3% of total GDP, compared to 28.1% for industry and 50.6% for services (Ghana Statistical Service, 2015). There is an evidence of urban sprawl in the Shai Osudoku District and therefore, investigation has to be conducted to find out its implications on food crop production, land use and food security. These call for questions that need to be asked about the situation, and probably, answers research for.

1.2. Research Questions

The evidence of urban sprawl in the Shai Osudoku District and its implications on food crop production, land use and food security call for questions that need to be asked about the situation. The research would seek answers to the following questions;

- i. What is the extent of decadal change in agricultural land space?
- ii. Which crops are most likely to be affected greatly by urban sprawl?
- iii. Will the urban sprawl affect the income of the farmers?
- iv. How is land tenure system affecting the crop production and food security in the study area?
- v. What roles are stakeholders playing in providing livelihood security for the food crop farmers in the study area

1.3. Hypothesis

H_0 Urban sprawl has not negatively affected farmlands

H_a Urban sprawl has negatively affected farmlands

1.4. The General Objective of the Study

The main objective of the study is assessing the impact of urban sprawl on agricultural land use and food security in Shai Osudoku District Assembly (SODA).

1.5. Specific Objectives

- i. To analyze the decadal change in the agricultural land use resulted from urban sprawling.
- ii. To identify crops that are greatly affected by urban sprawl?
- iii. To assess how land tenure system has affected food crop farmers in terms of land accessibility.
- iv. To examine the roles of stakeholder in providing security to the farmers' livelihood asset against urban sprawling in the study area.

1.6. Justification of the Study

The expansion of a city influences the surrounding farming communities, which often leads to forced displacement. It is obvious that urban fringe communities surrounding the expanding city have an advantage due to high land value, access to the urban services and urban rural development linkages or the 'trickle-down effect' of development. Despite this opportunity, urban fringe communities around the city face problems of socio-cultural, economic challenges, environmental deterioration and land tenure insecurity (Feleke, 2003). Access to and sustainable use of land for agriculture in urban periphery is now becoming a critical issue for many areas of Shai Osudoku District. This conforms to what Feleke (2003), said that the residents of the urban periphery around cities face joblessness, landlessness, and low access to social services especially women and children.

The Shai Osudoku District has now become the target for sporadic estate developers, government agencies and individuals for various projects. This is due to the fact that Dodowa (the District's capital) is noted as the future National capital of Ghana, in addition to the seat of Greater Accra Regional House of Chiefs already in existence by the Ministry of Local Government and Rural Development (2001). Another reason is that, the Ministry of Local Government and Rural Development has earmarked the District for the proposed construction of an International Airport. According to Ministry of Local Government and Rural Development (2001)'s report, more than 500 hectares of land has been demarcated for the Airport project. It should be noted that greater part of the demarcated land is currently under

cultivation with various crops. It is projected that in the near future, many farmers would be deprived of the needed farmland which would eventually lead to food insecurity. The District's nearness to the National Capital-Accra, is also a major factor for springing up of residential set ups.

As long as fertility remains high and socio-economic conditions in rural areas continue to deteriorate, urban sprawling in Africa and for that matter Ghana is likely to be sustained for some time. Despite the prevalence of unemployment, poverty, inadequate housing and under-supply of municipal services in many African cities, rural-urban migration continues unabated. The reason is that many of the over 600 million rural dwellers who constitute 60% of the continent's total population believe that city offers a better hope for deliverance from chronic and inter-generational poverty (UNFPA, 2007). When they realized that there are non-existing white colour jobs, and living in cities had become unbearable, they move to the peripheral areas, thereby contributing to urban sprawling.

In food crop producing District like the SODA, estate and individual developers take place at the expense of farmlands. Fragmentation of land holdings and lack of strong will to enforce the green belt or land use policy is envisaged as some of the contributory factors. Dealing with the loss of arable area, increased farmland prices, as well as positive and negative externalities related to the proximity to urban development may leave farmers with two primary choices: switch to higher value production or sell farmland for development. Over the past several decades, the area expansion of Accra cities has outpaced population growth due to urban sprawl, which is characterized by low-density residential developments in suburban areas and the urban-rural fringe (Ghana Statistical Service, 2010). This process fragments the peri-urban agricultural landscape as it progresses outwards.

In the Shai Osudoku District, there is high possibility that the cumulative effect of succession and dominance factors have made land increasingly scarce for food crop farmers. Scarcity of land affects cultivation of crops, and it in turn affects food security. These presuppose that danger is looming over the food crop farmers over land space, and the possibility of future food insecurity in the study area and in Ghana as a whole. The International Sugar Organization is an organization of sugar producers. It is made up of 86 member states,

represent 83 percent of world sugar production, 69 percent of world consumption, 95 percent of world exports and 47 percent of world imports, of which Ghana is a member (International Sugar Organization, 2013). Available evidence indicates that, the District has the highest sugar cane production in Ghana located at Asutsuare followed by sugar factory that is been revamped at Komenda in the Central Region of Ghana (DADU-SODA, 2013, *modernghana.com/...11/1/sugar-industry-bounces...*). There are other crops produced in the District that have also recorded reduction in both hectares of land and the total yield per annum that may be due to urban sprawl in the study area. According to DADU-SODA (2013), the Asutsuare factory was put into operation in 1966 with a capacity of 30,000 tonnes of sugar yearly operating on 12,500 hectares of land. As at 2013, there was only 2,500 hectares of land left for the cultivation of sugar at Asutsuare. Again, DADU-SODA (2013) report has indicated that, 2000 hectares of land which used to be rice farms has now reduced to 1,855 hectares at Agomeda and Asutsuare respectively (Table 1 in the Appendix 1). This has reduced the annual rice production from 22,000 to 19,506 tonnes per year. Moreover, a total of 7,800 hectares of maize located at Dodowa, Asutsuare and Doryumu as at the year 2000 have reduced to 5,230 hectares. This has warranted for an investigation into the implications that the urban sprawl might have brought on food production and food security as well as land cover/use change in SODA.

1.7. Scope of Research

This study is an assessment of the urban sprawl, agricultural land use and food security in the Shai Osudoku District in the Greater Accra Region of Ghana. The study is focused on the major communities located in the District. Communities considered include Dodowa, Ayikuma, Doryumu and Asutsuare. In this study, the examination of the existing farms in each community would be carried out, and complemented with possible food insecurity in the communities. The selection of SODA is based on its function as farming district, and its closeness to the National capital of Ghana, Accra. SODA is located on the northern part of the Greater Accra Region. These communities were, and still farming dominated, but has degenerated into a sporadic sprawling due to rapid urbanization and migration process without corresponding planning response. Thus, the study takes four communities with related occupational characteristics and assess urban sprawl, agricultural land use/cover and food

security in these communities so as to improve the understanding related to farming livelihoods and farmers income. In addition, the decadal change in agricultural land space, land tenure system and the roles of stakeholders in providing livelihoods security in the area are also part of the interest of the study.

1.8. Organization of the Study

The study is organized into five chapters. The first chapter is the Introduction of the study. This chapter involves the introduction, problem statement, hypothesis, research question, study objectives, scope of the research and justification of the research. This chapter was previously submitted as a synopsis of the study, and guides and links the development of the whole research.

The second chapter provides a relevant Review of the Literature on urban sprawl, agricultural land use and food security in the SODA. The third chapter discusses the Study Area and the Methodology of the research, whilst the fourth chapter focuses on the results and discussions of the study.

The last chapter presents the major findings, the limitation of the study, conclusion and recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.0. Introduction

This chapter presents a review of relevant literature about urban sprawl, agricultural land use and food security. Again, definitions given by other authors are discussed, which would assist the construction of an own understanding of assessment of urban sprawl, agricultural land use and food security in the selected communities. Also, the chapter discusses strategies and policies implemented by city authorities and presents different study cases as examples of successful or unsuccessful policies. In addition, it has the conceptual framework which provides the structure of studies.

2.1. Definition and General Principles of urban sprawl

2.1.1. The concept “Urban Sprawl” and Peri-Urban Development

Urban sprawl has gained an increasingly prominent interest with the contentious theme in both public and academic discussions in the last decades (Haase and Nuissl, 2007). Some scholars advocated that urban sprawl process has led to a cohort of environmental problems ranging from social segregation to environmental degradations for which appropriate solutions are still needed regarding the growing concern for sustainability (Ewing, 1997). According to Patrick *et al.* (2014), urban sprawl has been conceptualized as a noncontiguous and unplanned expansion of urban areas which is characterized by low density physical development and the non-existence of basic municipal infrastructure usually beyond urban fringes. Some early researchers on urban development have attributed the emergence of sprawl to the ‘*monocentric city model*’ (Alonso, 1964). This model suggests that spatial structure of urban areas result from the tradeoff between the rent of land and cost of commuting. The low cost of commuting from peri-urban areas to the city center coupled with relatively low rent at the peripheries of cities in many developing countries are facilitating the growth of peri-urban areas. Nechyba and Walsh (2004), attributed urban sprawl to other factors such as the desire of urban dwellers to flee poor governance, lack of planning and poor

access to amenities. Urban sprawl is a direct result of systemic failures in urban development control policies, although its adherents argue that urban sprawl is a natural manifestation of growing cities and has the tendency of creating opportunities for people to enjoy lower land and housing prices (Glaeser and Kahn, 2004). In the face of all these arguments, it is important to note that urban sprawl as a phenomenon is at variance with controlled urban land management and physical development.

The concept 'sprawl' was developed by Earle Draper in 1937 in the United States of America (Black, 1996), and this term has been used by city planners to refer to a wasteful type of urban growth (Osborn, 1965). Urban sprawl is a pattern of uncontrolled development around the periphery of a city, and is an increasingly common feature of the built environment especially in the industrialized nations (Ewing *et al*, 2002). The phenomenon reduces the orderly physical development that produces economically efficient land use and management at the fringes of rapidly urbanizing cities. Urban sprawl is commonly described as the spreading of a city to its suburbs. It is the construction of residential and commercial buildings in the adjoining rural areas or otherwise undeveloped lands at the outskirts of a city (wiseGEEK, 2003). As cities expand, the main zone of direct impact is the peri-urban area. The manifestation and impact of urban sprawl are therefore felt most in peri-urban communities. At these peri-urban communities, development is patchy, scattered and spread out, with a tendency for discontinuity. Gilham and Maclean (2002), relate peri-urban development to urban sprawl as urban sprawl fundamentally refers to the emergence of low density residential development usually beyond a city's limit. This is supported by Nechyba and Walsh (2004), who described urban sprawl as a phenomenon characterized by low density leapfrog development, concentration of population and economic activities in peri-urban areas and segregation of land uses. From a conceptual perspective, a major relationship between peri-urban development and urban sprawl is the loss of the traditional livelihood in agriculture of peri-urban dwellers resulting from competition for peri-urban land due to the rapid expansion of the city. The resultant effect of the urban sprawl phenomenon is the engagement of peri-urban dwellers in less profitable economic activities such as petty trading, commercial and other related livelihoods.

Urban sprawl is viewed from different perspectives depending on the background of the expert. Thus, the concept appears controversial in many discussions. This confers upon the term a conceptual vagueness and a negative connotation as observed by Haase & Nuissl (2007). In order to cover the various contradictions and amalgamations, some scholars have attempted to give it a neutral and concise definition. For example, Galster *et al.* (2001), define sprawl as a pattern of land use in an urbanized area that exhibits low levels of some combination of eight distinct dimensions: density, continuity, concentration, clustering, centrality, nuclearity, mixed uses and proximity. Chin (2002), distinguished four types of definition. The first one refers to urban forms as opposed to the compact city (Song & Knaap, 2004). The second is explained in terms of density, or density gradients (Couch *et al.*, 2005), the third one analyses urban sprawl in terms of land use and land cover changes (Batty *et al.*, 1999), and the fourth definition approaches the concept from the negative impact views (Johnson, 2001). From these definitions, it is clear that there are some other dimensions of urban sprawl that need to be reconsidered most especially the negative impacts as they affect the environment and mankind. Agbola & Agunbiade (2007) highlighted these consequences in some areas in Lagos where consequent planning process was not anticipated. They concluded that urbanization and its attendant processes are parts of the modernization processes and suggested that its' socio-economic and other deleterious environmental consequences must be curtailed. This study toes the line of the Chin's (2002), third definition of urban sprawl, which analyses urban sprawl in terms of land use and land cover changes. What is different is that, this study goes on to discuss the urban sprawl's impact on food security.

2.1.2. Physical and Socio-economic Manifestations of Urban Sprawl

The conversion of agricultural lands to urban development is a phenomenon currently affecting countries as their population grows. Although urban sprawl may not threaten overall agricultural productivity of a country it does result in the alteration and decline in local agricultural activities and to the loss of agricultural land. Available evidence on sprawl demonstrates conclusively that urban sprawl has accompanied the growth of urban areas across the world including United States of America (USA) (Nechyba and Walsh, 2004), Europe (European Environment Agency, 2006), and India (Sudhira and Ramachandra, 2005).

The physical and socio-economic manifestations of urban sprawl across the above mentioned regions are explored in the following paragraphs. The causes of urban sprawl in some part of the US such as New York, are attributed to lower commuting cost, rising incomes, and government tax, expenditure and zoning policies as well as the willingness of households to take advantage of peer externalities, avoid traffic, noise, crime, and to have homes with enough space and greenery (Nechyba and Walsh, 2004). Urban sprawl in the US is characterized by peri-urban development. Residents of sprawling cities find it difficult to travel even short distances without using an automobile, due to the remoteness of residential areas and the inadequacy of available means of transport such as mass transit, walkways, or bike paths (Resnik, 2010).

According to Gordon-Larsen *et al.* (2006), the USA and Canada lose 4,800 sq km of prime cropland annually to roads, buildings, reservoirs and other nonagricultural uses. Lopez *et al.* (2001) has indicated that between 1977 and 1994, the urban area of Puerto Rico increased from 11.3 percent to 27.4 percent. They therefore concluded that if the pattern of encroachment by urban growth into farmlands continues, Puerto Rico's potential for production in the future will be dimmed. The negative effects of urban sprawl on American cities include health inequalities (Gordon-Larsen *et al.*, (2006), pollution and environmental degradation (Frumkin *et al.*, 2004). The smart growth model has been pursued in the US as an alternative to sprawl (Resnik, 2010), despite several criticisms that the smart growth model reduces property values, increases the cost of housing and disrupts existing communities (Waite, 2009). The smart growth model is a policy framework that promotes an urban development pattern characterized by high population density, walkable and bikeable neighbourhoods, preserved green spaces and mixed-use development.

Historical trends, since the mid-1950s, show that land area of European cities has expanded on average by 78 percent, whereas the population has grown by only 33 percent. A major consequence of this trend is that European cities have become much less compact. The dense enclosed quarters of the compact city have been replaced by free standing apartment blocks, semi-detached and detached houses (European Environment Agency (EEA) 2006). EEA (2006), further states that, areas with the most visible impacts of urban sprawl in European countries are regions with high population density and economic activity such as Belgium, the

Netherlands, Southern and Western Germany, Northern Italy, Ireland and the Paris region in France. In Europe, sprawl is particularly evident where regions have benefited from European Union (EU). The same report hinted that new development patterns can also be observed around smaller towns or in the countryside, along transportation corridors, and along many parts of the coast usually connected to river valleys. Hot spots of urban sprawl are also common along already highly populated coastal strips, such as in the case of Spain where artificial areas may cover up to 50 percent of the total land area. This is a concerning trend given the known vulnerability of coastal ecosystems, and because the Mediterranean region is classified as one of 34 biodiversity hotspots in the world. Moreover, local community life has been weakened, if not destroyed, by urban sprawl (Osborn, 1965).

Organization for Economic Cooperation and Development (OECD) (1979), has documented the loss of peripheral agricultural land to sprawl in some European countries such as Netherlands and Norway which respectively lost 4.3 percent and 1.6 percent of their land annually to sprawl. This according to Pernia (1983), is a reflection of a country's loss of comparative advantage in diversified farming practices as a country loses its fertile land to urban sprawl and heads up the economic ladder. The same trend was found in a study carried out by Yoveva *et al.* (2000), in the city of Sofia, where land use is shown to be in a state of transition. The peri urban villages to the south of Sofia (Dragalevixi, Simeonovo and Pancharevo) are no longer areas of agricultural production as the agricultural land has been turned into housing complexes. For example the cities of Darvenitza and Mladost were built on prior agricultural land Yoveva *et al.* (2000).

In examining urban sprawl in India, Sudhira and Ramachandra (2005), challenged the conceptualization of urban sprawl by Galster *et al.* (2001), and argue that ascribing sprawl as a pattern of land use alone does not emphasize the underlying processes, causes and hence consequences. In a developing country like India, where population densities are high with significant urbanization rates, urban sprawl cannot be characterized by land use pattern alone but processes, causes and their consequences (Sudhira and Ramachandra, 2005). Hence, (Sudhira and Ramachandra, 2005), altered the definition of urban sprawl as the pattern of outgrowth emergent during the process of urban spatial expansion over time caused by certain externalities and a consequence of inadequate regional planning and governance. They further

stated that, in India, urban sprawl is caused by lack of effective governance with operational systems and processes in local bodies of governance, which have resulted in unplanned and uncoordinated urban outgrowths.

On the other hand, Wade (1986), has attributed the fast rate in which agricultural lands in the peripheries of Taipa, South Korea, dwindle to sprawl. Thus, the reduction of agricultural land and biodiversity in the peripheries has been attributed to sprawl. This is because sprawl encroachment into peripheral agricultural lands results in the loss of fertile land. Farmers, therefore, need to enhance the fertility of the land by adding fertilizer, changing to new farm techniques or changing to more productive crops. This change in prior farming techniques will definitely change the constitution of biodiversity that has adapted to the former farm management. Similarly, Luoto, *et al.* (2003), linked agricultural production changes to landscape fragmentation and species diversity. Based on their study on 'the loss of plant species richness and habitat connectivity in grasslands associated with agricultural change in Finland', they argued that development in agricultural production drives land-use changes and thus controls the capacity of landscapes to maintain biodiversity.

The high rate of urbanization has become a worldwide phenomenon and Nigeria is not left out in the prevailing global demographic and spatial flux. It has been observed that urban settlements attract people as they offer better economic opportunities and provide access to basic social needs like water and sanitation, better health care and well-being (Oluwole, 2011). Oyinloye & Adesina (2011), in analyzing the situation in Ibadan city, observed that one human phenomenon that has been impacting severely on the environment is incessant expansion of towns and cities. This is reflected by the quality of life in urban centres as well as the spread of the urban features into rural areas. The authors revealed that the urban infrastructure such as roads, streets, electricity, water supply system and waste management system are depreciating and this has compounded the way the cities are sprawling far beyond the range for which the facilities were planned and projected. The expansion of the city of Ibadan has heavily eaten into the valuable farmlands. The government is obviously losing the battle against the colonization of farmlands by human and industrial set ups (Oyinloye & Adesina, 2011). From the above literature, it is therefore obvious that urban sprawl has negative impact on the agriculture and infrastructure of cities. In most cases, it translates to an

increase in the cost of transport, public infrastructure and residential and commercial development. In many places, urban sprawl encourages new developments that cause significant loss of prime farmland. When cities are improperly planned, urban sprawl also adds to environmental degradation (UN-HABITAT, 2010).

The Ile-Ife city in Osun state in Nigeria has also taking its share of the urban sprawling. The contemporary post-colonial growth of the city is expressed by more developments which have been translated into spatial forms through residential, institutional, commercial and religious land uses. Ikhuoria (1999), through a qualitative analysis, observed the fragmented aspect of the land use and the uncoordinated high density of the grabbing of land meant for farming. Ikhuoria (1999) therefore concluded that there is the need to emphasize the urgency of a framework for urban growth strategies and policies for the city of Ile-Ife.

Global assessment of sprawl reveals stark differences in terms of physical and socio-economic outcomes across the regions. In the US, the phenomenon is characterized by increasing growth in suburbanization resulting in long commuting distances and associated difficulties. Urban sprawl in Europe is however, concentrated in countries with high population growth and economic opportunities. In India, the sprawling of cities is caused by poor planning and management of urban areas. As stated by Tofowomo (2008), a general consensus is that urban sprawl is characterized by unplanned and uneven pattern of growth, driven by a multitude of processes and leading to inefficient resource utilization. UN-HABITAT (2010), remarked that in many developing countries, urban sprawl encompasses two major and contrasting types of development. The first type is characterized by large peri-urban areas with informal and illegal patterns of land use. In these peri-urban areas, there is a lack of infrastructural facilities and basic services, and there is little or no public transport while access roads are inadequate. The second type of development is a form of “suburban sprawl” in which residential zones for high- and middle-income groups and high-valued commercial and retail complexes are well connected by individual rather than public transport.

2.1.3. Determinants and Characteristics of Urban Sprawl

There are several factors which govern the growth rate of urban sprawl and are also responsible for the growth to continue in a particular direction. Some researchers have identified some factors to be the characteristics and driving forces of urban sprawl. These factors are discussed in the subsequent paragraphs. Urban areas are characterized by high rate of population growth as a result of migration and natural increase. The presence of infrastructural services and job opportunities in urban areas tend to attract people from different places especially the rural areas, thereby propelling the growth of the cities (Nechyba and Walsh, 2004). Without effective urban planning and management, rapid population growth in the cities results in increasing physical expansion in all directions at the fringes. According to (Nechyba and Walsh, 2004), urban sprawl causes segregation of land uses into different zones as a result of the self-sorting of the population, which Powell (2000), refers to as racial segregation. This situation creates heavy reliance on the trickle-down or filtering process to provide housing to low income households with limited consumer choices about where and how to live, segregated housing, stores and work place from one another as well as decreased social and civic interaction and support.

Efficient transportation systems are assumed to be the most important factor for the spreading of cities, which continue to grow with the passage of time. The unlimited outward extension of cities coupled with lower transport cost has made it possible to live increasingly farther away from city center, while enjoying all the advantages of a city location (Nechyba and Walsh, 2004). They continued however that, sprawling cities and suburbs are characterized by unproductive congestion on roads, high levels of automobile pollution, loss of open spaces, and unequal provision of public goods and services across sprawling cities' suburbs. Ramirez de la Cruz (2009) however attributes the weak centralized planning to the activities of the affected stakeholders. Ramirez de la Cruz (2009) again mentioned that, stakeholders affected by urban planning policies have different interests which are often conflicting and opposing on political and moral grounds.

Additionally, industrial development facilitates the growth of cities. With the establishment of an industry, population is attracted from various directions in search of economic

opportunities. Other activities such as services and commercial activities follow, and the area grows larger. Here transportation gives the direction but the impact of industrialization is strong which generates faster growth of the city, than transportation. As an area develops, commercial centers and services spring up to specialize in particular functions. Hence, commercial activity becomes another factor influencing the type and direction of growth of urban areas

2.2. The Importance of Urban Agriculture (UA) to Sustainable Food Security

Urban agriculture can be defined as the growing, processing, and distribution of food and non-food plant and tree crops and the raising of livestock, directly for the urban market, both within and on the fringe of an urban area (Mougeot, 2006). Simply put, it's a productive economic activity done mainly on open air situations in the urban realm. UA has been practiced throughout the world for thousands of years and is an integrated urban form in many places. It is practiced in many areas that city planning is concerned with: on city streets, in public gardens, parks and schools, at the edge of cities and in community gardens and offers many benefits to city life. UA, although often overlooked in policy development and by city planners, is vital to enhance the health and well-being of its citizens (Bentley, 2005). The potential of UA food production in cities is great and the benefits to cities are many. Dozens of municipalities are demonstrating that UA is a necessary and viable urban land use. UA and the food system more broadly, is an integral part of the physical, economic, social and spiritual well-being of places that planners care about (Balmer, 2005). The potential benefits of UA are enumerated below: It serves as a means to food security. Urban households involved in Environmental Protection Agency (EPA) are generally more food secure and benefit from a more diverse diet. According to Foeken (2008), in Nakuru, Morogoro and Mbeya (Tanzania) a household's own urban agricultural production was among the most important food source for many poor households, which though seen as self-subsistence, surpluses are sold to support family income. The second rationale for UA is its economic value and its capacity to generate local economic development. The main aim is to achieve a productive city, one in which produce from outside the city is substituted by locally-grown produce (Cabannes, 2006). Food production, processing and marketing also contributes to generating income and employment for many poor urban households. According to the World

Bank (2007), intensive peri-urban horticultural and livestock rearing are extremely fast-growing sectors that employ many workers and produce high value added products that yield reasonable incomes and returns. Income and employment are not only generated in production, but also in processing, marketing and agricultural input supply. Although the production levels and turnover of individual urban producers or vendors in many cases will be small, their high number in each city makes their overall contribution to the urban economy highly relevant.

Thirdly, UA in other cases is part of an integrated environmental policy, with its main benefit being the greening of the city, increasing citizens' access to nature, recreation and leisure and their awareness of their environment. Increasing access to a healthy environment or reducing the ecological footprint in both dimensions is of an environmentally healthy city (Cabannes, 2006). If well planned and integrated into urban and peripheral design, urban agriculture can help to improve the physical climate. The production of trees, shrubs, flowers, and ornamental plants and food crops can beautify the city and its immediate environment, cool its climate, curb erosion and absorb air pollution and odours. UA can also positively increase biodiversity through ecological, divers and associated production systems.

Moreover, building more resilient cities is a key issue for future urban development. City adaptation to climate change has become a growing concern. The World Meteorological Organization (2007) suggested more urban farming as a response to ongoing climate change and as a way to build more resilient cities.

2.3. Urban Sprawl and Peri-urban Agriculture

The rate of population growth is linked to the fast expansion of urban slum areas, with high levels of unemployment, food insecurity and malnutrition. Such rapid urban sprawling engendering the harsh reality of urban poverty requires adapted strategies to ensure adequate access to food for all in a context of escalating levels of urban food insecurity together with its adverse health and social consequences. This change is driven by such factors as economic demands, consumption patterns and lifestyles (Heilig, 2002). Heilig (2002), has said, since land is nowadays needed for uses besides agriculture and forestry in the urban centre, its value

has shifted from a consideration of its fertility and other favourable bio-physical characteristics to that of its functions. This has resulted in the acquisition of some of the most suitable agricultural lands for residential developments, particularly those near the centre. According to *Atu et al. (2013)*, in most part of the world, there is a consequent decline in the farmed areas and an increasingly limited access to the natural resources on which the livelihoods of the poorest depend. *Atu et al. (2013)* continued that, there is not only the reduction in the total area of land available for farming but most importantly, there is a drastic loss of soil fertility due to intensive use to support plant growth and for that matter agriculture. A large number of youths are also opting out of farming because of growing concern of insecurity in land ownership. The loss of agricultural land to urban sprawling has become possible because of the high rate of natural population increase and migration of people to a number of towns and cities. They made reference to Ghana where this phenomenon is more evident, especially Tamale and other major cities. The peri-urban farmer is the most affected in all of these cases since his source of livelihood is dependent on agriculture.

Agriculture which is the main source of livelihood of peri-urban dwellers is seriously being threatened by rapid sprawling because of the problem of scarcity of land for agricultural purposes that will arise. Thus, the allocation of agricultural land for residential development has resulted in a reduction in the quantity (size) of land. Farmers are therefore, often left with little or no land to cultivate and this renders them vulnerable. Agriculture in general and the food production for the urban population have been take place in the rural sector only since time immemorial. In reality this undertaking has failed in many countries due to missing infrastructure (delivery of seeds and fertilizers to rural areas and delivery of the harvested produce to urban centres) and lack of purchasing power of the urban poor. Although the interest in agriculture in urban centres is quite recent, it is practiced for a long time. The peri-urban interface of most urban areas which show characteristics of both rural and a few urban life is, in most cases the agricultural hub of the urbanites and turns to supply most of their food requirements (*Atu et al. 2013*). *Atu et al. (2013)* recommended that very good (fertile) agricultural land should be zoned as agricultural land use and build up directed to the least fertile lands. Expansion of cities as a result of rapid urbanization should therefore be channeled to the least fertile agricultural lands first before those that are very fertile. Again, they suggested that green belts must be incorporated in the planning scheme to check the

inordinate desire for expansion and hence financial gains to individuals. Effective planning including zoning which incorporates agricultural zones and the encouragement of high rise structures, rather than single storey ones would help conserve peri-urban lands and minimize landlessness.

2.4. Urban Sprawl and Food Security

Food security was first defined in the proceedings of the 1974 World Food Summit as “availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices” (UN 1975). In 1983, FAO expanded its concept to include a third prong: ensuring that all people at all times have both physical and economic access to the basic food that they need. In the World Bank’s (1996) report of Poverty and Hunger, this concept of food security has been further elaborated in terms of access of all people at all times to enough food for an active, healthy life (UNFAO, 2001). This definition is again refined in “The State of Food Insecurity 2001” by UNFAO (2001), as food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary food preferences for an active and healthy life. According to Nord *et al.* (2007), food security is conceptually defined as access by all people at all times to enough food for an active, healthy life. Food insecurity is a complex, multifaceted phenomenon that varies along a continuum of a successive stage as it becomes more severe. It is likely that the proportion of the global population not producing food will continue to grow, as the number of middle and upper income consumers whose dietary choices are more energy given and greenhouse gas emission-intensive (and often more land-intensive) and where such changes in demand also bring change in price.

According to Comprehensive Food Security & Vulnerability Analysis (CFSVA)-Ghana (2012), food security has four main dimensions. These are;

1. Availability of food: This is the extent to which sufficient quantity and quality of food is physically present in an area. This includes food found in markets, food produced on local farms or home gardens, and food provided as food aid or gifts.

2. Access to food: Even when food is available, some people may not always be able to access it. Food access is ensured when communities, households and all individuals have enough resources to obtain sufficient food for a nutritious diet through a combination of home production, stocks, purchase, barter, gifts, borrowing or food aid.
3. Utilization of food: The CFSVA explained utilization as individual's ability to obtain energy and nutrients from food in order to live a healthy life. Proper child care practices, a diet with sufficient energy and nutritional value, safe drinking water, adequate sanitation, knowledge of food storage and processing, general health and basic nutrition are essential to achieving adequate food utilization.
4. Stability: A fourth component of food security, referring to both availability and access is stability. For households to be food secured they need to have access to food at all times and should not be at risk of becoming food insecure as a consequence of shocks or cyclical events, such as seasonal food shortages. Even if a household has adequate food consumption at one point in time, the household can still be food insecure if continuous availability or access to food is limited.

From the CFSVA-Ghana (2012) report on food security above, to achieve food security, there should be availability of food through domestic production, commercial imports and creation of reserves and food aid. For food to be accessible is dependent on the following: appreciable household food production, sustainable financial resources to purchase food, stable food prices and markets and existence of formal/informal social safety nets. In terms of utilization of food, proper care and feeding practices should be adhered to. Also, food preparation, intra-household distribution of food and biological utilization of food consumed should be closely monitored. These highlight that food security is often an outcome of the livelihood strategies adopted by households. Livelihood strategies are the behavioural practices and choices adopted by households to make a living. These strategies are based upon the assets available to households, which include human, social, natural, physical and capital resources. A livelihood strategy is considered to be sustainable when it can cope with and recover from stresses and shocks, while maintaining its capabilities and assets both now and in the future, while not undermining the natural resource base. Common livelihoods option seen in the greater part of the Shai Osudoku District is crop production. It should be noted however that, any action plans and policies that compromise the integrity of the farmer's livelihood option result in food insecurity among the farmers and the community at large.

Rapid urban growth and growing urban poverty should raise concerns particularly about African urban food security, supply and distribution systems. The urban poor are particularly vulnerable to variations in food and fuel prices and in income since food (often over 60 percent) and fuel (often more than 10 percent) make up a large part of their household expenses. It is estimated that the rise in food prices between 2007 and 2008 increased the number of people living in extreme poverty in urban areas in East and South Asia, the Middle East and Sub-Saharan Africa (SSA) by at least 1.5 percent (Main, 1995).

Although prices of food and fuel have declined in the latter half of 2008 and early 2009, they still remain much higher than they were for much of this decade. Though the food security situation in SSA improved from 2009 to 2010, nearly half of the region's population remains food-insecure. By 2020, the number of food insecure people in the region is projected to exceed 500 million (USDA, 2010). The FAO (2008), points out that the urban poor are disproportionately affected by rising food prices. There are two main reasons offered for this. First of all, city dwellers are more likely to consume foods that are tradable commodities (wheat, rice, etc), and thus more exposed to market changes. Conversely, in rural areas, diets are often made up of traditional staples such as roots and tubers. Secondly, city residents have much less access to land and other inputs required to grow one's own food (FAO, 2008). This naturally increases their exposure to fluctuating prices and leaves them with few options to react to changing prices. As prices of food increases, subsistence farmers stick to only production of food for home consumption without any surplus for sale. The problem then compounds where the livelihood asset (land) for farming has been compromise by sprawling activities.

According to Edem (2011), urbanization brings major changes in demand for agricultural products both from increases in urban population and from changes in their diets and demands. This has brought and continues to bring major changes in how demands are met among the farmers, companies, corporations, local and national economies that benefit. It can also bring major challenges for urban food security. This includes more scope for urban and peri-urban agriculture. It is difficult to predict how this will change—for instance, if there is a sustained increase in the price of oil and natural gas, this might provide local agricultural producers with some advantages in meeting local demands as their production and transport to

market is less carbon intensive, or disadvantage local producers that were serving foreign markets. At the other end of the spectrum, there is a very large urban population in nations or sub-national regions lacking prosperous economies where demand for agricultural products is likely to change much less. There are many nations where most of the urban population still has no electricity (Legros *et al.*, 2009) and where the profits to be made in food retailing are too small to attract large corporations. Urban areas provide at the same time a clear potential for food security and an increased risk. Urban diets can be more varied and nutritious than rural ones for those who have the means to access diversified food. However, cities and towns are cash-intensive and residents often have to pay for goods and services (such as fuel, water and housing) that they do not have to pay for in rural areas. High costs for non-food essentials means that urban dwellers must stretch their incomes across a wider range of goods such as housing, energy, transportation, household items, education, health care and personal items, in addition to food.

2.5. Urban Land Use/Land Cover Changes

The Earth's surface, throughout its history and existence, has undergone changes and modifications at varying space and time scales. Some of the changes occur over short time spans and others over many years; some reversible and others irreversible (Lambin *et al.*, 2001). The pace, magnitude and spatial reach of direct and indirect alterations of the Earth's land surface by humans in recent decades, according to Lambin *et al.* (2001), are unprecedented. They also posit that land use and land cover change are the most important effectors and outcomes respectively, of human induced earth surface alteration. They again said when urban land use/land cover changes are aggregated globally, both changes are so insidious that they considerably affect key aspects of earth system functioning.

According to Fuller & Gaston (2009), the land use and land cover pattern of a region is largely considered to be an outcome of natural and socio-economic factors and their utilization by man in time and space. Changes in both phenomena directly impact biotic diversity worldwide (Sala *et al.*, 2000); contribute to local and regional climate change as well as to global climate warming (Chase *et al.*, 1999). The changes also are the primary source of soil degradation and, by altering ecosystem services, affect the ability of biological systems to

support human needs. Kasperson *et al.* (1995), remarked that such changes also determine, in part, the vulnerability of places and people to climatic, economic or socio-political perturbations.

According to the Intergovernmental Panel on Climate Change (IPCC) (2000), “despite improvements in land cover characterization made achievable by earth observing satellites, global and regional land covers and, in particular, land uses are poorly enumerated”. Urban landscapes are proportionally the fastest emerging land cover type resulting from the fact that 50 percent of the world’s population, for the first time in human history, now live in towns and cities (UN Habitat, 2009). Urban expansion has increased the exploitation of natural resources and has changed land use and land cover patterns. UN HABITAT (2009), has reported that nearly half of the world’s population and three quarters of all westerners live in cities. World population, according to DESA (2009), is expected to increase by 2.3 billion, passing from the 2009 estimate of 6.8 billion to 9.1 billion by 2050. DESA (2010), has also projected that the population living in urban areas will gain some 2.9 billion, passing the 2009 figure of 3.4 billion to 6.3 billion by 2050. The report continue to say that, urban areas of the world are expected to absorb all population growth projected over the next four decades, drawing in concurrently, some of the rural population (DESA, 2010). Overall, the world population is expected to be 69 percent urban in 2050. DESA (2010), concluded that as the population in the cities increase, people are compelled to move to the peripheries to flee from congestion and any problem associated with over population. This intern put unnecessary pressure on the peripheral areas, thereby distorting the layout and the land use/cover patterns. Urban expansion, especially for developing countries, not only places much pressure on existing urban structures such as housing and transportation but also has impacted negatively on the land that serves as an agricultural land which are fundamental determinant of land use/land cover changes (Small, 2004). Of late, there are substantial amounts of data about the Earth’s surface information which provides easy and effective monitoring and analysis of land use/land cover changes such as by the use of GIS and Remote Sensing. For instance, a multi-temporal set of Remote Sensing data could be used to study and classify an area. Digital image-processing software such as ENVI could be also used to process, analyze and integrate a spatial data.

2.6. Land Tenure and Land Forms

The concept of ‘tenure’ is a social construct that defines the relationships between individuals and groups of individuals by which rights and obligations are defined with respect to control and use of land. Land tenure is a derivative of the concept of natural resource tenure, which in essence refers to the terms and conditions under which natural resources are held and used (Moyo, 1995). The centrality of land in all dimensions of rural life in the context of Africa means that the analysis of land tenure issues should be broadened from its traditional links with issues such as land-use, agricultural production efficiency, access to credit, conflict management mechanisms, fragmentation of landholdings and so on, to include all aspects of power/ politics and social position (ECA, 2009).

In Ghana, two broad tenure arrangements exist: customary tenure and public land tenure. According to Sarpong (2006), about 80 percent of Ghana’s lands are held under customary land tenure systems. The Ghanaian Government guarantees customary tenure arrangements. Customary Land Secretariats have been established to administer land rights but only a few are operational. The Customary Land Secretariats created by Land Administration Project (LAP) have great impact in local land administration through their basic records keeping, awareness creation, recording of customary land rights and their protection and dispute resolution (Larbi, 2011). Land tenure forms that exist in Ghana as put forward by Sarpong (2006), are discussed below:

- i. **Allodial title:** Sarpong (2006), described this as where the highest interest in customary law is held or vested in stools or skins. This right is acquired either by being the first to cultivate the land or by succession from the first owning group. Stool/skin ownership means corporate ownership and not ownership under the personal fiat of an individual ruler. Allodial owners hold their interest under customary law and are not subject to any restrictions on their user rights or any obligations, except for those imposed by the laws of Ghana (Ollennu, 1962).

- ii. **Freehold (broken down into customary law freehold and common law freehold):**
Customary law freehold, or “usufructuary title”, is an interest held by subgroups and individuals in land acknowledged to be owned allodially by a larger community. Customary law freehold may be held on a corporate status by the sub-stool, lineage, and family or by individuals. It is perpetual and continues as long as the superior title of the stool is acknowledged (da Rocha and Lodoh, 1999).
On the other hand, common law freehold is an interest in land acquired through a freehold grant made by the allodial owner, either by sale or gift to another person out of his interest. This grant requires the parties to agree that their obligations and rights will be regulated by common law (da Rocha and Lodoh, 1999).
- iii. **Sharecropping:** This is commonly referred to as ‘Abunu’ (a half share) and ‘abusa’ (a third share). It is a sharecropping arrangement by which the tenant tills the land and, at harvest, gives a specified portion of the produce to the landlord. The recipient is obliged also to recognize the superior authority of the stool and to perform customary services due from the subject grantor to the stool/skin. Holders of the usufruct have also the right to relinquish their interest by sale, lease, mortgage or pledge, or to grant agricultural tenancies or shareholder agreements (Sarpong, 2006).
- iv. **Leaseholds:** This refers to rights granted to a person to occupy specified land for a specified term that are derived from the common law, not customary law. A lease may be granted either by the holder of the allodial title or a customary freeholder. The lessee may create a sublease or assign the unexpired term of the lease, subject to the consent of the lessor (da Rocha and Lodoh, 1999).

In Sarpong (2006)’s literature on land tenure forms, it was highlighted that the elaborate institutional and administrative machinery to govern land tenure and land administration established by the state has not been effective. There is lack of complementarity, networking and occasional conflicts among some of the institutions. Customary authorities may engage in land transactions without informing, let alone consulting, current land users or land commission. When this happens, those whose livelihood asset is land, especially crop farmers are the most vulnerable.

2.6.1. Land Tenure and Gender Relations

Women are recognized as playing a pivotal role in maintaining and strategically using land and natural resources. Thus, in any debate on land tenure and livelihoods, gender requires special treatment, and any set of strategies for sustainable food security must address women's access to productive resources. Economic Commission for Africa (ECA) (2009), stated that typically, gender relations are governed by the prevailing socio-political structures and religio-ideological value systems. According to ECA (2009), in Africa the predominance of patriarchal systems relegates women and children to minority positions, ensuring that women only have access to land and related natural resources through their spouse or male relatives. This division between primary (male) and secondary (female) access may have an impact on the way men and women manage natural resources in communal areas. One of the most serious obstacles to increasing the agricultural productivity and income of rural women is their insecurity of land tenure (ECA, 2009). ECA (2009), report further states that security of tenure is the key to having control over major decisions, such as what crop to grow, what techniques to use, what to consume and what to sell. Without this, women cannot access credit and membership of agricultural associations, particularly those responsible for processing and marketing.

Land reform and the forces of modernization have had a mixed effect on the status of women in Africa. Few agrarian reform or resettlement programmes have significant numbers of female beneficiaries or even pay attention to gender as a beneficiary category (ECA, 2009). Also in some cases, however, women have gained greater access to land through reform, generally where the participation of rural women is a well- defined state policy. Byers (2001), has hinted that in some countries, agrarian reforms have replaced the feudal system, where women traditionally held a subordinate role in family production. There are also many instances where women's organizations have fought to gain access to land, which they farm collectively (Byers, 2001).

The National Land Policy (NLP) (1999) has identified a number of difficulties relating to land tenure and administration, that is to say insecurity of tenure of certain groups. The interests and the impact of land administration and land tenure on women have not been mentioned,

rather, men are always projected as the heads and custodians of lands. However, the activities since LAP inception and preparation documents have been gender-conscious and attempt at correcting the policy document through the implementation documents and studies have been promoted (Runger, 2008).

The principal ways in which women acquire land is through their lineage, inheritance, marriage or by contractual arrangements. However, women have more limited rights to land and other natural resources than their male counterparts. Among the multiple causes are Ghana's inheritance systems, tenure arrangements and land-use patterns, all unfavourable to women (Sarpong, 2006). Women's land rights under customary law in rural areas, tend to be secondary rights, derived through their membership in households and lineages and secured primarily through marriage. These rights are not clearly defined or documented, tend to be subject to change, are of uncertain duration and are often subject to the maintenance of good relations between the parties involved (Runger, 2008). However, access to land by women, especially for agricultural use, is generally possible, (Bugri, 2008). Sarpong (2006), again remarked that, generally, women have little control and ownership over land though they are strongly represented in agriculture.

2.6.2. Land Tenure System verses Land accessibility by farmers

Ghana has an agrarian economy. The majority of farmers are small-scale food crop producers (CARE, 2005). National land and agricultural policies have not adequately addressed the needs of the poor small-scale farmer regarding access to and control over land resources. Access to land is explained as the ability to use the land resources in a community for grazing or growing of subsistence crops (CARE, 2005). Land tenure is about the institutional framework within which interests in land are granted, acquired, held, and utilized or left dormant in the process of land management and development. "It denotes the system of landholding, which has evolved from the peculiar political and economic circumstances, cultural norms, and religious practices of a people" (Kassanga & Kotey, 2001).

The land tenure systems in Ghana are complex and reflect the unique traditional political organizations, socio-cultural differences, and attributes of the various ethnic groups, clans, and families (Kwapong, 2009). Clans and families are the outcome of historical alliances in

wars, conquests, and assimilation of the conquered. Land tenure in Ghana is administered in a plural legal environment. According to Kwapong (2009), there are two main classes of land: private (customary) and public. The private sector holds 80% to 90% of all the undeveloped land in Ghana, with varying tenure and management systems. In most parts of the country, private lands are in communal ownership, held in trust for the community or group by a stool or skin as a symbol of traditional authority or by a family. Kwapong (2009), further stated that, depending on the culture or practices of the people, the seat of the chief or king is described as a stool or a skin. The chief or king who represents the stool or skin takes custody of the land and holds it in trust for the people of the land. Stool or skin lands are features of landownership among almost all the Akan traditional groups in southern Ghana and in most traditional groups in northern Ghana. Landholdings under stool or skin include individuals and families, communities represented by stools, skins, clans, and families; and *Tendamba* (i.e., the first settlers) or clans (Kassanga & Kotey 2001).

It was revealed in the literature of Lund (2000) that the existing system of tenure in Ghana points to several paths for access to land by the poor. Land may be acquired in a formal or informal agreement. It may also be acquired within collective or individualized contexts, which include: intra-family transfers, such as inheritance and allocation of plots to specific family members, access through community membership and informal land markets, access through land sales markets, and access through specific non-coercive policy interventions, such as land assisted land reform.

Kwapong (2009) posits that, in theory there are no landless people in Ghana, since in one way or another everyone has access to land. She continued that indigenous people have access to stool, skin, or family lands, while migrant farmers could also access land through the sharecropping or hiring system. Meanwhile emerging practical challenges are affecting access to land, most especially among the poor. Much as indigenous people or family members could access land through customary regulations, it may be possible that due to poverty, such people or the custodians may rather prefer to sell or hire out greater portions of the lands and use small portions for farming food crops (Kwapong, 2009). Landowners who sell their land out of poverty could also become sharecroppers for the buyers. This implies that the landowners may not have adequate capital resources to utilize their lands for commercial farming.

Kassanga and Kotey (2001) observed that customary systems are undergoing rapid change and evolution, especially in the south. Tenancy and sharecropping are becoming widespread. There is also a weakening of fundamental principles of customary land law and a breakdown of the trusteeship ethos, which have resulted in landlessness, homelessness, endemic poverty, and general insecurity for women and men in peri-urban neighborhoods. Kassanga and Kotey (2001), recommended that it may therefore be useful for policy purposes to assess and define access to land as effective access to land, that is, access that is subject to an individual's ability to develop the land and put it into productive use.

GLSS 4 (2000), results on land/plot ownership in Ghana indicate that individual ownership of land is not very encouraging in the country. The report revealed, there are only 16% of land/plot owners in urban areas, 27.3% in rural areas, and 23.2% at the national level. Individuals who may not have farmland at all and are poor may also not be able to acquire land, because they simply do not have the capital resources to do so. The report further disclosed that security of access and more production will take place when the market is allowed to freely allocate land resources because land would be bought by the most productive user; however, one can be sure that if not supported, the poor will be the losers in such a system. The risk exists that rich people might buy the land and use poor people on it as sharecroppers. Lands are being bought by the rich at the expense of the poor, threatening peri-urban agriculture, which provides a livelihood for the farmers and the urban poor. In many cases peripheral dwellers do not have experience or knowledge of land legislation to negotiate the sale. The purchasers therefore take advantage of the situation. In the case of outright purchase, even where the community or family is paid a "fair market price" they may lose the right to use the land forever (CARE, 2005). The poor may participate in land sales if they can have financial resources from the capital market or are supported by both governmental and non-governmental agencies to acquire the land.

Feder (2000) has argued that renting of land will be in the better interest of the poor than outright sale (to the rich). If rented, at least the youth or children will grow to inherit the property. Feder (2000) recommended that land policies need to ensure that poor people gain new livelihood opportunities and that their rights are protected. To emphasize, land policies need to be considered in the wider context of poor people's productivity and livelihood,

provision of services (health, education, advice, technologies), and access to markets (DFID, 2002).

2.6.3. Land Tenure ship, Land Accessibility and Livelihood Security at the Urban Peripheries

Although the agricultural activities and other livelihood options are affected by various factors (climatic conditions, markets, infrastructure, physical conditions), unequal access to land and insecure land tenure have the most profound effect on the livelihoods of smallholders in Africa (ECA, 2009). According to UN-HABITAT (2012), in most African countries, agriculture is a main economic activity, and access to land is a fundamental means whereby the poor can ensure household food supplies and generate income.

Land is of crucial importance to economies and societies, constituting the main livelihood basis for a large portion of the population. In this context, changes in land tenure systems bring about winners and losers. As land competition increases and as resource access relations become more monetarised, those with more access to financial resources (including local elites and urban middle classes) are able to gain control over valuable resources (UN-HABITAT (2012). The report goes on to say that in many parts of Africa, assertive customary chiefs are reinterpreting their guardianship powers as those of owners, and are allocating or even selling common lands for private gain. In this context, weaker rural and urban groups are being squeezed out, and are losing access to the resources on which they depend for their survival.

UN- HABITAT (2012), has further pointed out that it is well recognized that secure land and property rights for all are essential to reducing poverty because they underpin economic development and social inclusion. The report continued that secure land tenure and property rights enable people in urban and rural areas to invest in improved homes and livelihoods. Although many countries have completely restructured their legal and regulatory framework related to land and they have tried to harmonize modern statutory law with customary ones, millions of people around the world still have insecure land tenure and property rights. The report further stated that lack of access to land and the fear of eviction epitomize a pervasive

exclusion of poor people from mainstream social, economic and civic opportunities, especially women.

Tenure insecurity is very high both in rural and urban areas under common law and customary tenure. Customary land tenure insecurity is due to institutions and rules changing under the pressure of population growth, increasing food and bio-fuel demand, urbanization and commercialization of land transactions. Common law tenure insecurity is a result of the manner in which the state acquired private properties. Manifestations of tenure insecurity are land encroachments, multiple land sales, unapproved development schemes, undetermined boundaries of customary lands, compulsory land acquisition by the government without compensation, conflicting land uses (mining and other companies versus agriculture) and a weak administration to manage these conflicts (UN- HABITAT, 2012). The UN-HABITAT (2012), hinted that, in Ghana there were 66,000 land disputes before the courts in 2006. This underlines the gravity of current land insecurity. The consequences of this are dysfunctional land markets, insufficient investment in land due to high transaction costs and continuing widespread rural and urban poverty.

As part of the UN- HABITAT (2012)'s recommendation, it suggested that to address these problems, tools and strategies to increase poor people's access to secure land and housing tenure need to be devised. The Global Land Tool Network (GLTN) recognizes that security of tenure for the poor can best be improved by recognizing a range of types of land tenure such as communal ownership instead of individual ownership or titles.

2.7. Conceptual Framework

This presents the framework within which the study is organized. Figure 1 shows the Conceptual Framework of urban sprawl and agricultural land use and food security. The components in the framework are interconnected. There are drivers that propel urban sprawl. They include land planning institutions such as land survey department and land commission. Other driving force is the urban land market. It should be noted that population increase goes in tandem with demand for land for building, particularly in the urban centres. The land is fixed in supply. Therefore, the more people are demanding land for building purposes; all

other things being equal, its other uses must be forgone. In most peripheral areas in Accra such as SODA, the demand for land is higher than its price. That is to say, the demand now determines the price of land, especially in Dodowa and its surroundings. Those involved in the urban market are Real Estate Developers and the Individuals who acquire land for building homes, business projects and farming. These drivers propel urban sprawling.

The driving forces are facilitated by land policies and processes in Ghana. In Ghana, land use does not follow any prescribed lay down procedure. Land administrators at the national, regional and metropolitan/municipal/district assemblies have failed in the battle of demarcation towns and communities into residential, industrial, farming, reserves and other uses of which SODA is not an exception. The aftermath of this is the haphazard expansion of settlements as seen in figure 1. In Ghana, two broad tenure arrangements exist: customary tenure and public land tenure (Sarpong, 2006). According to Sarpong (2006), about 80 percent of Ghana's lands are held under customary land tenure systems. The Ghanaian government guarantees customary tenure arrangements. Customary land secretariats have been established to administer land rights but only a few are operational. The customary holdings consist of stool lands, clan/family lands and sometimes individual lands. This customary system does not allow coordination and effective land management, hence, urban sprawling. As put forward by Sarpong, (2006), it has reflection from the chat below that, institutional and administrative machinery (policy framework) to govern land tenure and land administration established by the state has not been effective. There is lack of complementarity, networking and occasional conflicts among some of the institutions. Customary authorities may engage in land transactions without informing, let alone consulting the state land administrators.

2.7.1. The Diagram of Conceptual Framework

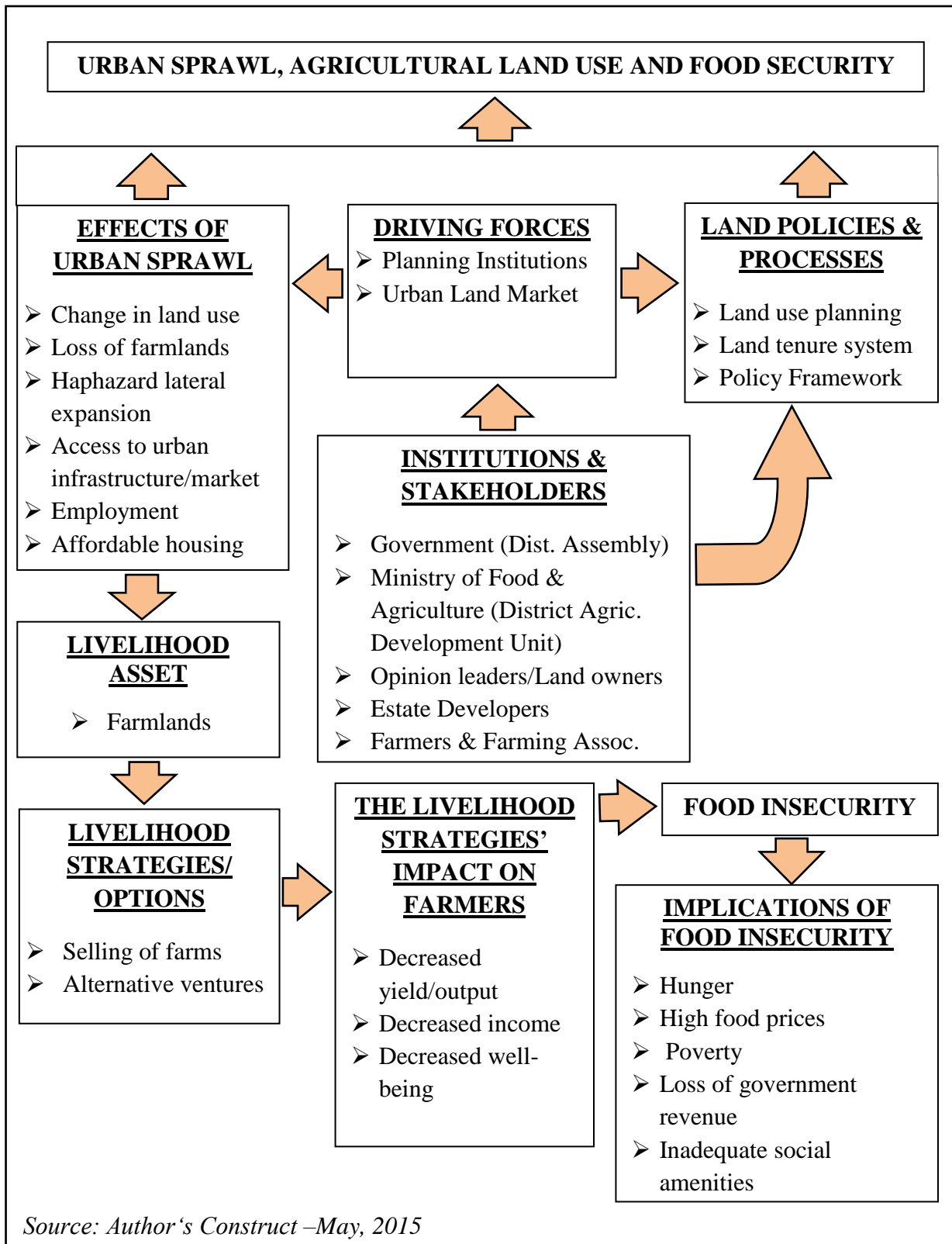


Fig. 1. Conceptual Framework on urban sprawl, agricultural land use and food security

From Figure 1 above, institutions and stakeholders influence the driving forces and land policies and processes. The effectiveness or otherwise of institutions and stakeholders (the government, DADU, opinion leader, etc.) to a large extent determine the extent of the operation of the constituents of the driving forces and land policies and processes. For instance, land use planning and policy framework rest in the hands of lands commission (government), likewise urban land market and tenure ship are being coordinated, controlled and determined by opinion leaders (including land owners), estate developers and farmers.

Again, urban sprawl per se is not always negative. That notwithstanding, its effects on the environment and the human populace are determined by the driving forces as seen in Figure 1. It could be seen that effective planning institutions and coordinated urban land marketing would lead to access to urban infrastructure and amenities such as good roads, market, electricity among others, employment and affordable housing. On the other hand, failure in the part of planning institutions and uncoordinated urban land marketing would result in change in land use, loss of farmlands and haphazard lateral expansion of towns and cities.

It should be noted that the livelihood asset of the farmers is the farmlands. Anything that negatively impacts on the livelihood asset affects the farmers entirely. When livelihood asset is suspected to be affected, then farmers adopt a new strategy of either selling their farms and relocate elsewhere or enter into alternative ventures such as trading, transport business, just to mention a few. With reference to Figure 1, the implications of the livelihood strategy on the farmers are decreased in yield/output of farmers that may lead to decreased in their income and decreased in a total well-being of farmers and the entire populace. The aftermath is the food insecurity in the immediate environment (Shai Osudoku District Assembly) and the nation as a whole. Finally, the effects of food insecurity are enormous. These include hunger, high food prices, poverty, loss of government revenue and inadequate provision of social amenities.

In sum, urban sprawl is driven by land planning institutions and urban land market. These driving forces have positive and negative effects on farmers. These negatively impact the livelihood asset (farmlands). When this happens, it leaves the farmers' option to either sell the farm and venture into another business or relocate to different location to continue the farming. This will lead to decrease in food production in the District, drop in farmers' income

and the standard of living. The aftermath result is food insecurity. The implication of food insecurity may be hunger, high food prices, poverty, among others. Above all, there are institutions and land policies that are directly or indirectly influence the urban sprawl, agricultural land use and food security in the study area as seen in figure 1.

2.7.2. The Theoretical Underpinning the Study

The study was based on Johann Heinrich Von Thünen Model of Agricultural Land Use. Early in the 19th century Johann Heinrich von Thünen (1783-1850) developed a model of land use that showed how market processes could determine how land in different locations would be used, (but it wasn't translated into English until 1966). Von Thünen was a skilled farmer who was knowledgeable in economics. The Von Thünen model is an excellent illustration of the balance between land cost and transportation cost. Von Thünen model also states that as one gets closer to a city, the price of land increases. Von Thünen developed his model of the spatial distribution of agriculture land more than 200 years ago from observations on the distribution of activities on farmland surrounding towns in southern Germany.

Von Thünen model showed that, with positive transportation costs and different net returns per hectare for agricultural output, the most likely outcome is a series of concentric rings, with bands of production within them. The model further states that commodities with higher unit returns and high unit transport costs will occupy the inner rings and commodities with low returns and low transport costs will be further out. The interesting aspect of von Thünen's analysis is the clean edge between land-uses. At some point, increasing transport costs overwhelm higher net returns per unit of land from one commodity over another and land switches to the next lower net return commodity, because its transport costs are low enough to just offset its lower selling price. The result is a sharp edge between rings. Production ceases at the extensive margin where transport costs fully exhaust the net return for the commodity produced in the final ring. The analysis shows that a change in either relative net returns per area or in transport costs will alter the transition zones, but in ways that preserve precise edges.

While von Thünen himself is silent on the issue, a similar process must determine the boundary between the city and the highest return from an agricultural commodity. At some distance from the place of work, the cost of a house, including the cost of travel to work, must increase to the level where it no longer makes sense to build houses. At this point agriculture begins, assuming that housing is a more valuable land-use than agriculture.

As von Thünen noted, if conditions change, the boundaries should also change. An increase in urban population or an increase in urban income that drives up demand for housing should lead to an outward movement of the urban land zone and a rippling effect through other agricultural zone boundaries. Conversely, an increase in the price of food or a decrease in transportation costs for various farm commodities has a more ambiguous effect. While there is some likelihood that the zones of agricultural production might shift, there is less likelihood that the boundary delimiting the urban fringe would move significantly.

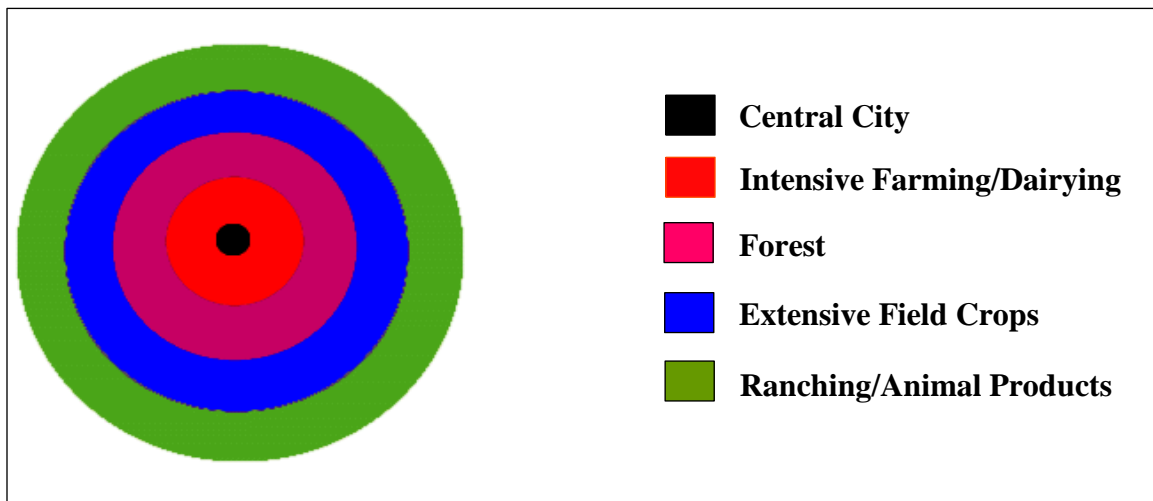


Fig.2. The Von Thünen Model of Agricultural Land Use

Von Thunen's model was created before industrialization and is based on the following limiting assumptions:

- i. The city is located centrally within an "Isolated State" which is self-sufficient and has no external influences.
- ii. The Isolated State is surrounded by an unoccupied wilderness.

- iii. The land of the State is completely flat and has no rivers or mountains to interrupt the terrain.
- iv. The soil quality and climate are consistent throughout the State.
- v. Farmers in the Isolated State transport their own goods to market via oxcart, across land, directly to the central city. Therefore, there are no roads.
- vi. Farmers act to maximize profits.

In an Isolated State with the foregoing statements being true, Von Thünen hypothesized that a pattern of rings around the city would develop. There are four rings of agricultural activity surrounding the city.

Dairying and intensive farming occur in the ring closest to the city. Since vegetables, fruit, milk and other dairy products must get to market quickly, they would be produced close to the city (remember, we didn't have refrigerated oxcarts!)

Timber and firewood would be produced for fuel and building materials in the second zone. Before industrialization (and coal power), wood was a very important fuel for heating and cooking. Wood is very heavy and difficult to transport so it is located as close to the city as possible.

The third zone consists of extensive fields crops such as grains for bread. Since grains last longer than dairy products and are much lighter than fuel, reducing transport costs, they can be located further from the city.

Ranching is located in the final ring surrounding the central city. Animals can be raised far from the city because they are self-transporting. Animals can walk to the central city for sale or for butchering.

Beyond the fourth ring lies the unoccupied wilderness, which is too great a distance from the central city for any type of agricultural product.

CHAPTER THREE

THE STUDY AREA AND THE METHODOLOGY

3.0. Introduction

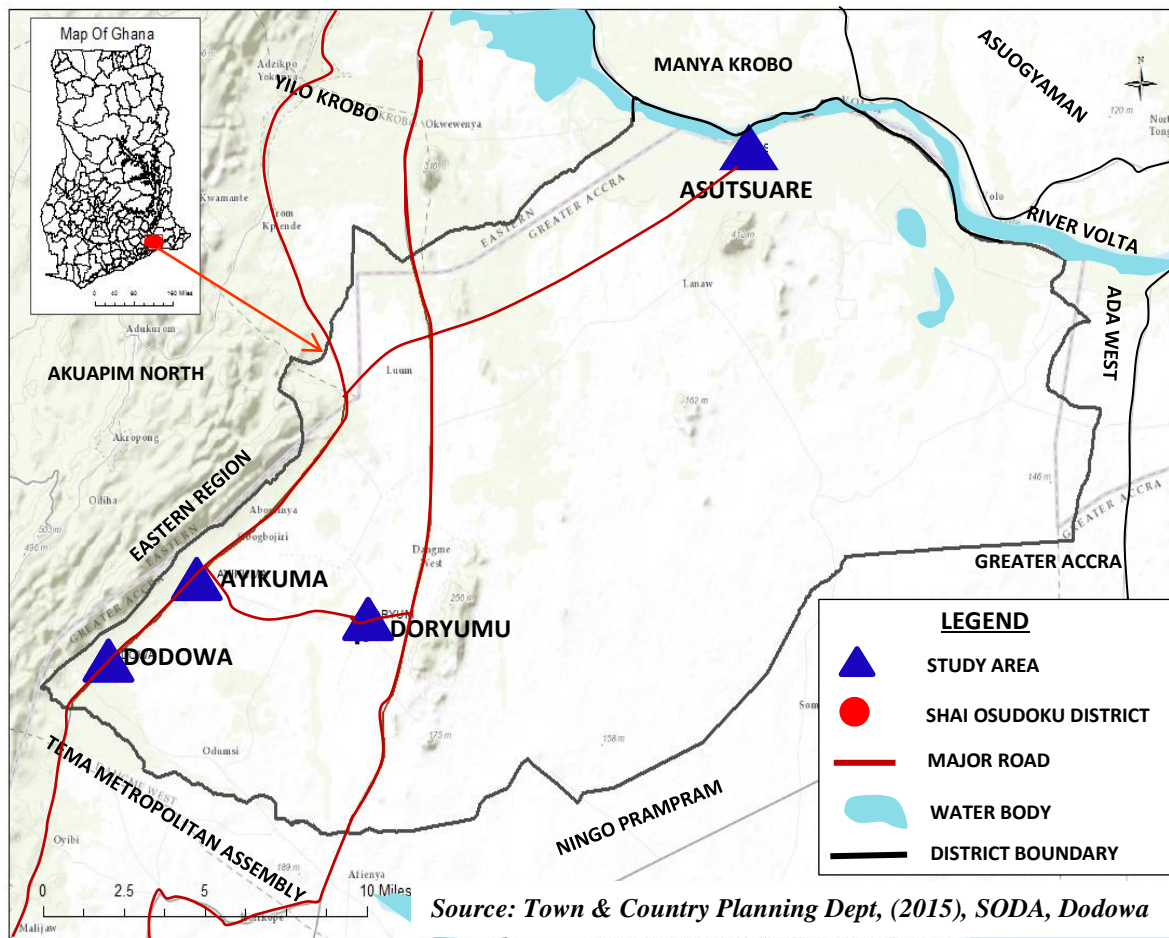
This chapter describes the nature and the characteristics of the study area. This includes the pictorial representation of the area. The methodology provides a detailed explanation about the process and stages employed in the study. Thus, the chapter details the design of the research, data requirements, data collection methods, sampling techniques and tools chosen for obtaining the information in the communities selected and presentation of the data. In addition, the chapter indicates specific stages for the research process as well as the detailed steps for the administration of questionnaires and interviews conducted during the field work.

3.1. The Study Area

The Shai Osudoku District Assembly (SODA), formally Dangme West District Assembly (DWDA) was created by a Legislative Instrument (LI 2137). The District was carved out of the former Dangme District in 1988 as a result of a national re-demarcation exercise carried out in relation to decentralization reforms in the country. The District was re-named 'Shai Osudoku' in June, 2012. SODA is one of six (6) Districts in the Greater Accra Region. The District now occupies a total land space of about 721 square kilometers, representing 21% of the total land area of the Greater Accra Region. It is situated in the Southern part of Ghana. Precisely, it lies between latitude 5° South and 6° North and Longitude 0° East and 1° West. The District forms part of sixteen (16) Metropolis, Municipalities and Districts in the Greater Accra Region. The Administrative Capital of the District is Dodowa. The District shares boundaries with Yilo Krobo District, Manya Krobo District and Asuogyaman to the North, to the East with Ada West, to the South with Ningo-Prampram District and to the West with Akwapim North Municipal and Tema Metropolitan Assembly. The District is predominately rural with few major towns (*dangmewest.ghanadistricts.gov.gh*). Fig. 2. is the regional map of Ghana showing the Shai Osudoku District and the study communities (Town and Country Planning Department, SODA-2015).

In the area of demography, the District has a population of 72,525 which consist of 34,473 representing 48.2% male and 37,473 representing 48.2% of females (Ghana Statistical Service, 2010). Though the District is predominantly rural, it has few urban populations of about 23.6 percent. SODA is the largest District in Greater Accra in terms of landmark. The District is spatial with about 145 settlements. The major settlements in the district included Asutsuare Agomeda, Kordiabe, Volivo, Ayikuma, Doryumu and Dodowa. About half of the economically active population in the District is engaged in agriculture (Ghana Statistical Service, 2010)

3.1.1. The Map of the Study Area



Map 1: The regional map of Ghana showing the Shai Osudoku District and the study communities

The vegetation type in SODA is made up of coastal scrub and grassland with semi-moist deciduous forest found along the foothills of the Akwapim Range. The soil type is mainly of the heavy Akuse series with sandy and sandy-loams in certain areas. Heavy fertile soils good for crop production, storing water for irrigation, aqua-culture and watering livestock is present in the District. About 45,600 hectares of the land is currently under cultivation with about 2,200 hectares under irrigation. The main agricultural activities undertaken are livestock production, crop production, fishing and fish processing and other agro-processing activities. Major crops that are produced in the District include maize, cassava, rice, sugarcane, banana, pineapple and vegetables. Tree crops grown are mainly mangoes with a few small-scale cashew plantations in the area. The suitable climatic condition favours the cultivation of wide range of crops. The rainfall pattern is bimodal. The mean annual rainfall is 762.5mm towards the coast and 1220 mm in the Northeast. The district has dual temperature. Temperatures (30-40°C) are high for most parts of the year with November-March being highest while July-August are the lowest (*dangmewest.ghanadistricts.gov.gh/*).

Agricultural activity is not highly practiced in Greater Accra due to its predominantly urban characteristics. Only 6.6 percent of households are agricultural households. In urban localities, only 4.4 percent of households are agricultural households compared with 31.4 percent in the rural Districts. The rural Districts such as Shai Osudoku and Dangme East have the highest proportions of agricultural households in the region, which is 49.8% and 37.3% respectively. Among rural communities, 59.3 percent of Shai Osudoku households are agricultural households, followed by 46.2 percent in Ga South and 46.0 percent in Dangme East (Ghana Statistical Service, 2010). Though in terms of ethnicity, the Dangme dominates, there are other ethnic groups such as the Ewes, Akans and people of Northern descent. One important unique feature of the District is its traditional setup exhibited in a form of festivals called Mmanyem. There are many tourist attractions such as the Tsenku Water Falls, the “Proverbial Dodowa Forest”, the Shai Hills Reserve that has a lot of wild animals in it, the Oyikum Ancestral Grove –Adumanya, the Osuwem Shrine & Osuyom (Ancestral Home) and other important landmarks (*dangmewest.ghanadistricts.gov.gh/*).

3.2. The Methodology

3.2.1. Data Source

Undoubtedly, in carrying out a research, data could be sourced from different places or angles depending on how relevant it is to the quality of information needed by the researcher. In this research, the researcher depended on both primary data and secondary data. Primary Data was highly used. Primary data source comprised questionnaires, observation and focus group discussion or in-depth interviews. Secondary data on the other hand, were solicited from SODA, District Agricultural Development Unit (DADU), other Government Publications, Organizations' Databases and Websites, Newspapers, Journals, especially those relevant articles and publications on urban sprawl that were considered relevant towards the achievement of the objectives of this research.

3.2.2. Research Strategy and Methods

In the collection of research data, various instruments were used. This research employed quantitative data instruments and qualitative as well. Structured questionnaires were used to collect the quantitative data. These questionnaires covered the respondents' background information, employment characteristics, major crops grown, income level, food security, land tenure issues and source of livelihood security to the farmers. To get the qualitative data, in-depth interview guides were structured for the institutions (Appendix 2) and other stake holders such as the Opinion Leaders, District Assembly, DADU of SODA, Farmers Associations, Forestry Commission and Estate Developers. Focus Group Discussions (FGD) were organized at Asutsuare and Dodowa. With FGD, 5 Executive Members of Mango Growers Association at Dodowa and 6 workers of Golden Exotic Ltd at Asutsuare had an open but deep discussion on the topic by which the researcher acted as a moderator to aid discussion by using probes to collect the desirable data.

3.2.3. Sampling Technique

The purposive sampling technique was used to select four (4) towns where urban sprawl was conspicuous. These towns included Dodowa, Asutsuare, Doryumu and Ayikuma. The same purposive sampling technique was used to select the respondents in the selected towns. The purposive sampling was considered most appropriate because the study want to find out from respondents who are in a certain occupational domain, that is, crop farmer and have spent at least 2 years in the study area. The purposive sampling technique was again employed in the selection of institutions and some opinion leaders in the selected towns within the District. The institutions and opinion leaders chosen were those who are either directly or indirectly associated with urban sprawl, agricultural land use and food security.

3.2.4. Sampling Size and Target Group

The total population of farmers in in the 4 communities selected was 6656 (DADU-SODA, 2013). The Yamane's (1967, in Coe 1996) formula was used to calculate the sample sizes for each community for the study.

$$N = \frac{N}{1+N(e)^2}$$

Where:

n = sample size

N = population size

e = the level of precision

Substituting into the formula, we have;

Dodowa:

N= 2330

e = 95% confidence level or 10% acceptable sampling error

n= 2330/ 1+2330 (0.10) (0.10)

= 95.884

≈ 96

Asutsuare:

N= 1664

e = 95% confidence level or 10% acceptable sampling error

 $n = 1664 / (1 + 1664) (0.10) (0.10)$

= 94

Doryumu:

N= 1331

e = 95% confidence level or 10% acceptable sampling error

 $n = 1331 / (1 + 1331) (0.10) (0.10)$

= 93

Note: Doryumu and Ayikuma have the same population of farmers, and therefore the same sample size was obtained.

From the above, 96 respondents would be the highest acceptable number of respondents that would be selected from Dodowa to maintain a 95% confidence level and 10% precision or error level in the community. In view of the above calculation, and for convenient sake, 70 questionnaires were administered in Dodowa instead of 96 obtained from the formula. The same was applied to get 50 at Asutsuare and 40 respondents each from Doryumu and Ayikuma using the interview method. In all a total of 200 respondents were selected from the four communities for the study.

Considering the topic assessing the impact of urban sprawl, agricultural land use and food security, only crop farmers were targeted to answer the household questionnaire for the research. In addition, 5 institutions and 2 stake holders were interviewed. The institutions that were interviewed included the Town and Country Planning Department of SODA, the District Agricultural Development Unit (DADU) of SODA, the Mango Growers' Associations- Dodowa, the Castle Gate Estate Ltd and Dream Land Estate, (Real Estate Developers located on the Dodowa-Afienyia road), District Forestry Commission and Opinion Leaders (including a Chief and an Assemblyman).

3.2.5. Data Analysis Technique

Data collected were analyzed using statistical tools and procedures. The data was entered into the Excel software. It was exported later into the SPSS software. Using the SPSS, the researcher was able to find out the percentages of the various variables the questionnaires lined up. These included income levels, farm sizes, land cover changes, the extent of urban sprawl, food security, quantity of food produced, the kind of crops affected by urban sprawl, rainfall pattern, land litigation among others. The SPSS was also used to generate charts and graphs to interpret the survey. The same was used to summarize the information collected which helped to ascertain the exact findings from the study area. In addition, a multi-temporal set of Remote Sensing data of the study area was used to study and classify Shai Osudoku District. This dataset included mainly Landsat images (1991, 2002 and 2013). Digital image-processing software ENVI 5.1 was used to process, analyze and integrate the spatial data. Geographic Information Software ArcGIS was used to produce the map output.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0. Introduction

The purpose of this chapter is to use data from the study area to test and investigate if the conceptual framework issues discussed in Chapter Two concerning the assessment of urban sprawl, agricultural land use and food security in Shai Osudoku District Assembly (SODA) are achievable. Again, the specific objectives of this study have been critically examined topically to see their extent of attainment, as well as the hypothesis testing.

4.1. Socio-Demographic Profile of Respondents

The purpose of the study demanded that data be generated both from crop farmers and institutions who are directly involved in urban sprawl, agricultural land use and food security. In all, a total of 200 respondents were interviewed in the household survey, with 59.5% representing males and 40.5% made up of females as shown in Table 2 in Appendix 1. The survey showed that, 35.5% of the respondents were co-habiting, 33% were married couples (both), 12.5% were found to be widowed and the rest were unmarried. A total of 53.5% had basic education, 22% had no education, only 1% had reached tertiary level and the rests level of education is below tertiary level. It is obvious from the study that majority of the respondents have low formal educational level or none at all. Concerning the tribe of the respondents, majority (63.5%) were found to be Ga-Adangmes, followed by Ewes (29.5%). This confirms that the indigenes (Ga-Adangmes) are predominantly farmers. Akans, Dagombas and Hausas on the other hand represented less than 5% of the respondents.

4.2. Period of Engagement in Farming by the respondents

The survey revealed that 84% of the respondents have stayed in the study area for more than 8 years. The rest of the respondents (16%) have lived in SODA between 2 and 7 years. At least, each farmer interviewed had stayed in the study area for 2 years. To be able to get credible result especially on land use/cover change, the attention was focused on those who have stayed in the District for more than 5 years. Even though those who have stayed in the study

area less than 5 years were interviewed, the aim was to get the present information about land use/cover change in the study area. When inquired about the respondents' number of years they have farmed in the SODA, 42% said they have farmed more than 10 years, 18% responded to have farmed between 8 and 10 years, 37% have been farming for between 2 and 7 years and those who have spent less than 1 year in farming were only 3% (Table 3 in Appendix 1).

4.3. Changes in Land Use/Land Cover for the Past Decades in SODA

A greater number of respondents (96.3%) confirmed that, they have experienced enviable change in the land cover for the past decade (Table 4 in Appendix 1). Many writers have a diverse view about population growth. Population growth has been found not to be the cause of environmental change in some developing countries of the tropics (Boserup, 1981). Other studies by (Allen and Barnes, 1985) have positively correlated population growth to deforestation while (Main, 1995) has attributed it to increased usage of land, particularly in developing countries. It could be concluded that "population growth, therefore, is still widely recognized as a key determinant of environmental change, especially in developing countries" Cheng, (1999). A sub-chief in Dodowa when interviewed disclosed that Dodowa and its environs used to be a typical forest in the early 60's. He said there was no separation, in terms of evergreen forest vegetation between the stretch of Akwapim Togo Range and Dodowa Forest as seen today. He continued that the traces of the forest are what we see today as the "Proverbial Dodowa Forest", which is the only evergreen forest in SODA presently. He attributed human activities due to population increase as the cause for the change of land cover in the area.

According to the Officer in Charge of Crop at DADU-Dodowa, vegetation type seen in the SODA presently is Savanna Transitional Forest type. The survey probed into the effects the change in land cover has brought in the area. With this, 79.6% of the respondent said the change in land cover has resulted in the loss of soil fertility while 16.7% attributed inadequate rainfall pattern in the area as a cause of change in land cover.

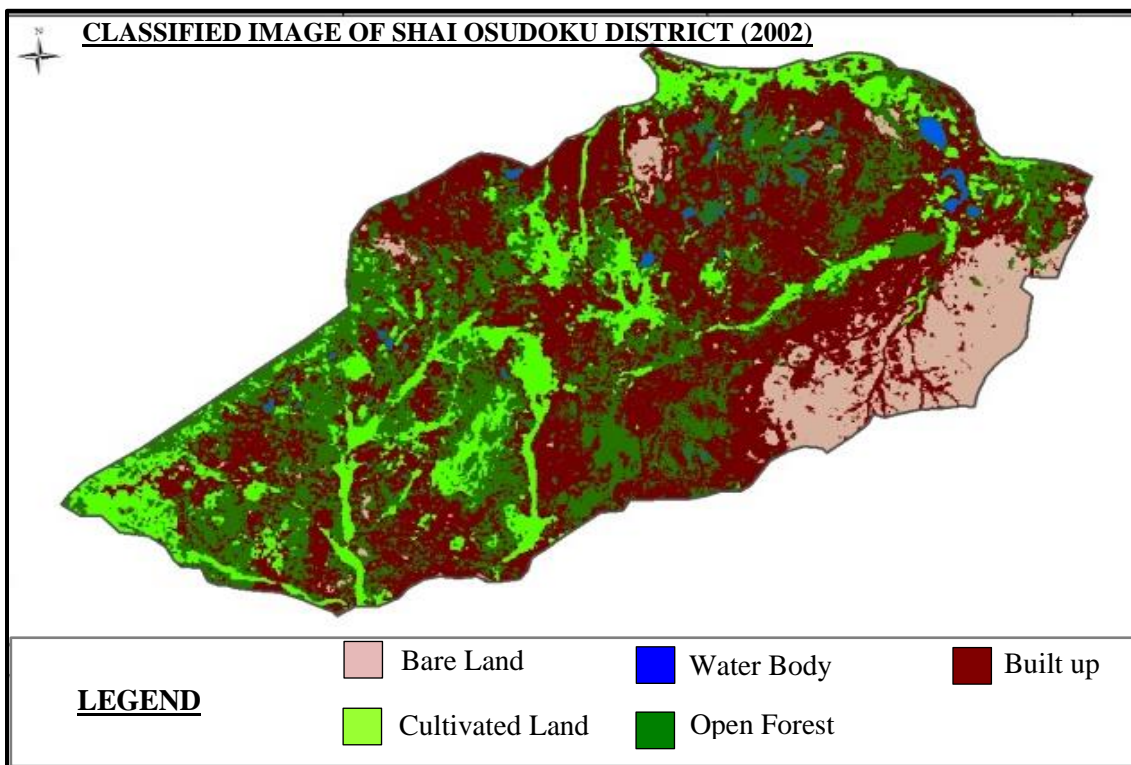
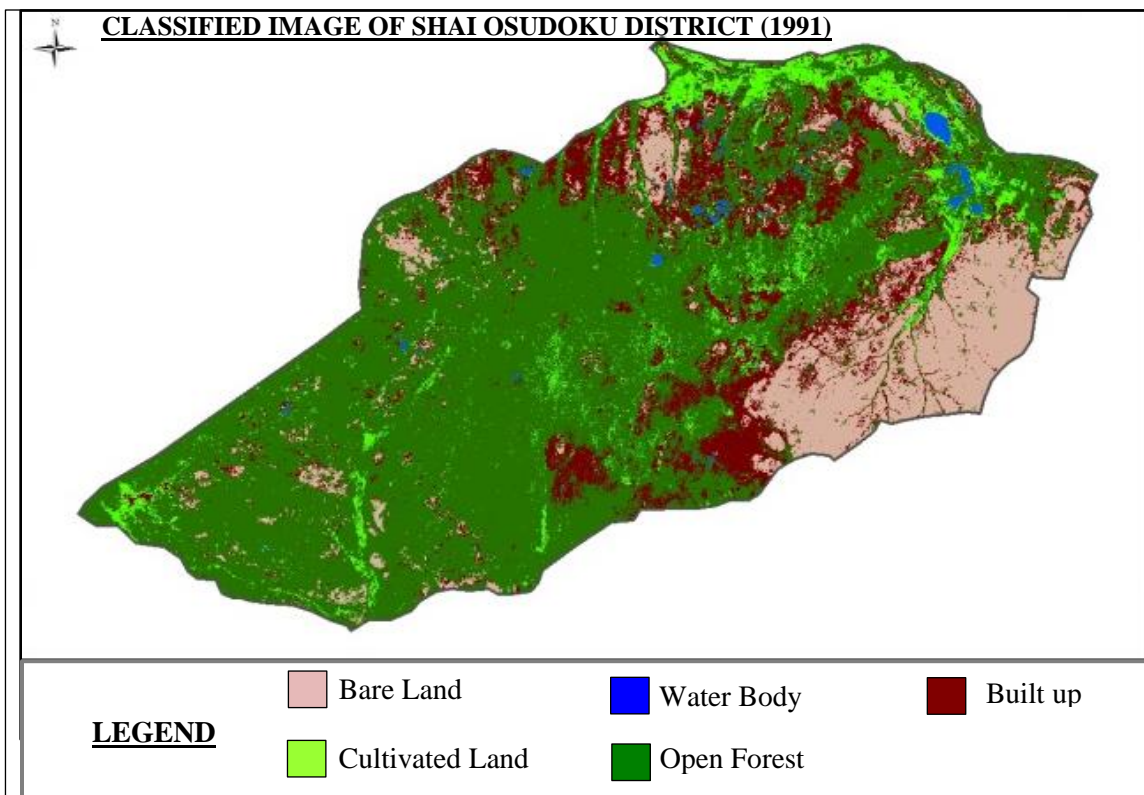
When respondents were asked to identify the perceived changes in land use, those who said farmlands are now built up areas were 64.4%. 15.1% said foodstuff farmers are shifting to tree

crops such as mango, orange and pawpaw. 12.3% responded by saying that farmers are diverting to non-farm businesses whilst 5.5% said few people are farming of late as compared to the past as in Table 4 in Appendix 1. It was discovered that the diversion from farming to non-farm businesses and the change in farmers' attitude towards farming were due to the fact that most of their farmlands were either being encroached upon or they have been given ejection notices. This confirms what (Jedwab, 2011), said that "there is a possibility of local small-holder farmers becoming urban poor people through the elimination of farming livelihoods". The Land use/land cover changes situation in SODA is not different from what was put forward by Lambin *et al.* (2001). According to Lambin *et al.* (2001), the pace, magnitude and spatial reach of direct and indirect alterations of the Earth's land surface by humans in recent decades, are unprecedented. Also, in comparing this study with that of Atu *et al.* (2013), some similarities were identified. In Calabar in Nigeria, between 2002 and 2012, there was an outgrowth of Greenfield residences on the urban periphery developed by the government, and the private sector for their workers or by property developers for rent or sale. Also, although all cities in Nigeria are experiencing sprawl, Calabar's case is quite exceptional because of the scale and type of development on some of the city's most agriculturally productive land. This is not different from the sprawling situation in SODA. Moreover, in analyzing the decadal change in the agricultural land use resulted from urban sprawling which is one of the objectives, not only questionnaires and interviews were employed, but also, a multi-temporal set of Remote Sensing data was used to study and classify Shai Osudoku District to see the extent of change in land use/change as shown in Figure 2 below.

4.4. Change Detection Statistics

A multi-temporal set of remote sensing data of the area of interest has been used to study and classify Shai Osudoku District. This dataset included mainly Landsat (Enhanced Thematic Mapper-ETM) images of (1991, 2002 and 2013). Digital image-processing software ENVI 5.1 in addition to geographic information software ArcGIS has been used to process, analyze and produce a map output. The satellite images used were in the "WGS 1984" coordinate system. Applying supervised classification specifically maximum likelihood classification method, five classes were defined; **open forest, cultivated land, water body, built up and bare land.**

4.4. 1. The Classified Images of Shai Osudoku District (SODA)



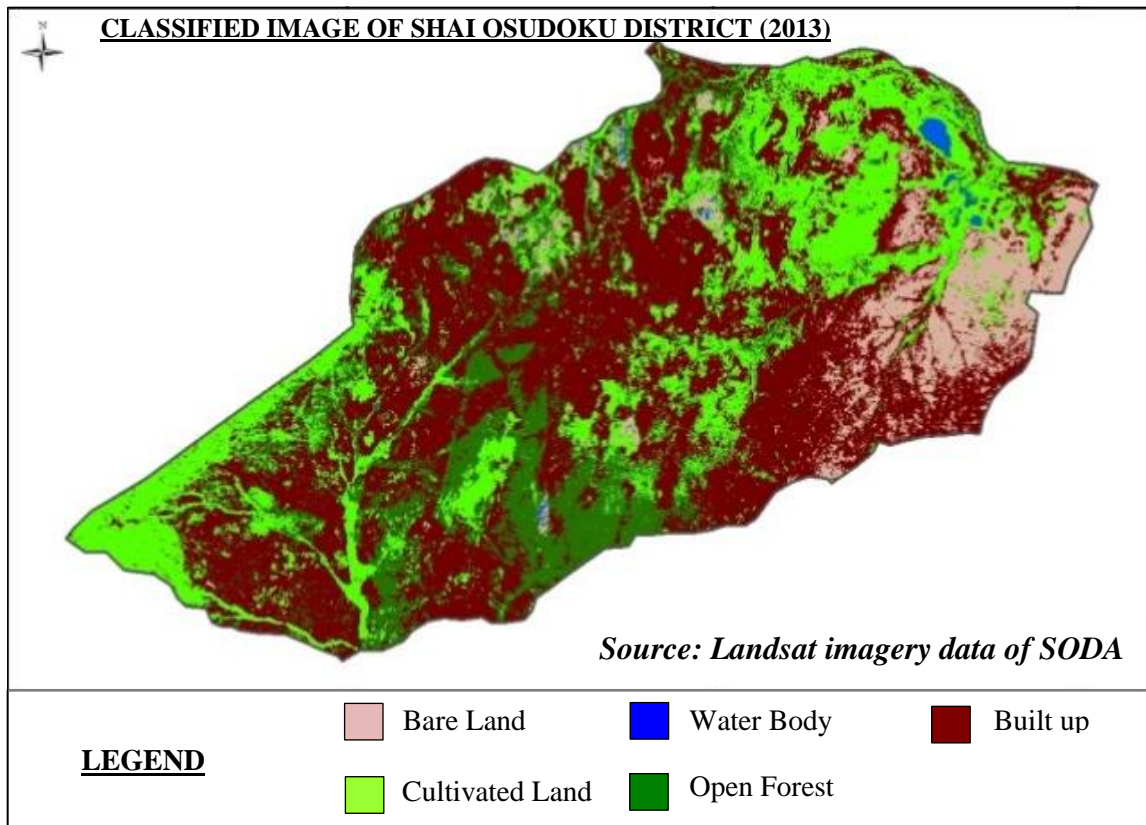


Fig. 3. Historical land-cover pattern of the Shai Osudoku District from 1991 to 2013 based on Landsat imagery

Results from the 1991 to 2002 analysis (Table 5) indicated that the study area has undergone a significant amount of change with open forest land cover reducing steadily over the years while cultivated land on the other hand increased mainly attributed to more engagement in mechanized farming, especially in the northern part of the District. It was revealed that between 1991 and 2002, open forest lost a total of 28704 hectare of land cover to other features. Out of this figure, 9889.2 hectare of forest was converted into cultivated land with 13777.92 hectare (48% of forest land cover change) also changing into built up. The remaining was changed into mainly bare land. Bare ground also lost a significant 5059 hectares of land after 11 years. Built up cover gained massively from bare ground with 1770.65 hectares of bare ground converted into built up. This means 35.5% of bare ground now is built up after 11 years. Bare ground further lost 34.11 hectares to cultivated land.

Built up had the highest increase rate after 11 years growing by 26460 hectares, almost triple. What have suffered from increase in built up was mainly open forest (77.5%) and in some few cases bare land and cultivated land. Cultivated land also gained significantly about 7260

hectare of land cover between 1991 and 2002. Open forest land cover type was changed into cultivated land amounting to 2809.62 hectares (38.7%).

The second change detection analysis occurring between 2002 and 2013 was quite similar to the former one. Open forest continued its steady fall, decreasing by 12367 hectares (47.1%). The main gainer from this decrease was built up 5701.2 hectares (46.1%) and cultivated land 1140.2 hectares (19.9%). Also, built up further increased by 3171 hectares between 2002 and 2013. This change was accounted for by a decrease in open forest of 1826.5 hectares. One notable observation was that increased in built up was mostly associated with some level of increase in cultivated land. This may probably be due to the fact that the new settlers are interested in farming. Cultivated land over the years gained significant increase with majority of the change converted from open forest cover as well as expansion of cultivated lands around built up areas. In all, cultivated land gained 10121 hectares. Making up this gain also, 111.3 hectares of cultivated land was converted to bare land. Water bodies in the study area between 2002 and 2013 decreased by 331 hectares. Out of this, 86.1 hectares was lost to cultivated land while losing a further 8.3 hectares to bare land. Factors the study identified as the cause of these changes, to a large extent included reduction in rainfall patterns, deforestation, increase in build ups, among others. Based on Landsat satellite imagery from 1991 to 2013, the build ups has expanded by about 30.3% over the period.

Land Cover type	1991	2002	2013
Open forest	54954	26250	13883
Cultivated land	5230	12490	22611
Water body	698	719	388
Built up	13238	39698	42869
Bare land	12784	7725	7126
Total	86904	86882	86877

Table 5. Decadal Changes in Area Coverage in Hectares from 1991 to 2013

4.5. Causes of Urban Sprawling in Shai Osudoku District Assembly (SODA)

The survey again investigated the causes of urban sprawling in SODA. It was revealed that the major cause of urban sprawl is migration, which constitutes 94.9% as shown in Table 6 in the Appendix 1. Many people are with the notion that urban life especially, has answers to all human problems and that people's desire to relocate to urban centres is high. This notion would be sustained in as much as conditions in the rural areas continue to deteriorate. In most cases, persons who troop into the cities from the rural areas, find it difficult to settle in Central Business District or in the core of cities and the developed residential areas due to high rental charges and other living conditions. When this happens, they turn to locate at the fringes where probably accommodation and building plots are comparatively cheaper. 64.5% of the respondents attributed the cause of urban sprawl in the SODA to high price of land in the city of Accra. It was observed during the survey that a plot of land in some parts of AMA like Nungua, Cantonments, East Legon, Madina, La among others currently is quoted between GHC30, 000.00 and GHC300, 000.00. The high cost of land in AMA also comes from the fact that land for building is almost finished. Due to this exorbitant price of land within most part of the AMA, people have moved to peripheral areas such as Dodowa, Oyibi, Oyarifa, Amansaman, Kasoa, just to mention a few where a plot of land ranges between GHC4, 000.00 and GHC15, 000.00.

According to Town and Country Planning Officer for SODA, the District is one of the highest in terms of land acquisition by individuals and groups for projects. He continued that this probably, is due to the fact that Dodowa, (the District's capital) is noted as the future National Capital of Ghana, in addition to the seat of Greater Accra Regional House of Chiefs already in existence. Another reason he gave was that, the District has been earmarked for the proposed construction of an International Airport as contained in Ministry of Local Government and Rural Development's Report in 2001. Comparing these, vis-avis the Ile-Ife city in Osun state in Nigeria, it has also taking its share of the urban sprawling. The contemporary post-colonial growth of the city is expressed by more developments which have been translated into spatial forms through residential, institutional, commercial and religious land uses. Different from what is causing urban sprawling in SODA, land grabbing was identified as the cause of urban sprawling in the Ile-Ife city in Osun state in Nigeria. Ikhuoria (1999), through a qualitative analysis, observed the fragmented aspect of the land use and the uncoordinated high density of

the grabbing of land meant for farming. Troubled with the future loss of farmlands in Ile-Ife, Ikhuoria (1999), therefore recommended the need to emphasize the urgency of a framework for urban growth strategies and policies for the city of Ile-Ife.

Proliferation of Estate Developers has also accounted for rapid urban sprawling in the SODA according to the survey. Acquiring estate through an Estate Agent is seen as the fastest means of owning a house in Ghana. With a minimum deposit with an Estate Agent and upon initial agreement, one could own a house by paying the rest of the money in an installment bases for a certain number of years. It was observed that people's patronage in the Estate houses were quite high. This is because property acquired through Estate Agent is more secured as compared to those acquired from individuals of families. The Shai Osudoku District has now become the target for sporadic Estate development. Identifiable Real Estate Developers in the District include Castle Gate Estate, Noble Dreams, Heaven's Gate, Paradisco Estate, Mcuttley Estate, and Dream Reality. Moreover, the Shai Osudoku District's closeness to the Capital City of Ghana, Accra was seen as the reason for sporadic spreading of settlement in the District. People who want to enjoy their privacy move to the peripheries to avoid excessive noise and congestion in the major city centres.

4.6. Testing Of Hypotheses

Table 7 shows a comparative analysis of how urban sprawl has negatively affected farmlands or otherwise. These attitude tests were analyzed statistically to determine whether urban sprawl has negatively affected farmland or not as far as variables such as education, farm location, means of land acquisition, stakeholders providing livelihood security and length of stay are concerned. The statistical test used was chi-square.

The Null Hypotheses (Ho) tested was that urban sprawl has not negatively affected farmlands based on the variables such as education, farm location, means of land acquisition, stakeholders providing livelihood security and length of stay of the respondents.

Alternative Hypotheses (Ha) tested was that urban sprawl has negatively affected farmlands based on the variables such as education, farm location, means of land acquisition, stakeholders providing livelihood security and length of stay of the respondents.

From the Table 7, farmers' education, length of stay in the community, the farm location, means by which the land was acquired and the stakeholders providing the livelihood security was not statistically significantly associated with the effect of urban sprawling on farmlands.

The binary logistic model indicate that, people with higher education are more likely to have their farmland negatively affected by urban sprawl than those with lower education (OR=3.97, CI=1.07, 14.7).

With regards to farm location, persons who have their farm lands being located within settlement are 2 times more likely to be affected by the sprawling than those on government land. However, those whose farmlands are located outside settlement are 43% less likely to be affected by the sprawling than those located on government land.

4.6.1. A Binary Logistic Regression

	P-value	OR	95% CI
Education			
None (reference)	1		
Basic	0.27	1.50	0.73 - 3.08
MSLC	0.86	1.11	0.36 - 3.48
SSS	0.72	2.91	0.91 - 9.34
Higher	0.39	3.97	1.07 - 14.70
Farm location			
On government land (reference)	1		
Within settlement	0.55	1.860	0.24 - 13.91
Outside settlement	0.59	0.57	0.78 - 4.23
Means of land acquisition			
Through lease/rent (reference)	1		
Gift	0.35	0.59	0.19 - 1.79
Through outright purchase	0.39	2.70	0.29 - 25.27
Through inheritance	0.14	0.43	0.22 - 0.84
abunu/abusa (work and share)	0.28	0.40	0.18 - 0.91
Stakeholders providing livelihood security			
Nobody (reference)	1		
Shai Osudoku Assembly	0.37	1.57	0.58 - 4.21
Traditional Council	0.95	1.03	0.49 - 2.34
the landlords	0.79	1.11	0.50 - 2.46
Length of stay			
Less than 5 years (reference)	1		
6-7 years	0.47	1.69	0.41- 6.88
8-10 years	0.287	2.00	0.56 - 7.16
over 10 years	0.59	1.35	0.46 - 4.01

Table 7. A binary logistic regression showing Odds of factors leading to urban sprawling negatively affecting farmlands

Again, with regards to the means of acquiring land, urban sprawling is more likely to affect people who acquired their farmland through lease or rent than those who had it outright purchase through (OR=2.7, CI= 0.29, 25.27).

In contrast, those who acquired the farm land as a gift from landlord (s) or chief (s), through inheritance, and 'abunu/abusa' (work and share) have lesser chances to be affected by the sprawling.

Moreover, in connection with stakeholders that are providing livelihood security for the farmers (Table 7), farmers whose farm lands are being protected by the Shai Osudoku assembly are 1.6 times more likely to be affected than those without any livelihood security.

Similarly, farmers who have stayed for a period between 8 and 10 years are twice more likely to witness the effect of urban sprawl on their farmlands as compared to those who have stayed for less than 5 years in the community.

Therefore in all these cases, since the computed $p > 0.05$, H_a is accepted and the H_o is rejected. This means that urban sprawl has negatively affected farmlands based on the variables such as education, farm location, means of land acquisition, stakeholders providing livelihood security and length of stay of the respondents.

4.7. Types, Acres and Quantities of Crops Produced in SODA

It was discovered that more than 53% of the respondents cultivate cereals, root tubers and vegetables as shown in the Table 8. These crops constitute about 95% of foodstuff found in most of the markets within the District and beyond. This demonstrates the immense contribution of SODA in food supply. Though tree crops recorded a lower percentage figure (31.70%), yet more than 50% of the total produce is exported outside Ghana. This was disclosed by the president of the Mango Growers Association in SODA.

The survey further showed that 48% of the farmers interviewed cultivate up to 2 acres of land per season. Those who have more than 3 acres of farmlands constitute more than 50% of the respondents. It therefore suggests that majority of the respondents are commercial farmers. Information gathered from the Operation Manager of the Golden Exotic Limited at Asutsuare indicated that, the company is operating on 1,055 hectares of farmland as at the end of 2014. This makes the Golden Exotic Limited the single largest commercial banana farm in Ghana with a workforce of 2,464.

	Frequency	Percentage
Crops Cultivated		
Vegetables	107	53.80%
Root tubers	149	74.90%
Tree crops	63	31.70%
Cereals	171	85.90%
Other	4	2.00%
<i>*Multiple responses</i>		
Acres of Cultivation		
Less than 1 acre	13	6.50%
1-2 acres	83	41.50%
3-5 acres	42	21.00%
6-8 acres	29	14.50%
9-10 acres	10	5.00%
11 acres and above	23	11.50%
Yield per Acre for a Season		
Less than 1 ton	98	49.00%
1-2 ton	59	29.50%
3-5 tons	40	20.00%
6-8 tons	1	0.50%
11 tons and above	2	1.00%

Table 8. Percentage Distribution of Types, Acres and Quantities of Crops Produced in SODA

On the yield per farm size for a season, almost 50% reaps less than 1 ton of produce. This is due to the change in the vegetation cover in the last decade. The same figure was realized for those whose farm produce yield between 1 and 5 tons as indicated in the Table 8. Only 1.5% of the respondents harvest more than 6 tons of produce per farm for a season. Here too, Golden Exotic Limited was identified as the highest with a total of 51,000 tons annually.

4.7.1. Crops Greatly Affected by Urban Sprawl in the Study Area

The survey sought to investigate crops that are greatly affected by urban sprawl in the study area as stated in objective 2. As indicated in the (Figure 4), crops greatly affected by urban sprawl are cereals, root tubers and vegetables. These are also the dominant crops cultivated in SODA. It revealed that, root tubers lead with 66.2%, followed by cereals (62.2%) and then vegetables (49.6%) as shown in (Figure 4). According to the survey, the major reason why

these crops have been greatly affected by urban sprawl for this was that, these crops: vegetables (tomato, okra, and pepper), cereals (maize, millet and rice) and root tubers (yam, cassava, potato and cocoyam) are usually cultivated not too far from human settlements in the SODA. There were large scale farms found in the study areas. They included Banana farm at Asutsuare, Mango Plantations at Dodowa, Ayikuma and Doryumu, Sugar Cane Plantations at Asutsuare and Doryumu, Rice farms at Asutsuare, Cassava Farmers in all the selected communities, among others.

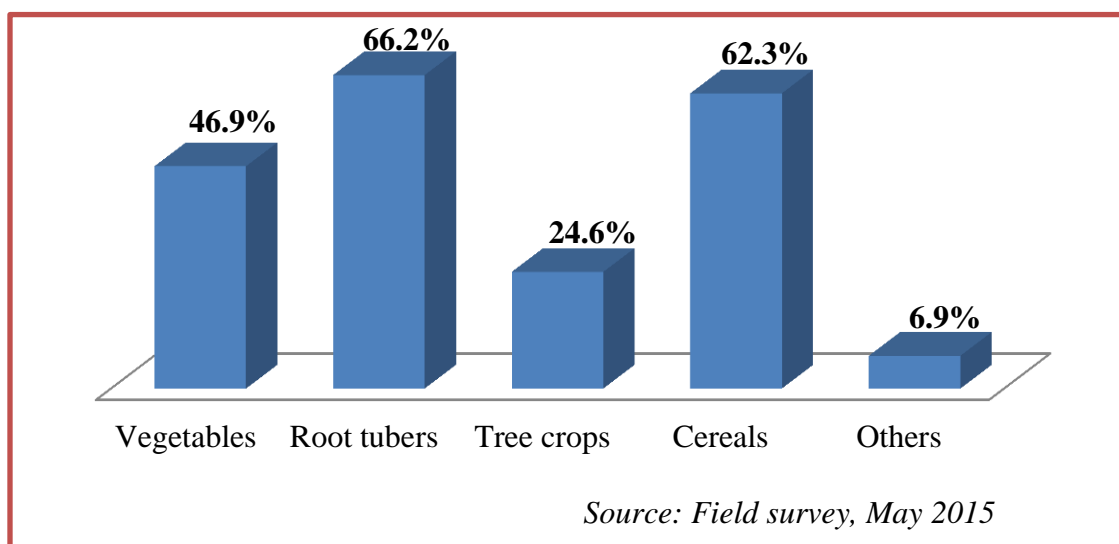


Fig. 4. Crops Greatly Affected by Urban Sprawl

Another reason was that land value has increased more than thousand folds over just 10 years. An acre of land that is rented for farming at Ayikuma in the year 2003 at GHC30.00 per year is now going for between GHC 200.00 and GHC300.00 per year. This had had serious consequences as the vulnerable in the society are unable to cope with these rapid increases in land values and hence are always outwitted. Since land is expensive, food production has reduced because the cost of production has increased. This calls for interventions as they would always continue to be sidelined in the bid for land.

It was observed from the field survey that land in the Central Business District attracts higher values than those at the peripheries. As a result of this, large tracks of land are being purchased at the peri urban areas by residential developers as well as other speculators. This has a potential of further worsening the plight of crop farmers as more would be affected. The

survey further revealed that, the aforementioned crops dominate in the markets within the study area. This therefore suggests that when urban sprawl perpetuates, it will reduce food production and eventually lead to food insecurity. On the contrary to the studies conducted by Peprah (2012), urban expansion in Wa has rather encouraged the extensive livestock rearing at the periphery communities. The expansion has made peripheral livestock farmers closer to human settlements, thereby improving their security. The animal rearing practice follows an extensive culture where the animals roam about in the community looking for pasture.

4.8. Rainfall Pattern in the Area

When respondents were asked to classify rainfall pattern in the study area, 15% said the annual rainfall is below average while 20% see rainfall pattern as above average (Figure 5). Those who see rainfall pattern as neither high nor low, that is average constituted the greatest proportion of 65%. It could be inferred from Figure 5 that, though the rainfall pattern in the SODA has reduced in the past decade to some extent, it is not too bad as far as farming is concerned. The reduction of rainfall in the past decade has implicated the land use and land cover change in the study area. This is because crops and vegetation growth largely depend on rainfall. This corresponds with the data from Ghana Meteorological Agency (Aburi Station) which indicates that the mean annual rainfall is 762.5mm towards the coast and 1220 mm to the northeast of the District. The rainfall pattern is bimodal. The pie chart below shows the rainfall pattern as classified by the respondents.

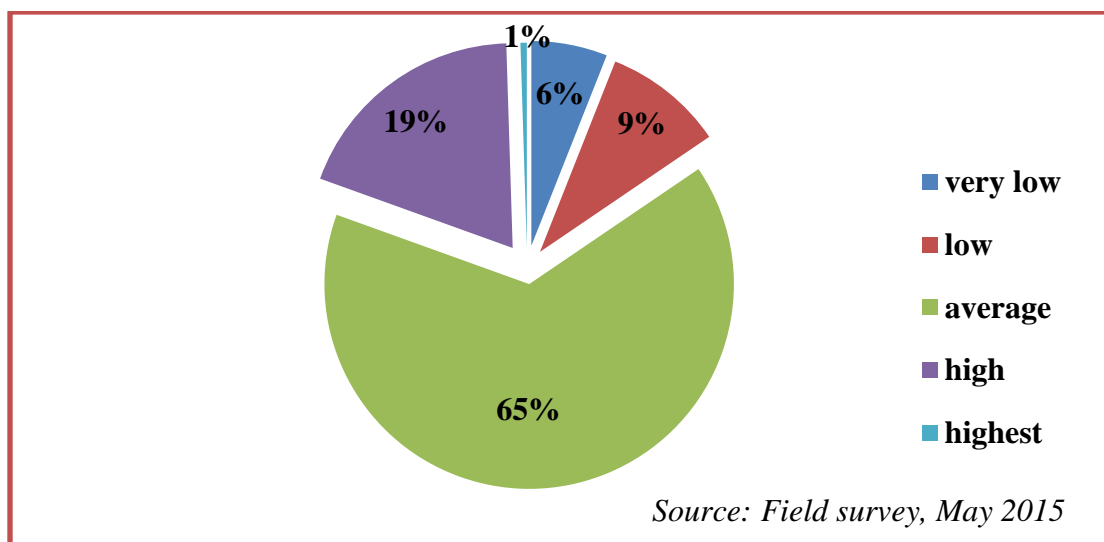


Figure 5: Perceived Rainfall Pattern in the Study Area (Scale 1-5)

4.8.1. Extent of Farmland Loss

Respondents who have lost between 1 and 2 acres represent 22% (Table 9 in Appendix 1). Majority of the respondents were found to have lost at least a parcel of land to urban sprawl. From the survey, none of the respondents has lost his/her entire farmland in all the communities visited. Observations however indicate that in the next 5 to 10 years, apart from those farmers who acquired their land through gift, outright purchase or inheritance, most of the farmers interviewed will lose their entire farmlands because of the galloping nature of the sprawling. This was confirmed by the Land Use/land cover change data from Landsat (Enhanced Thematic Mapper) images (1991, 2002 and 2013). It indicated that built up had increased between 1991 and 2002, growing by 26460 hectares as already shown in Table 5. Again, analysis made between 2002 and 2013 was quite similar to the former one. Open forest continued its steady fall decreasing by 12367 hectares (47.1%). The main gainer from this decrease also was built up which increased by 5701.2 hectares (46.1%). This has resulted in declining of crop production in the study area as shown in Table 1 in Appendix 1. This result and that of what Pankhurst (1962), in Addis Ababa are similar. Pankhurst (1962) hinted that the overall trend and picture of Addis Ababa's population and spatial growth pattern is the most accelerated growth rates in the world. This accelerated growth is also accommodated by the conversion of agricultural and forest land to urban settlement just as what is happening in SODA. However, the Addis Ababa's case is quite different. It has resulted from the decongestion exercise conducted by AACA in the process of creating open space in the inner city of Addis Ababa. Urban displacement and relocation of the occupants to the periphery of agricultural and forestland became necessity and the option, which resulted in dispossession and dislocation of farmers (AACA, 2000).

Otoo *et al.* (2006) observed that demand for and access to land for residential purposes are the major drivers for the spatial growth of a city. Increase in residential and office accommodation is the status quo in most urban communities of Ghana, accounting largely for sprawl infrastructure development, often at the expense of other land uses, especially those for farming. This was manifested through the survey that farmers have lost sizable margin of farmlands to expansion of towns. On the contrary, urban sprawl in the US is characterized by planned peri-urban development. Residents of sprawling cities find it difficult to travel even short distances without using an automobile, due to the remoteness of residential areas and the

inadequacy of available means of transport such as mass transit, walkways, or bike paths (Resnik, 2010). Nevertheless, it has not negatively impacted on farming.

4.8.2. The extent of Annual/Seasonal Crop Loss

After the extent of loss of farmland has been established, the survey further investigated into the extent of loss they have experienced. 86 out of 200 respondents indicated that they have experienced some reduction or loss in their annual/seasonal yields. Out of these 86 affected respondents, 55.8% have lost between 1 and 2 ton annually/seasonally (Table 10 in Appendix 1).

At Ayikuma, it was surprising to identify a cassava farmer who has lost about half of his 25 acre cassava farm located on the Ayikuma-Manfe road. He estimated the loss to be around 50 tons of cassava. The farmer said, “I was informed about the landlord’s intention to sell the same land he has rented to me for farming for 5 years to an Estate Developer. Before I could think of what to do next, I went and met about 50 percent of my land being graded by an Estate Developer”. There was another instance where 3 okra farmers who used to produce about 2 ton of okra located at Sota (on Dodowa- Afiencya road) have lost about 90% of their farm to Castle Gate Estate, where the Company is developing as its project site as shown in the Plate 1 below.



Plate 1. An Okra farm located at Sota (on Dodowa- Afienya road) which Castle Gate Estate has graded part for its project development. This shows how some farmers are losing their farmlands as well as produce to land developers.

The table 10 in Appendix 1 also indicates that, cumulatively, 36% of 86 respondents have loss between 3 and 10 tons of their produce seasonally. This may threaten food security in the study area in that there is a high possibility that the figure could increase considering the sporadic nature of urban sprawling in the SODA.

This situation is not quite different from what was reported by *Atu et al.* (2013), at Calabar in Nigeria, where between 2002 and 2012, over 5, 200.09 hectares of the former agricultural land at Ekorinim, Esuk Utan, Edim-Otop, among others have been converted to low density residential, commercial and industrial uses as these areas are now merged with the urban areas. This resulted in a total loss of about 600 tons of food crop within ten years.

4.8.3. Reasons for Food Decline in SODA

It was found out from the respondents that, unreliable rainfall is the major reason for the decline in food production, which accounted for 65% of the responses as in Figure 6 below. The Forestry Commissioner in charge of SODA disclosed that the District has almost lost all its forest to indiscriminate felling of trees for timber and charcoal burning. She said this has had greater influence on the vegetation and has eventually led to reduction in rainfall in the area. On what her department is doing to curb the deforestation in the area, she said there is very little they could do about the situation because the land belong to either individuals, families or stools and they choose to do whatever they want any time they deem it fit. She further stated that the illegal chain-saw operators mostly operate in the night which makes it almost impossible to check their activities.

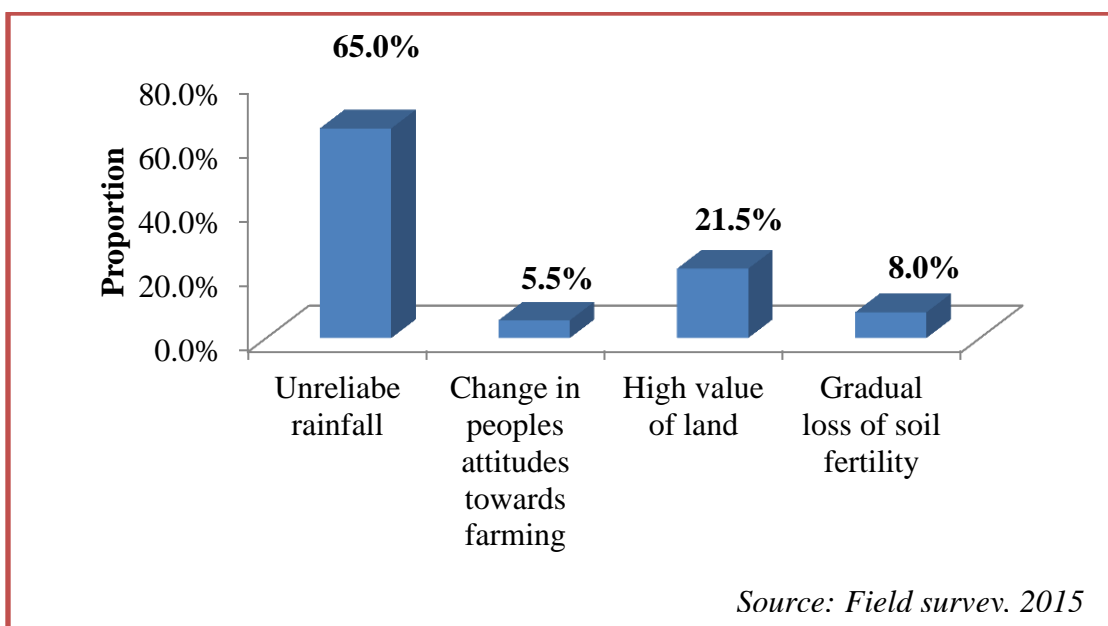


Fig.6. Perceived Reasons for Decline in the Annual Food Produce in SODA

In an interview with the Agricultural Extension Officer at DADU, he hinted that the increase in build ups has robbed most farmers of their farmlands. He mentioned some area where it used to be farmlands. These areas included areas beyond Ghanata SHS, Sota, Abunya, Rama town (near Dodowa), lands beyond Ayikuma on the Somanya main road, among others. One thing he considered as disturbing was the acquisition of large tracts of land by estate

developers, companies, associations and individuals for future use. Though the development of these lands has not been started, which could have been used for farming, yet they are being guarded by their own security personnel popularly known as 'land guards'. Perhaps, this is due to fear of future land litigation that may emanate between landlords and the temporal occupants (farmers) who may claim ownership because they have been there for long time.

Furthermore, it became evident that people's attitude towards farming has changed of late. The Agricultural Extension Officer at DADU-Dodowa said, people's attitude has changed primarily due to increasing cases of land litigation and confrontations of farmers in the SODA. Moreover, gradual decline of soil fertility due to deforestation, continuous cropping and sand winning was also mentioned by the respondents as a reason for the decline in farmer's production. Apart from the large mechanized farmers, other farmers, mostly peasant farmers do not have access to capital, fertilizers, agro-chemicals among others to improve the fertility of the soil, hence low crop yield.

One interesting development that was observed during the survey that perhaps have caused decrease in food production in the study area was excessive sand winning in most parts of the District. Field observation revealed that 40% of the lands in Dodowa, Ayikuma and Doryumu have been scooped off by sand winners. It should be noted that the Shai Osudoku District has the highest deposit (including the Shai Hills) for sand, gravels and other building and construction materials in the Greater Accra Region. The survey further revealed that, though SODA is the largest in terms of total landmark in the Greater Accra Region, not all the lands have the top soil for farming purposes due to uncontrolled sand winning activities. Ironically, those building various projects at the Eastern part of Dodowa currently take sand and gravels from elsewhere. Another reason the respondents attributed the decline in food production to included high price of land in the area which inhibits farmers from buying/renting large size of land for commercial farming. It was observed that price of a plot of land does not have fixed price for all land owners, especially in Greater Accra Region. The major factor that determines the price of a plot of land in SODA is the location of the plot. Investigation has revealed that plots that are closer to where people already reside (town) or closer to the main roads are sold for between GHC15, 000.00 and GHC20, 000.00 in Dodowa and Ayikuma. Those plots which are about 5 to 10 kilometers from the town go for between GHC7, 000.00

and GHC12, 000.00. Plots that are sold for between GHC4, 500.00 and GHC 6,500.00 are over 10 kilometers from the town as in Dodowa and Ayikuma.

4.9. The Extent of Effect of Urban Sprawl on Income

With the evident received from the respondents on the extent of loss of yield (Table 11 in Appendix 1), it revealed that not all farmers interviewed have experienced sprawling into their farms. Thirty percent (30%) of the total respondents have been affected positively with respect to their income. Though the greater number has not been affected negatively at the time of the interview, yet they expressed optimism that they would be affected in the near future looking at the demand for land, and the rate of expansion of the city of Accra and its peripheral areas. Among those who said they have been affected negatively, 5% mentioned that their income is extremely affected (very high) by the activities of urban sprawl (Table 11). It was further realized that those who have had minimal effect and none at all were 51.8%. Moreover, respondents whose income has been affected averagely as depicted in (Table 11) were 15.1%, while those who saw the effect as high constituted 28.1%. This means that they have felt the impact on their income but the impact is not strong to cause either loss or gain. In as much as people's demand for land has not dropped, and population increase is sustained, farmers' farmlands would continue to decrease through encroachment in the SODA. When the farmlands are affected, crops yield (output) is reduced and the resultant effect would be reduction in farmers' income, which would eventually leads to poverty. SODA is not the only District that has been impacted negatively by urban sprawl. According to Osborn (1965), hot spots of urban sprawl are also common along already highly populated coastal strips, such as in the case of Spain where artificial areas created may cover up to 50 percent of the total land area. Osborn (1965) mentioned that because of this the Mediterranean region is classified as one of 34 biodiversity hotspots in the world. Moreover, he said local community life in the sprawling parts has been weakened, if not destroyed, by urban sprawl. The only contrast here is that the effect in Spain is on coastal ecosystems where that of SODA is inland.

In a related situation, DESA (2010), asserted that as the population in the cities increase, people are compelled to move to the peripheries to flee from congestion and any problem associated with over population. When this happens, it puts unnecessary pressure on the

peripheral areas, thereby distorting the layout and the land use/cover patterns. As an inevitable process which results from economic development and rapid population growth (Rimal, 2011), urban expansion, especially for developing countries, not only places much pressure on existing urban structures such as housing and transportation but also has impacted negatively on the land that serves as an agricultural land which are fundamental determinant of land use/land cover changes. This result in loss of food crops and eventually causes reduction in farmer's income (Small, 2004).

4.10. Land Tenure System Verses Food Crop Production

Around the city of Banjul (Gambia), founding (land-owning) families used to allocate land to residents at no monetary cost but, as the city expands and pressure on land increases, farm households with usufruct rights (tenants and borrowers) are often evicted to make land available for sale to outsiders for urban development (Rakodi, 1999). This is also the case in peri-urban Shai Osudoku District of Accra. The land tenure forms that exist in Ghana as put forward by Sarpong (2006), manifest itself in SODA. They are Allodial title (land vested in stools or skins), Freehold, Sharecropping ('Abunu' (a half share) and 'abusa' (a third share) and Leaseholds (to occupy specified land for a specified term that are derived from the common law). The commonest land tenure system as far as farmland is concerned in the study area according to the survey, were leasehold and sharecropping.

As part of the objectives to assess how land tenure system has affected food crop farmers in terms of land accessibility, respondents were asked to indicate means through which their farmlands were acquired for farming. Farmers who have spent over 10 years in the study area indicated that farmlands used to be acquired free of charge but the situation is different today. It came up that greater number of them (40%) acquired the land through lease or rent from the land owners. This was followed by those who acquired theirs through inheritance (Table 12 in Appendix 1). These were purely indigenes in the study area. The survey also identified farmers who are engaged in "Abunu/Abusa" (work and share) farming. They formed 17.5% of the respondents. With this practice, the farmer does not pay for the land, instead he/she cultivates his/her preferred crop(s) and the proceeds/produce is shared between the farmer and the land owner. It sometimes depends on the initial agreement the parties make. It could be

either $\frac{1}{2}$ (Abunu or equal sharing) or $\frac{2}{3}$ (Abusa or dividing the proceeds into 3 equal parts) with the farmer taken two (2) (Sarpong, 2006). It was discovered that farmers who engage in “Abunu/Abusa” feel secured to a large extent. The relief, according to some of the respondents comes from the fact that the land owner has a share in the produce and may not allow infiltration or encroachment of the farmland.

Again, some of the farmers have purchased the land outright and others have received theirs as a gift. These groups constituted 10% of the respondents. To a large extent, the most secure means of acquiring land for any project as far as SODA is concern is through outright purchase. The expert interview conducted disclosed that at Odumasi, a suburb of Dodowa, there is about 100 acre stretch of mango plantation situated on the Dodowa-Somanya main road. The place is partly residential and a developing area, but because the plantation owner has purchased the land outright and has also registered, the farm has been there untouched, and is likely to be sustained for long time. Similar to what Zana *et al.* (2013) conducted in Tamale, the rapid urbanization of Tamale is as a result of increased commercial activities and its strategic location. Since the tenure system in Tamale is allodial, large parcel of land are sold to individuals and groups by the chiefs. Pressures of urbanization have negatively implicated the predominantly poor farming communities in the Tamale region as most farmers have been ejected through urban expansion in the same manner it has impacted on the inhabitants of SODA. However, that of Tamale sparked up a succession syndrome where prime agricultural lands have been converted to sand winning and other land uses believed to be the highest in income generation and best use.

Respondents who said they acquired their land through lease/rent and “Abunu/Abusa” or as a gift during the interview were asked to indicate the number of years the land has been given to them. It was found out that land holding for farming is usually given in short, medium and long term durations. The short term lease or rent is for up to 2 years and they constituted 21.8% of the total respondents (Table 12 in Appendix 1). It was identified that such farmers mostly cultivate short term crops such as cereals and vegetables. The medium term leasehold ranges from 3 years to 10 years. It became evident through the survey that predominantly medium term ownership or leasehold leads in land acquisition. The medium term ownership or leasehold constitutes 64.7% of the total respondents. The mostly grow tuber crops such as cassava and cocoyam and sometimes mangoes. These farmers who are in the medium term

ownership indicated that they are comfortable with the duration of tenure ship because much could be produced within the period. Considering the galloping nature of prices of lands at the peripheries, especially in the Greater Accra Region, there is a high possibility that the numbers of years that the land is leased to a farmer would be reduced in the next five years. When this happens, crops that have long lifespan would no more be produced and may lead to scarcity of such crops. This will eventually lead to food insecurity in the area. Moreover, those who own the land for more than 20 years were classified as long term occupants. These groups were mostly those who either acquire the land through inheritance, gift or outright purchase (purchase a land for over 20 years). They form a small percentage of 13.6%, yet they are considered as the most secured in terms of farming as compared to other means of acquiring land in the SODA.

When inquired from the Agricultural Extension Officer at DADU-Dodowa, about the future prospects of farming in the SODA, he said “unless some divine interventions are put in place by the stakeholders of lands, the future of farming and food security in SODA would not be buoyant”. The reason he gave was that government does not own land in the District but rather individuals, family heads and chiefs. The landlords are not ready to release their lands for farming; instead, they want to sell to individuals and estate developers who would give them the value for money. This is also in line with what Jedwab (2011), put forward that “the planners of emerging urban centers in developing countries particularly Ghana are being cautioned about the possibility of local small-holder farmers becoming urban poor people through the elimination of farming livelihoods”. In a related case, the study conducted by Lopez *et al.* (2001) in Puerto Rico, showed that between 1977 and 1994, the urban area of Puerto Rico increased from 11.3 percent to 27.4 percent. Lopez *et al.* (2001), recommended that if the pattern of encroachment by urban growth into farmlands continues, Puerto Rico’s potential for crop production in the future will be dimmed. The Agricultural Extension Officer set instances where some farms under his farming jurisdiction have now been taken by Estate Developers and other land developers. He said this land in particular was one of those lands that have been earmarked for farming in the District but since the tenure system in the area is allodial, the chiefs sold it out. A typical example was the one at Odumasi, a suburb of Dodowa where a large parcel of mixed cropping farmland has been demarcated with poles and sign board by an estate developer as shown in Plate 2 below.



Plate 2

Plate 2. Pillar/pole and a sign board belonging to McCutley Estate indicating the margins and ownership of building plots found in a mixed cropping farmland. This indicates how farmlands are been taken over by land developers in SODA

Projecting into the future, this would be similar to the trend that was found in a study carried out by Yoveva *et al.* (2000), in the city of Sofia, where land use is shown to be in a state of transition. The peri urban villages to the south of Sofia are no longer areas of agricultural production as the agricultural land has been turned into housing complexes. For example the cities of Darvenitza and Mladost were built on prior agricultural land likewise the township of Abonya near Dodowa.

What the survey further discovered was that, 20% of the total respondents confirmed that they have been given ejection notices to move from their current farmlands as depicted in Table 12 in Appendix 1. When further asked the reason(s) for their ejection from their farmlands by their respective landlords/ladies, 65% of the respondents said, they have been notified by their landlords/ladies that they are ready to develop their land. Further investigation revealed that, this normally happens when the landlords/ladies want to get higher price than what the current farmer pays. The reason 35% of the respondents gave for their ejection from their farmlands was that their lands have been sold to individuals or groups for building purposes. When this happens, according to one of the sub chiefs in Dodowa, the farmer has to renegotiate with the new land owner for possible extension. This, the chief continued, to a large extent do not materialize for the farmer because the new tenant has his/her agenda to pursue on the land. One respondent said his ejection has come as a result of the landlord's selfishness. He said the landlord is jealous about the quantity of maize he gets annually.

4.10.1. Land Tenure ship problem and its Basis in SODA

Land tenure and administration is pluralistic in Ghana (Kasanga and Kotey, 2001) and involves the state, traditional authorities (stools and skins), and private individuals. State or public lands are lands compulsorily acquired by government through the invocation of the appropriate legislation, the State Lands Act, 1962 (act 125), since 1962. It included a payment of compensation to the original owners of the land. These lands, vested in the president on behalf of and in trust for the people of Ghana, have been so acquired since the colonial era. Consequently, large areas of land have been compulsorily acquired but without adequate compensation, leading to massive encroachments, especially in many urban areas (Gough and Yankson, 2000).

The survey conducted showed that 84% of the respondents have so far not been confronted with land litigation. On this, the Officer in charge of crops at DADU has said looking at the trend of urban expansion couple with high value of land in SODA, especially in Dodowa and Ayikuma, over 50% may experience land litigation issues in the next five years. He suggested that farmers should begin looking for new farmlands far away from the communities if they want to sustain farming as their main livelihood.

The land tenure systems in Ghana are complex and reflect the unique traditional political organizations, sociocultural differences, and attributes of the various ethnic groups, clans, and families (Kwapong, 2009). Clans and families are the outcome of historical alliances in wars, conquests, and assimilation of the conquered. This intermingled ownership has created controversies of land matters in the study area. Bearing this in mind, the survey inquired from the respondents the basis of land litigation in the study area as shown in Table 13 in Appendix 1. The causes of land litigation range from individuals, families, tribes and the government levels. The common cause of dispute recorded during the survey was the conflict that emanates among same family members who are claiming ownership of the family land. According to a Traditional ruler of Dodowa, family lands are not all that safe for tenants. He explained that after acquiring a land rightfully for some time, another member from the same family may come to dispute the tenancy of the so called family head who earlier on has sold the land to the tenant. The later comes with the claim that the former does not have moral and legal right to sell the land to tenant. He cited instances where the same piece of land has been sold 3 times to a tenant by 3 people from the same family. These cases accounted for 31.5% of the total respondents. The unfortunate aspect of this issue according to the interview is that, the tenant pays for the same piece of land as quoted by each prospective land seller. This situation becomes worrisome where the tenant has an asset on the disputed land.

Another basis for land dispute that the interview unveiled was one where two tribes- Shai and Larteh are claiming ownership on the stretch of land at the base of Akuapim –Togo Ranges, which is from Kpone Bawaleshie right down to Ayikuma. Observation revealed a fresh conflict that ensued on 4th May, 2015 at Odumasi, a suburb of Dodowa where a driver of bulldozer was shot and killed and his caterpillar and two other private cars set ablaze by unknown men (The Ghanaian Chronicles, Monday, 4th May, 2015). According to an eye witness farmer who was interviewed, the driver was contracted by somebody from Larteh to grade a 10 acre mango plantation belonging to somebody from Dodowa. The survey found out that this incidence is not typical but it is gaining popularity of late in the study area. Plate 3 below is the picture of the burnt bulldozer at the farm.



Plate 3. The burnt bulldozer resulting from a protracted land dispute between the people of Larteh Akuapim and the residents of Odumasi (a suburb of Dodowa). This potrays among others the gravity of land litigation in the study area.

Moreover, in the Thursday, 17th April, 2014 issue of the Daily Graphic, it captioned “Dodowa Chief threatens war against Ningos over disputed land”. The paper reported that one of the chiefs of Dodowa threatened when he notice that some youths from Ningo (the neighbouring District) have leased disputed 140 acre land at Ayikuma, to the Ghana National Fire Service, which he claims belonged to his forebears. Though these incidences constituted only 3.1%, yet is considered as the deadliest form of land dispute in the SODA and has accounted for several lives being lost, the interview hinted.

Above all, 12.5% of the respondents said government is claiming ownership of some parcels of land in SODA Table 13 in Appendix 1. The government of Ghana is claiming over 500 acres of land around Afiencya for the proposed International Airport, which is located within SODA (Ministry of Local Government and Rural Development, 2000-2015). The Town and

Country Planning Officer for SODA hinted that the land owners are demanding a befitting compensation from the government, which the government is proving noncompliance. The survey has however, uncovered complications in the land tenure systems as well as institutional inefficiencies and lack of capacity in land administration as the causes of the woes of the farmers in SODA. Since land registration in Ghana is more bureaucratic, time consuming and cumbersome, scrupulous self-acclaimed landlords take the opportunity to resell their lands to more than one tenant.

From the aforementioned discussion on basis of land litigation in SODA, Kassanga and Kotey (2001)'s recommendation is laudable. That is, it is therefore be useful for policy purposes, to assess and define access to land as effective access to land, that is, access that is subject to an individual's ability to develop the land and put it into productive use. Similarly, Feder (2000), also recommended that land policies need to ensure that poor people gain new livelihood opportunities and that their rights are protected in an event where their livelihood are taken away from them. This was further emphasized by DFID (2002), which stated that land policies need to be considered in the wider context of poor people's productivity and livelihood, provision of services (health, education, advice, technologies), and access to markets.

4.11. The Role of Stakeholders in Providing Security to the farmers' livelihood asset, vis-a-vis Urban Sprawling.

Taken into account the nature of urban sprawling in the SODA, and in response to the fifth objective, the research further inquired from the respondent who is/are providing them with livelihood asset security against urban sprawling. In other words, who protects the livelihood asset and activities of farmers in case of land litigation or confrontations? Stakeholders identified in the study area include the Shai Osudoku District Assembly, the Traditional Council/Leaders and Landlords. It came out as indicated in the graph in Figure 7 below that Shai Osudoku District Assembly (SODA), which represents the Central Government has the lowest protection ratio of 14%.

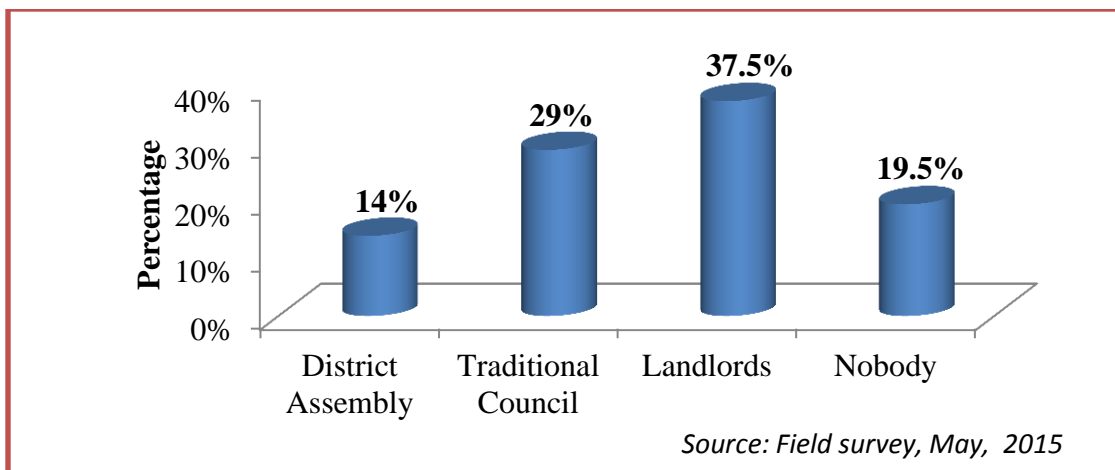


Fig. 7. Stakeholders Providing Livelihood Security against Urban Sprawling

When inquired from the Planning Officer for the District, he said the Assembly is there as a “ceremonial head” as far as land ownership and acquisition in the District are concerned. He explained that they are powerless in land matters since the lands in SODA are solely in the hands of the Traditional Council/Rulers and the Family Heads. The only help they sometimes offer is to advise them to seek legal advice in case of land litigation between parties. What the Assembly, however do is the zoning of the area into suburbs and streets, which has nothing to do with land ownership. He further said, some time ago, the SODA earmarked a parcel of land for solely agriculture as seen in Plate 6 below, but the real owners of the lands (Ayikuma Traditional Council) defiled their rules and as at the time of this research, the land in question is now the property of the an Estates Developer.



Plate 4

Plate 4: Inserted signboard showing a greenbelt reserved for farming by Dangme West District Assembly (now Shai Osudoku District Assembly). This indicates an effort made by SODA to secure and protect the livelihood asset of food crop farmers.

The Traditional Council and the Landlords in SODA according to the respondents give the highest (66.5%) livelihood security to the asset of farmers (Figure 7). This security provided by the Traditional Council or the Landlords based on the survey, was found not to be secured, reliable and sustainable to the individual farmers they lord over. The reason is that the documents issued by the Traditional Council or Landlords (usually family heads or representative) to the respective tenants are not hundred percent bound by Statutory Law, unless the land is dully registered by the tenants at the Lands Commission. The insecure nature of tenure ship also comes from the fact that, a land acquired by individual or group could be contested by somebody from among the Traditional Council or from the same clan/family. The survey further captured some respondents who indicated that they have nobody to provide security for their farming should there be any problem about land issue. These, according to the survey are those who acquired their land through gift or outright purchase. From the above discussion on the role of stakeholders in providing security to the farmers' livelihood asset, vis-a-vis urban sprawling in SODA, it is clear that the security of farmers is very fragile. Just as the government of Nigeria is obviously losing the battles against the colonization of farmlands by human and industrial set ups (Oyinloye & Adesina, 2011), the Shai Osudoku District Assembly (government) is doing the same. Ironically, SODA is in charge of the entire District, meanwhile it does not owe any land due probably to the customary nature of land holdings in Ghana.

4.12. Suggestions to Protect Food Crop Farmers from Urban Sprawling

The survey, after soliciting views and ideas from the respondents about urban sprawl, land use, food production, land tenure, farming security among others further asked the respondents what they suggest should be done to protect food crop farmers as far as urban sprawling is concerned. As seen in Table 14 in Appendix 1, as many as 56.5% of the respondents hold the belief that Government's intervention in the situation would do a lot of good in the life of farmers. The Extension Officer at DADU of SODA strongly supported this view and added that since the District is predominantly a farming community; a parcel of land should be secured purposely for farming activities. This is in line with the recommendation of *Atu et al.* (2013), that very good (fertile) agricultural land should be zoned as agricultural land use down to the least fertile lands. They further suggested that expansion of cities as a result

of rapid urbanization should therefore be channeled to the least fertile agricultural lands first before those that are very fertile.

Other respondents also suggested the intervention of the local landlords/ladies. As discussed earlier, one of the causes of litigation is inter-family disputes. Here, the landlords/ladies should settle all inter-family disputes in order that the tenant may not suffer. It was discovered that, to a large extent, the state of land security has greater influence of food crop production and food security in an area. 10% of the respondents are of the view that farmers who would be affected through urban sprawling should be fully compensated.

CHAPTER FIVE

FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0. Introduction

This chapter looks at the summary of the major findings of the study. It also includes limitations of the study. In addition, the chapter also synthesizes the linkages between findings of this study and that of others. Again, the conclusions and recommendations or what should be done to address the adverse effects that urban sprawling has had on agricultural land and food security have been outlined in this chapter.

5.1. Major Findings

Urban sprawl which involves the conversion of open space, wetland, semi-natural and natural vegetation and agricultural land into built up has become a global issue, hence the need for assessing urban sprawl's impact on agricultural land use and food security in Shai Osudoku District Assembly (SODA). Urban sprawl has affected many cities in Ghana but that of SODA is unique due to high rural-urban migration, high price of land in the city of Accra, proliferation of estate development, the District's closeness to the capital city of Ghana and the proposed International Airport site located within the District.

The study tried and sought answers to the following questions; what is the extent of decadal change in agricultural land space? Which crops are most likely to be affected by urban sprawl in quantity? How is land tenure system affecting the crop farmers in terms of land accessibility? And finally what roles are stakeholders playing in providing security to the livelihood asset for the food crop farmers in the study area? These research questions were formulated into research's specific objectives.

Data from both primary and secondary resources were used. Data from primary sources were collected through semi-structured questionnaires from food crop farmers. This involved a total sampling size of two hundred (200) respondents. This sample size was allocated to the 4

selected communities (Dodowa, Asutsuare, Ayikuma and Doryumu) based on their population using Yamane's (1967 in Coe, 1996) formula. Interview schedules were held with the Town and Country Planning Officer for SODA, the Extension and Crop Officers of DADU-SODA, the Executive of Mango Growers' Associations-Dodowa, the project Managers of Castle Gate Estate Ltd and Dream Land Estate, (Real Estate Developers located on the Dodowa-Afienua road), District Forestry Commissioner and Opinion Leaders. Secondary data came from literature gathered from published and unpublished materials. Dodowa, Asutsuare, Ayikuma and Doryumu were purposely selected for the study because they are the communities that are expanding in terms of build ups at a very fast rate due to their population size, town status and strategic geographical locations. Descriptive statistical techniques involving frequencies, percentages, summations, diagrams and tables were employed in analyzing the data. In addition, a multi-temporal set of Remote Sensing data of the study area was used to study and classify Shai Osudoku District. This dataset included mainly Landsat images of (1991, 2002 and 2013). Digital image-processing software ENVI was used to process, analyze and integrate the spatial data. Geographic Information Software ArcGIS was used to produce the map output. Despite problems such as difficulty in assessing literature on the subject area, time and resource constraints and handling qualitative data from perceptions, the researcher has attempted an analytical study upon which further research could be conducted.

The study had revealed that, out of 200 respondents interviewed, 59.5% were males and 40.5% were made up of females. It was discovered from the study that majority of the respondents have low formal educational level or none at all. Concerning the tribe of the respondents, majority (63.5%) were found to be Ga-Adangme, followed by Ewe (29.5%). Other tribes represented 12%.

5.1.1. Number of Respondents Interviewed in each Community (Table 15)

Towns/Communities	Number of Respondents
Dodowa	70
Asutsuare	50
Ayikuma	40
Doryumu	40
Total	200

5.1.2. Number of Institutions Interviewed in SODA (Table 16)

Institutions/Groups	Number of Respondents
Shai Osudoku District Assembly (SODA)	1
District Agricultural Development Unit (DADU)	1
Forestry Commission	1
Farmers Associations	1
Real Estate Developers	2
Opinion Leaders	2
Total	8

From the above tables, a total of 200 respondents were interviewed from the 4 selected communities. In addition, seven (8) key informants from the five (6) institutions/groups responded to several questions related to urban sprawl, agricultural land use and food security issues within SODA.

The survey further revealed that 84% of the respondents have stayed in the study area for more than 8 years. This therefore suggested that the respondents were familiar with the farming trend and the land use changes. Also, a greater number of respondents (96.3%) confirmed that, they have experienced enviable changes in the land cover for the past decades. Based on Landsat satellite imagery from 1991 to 2013, the study found out that the study areas has expanded by about 30.3% over the period. Most of the respondents attributed human

activities resulted from population increase and climate change as the causes for the change of land cover and expansion in the area. The effects of the change in land cover have resulted in the loss of soil fertility and inadequate rainfall pattern in the study areas.

The study uncovered that farmlands are now built up areas. Because of these foodstuff farmers are shifting to tree crops such as mango, orange and pawpaw at a distance location and others diverting to non-farm businesses. The diversion from farming to non-farm businesses such as trading and the change in farmers' attitude towards farming were due to the fact that most of their farmlands have either being encroached upon or they have been given ejection notices.

The dominant crops cultivated in the study area according to the study were cereals, root tubers and vegetables. These crops constitute about 95% of foodstuff found in most of the markets within the District, the Region and beyond. Though tree crops recorded little lower percentage figure (31.70%), its cultivation spreads across the study areas, and it is gaining root steadily. The study further showed that 72% of the respondents cultivate at least three acres of farmlands. There were large scale farms found in the study areas. They included Banana farm at Asutsuare, Mango Plantations at Dodowa, Ayikuma and Doryumu, Sugar Cane Plantations at Asutsuare and Doryumu, Rice farms at Asutsuare, Cassava Farmers in all the selected communities, among others. It could therefore be said that majority of the respondents are commercial farmers.

The study identified the largest commercial banana plantation in Ghana within the study area known as 'Golden Exotic Limited' at Asutsuare, which is operating on 1,055 hectares of farmland currently and with a workforce of 2,464. The study has discovered that one crop that is emerging in a full swing in the study area is plantain. Looking at the trend, plantain production in the next five years would be the leading food crop that would be produced in SODA despite this escalating urban sprawling. That notwithstanding, there were minimal peasant farmers (28%) who cultivate far less than an acre in the study area. The common crops found to be cultivated on subsistence bases were maize, okra, yam, pepper, tomato, water melon, onion and garden egg. However, the study found out that the yield does not correspond with the number of acres farmers cultivate. It rather shows reduction in yield.

With the exception of Golden Exotic Limited which produces a total of 51,000 tons annually, almost 50% of the farmers interviewed reaps less than 1 ton of produce. This confirms the earlier assertion that there has been a reduction in either the fertility of the land or rainfall pattern or both. This is primarily due to the change in the vegetation cover in the last decades.

Again, it was discovered that root tubers, cereals and vegetables were crops that have been affected greatly by the urban sprawl. The reasons are that these crops are usually cultivated not too far from human settlements in the study areas. Another reason was that land value has increased more than thousand folds within the past 10 years. This has made the vulnerable in the society unable to cope with these rapid increases in land values and many have bowed out of farming. The hike in land value in SODA has been propelled by high price of land in the AMA. This has come from the fact that individuals and estate developers as well as other speculators have seen lands at the peripheries as cheaper as compared to those within the city core.

The study found out that farmers have various reasons for engaging in farming. 70% of the farmers want to produce and sell, 38% produce for home consumption and 0.5% produce to feed a specific industry in Ghana. The study has shown that the intention of the respondents is food security oriented. It was further identified through the study that, 80% of the crops produced in SODA are sold in the markets within Greater Accra Region. This has strong correlation with food insecurity in the area in that anything that affects food production would obviously affects its supply and the final consumer will suffer. Also, exports were found to be very low (5%). With this export, Golden Exotic Ltd. exports about 95% to the European and regional markets including Burkina Faso, Mali, Niger, and Benin. Furthermore, majority of the farmers were found to be selling their produce in the farm, especially mangoes.

Generally, the rainfall pattern in the study area was found to be averaged (moderate). It was manifested through the study that farmers have lost sizable margin of farmlands to increase in build ups. Majority of the farmers were found to have lost at least a portion of land to urban sprawl. It should be however mentioned that, none of the respondents has lost his/her entire farmland in all the communities visited. Even though the study found a decline in food production resulted from loss of farmlands, yet food shortage was minimal in the area. However, it could be predicted that in the next 5 to 10 years, most of the farmers interviewed

may lose their entire farmlands should the current urban sprawl trend remains unchecked. The reason is that currently, more than 50% of the foodstuffs (plantain, cassava and cocoyam) found in the Dodowa market (the biggest market in the District) comes from the Eastern Region, precisely Larteh, Adukrom, Mamfe and other surrounding farming communities.

The following reasons were identified through the study as cause for the decline in the annual food production in SODA. Unreliable rainfall due to indiscriminate felling of trees for timber and charcoal burning by illegal chain-saw operators and inhabitants in the communities has accounted for the decline in the annual food production in SODA. Other reason was the high price of land in the area which inhibits farmers from buying/renting large parcel of land for commercial farming. The price of land in the study areas were found not to have fixed price. It ranges between GHC4, 500.00 and GHC20, 000.00 depending on the location of the plot, especially in Dodowa. Again, people's attitude towards farming has changed of late primarily due to increasing cases of land litigation and confrontations of farmers in the SODA. A typical one was the recent land dispute cases at Odumasi and Adumanya which resulted in severe clashes where several properties including houses, vehicles and crops were vandalized. Gradual decline of soil fertility due to deforestation and sand winning was also found to be the reason for the decline in farmers produce. One interesting development that was observed from the survey that has caused decrease in food production in the study areas was excessive sand winning in most parts of the District. About 40% of the lands in Dodowa, Ayikuma and Doryumu have been scooped off by sand winners. It is an undeniable fact that the SODA has the highest deposit for sand, gravels and other building materials as well as the largest in terms of total landmark in the Greater Accra Region, yet not all the lands have the top soil for farming purposes due to uncontrolled sand winning activities.

The study further discovered that 86 out of 200 respondents have experienced some sort of reduction or loss in their annual/seasonal yields. Again, some of the farmers have lost significant quantities of produce (tons). The highest lost was 50 tons and the lowest was 2 tons at Ayikuma and Sota respectively. The study found this as a threat to food security in the study area in that there is a high possibility that the figure quoted above could be increased considering the sporadic nature of urban sprawling in the SODA.

The study revealed that thirty percent (30%) of the total respondents have been affected negatively as far as their income is concerned. Considering the percentage of respondent affected negatively, even though it is not alarming, yet it could be projected that the rest would be affected in the near future looking at the people's high demand for land, and the rate of expansion of the city of Accra and its peripheral areas.

The land tenure forms identified by the study were Allodial title, Freehold, Sharecropping ('Abunu'/ 'abusa') and Leaseholds. The commonest land tenure forms as far as farmlands are concerned in the study area according to the study, were leasehold and sharecropping. The study further revealed that farmlands used to be acquired free of charge but the situation is different today. In all, land acquired through lease or rent (40%) dominates in the study, followed by those who acquired theirs through inheritance (32.5%).

Again, lands are acquired in a short, medium and long term bases in the study areas. The medium term ownership or leasehold which ranges between 3 to 10 years constitutes the highest (64.7%) in farmland ownership. This has influenced the crops that are grown in the study areas in that farmers are discouraged from cultivating crops which have long lifespan, especially tree crops. It has led to scarcity of those crops, which eventually would lead to food insecurity in the areas.

The study also discovered that some farms in SODA have now been taken by Estate Developers and other individual land developers. At Odumasi, a suburb of Dodowa a large parcel of mixed cropping farmland has been demarcated with poles and sign board for an estate project. Similar cases were sported sparingly across the study areas. What the study further discovered was that, 20% of the total respondents have been given ejection notices to move from their current farmlands. The reasons for the farmers' ejection were; the land owners said they are ready to develop their land, the farmers' lands have been sold to individuals or groups for various projects and the landlords' selfishness or jealousy about the quantity of produce the farmer gets at a season.

Another revelation the study uncovered was that 84% of the respondents have so far not been confronted with land litigation. However, the Officer in charge of crops at DADU pointed out that looking at the trend of urban expansion couple with high value of land in SODA,

especially in Dodowa and Ayikuma, over 50% may be entangled with land litigation issues in the next five years. The causes of land litigation range from individuals, families, tribes and to the government levels. The common cause of dispute recorded during the study was the conflict that emanates among same family members who are claiming ownership of the family land. Another is the one that involves two tribes. Typical among these were the conflict between Shais and Lartehs, and that of Shais and Ningos. Observation revealed a fresh conflict at Odumasi, Adumanya, Sota and Dodowa among others, where bulldozer, cars, buildings have been destroyed and lives lost. Above all, government's intention of claiming ownership of over 500 acres of land around Afiencya for the proposed International Airport has also sparked controversies. Moreover, complications in the land tenure systems as well as institutional inefficiencies and lack of capacity in land administration were identified as the basis for land litigation in SODA.

The study has revealed that 42% of the respondents have already been engulfed by settlement and that their farmlands are within residential area or place of isolated buildings or traces of buildings. The study again revealed that 58.5% of the respondents have up to half a kilometre between their farms and the nearby buildings. 41.5% of the respondents have their farms located more than one kilometre from the nearest building. There were available indicators that showed that in the next 5 to 10 years, majority of the farmers would be engulfed by human settlements, putting into consideration the galloping nature of build ups in SODA. These were evidence in Dodowa and Ayikuma where almost completed house were spotted in some farms. In other cases such as at Abonya, structures were at the foundation level, lential level and some almost completed within farms. These available incidents through the study suggested that the future of food crop production that would lead to food security is bleak. In addition to this, it was discovered that only 1.5% of the total respondents were found to be safe because they are farming on a reserved farmland.

Moreover, it was found out that landlords have considered the option of selling their lands to companies and individuals for building projects instead of giving them for farming purposes. This has resulted in respondents who take farming as their main occupation and livelihood bowing out of farming in SODA. As a result, these were the alternative options the farmers have considered: 70.5% said they shall migrate to farmlands elsewhere should the urban

sprawl engulf their farmlands entirely, 9% would sell their farm and enter into another business and 19% of the respondents chose termination of farming.

The anticipation that greater part of farmlands that are currently under cultivation at the peripheries could be wiped off by buildings was confirmed when 84% of the respondents asserted that in the next 10 years, greater part of farmlands that are currently under cultivation could be wiped off by build ups. Though the study revealed a minimal threat from food insecurity as at the time of the study, yet it is evident that there is high possibility that in the next 10 years, greater part of farmlands that are currently under cultivation by food crop farmers could be wiped off by urban sprawl activities due to uncontrolled lateral expansion of build ups.

The implications of urban sprawl in SODA were seen as a “double sword”. Positively, it resulted in the expansion of the towns, increased the accessible roads, increased in perennial income from renting of rooms, employment for sand winners and accessible portable water supply. On the other hand, these provisions were acquired to the detriment of the farmer who farms at the peripheries. For instance, sand winning has rendered sizable number of farmers farm-less in the SODA. Urban sprawling has resulted in social conflicts emanating from land acquisition and land related issues which obviously has affected food production. Furthermore, the study envisaged unfavourable economic implication of urban sprawl on food production and food security in SODA. These included likelihood shortage of food, high living standard emanate from low income of the farmers and poor saving habit among others.

The study discovered institutions and stake holders that are providing livelihood security against urban sprawling to the farmers. They are Shai Osudoku District Assembly (SODA), which represents the Central Government, Traditional Council/Rulers and the Family Heads. It came to light that, the District Assembly is only there as a “ceremonial head” as far as land ownership and acquisition in the study area is concerned. This is due to the customary land administration practice in Ghana which has entrusted landholdings greatly in the hands of the traditional leaders. This was confirmed where the parcel of land earmarked solely for agriculture purpose by SODA has been encroached by estate developers.

The study showed that the security provided by stake holders in the SODA is not secured, reliable and sustainable to the individual farmers because documents issued by the Traditional

Council or Landlords to the respective tenants could be contested by somebody from among the Traditional Council or from the same clan/family. Those the study found to be safer as far as land litigations are concerned are those who acquired their land through gift or outright purchase.

5.2. Linkages between Findings and that of Other Studies

Apart from urban sprawling which was found to be the main cause of food insecurity in the study areas, other factors were found responsible. These included unreliable rainfall that has resulted from indiscriminate felling of trees for timber and charcoal burning by illegal chain-saw operators and inhabitants in the communities, high price of land in the area which inhibits farmers from buying/renting large parcel of land for commercial farming. Again, people's attitude towards farming has changed of late primarily due to increasing cases of land litigation and confrontations of farmers by landlords and 'land guards' in the SODA. Gradual decline of soil fertility due to deforestation and excessive sand winning was also found to be the reason for the decline in farmers produce. One interesting development that was observed from the survey that has caused decrease in food production in the study area was excessive sand winning in most parts of the District. More generally urban sprawl of SOD has a lot in common with the sprawl of Wa where urban encroachment has had effects on hitherto rural and agricultural lands (Peprah, 2014). But, in the Peprah (2014)'s study, though farmlands are being degraded by and lost to sand winning, the degrading activity brings new income considered to be higher, quicker and easier to earn. There is a link between an imminent threat on food security which may affect local staples like maize, cassava, rice, plantain and yam and that of Peprah (2014).

The findings of this study indicates that, loss of farmland that has resulted in food insecurity is driven by the desire by the landlords to make higher, quicker and easier income, quest to avoid land litigation as well as the fear of losing the land without due compensation to indigenous farmer-land owners of SODA. These have influenced the decision of the landlords to dispose off their land (suppose to be for farming). The causes of land litigation or dispute per this study include the conflict that emanates among same family members who are claiming ownership of the family land and the one that involves two tribes. Above all,

government's intention of claiming ownership of over 500 acres of land around Afienya for the proposed International Airport has also sparked controversies. Bhatta (2010), complements this present study with findings such as the loss of farmland due to urban sprawl which implies loss of fresh local foods, species diversity, habitats and rural economic stability. However, in the case of Bhatta (2010), the loss of farmland is driven by increase in provincial taxes.

In a related study conducted by Mutuga (2009), on the impact of urban growth on wildlife protected area of Nairobi National Park, it was found out that population increase and expansion of human settlements and infrastructure has resulted in the degradation of ecologically valuable areas – for instance protected areas. The impacts of urbanization on protected areas he identified, such as fragmentation of habitats, loss of rare species, edge effects, introduction of alien species, decreased water quality and quantity, shrinking of wetlands, air and water pollution, solid waste, noise, and human-wildlife conflicts are similar to this study.

In comparing this study to that of Attua and Fisher (2010), there are similarities in terms of urban land cover change. Both areas have expanded over a period. In New Juaben Municipality of Ghana, the total urban land-cover expansion between 1985 and 2003 was 34.80% of the total land area (Attua and Fisher, 2010). In the same way that of this current studies-Shai Osudoku District has expanded by 30.3% between 1991 and 2013, based on Landsat Images. Again, land-cover changes in both study areas were positive in respect to urban core and peri-urban covers.

5.3. Limitations of the Study

The use of enumerators for the collection of the primary data was seen as a limitation to the study. The study area was a multi-dialect community. Some of the respondents were interviewed through an interpreter. The information might have been compromised during translation.

Another limitation was the generalizability of the results. The scope of the study was focus on the four major communities (Dodowa, Doryumu, Ayikuma and Asutsuare) to represent the

entire SODA. Generalizing this result for another District(s) may not be the through representation since each District has its peculiar characteristics in terms of occupation, soil type, climate, among others.

5.4. Conclusion

It is acknowledged in this study that Shai Osudoku, a District known as the cradle of Dangme land and Krobo culture, is experiencing the sprawl phenomenon. Considering a long period of time of twenty two (22) years, from 1991 to 2002 in the first instance and from 2002 to 2013 in the second, and using remote sensing satellite image classification supported by field survey data, the research has shown that the District is expanding at an average rate of 3.5% per annum.

Based on Johann Heinrich Von Thünen Model of Agricultural Land Use as shown in Fig.2, the study has revealed that there has been a transformation that has occurred in land use and land cover, and that a large part of vegetation or bare land areas have been transformed into built up and agricultural land. As stated in Johann Heinrich Von Thünen Model of Agricultural Land Use, “an increase in urban population or an increase in urban income that drives up demand for housing leads to an outward movement of the urban land zone and a rippling effect through other agricultural zone boundaries”. Von Thünen model also states that as one gets closer to a city, the price of land increases. This is exactly what is happening in the Shai Osudoku District.

This study has also provided an empirical evidence of land cover change of the Shai Osudoku District between 1991 and 2013 through remote sensing satellite image classification.

Again, most of the expansion in human settlements has been experienced within peri-urban environments and has involved in a rapid loss of hitherto arable lands such as natural vegetation and current croplands. Interestingly, while natural vegetative cover declined, urban physical infrastructure expanded enormously within the period. Other major effects identified as caused by land cover change were deforestation and reduction in the rainfall pattern especially in the last two decades in the study area as indicated in Figure 5.

Again, the study findings have confirmed urban encroachment on hitherto rural and agricultural lands. The reduction in farmers' farmlands as a result of increase in build ups has subsequently threatened food security in the study area. In addition, excessive and uncoordinated sand winning activity has thwarted the efforts of many farmers. There is an imminent threat on food security which may affect local and regional staples like maize, rice, cassava, plantain, yam and vegetables in the next 5-10 years.

What is more, apart from the natural increase in population, there are other factors causing urban sprawling in the study area. These include migration, high price of land in the city of Accra, proliferation of estate development, the District's closeness to the capital city of Ghana and the proposed International Airport site located within the District.

Economically, urban sprawl has led to reduction in crops yield and food supply that has emanated from loss of farmlands. This has resulted in the reduction in farmers' income. The possible aftermath effects of reduction in crops yield and food supply is food insecurity. Food insecurity would cause famine, high food prices, poverty, loss of government revenue and inadequate provision of social amenities in the study area and beyond.

Moreover, there has been a major change in agricultural land uses, which has given way to residential land use in the peri-urban area and residential land uses given way to commercial land uses in the area. This has caused drastic reduction in access to agricultural land and has threatened food security in the study area.

Finally, the management of the lands is a key issue to individuals and the institutions involved. As a result, land degradation, excessive sand winning, land litigation and haphazard or uncontrolled expansion of building have taken place in Shai Osudoku District, causing changes in land use and land cover as well as the climate of the area. There is, therefore, the need for further research into the management of lands in the study area and its consequences on the socio-economic development of the people.

5.5. Recommendations

Regarding the rapid rate at which the cities and towns are growing, coupled with urban land transformation such as in SODA, there is the need for adequate planning strategies to be formulated in order to properly monitor and control the uncoordinated land occupation such as the extension of built up area into natural reserves (Dodowa Forest) and reserved farmlands.

Secondly, urban land fragmentation, especially in peri-urban areas, may be offset by urban led demands for conservation uses that permit various degrees of use. It is therefore recommended that collaborative management approaches that involve communities, the private sector, researchers, and other stakeholders in land decision-making processes for efficient management be adopted.

Thirdly, to control haphazard development in urban environments, it is recommended that conscious efforts should be made at the national, regional, and district levels to develop comprehensive land-use plans to guide urban land management. As part of housing policy, vertical development (storey building) of housing and office accommodation is encouraged rather than horizontal expansion of offices and residential accommodation, which could encourage further sprawl developments.

Moreover, to minimize the negative impacts of land-cover changes on urban ecosystems in the Shai Osudoku District in particular and Ghana at large, it is recommended that Ghana develops an urban development policy. The focus of such policy should be the maintenance a reasonable balance between urban infrastructure development, ecological sustainability, and agricultural production.

Not all, the social (excessive sand winning, land litigation and insecurity) and economic (reduction in crops yield and food supply, reduction in farmers' income and food insecurity) implications of urban sprawl on agriculture should be watched with the lens of urgency and priority. Putting forward the contributions of SODA in food production within the District, the Region, Ghana and the Continents, its land resource, particularly lands for farming should be protected from encroachment. It should be noted that sustainable peripheral agriculture will lead to food security and meeting the dietary needs of many of those at the peripheries and the

urban poor. This, when achieved will help the peripheral residents and the urban poor to improve their health status, provide them the opportunity to be out of poverty as a soaring food prices will render most of them vulnerable, and employment generation.

More importantly, it is recommended that government should as a matter of urgency acquire some parcels of land that would be designated purposely for farming activities in the Metropolitan/Municipal/District Assemblies (MMDAs) where farming is the mainstay of majority of the inhabitants, especially those at the peripheral areas of major cities in Ghana. This is a necessity if Ghana wants to maintain agriculture as the largest employer of its populace. Also, any land acquired by government must be registered fully to avoid encroachment, and compensations fully paid should anybody be affected.

It is also recommended that the Forestry commission in the MMDAs should be equipped with logistics and personnel to combat the activities of chain-saw operators and charcoal burners, who mostly operate at night.

Furthermore, it is also critical to develop the capacity of government institutions responsible for public and private lands administration and development while harmonizing their functions under a single management authority. This planning scheme should also consider a land administration programme at the formulation and implementation stages. This is expected to improve efficiency in land administration throughout the country. Because MMDAs represent decentralized units of administration and planning at local levels, their capacity should equally be strengthened to manage public lands at their respective Assemblies, to ease the pressure of work at National Offices. Institutional bottlenecks that promote duplication and overlapping roles need a strong coordination and cooperation between all land management institutions in the country. This will reduce the cumbersome administrative procedures currently associated with land administration and registration in Ghana as a whole.

REFERENCES

- AACA, (2000): *The Second Five Years (2000-2004) Development Plan*. Addis Ababa: Addis Ababa City Administration.
- Aduah, M. S. and Aabeyir, R., (2012): 'Land Cover Dynamics of Wa Municipality, Upper West Region of Ghana', *Research Journal of Environmental and Earth Sciences*, 4, 6, 658-64. (<http://maxwellsci.com/print/rjees/v4-58-64.pdf>.)
- Agbola, T. & Agunbiade, E. M., (2007): *Urbanization, Slum Development and Security of Tenure: The Challenges of Meeting*. Paper presented to the PRIPODE workshop on Urban Population, Development and Environment Dynamics in Developing Countries, Nairobi.
- Allen, J. C., and D. F. Barnes, 1985: The causes of deforestation in developing countries. *Ann. Assoc. Amer. Geogr.*, 75, 163–184.
- Alonso, W., (1964): *Location and Land Use*. Cambridge: Harvard University Press.
- Atu, J. E, Offiong R. A. & Eja I., (2013): Urban Sprawl Effects on Biodiversity in Peripheral Agricultural Lands in Calabar, Nigeria, *A Journal of Environment and Earth Science*. Vol. 3, No.7, 2013
- Attua, E. M and Fisher J. B., (2010): Historical and Future Land-Cover Change in a Municipality of Ghana. *Earth Interactions*, Volume 15 (2011).Paper No. 9
- Balmer, K. et al., (2005): *The Diggable City: Making Urban Agricultural a Planning Priority*. Prepared for the City of Portland, Portland State University.
- Batty, M., Xie, Y, & Sun, Z., (1999): The Dynamics of Urban Sprawl. (L. Centre for Advanced Spatial Studies (CASA), Ed.) *CASA Working Paper Series, Paper 15*.
- Bentley, S., (2005): *Community Garden Background Paper*. Prepared for the Social Planning Department, City of Vancouver.
- Bhatta B. (2010): *Analysis of Urban Growth and Sprawl from Remote Sensing Data: Advances in Geographic Information Science*, (Springer Berlin Heidelberg).
- Black, J. T., (1996): "The Economics of Sprawl". *Urban Land*. 55(3), pp. 52-53.
- Boserup, E., 1981: Population and development review. *Population and Technological Change: A Study of Long Term Trends*, University of Chicago Press, 21–36.

- Bugri, J. T., (2008): *The Dynamics of Tenure Security, Agricultural Production and Environmental Degradation in Africa: Evidence from Stakeholders in North-East Ghana*. Land Use Policy, Vol. 25, No. 2, pp271-285.
- Byers, B. (2000):“Miambo Ecoregion Reconnaissance Synthesis” *Report Draft Review*, Harare: WWF, SAPRO.
- Cabannes, Y., (2006): *Financing and Investment for Urban Agriculture*. RUAF Foundation/ IDRC/IIRR.
- CARE, (2005): *Annual implementation report*. Accra, Ghana.
- Chase, T. N., Pielke, R. A., Kittel, T. G., Nemani, R. R., & Running, S. W., (1999): Simulated impacts of historical land cover changes on global climate in northern winter. *Climate Dynamics*, 16, 93-105.
- Cheng, G.W., 1999: Forest change: Hydrological effects in the upper Yangtze River Valley. *Ambio*, 28, 457–459.
- Chin, N., (2002): Unearthing the roots of urban sprawl: a critical analysis of form, function and methodology. (L. Centre for Advanced Spatial Studies (CASA), Ed.) *CASA Working Paper Series, Paper 47*.
- Claire, C., (2013): Feeding the Cities: Is Urban Agriculture the Future of Food Security? *Future directions international, Australia*.
- Comprehensive Food Security & Vulnerability Analysis (CFSVA)-Ghana, (2012): Focus on Northern Ghana, wfp.vaminfo@wfp.org
- Couch, C, Karecha, J., Nuissl, .H, & Rink, D., (2005): Decline and sprawl: an evolving type of urban development — observed in Liverpool and Leipzig. *Eur. Plan. Stud.*, vol. 13, no.1, pp. 117–136.
- da Rocha, B. J. and Lodoh, C. H. K., (1999): *Land Law and Conveyancing in Ghana*, Accra, Ghana.
- Daily Graphic, Thursday, 17th April, 2014 issue “Dodowa Chief threatens “war” against Ningos over disputed land”. <http://www.radioxyzonline.com>
- DESA, (2010): *World urbanization prospects*. The 2009 revision highlights. New York: United Nations.

- DESA, (2009): *World population prospects. The 2008 revision highlights*. New York: United Nations.
- DFID, (2002): *Better livelihood for poor people: The role of land policy*. Retrieved July 20, 2006. <http://www.behumankind.biz/resources/learning/landrights/downloads/dfidpol2.rtf>; http://ec.europa.eu/development/icenter/repository/landpolicyconsult_en.pdf.
- District Agricultural Development Unit (DADU) of Shai Osudoku District (SOD), (2013): *Annual Report, Dodowa*.
- Drechsel, P. (2007): *Rural-urban food, nutrient and water flows in West Africa*, IWMI Research Report (in preparation).
- Economic Commission for Africa (ECA), (2009): *Land Tenure Systems and their Impacts on Food Security and Sustainable Development in Africa*. Addis Ababa, Ethiopia. <http://www.uneca.org>.
- Edem, K. T., (2011): *The Integration of Urban Agriculture into Sustainable City Development*. A Case Study of Accra and Kumasi Cities.
- European Environment Agency (EEA), (2006): *Urban sprawl in Europe*. <http://www.eea.europa.eu/main.html>.
- Ewing, R., (1997): Counterpoint: Is Los-Angeles-style sprawl desirable? *J. Am. Plann. Assoc.*, vol. 63, no 1, pp.107–126.
- Ewing, R., Pendall R. and D. Chen., (2002): *Sprawl Scores for 83 Metropolitan Regions*. Washington D. C: Smart Growth America. <http://www.smartgrowthamerica.org/sprawlindex/chart.pdf>.
- FAO, (2011): *World Census of Agriculture: analysis and international comparison of the results (1996-2005)*. FAO Statistical Development Series No. 13. (Columns 3 and 4). Rome.
- FAO, (2008): *Soaring Food Prices: Facts, perspectives, impacts and actions required*. Background paper for the High-Level conference on World Food Security. June, 2008.
- Feder, G., (2000): *Potential and limitations of land markets: Land transactions and market*. Washington, DC: World Bank.
- Feleke, T., (2003): *Urban “Development” and the displacement of Rural communities around Addis Ababa*, Paper presented at the workshop on Settlement and Resettlement in Addis Ababa, Ethiopia, 29-30 January 2003: Ethiopia, Addis Ababa.
- Foeken, D., (2008): *Urban agriculture and the urban poor in East Africa: Does policy matter? In: Inside poverty and development in Africa: Critical reflections on pro-poor policies*, Brill Academic Publishers, Leiden, The Netherlands.

- Frumkin, H. Frank L. and Jackson R., (2004): *Urban Sprawl and Public Health*. Washington, DC: Island Press.
- Fuller, R. A. & Gaston K. J., (2009): *The scaling of green space coverage in European cities*. *Biology Letters*, 5, 352-355.
- Galster, G., Hanson, R., Ratcliffe, M. R., Wolman, H. Coleman, S. & Freihage, J., (2001): Wrestling sprawl to the ground: defining and measuring an elusive concept, *Housing Policy Debate*, vol. 12, no 4, pp.681–717.
- Glaeser, E. and Kahn, M., (2004): “Sprawl and Urban Growth”, (In: J. V. Henderson and J.-F. Thisse (Eds). *The Handbook of Regional and Urban Economics*, Vol. 4, (pp. 2481–2528). Amsterdam: North Holland.
- Ghana Meteorological Agency: Aburi Station
- Ghana Statistical Services, (2015): *Quarterly Report*, Accra, Ghana, July, 2015.
- Ghana Statistical Services, (2012): Population and Housing Census: *Summary Report of Final Results*, Accra, Ghana, 2012.
- Ghana Statistical Service, *Ghana living standard survey*, (2010): Population and Housing Census: Accra, Ghana, 2012
- Ghana Statistical Service, (2007): *Patterns and Trends of Poverty in Ghana-1991-2006*, (Accra).
- Ghana Statistical Service (2000): *Ghana Living Standard Survey (GLSS) 4*, Accra.
- Gilham, O. and Maclean A. S., (2002): *The Limitless City: A Primer on the Urban Sprawl Debate*. Washington DC: Island Press.
- Gordon-Larsen P., (2006): M. Nelson, P. Page and B. Popkin. Inequality in the Built Environment underlies key Health Disparities in Physical Activity and Obesity. *Pediatrics*, 117 (2), pp. 417–424.
- Government of Ghana, (2013): 'Sustaining Confidence in the Future of the Ghanaian Economy', in S. E. Terkper (ed.), *Budget Statement and Economic Policy of the Government of Ghana for the 2013 Financial Year*, (Accra: Ministry of Finance and Economic Planning,), 1-57.
- Gough, K. V., and P. W. K. Yankson, (2000): Land markets in African cities: The case of peri-urban Accra, Ghana. *Urban Stud.*, 37, 2485–2500.
- Hasse, J. E. and Lathrop R. G., (2003): 'Land Resource Impact Indicators of Urban Sprawl', *Applied Geography*, 23, 159-75

- Haase, D. & Nuissl, H., (2007): Does urban sprawl drive changes in the water balance and policy?: The case of Leipzig (Germany) 1870–2003. *Landscape and Urban Planning*, vol. 80, no.1-2, pp.1-13.
- Heilig, G. K., (2002): The Multifunctional Use of Landscapes– Some thoughts on the diversity of land use in rural areas of Europe; Paper presented at 2nd Expert meeting on European Land Use Scenarios, European Environmental Agency, November 25-26, 2005, Copenhagen, Denmark
- <http://www.dangmewest.ghanadistricts.gov.gh/>
- <http://www.modernghana.com/...11/1/sugar-industry-bounces...>
- <http://www.myjoyonline.com>.
- Ikhuoria, I. A., (1999): SPOT satellite detection and analysis of urban spatial growth regimes in a pre-colonial African city. *Geo Carto International*, vol. 4, pp.49-52
- Institute of Statistical, Social and Economic Research (ISSER) (2000, 2011): *The State of the Ghanaian Economy in 2010*. Legon: University of Ghana.
- International Sugar Organization, (2013): London. (www.isosugar.org)
- Intergovernmental Panel on Climate Change, (2000): *Land use, land use change, and forestry Special Report*. Cambridge: Cambridge University Press.
- Jedwab, R., (2011): “Why Is Africa Urbanized But Poor? Evidence from Resource Booms in Ghana and Ivory Coast”, *JEL*, 1-59.
- Johnson, M. P., (2001): Environmental impacts of urban sprawl: a survey of the literature and proposed research agenda. *Environ. Plann. A*, vol. 33, no. 4, pp. 717–735.
- Kasanga, K., & Kotey, N. A., (2001): *Land management in Ghana: Building on tradition and modernity*. London: International Institute for Environment and Development.
- Kasperson, J. X., Kasperson, R. E., & Turner, B. L., (1995): *Regions at risk*. Comparisons of threatened environments. Tokyo: United Nations University Press.
- Kwapong, O., (2009): The Poor and Land: A Situational Analysis of Access to Land by Poor Land Users in Ghana. *Journal of Rural and Community Development* 4, 1 (2009) 51–66.
- Lambin, E. F., Turner, B. L., Helmut, J. G., Agbola, S. B., Angelsen, A., Bruce, J. W., & Jianchu, X., (2001): *The causes of land use and land cover changes: Moving beyond the myths*. *Global Environmental Change*, 11, 261-269.

- Larbi, Odame, W. (2011): Ghana's Land Administration Project: Accomplishment, Impacts and the way ahead. World Bank Conference on Land and Poverty Reduction. The World Bank 18-20 April 2011. Washington D.C.
<http://siteresources.worldbank.org/INTIE/Resources/4754951302790806106/GOV5Paper2Larbi.pdf>.
- Legros, G., Havet, I., Bruce, N. & Bonjour, S., (2009): *The energy access situation in developing countries*. New York, NY: World Health Organization and United Nations Development Programme.
- Lerise, Fred, Lupala, Manoris and Kiunsi, (2004): *Managing Urbanization and Risk Accumulation Processes: Cases from Dares Salaam*. Tanzania, University College of Lands and Architectural Studies.
- Lopez, T. D, Mitchell, A. and Thomlinson, J. R., (2001): Urban expansion and the loss of prime agricultural lands in Puerto Rico, *Ambio: A Journal of the Human Environment*, 30 (1), 49-54.
- Lund, C., (2000): *African land tenure: Questioning basic assumptions*. (Dry lands Issue Paper E100). London: International Institute for Environment and Development.
- Luoto, M., Seppo R., Jyrki A. and Juha P., (2003): Loss of plant species and habitat connectivity in grasslands associated with agricultural change in Finland.
- Main, H., 1995: *The Effect of Urbanization on Rural Environments in Africa*. Wiley, 51 pp.
- Ministry of Food and Agriculture (2002): *Annual Report*, Accra
- Ministry of Land and Forestry (MLF), (1999): *National land policy*. Ministry of Land and Forestry.
- Ministry of Local Government and Rural Development, (2000-2015): A Long term Metropolitan Development Plan for Accra Metropolis (2006-2009). *Executive Summary Report, 2001*.
- Mongabay, (2013): "Ghana - The Economy", in R. Butler (ed.), Ghana – Economy.
http://www.mongabay.com/reference/country_studies/ghana/ECONOMY.html.
- Montgomery, M. R., (2008): The urban transformation of the developing world. *Science*, vol. 319, pp.761-764.
- Mougeot, L. (2000): *Urban Agriculture; Definition, Presence, Potentials and Risks, and Policy Challenges*. IDRC, Cities Feeding People Series. Report 31.
- Mougeout, L. (2006): *Growing Better Cities. Urban Agriculture for Sustainable Development*. Ottawa: International Development Research Center
- Moyo, S. (1995): *The land question in Zimbabwe*. Harare: Sapes Books.

- Mutuga, F. (2009): *The impact of urban growth on a wildlife protected area: a case study of Nairobi National Park*, IIIIEE, Lund University, Sweden.
- Nechyba, T. J. and Walsh R. P., (2004): "Urban Sprawl". *The Journal of Economic Perspectives*, 18 (4), pp. 177-200.
- Nord, M. Andrew, M, and Carlson, S., (2007): Household Food Security in the United States, 2007. *Economic Research Report* No. 66 (ERS-66) November 2008.
- Nwafor, J. C., (2006): *Environmental Impact Assessment for Sustainable Development: The Nigerian Perspective*, EDPCA Publications, Enugu, Nigeria.
- Obosu-Mensah, K., (2002): Changes in Official Attitudes Towards Urban Agriculture in Accra. *African Studies Quarterly*, Volume 6, Issue 3, Fall 2002.
- Ollennu, N. A., (1962): *Principles of Customary Land Law in Ghana*, Sweet and Maxwell, London.
- Olima, Washington H. A., (2003): Urbanization and Housing Challenges. Cities in Africa Conference. *Rapporteur's report*.
- Oluwole, P. D., (2011): *Community Participation and Sustainable Urban Environmental Management in Nigeria, Ile-Ife*: Obafemi Awolowo University Press, pp. 596-610.
- Organization for Economic Co-operation and Development (OECD), (1979): *Agriculture and Biodiversity*, Developing Indicators for Policy Analysis.
- Osborn, F. J., (1965): Preface, In: *Garden Cities of Tomorrow*. (Howard Ebenezer, ed.) Cambridge, Mass: MIT Press.
- Otoo, E. A., D. J. Whyatt, and U. E. Ite, 2006: Quantifying urban growth in Accra metropolitan area (AMA), Ghana and exploring causal mechanisms. *Proc. Fifth FIG Regional Conference on Promoting Land Administration and Good Governance*, Accra, Ghana, Environmental Systems Research Institute, 9 pp.
[Available online at: http://www.fig.net/pub/accra/papers/ts10/ts10_03_otoo_etal.pdf.]
- Oyinloye, R. O, & Adesina, F. A., (2011): *The Paradoxal Effects of Urbanization in Developing Countries. A case study of solid waste pollution in Ibadan City, Nigeria, Ile-Ife*: Obafemi Awolowo University Press, pp. 641-679
- Pankhurst, R., (1962): 'The Foundation and Growth of Addis Ababa to 1935', *Ethiopian Observer* Vol. VI, No. 1, P. 35-36.
- Patrick, B. & Clifford A., (2014): Urban Sprawl and the loss of peri-urban land in Kumasi, Ghana. *World Academy of Science, Engineering and Technology International Journal of Social, Management, Economics and Business Engineering* Vol: 8 No: 1, 2014

- Peprah, K., (2014): Urban Sprawl of Wa, Ghana: Socio-Economic Implications for Small-Holder Farmers. *International Journal of Innovate Research and Development*. Vol. 3 Issue 1
- Pernia, E. M., (1983): *Implications of Urbanization for Food Policy Analysis in Asian Countries*, Resource System Institute East-West Centre Honolulu, Hawaii, USA.
- Powell. J., (2000): *Race, Poverty, and Urban Sprawl: Access to Opportunities through Regional Strategies*. The Institute on Race and Poverty, University of Minnesota.
- Rakodi, C. (1999): A Capital Assets Framework for Analysing Household Livelihood Strategies: Implications for Policy. *Development Policy Review*, 17: 315–342. doi: 10.1111/1467-7679.00090
- Ramirez de la Cruz, J., (2009): “Local Political Institutions and Smart Growth: An Empirical Study of the Politics of Compact Development”. *Urban Affair Review*, 45(2), pp. 218–246.
- Resnik, D. B., (2010): “Urban Sprawl, Smart Growth and Deliberative Democracy”. *American Journal of Public Health*, 100(10), pp. 1852-1856.
- Rimal, B., (2011): Urban growth and land use/land cover change of Pokhara Sub Metropolitan city, Nepal. *Journal of Theoretical and Applied Information Technology*, 26 (22), 118-129.
- Rünger, M., (2008): Governance, Land Rights and Access to Land in Ghana. A Development Perspective on Gender Equity. GTZ, Ghana.
http://www.fig.net/pub/accra/papers/ts01/ts01_02_ruenger.pdf.
- Shai Osudoku District Assembly Report, (2013): *The Trend of Agriculture in SODA, Dodowa*
http://www.ghanadistricts.com/home/?_id=25&sa=3385.
- Sala, O. E., Chapin, F. S., Armesto, J. J., Berlow, E., Bloomfield, J., Dirzo, R., & Huber-Sanwald, E., (2000): Biodiversity. Global biodiversity scenarios for the year 2100. *Science*, 287, 1770-1774.
- Sarpong, George A., (2006): Improving Tenure Security for the Rural Poor- Ghana Country Case Study- Towards the Improvement of Tenure Security for the Poor in Ghana: Some Thoughts and Observations. FAO, Rome.
- Small, C., (2004): Global population distribution and urban land use in geophysical parameter space. *Earth Interactions*, 8 (8), 1-18.
- Song, Y. & Knaap, C. J., (2004): Measuring urban form: is Portland winning the war on sprawl? *J. Am. Plann. Assoc.*, vol. 70, no. 2, pp.210–225.
- Sinclair, R. (1996): Von Thünen and urban sprawl. *Annals, Association of American Geographers*, 57, 71-87

- Sudhira, H. S. and Ramachandra, T.V., (2005): *Integrated Spatial Planning Support Systems for Managing Urban Sprawl*, India.
- Tegenge, G. E., (2000): *Perspectives and issues of urban Development in Ethiopia*, Working Paper No.10, RLDS. Addis Ababa: Addis Ababa University.
- The Ghanaian Chronicles, Monday, 4th May, 2015 issued “*Massive demolishing at Adumanya, a suburb of Dodowa*”. <http://www.myjoyonline.com>.
- Tofowomo, A., (2008): *The Planning Implications of Urban Sprawl in Akure. 44th ISOCARP Congress*
- Town and Country Planning Department, (2015), SODA, Dodowa
- United Nations, (2008). World Urbanization Prospects. *The 2007 revision*. New York; United Nations
- United Nations (1975): *Report of the World Food Conference, Rome 5-16 November 1974*. New York.
- United Nations Food and Agricultural Organization (UNFAO), (2001): *The State of Food and Agriculture UNFAO: Rome*.
- UNFPA, (2007): *Unleashing the Potential of Urban Growth, State of World Population*, New York: UNFPA. http://www.unfpa.org/swp/2007/english/chapter_4/print/chapter_4.html.
- UN-HABITAT, (2012): *Land Tenure Security in Selected Countries*. Global Report on Human Settlements.
- UN-HABITAT, (2010): *Urban trends: urban sprawl now a global problem*. Nairobi: United Nations Human Settlements Programme.
- UN HABITAT, (2009): *Planning sustainable cities – Policy directions*. Global Report on Human Settlements. London: United Nations Human Settlement Programme.
- UN-HABITAT, (2008): *The state of African cities 2008, a framework for addressing urban challenges in Africa*, Nairobi, Kenya
- USDA, (2010): *Food security assessment 2010-20*, Washington, USA
- Von Thünen, J. H., 1826, *Der Isolierte Staat in Beziehung auf Landwirtschaft und Nationalökonomie*, Hamburg, Perthes. English translation by C.M. Wartenberg: *The Isolated State*, Oxford, Pergammon Press (1966).

- Wa Municipal Assembly, (2012): "The Composite Budget of the Wa Municipal Assembly for the Fiscal Year 2012", (Wa: Ministry of Local Government and Rural Development), 1-109. <http://www.mofep.gov.gh/>.
- Wade, I., (1986): *City food, Crop selection in Third World Cities*, San Francisco, Urban Resources System.
- Waite, D., (2009): "It's not Smart Growth". *Gainesville Sun*.
<http://www.gainesville.com/article/20090522/NEWS/905229984>.
- Wolman H., Galster, G., Hanson, R., Ratcliffe, M., Furdell, K. and Sarzynski, A., (2005): 'The Fundamental Challenge in Measuring Sprawl: Which Land Should Be Considered'? *The Professional Geographer*, 57,1, 94-105
- World Bank, (2007): *Agricultural Investment Source book* (First update) World Bank- ARD, Washington, USA
- World Meteorological Organization, (2007): *UN Agency calls for urban agriculture*, WMO press release December 7, 2007
- WiseGEEK, (2003): *What is Urban Sprawl?* Retrieved 06 04, 2013, from wiseGEEK: <http://www.wisegeek.com/what-is-urban-sprawl.htm>.
- Yamane, T., (1967): *Statistics, an Introductory Analysis*, 2nd Ed, New York: Harper and Row, page 258. In Coe, R., (1996): Sampling size determination in farmers survey. *ICRAF-World Agro Forestry Centre-Narobi, Kenya*.
www.Worldagroforestrycentre.org.
- Yoveva, A., Gocheva, B., Voykov, G., Borrisov, B. and Spassov, A., (2000): *Sofia: Urban agriculture in an economy in transition*. In Ambo, M. E. environmental change and urban agriculture: Implication for food security in Calabar Metropolis, South Eastern Nigeria, University of Calabar, Calabar. January, 2008.
- Zana, N. F., Dogkubong, D. R. and Kasim, K. R., (2013): Urbanization and its impact on agricultural lands in growing cities in developing countries, *Modern Social Science Journal*, 2 (2013), No. 2, 256-287.

APPENDICES

APPENDIX I

TABLES

Table 1: Statistics of Major Crops Grown in the Shai Osudoku District (SODA)

Types of Crops	Areas where the crops are cultivated	Cultivable Land (All figures are in hectares)		Annual Production (Tons)		Percentage (%) Exported
		Previous (Up to 2000)	Current (2014)	Previous (Before, 2000)	Current (2014)	
1. Sugar Cane	Asutuare, Dodowa, Sota, Abonya	12,500	2,500	30,000	5	0
2. Banana	Asutuare, Kasunya	3,600	3,680	171,100	172,800	95
3. Pineapple	Dodowa, Odumasi, Ayikuma, Ayenya	50	5	2,500	250	70
4. Cassava	Dodowa, Ayikuma, Agomeda, Asutuare	500	443.2	22,161	8,864	0
5. Mango	Dodowa, Ayikuma, Sota, Abonya, Kodiabe	2,846	2,846	34,152	34,152	70
6. Rice	Agomeda, Asutuare	2,000	1,855	22,000	19,506	0
7. Maize	Dodowa, Agomeda, Asutuare, Kodiabe, Doryumu	7,800	5,230	29,640	18,120	0
8. Pepper	Dodowa, Ayikuma, Kodiabe, Agomeda	3,900	2,176	23,400	19,506	10

Sources:

1. DADU-SODA, (2013)
2. (modernghana.com/...11/1/sugar-industry-bounces...)

Table 2: Socio-Demographic Profile of Respondents

Characteristics	n (%)
Age	
18-25	17(8.5)
26-35	41(20.5)
36-45	52(29.0)
46 and above	90(45.0%)
Sex	
Male	119(59.5)
Female	81(40.5)
Marital Status	
Single	28(14.00)
Married	66(33.0)
Divorced	10(5.0)
Widow/widower	25(12.50)
Co-habiting	71(35.5)
Level of Education	
Basic	107(53.5)
MSLC	18(9.0)
SHS	17(8.5)
GCE O'level	12(6.0)
Tertiary	2(1.0)
None	44(22.0)
Tribe	
Akan	8(4.0)
Ga-Adangme	127(63.5)
Ewe	59(29.5)
Dagombas	29(1.0)
Hausa	49(2.0)
Length of Stay	
2-5 years	15(7.5)
6-7 years	179(8.5)
8-10years	28(14.0)
Over 10years	140(70)

Table 3: Distribution of Period of Engagement in Farming by respondents

	Frequency	Percentage
Years of Farming		
Less than 1 year	6	3
2 - 5 years	37	18.5
6 - 7 years	37	18.5
8 - 10 years	36	18
Over 10 years	84	42

Table 4: Changes in Land Cover and Land Use in the Past Decade in SODA

Significant Changes in Land Cover in the Past Decade		
Reduction in soil fertility	43	79.6
Inadequate rainfall pattern	9	16.7
Don't Know	2	3.7
Perceived Changes in Land Use		
Farm lands are now built up areas	47	64.4
Foodstuff farmers are shifting to tree crops	11	15.1
Farmers are diverting to non-farm business	9	12.3
Few people farming of late compared to the past	4	5.5
Others	2	2.7

Table 6: Perceived Causes of Urban Sprawling in Shai Osudoku District

	Frequency	Percentage
Rural urban migration	187	94.9%
High price of land in Accra city	127	64.5%
Proliferation of estate developers	84	42.6%
Closeness to the capital city of Ghana	38	19.3%
Others	9	4.6%

***Multiple responses**

Table 9: Percent Distribution of Extent of Farmland Loss and Decline in the Annual Food Production

	Frequency	Percentage
Less than 1 acre	17	8.5
Between 1& 2 acres	44	22.0
3-5 acres	14	7.0
6-8 acres	11	5.5
9-10 acres	3	1.5
More than 11 acres	6	3.0

Table 10: Extent of Loss by Urban Sprawl on Annual/Seasonal Crop Yield (N =86)

	n (%)
Less than 1 ton	2.3
1-2 tons	55.8
3-5 tons	11.6
6-8 tons	15.1
9-10 tons	9.3
11 tons and above	5.8

Table 11: The Extent of Effect of urban sprawl on income

	Frequency	Percentage
Effect of Urban Sprawl on Income		
Positively	60	30.0
Negatively	133	66.5
I don't know	7	3.5
Extent of Effect on Scale of (scale 1-5)		
Not at all	60	43.2
Low	12	8.6
Average	21	15.1
High	39	28.1
Very high	7	5.0

Table 12: Percent Distribution of Land Tenure System Verses Ejection of Farmers from Farmlands

	Frequency	Percentage (%)
Means of Land Acquisition		
Through lease/rent	80	40.0
It is gift	15	7.5
Outright purchase	5	2.5
Through inheritance	65	32.5
Abunu/abusa (work and share)	35	17.5
Years of Land Acquisition		
Less than 2 years	29	21.8
Between 3 and 6 years	52	39.1
Between 7 and 10 years	34	25.6
Between 11 and 20 years	14	10.5
Up to 99 years	1	.8
Permanent/forever	3	2.3
Ever received ejection notice		
Yes	40	20.0
No	160	80.0
Reason for Ejection		
For building	25	62.5
The land is sold to different person	14	35.0
Landlord's selfishness	1	2.5

Table 13: Land Tenure ship Problem and its Basis in SODA

	Frequency	Percentage
Ever Confronted with Land Litigation		
Yes	32	16
No	168	84
Basis of Land Dispute		
Among same family members claiming ownership	11	34.4
Two tribes, each claiming ownership	1	3.1
Government claiming ownership	4	12.5
Exorbitant rent charges by landlords	5	15.6
Same land sold to more than one person	10	31.3
Others	1	3.1

Table 14: Suggestions to Protect Food Crop Farmers in Connection with Urban Sprawling

	Frequency	Percentage
Government intervention	113	56.5
Intervention by local land owners	67	33.5
Affected landowner's should be compensated	20	10.0

NB: Apart from Table 1, all other Table are sourced from the field survey, May, 2015

APPENDIX 2

QUESTIONNAIRE

**URBAN SPRAWL, AGRICULTURAL LAND USE AND FOOD SECURITY IN
SHAI OSUDOKU DISTRICT**

Community/Town.....

HOUSEHOLD QUESTIONNAIRE

This Research Instrument is designed to seek relevant primary data for the conduct of an academic study on the topic “urban sprawl, agricultural land use and food security in Shai Osudoku District”. The research is conducted in partial fulfillment of obtaining an MPhil Degree in Geography and Resource Development from University of Ghana, Legon. Your support and co-operation is very much anticipated and please be assured that your responses will be treated with utmost confidentiality.

Please provide the right answers by either ticking or writing in the spaces provided.

Section (1): BACKGROUND INFORMATION OF RESPONDENT**1. Age :**

<i>Code</i>	<i>Response</i>	
1	18-25 years	[]
2	26- 35 years	[]
3	36- 45 years	[]
4	46 years above	[]

2. Sex:

<i>Code</i>	<i>Response</i>	
1	Male	[]
2	Female	[]

3. Marital status:

<i>Code</i>	<i>Response</i>	
1	Single	[]
2	Married	[]
3	Divorced	[]
4	Widow/Widower	[]
5	Co-habiting	[]

4. Level of education :

<i>Code</i>	<i>Response</i>	
1	Basic	[]
2	M.S.L.C	[]
3	SHS	[]
4	GCE O'/A' Level	[]
5	Tertiary	[]
6	None	[]

5. What is your tribe?

<i>Code</i>	<i>Response</i>	
1	Akan	[]
2	Ga/Adangme	[]
3	Ewe	[]
4	Dagbani	[]
5	Hausa	[]
6	Other, specify.....	

Section (2): CHANGES IN LAND COVER/USE**6. For how long have you been in this town?**

<i>Code</i>	<i>Response</i>	
1	Less the 1 years	[]
2	2-5 years	[]
3	6-7 years	[]
4	8-10 years	[]
5	Over 10 years	[]

7. Since when did you start farming on this land?

<i>Code</i>	<i>Response</i>	
1	Less the 1 years	[]
2	2-5 years	[]
3	6-7 years	[]
4	8-10 years	[]
5	Over 10 years	[]

8. Have you experience any change in the land cover or the vegetation?

<i>Code</i>	<i>Response</i>	
1	Yes	[]
2	No	[]

If no, jump to question 12

9. What significant changes have you notice in the land cover or the vegetation for the past 10 years?

.....

.....

.....

10. Have you experience any change in the land use?

<i>Code</i>	<i>Response</i>	
1	Yes	[]
2	No	[]

If no, jump to question 12

11. If yes, what change have you seen?

<i>Code</i>	<i>Response</i>	
1	Farm lands/sites are now build up area	[]
2	Foodstuff farmers are shifting to tree crops, especially mango farming	[]
3	Farmers are diverting to non-farm businesses	[]
4	Few people are into farming of late as compared to the past.	[]
5	Other, specify.....	

12. Have you experienced decrease in your produce over the past ten years?

<i>Code</i>	<i>Response</i>	
1	Yes	[]
2	No	[]
3	Don't know	[]

If no, jump to question 14

13. About what percentage has your produce decreased per season over the past 10 years?

<i>Code</i>	<i>Response</i>	
1	Less than 10%	[]
2	20 to 40%	[]
3	50%	[]
4	60 to 70%	[]
5	80 to 90%	[]
6	Up to 100%	[]
7	None	[]

Section (3): CROPS LIKELY TO BE AFFECTED IN QUANTITY BY URBAN SPRAWL

14. What type of crops do you cultivate? (Tick as many as apply)

<i>Code</i>	<i>Response</i>
1	Vegetables (e.g. Tomato, pepper, etc.) []
2	Root tubers (e.g. Yam, Cassava, etc.) []
3	Tree crops (e.g. Mango, Pear, etc.) []
4	Cereals (e.g. Rice, Maize, etc.) []
5	Other, specify.....

15. How many acres of land have you cultivate so far?

<i>Code</i>	<i>Response</i>
1	Less than 1 acre []
2	1-2 acres []
3	3-5 acres []
4	6-8 acres []
5	9-10 acres []
6	11 acres and above []

16. What is the yield per acre for a season?

<i>Code</i>	<i>Response</i>
1	Less than 1 ton []
2	Between 1-2 tons []
3	3-5 tons []
4	Between 6-8 tons []
5	9-10 tons []
6	More than 11 tons []

17. Which crops have been greatly affected by urban sprawl in quantity?*(Tick as many as apply)*

<i>Code</i>	<i>Response</i>	
1	Vegetables (e.g. Tomato, pepper, etc.)	[]
2	Root tubers (e.g. Yam, Cassava, etc.)	[]
3	Tree crops (e.g. Mango, Pear, etc.)	[]
4	Cereals (e.g. Rice, Maize, etc.)	[]
5	Other, specify.....	
6	None	[]

18. Give reason (s) for your answer to question 17.

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Section (4): FARMERS ADJUSTMENT TO FOOD INSECURITY AND LAND USE/COVER CHANGE

19. Is crop farming your main activity?

<i>Code</i>	<i>Response</i>	
1	Yes	[]
2	No	[]

*If no, skip to question 24***20. What is your reason for engaging in crops farming?**

<i>Code</i>	<i>Response</i>	
1	For home consumption	[]
2	To sell to the local market	[]
3	For export	[]
4	To feed a specific industry	[]
5.	Other, specify.....	

21. Do you do any other work in addition to crops farming?

<i>Code</i>	<i>Response</i>
1	Yes []
2	No []
3	If Yes, state.....

22. What is the scale of your farming?

<i>Code</i>	<i>Response</i>
1	Subsistence []
2	Commercial []

23. Where do you market/sell your farm produce?

<i>Code</i>	<i>Response</i>
1	In the farm []
2	In the local market []
3	Other markets in Accra []
4	Outside Ghana []
5	I don't sell any []

24. How would you classify the Rainfall pattern in the area in the scale of 1-5?*(Tick as appropriate)*

<i>Code</i>	1	2	3	4	5
<i>Rainfall</i>	Very low	Low	Average	High	Highest
<i>Response</i>	[]	[]	[]	[]	[]

25. What would you attribute the reduction in the annual food produce in the Shai Osudoku District to?

<i>Code</i>	<i>Response</i>
1	unreliable rainfall pattern []
2	Change in people's attitudes towards farming []
3	High value of land []
4	Gradual loss of soil fertility/nutrients []
5	Other, specify.....

Section (5): FARMER'S INCOME

26. Is farming your main livelihood activity?

<i>Code</i>	<i>Response</i>
1	Yes []
2	No []
3	If No, state.....

27. Has the urban sprawling negatively affected your farmland?

<i>Code</i>	<i>Response</i>
1	Yes []
2	No []

If No, jump to question 31

28. What is the margin of the sprawling into your farm?

<i>Code</i>	<i>Response</i>
1	Less than 1 acre []
2	1-2 acres []
3	3-5 acres []
4	6-8 acres []
5	9-10 acres []
6	11 acres and above []

29. Has urban sprawl negatively affected your seasonal/annual yield of crops?

<i>Code</i>	<i>Response</i>	
1	Yes	[]
2	No	[]

If No, skip to question 31

30. What is the margin of loss?

<i>Code</i>	<i>Response</i>	
1	Less than 1 ton	[]
2	1-2 tons	[]
3	3-5 tons	[]
4	6-8 tons	[]
5	9-10 tons	[]
6	11 tons and above	[]

31. What percentage of your produce is sold to the general public?

<i>Code</i>	<i>Response</i>	
1	Less than 10%	[]
2	20 to 40%	[]
3	50%	[]
4	60 to 70%	[]
5	80 to 90%	[]
6	100%	[]
7	None	[]

32. How has urban sprawl affected your income?

<i>Code</i>	<i>Response</i>	
1	Positively	[]
2	Negatively	[]
3	I don't know	[]

If positively, skip to question 34

33. How has urban sprawl negatively affected your income in the scale of 1-5?*(Tick as appropriate)*

<i>Code</i>	1	2	3	4	5
<i>Income</i>	Not at all	Low	Average	High	Very High
<i>Response</i>	[]	[]	[]	[]	[]

Section (6): LAND TENURE SYSTEM AND FOOD CROP PRODUCTION**34. How did you acquire your farmland?**

<i>Code</i>	<i>Response</i>
1	Through lease/rent []
2	It is gift []
3	Through outright purchase []
4	Through inheritance []
5	'Abunu'/'Abusa'(work & share) []

*If your answer is 3 or 4, skip to question 36***35. How many years has the land been rented or given to you?**

<i>Code</i>	<i>Response</i>
1	Less the 2 years []
2	Between 3 and 6 years []
3	Between 7 and 10 years []
4	Between 11 and 20 years []
5	Up to 99 years []
6	Permanent/forever []

36. Have you been given notice of ejection either now or in future from the farmland?

<i>Code</i>	<i>Response</i>
1	Yes []
2	No []

37. If yes, to question 36, what was the landlord's reason(s) for ejection?

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38. Have you been confronted with any land litigation issue so far?

<i>Code</i>	<i>Response</i>	
1	Yes	[]
2	No	[]

39. If yes, what was the basis of the dispute?

<i>Code</i>	<i>Response</i>	
1	Among the same family members claiming ownership	[]
2	Two tribes, each claiming ownership	[]
3	Government claiming ownership	[]
4	Landlord's rent charges has been exorbitant	[]
5	The same land has been sold to more one person	[]
6.	Other, specify.....	

Section (7): IMPLICATIONS FOR URBAN SPRAWL ON FOOD CROP

PRODUCTION AND FOOD SECURITY

40. Where is your farm located?

<i>Code</i>	<i>Response</i>	
1	within settlement	[]
2	outside settlement	[]
3	On government land	[]
4	On a reserved farming land	[]

41. What is the average distance from your home to the farm?

<i>Code</i>	<i>Response</i>	
1	less than 100 metres	[]
2	100-300 metres	[]
3	Half a kilometre	[]
4	One kilometre	[]
5	Over one kilometre	[]

42. What is the average distance between your farm and the nearby building?

<i>Code</i>	<i>Response</i>	
1	less than 100 metres	[]
2	Between 100-300 metres	[]
3	Half a kilometre	[]
4	Between 1 and 2 kilometres	[]
	Between 3 and 5 kilometres	[]
5	Over 5 kilometre	[]

43. As the settlement or the township gradually extends into your farmland, what would you do?

<i>Code</i>	<i>Response</i>	
1	Migrate to farmland elsewhere	[]
2	Sell the land and enter into another business	[]
3	Terminate farming	[]
4	Other, specify.....	

44. Do you envisage that in the next ten years the greater part of your farmland or entire farmland could be wiped off by build-up?

<i>Code</i>	1	2	3	4	5
	Strongly agree	Agree	Not sure	Disagree	Strongly Disagree
<i>Response</i>	[]	[]	[]	[]	[]

45. Could the current trend of urban sprawling in Shai Osudoku District affect food security?

<i>Code</i>	1	2	3	4	5
	Strongly agree	Agree	Not sure	Disagree	Strongly Disagree
<i>Response</i>	[]	[]	[]	[]	[]

46. In your view, what is causing the urban sprawling in Shai Osudoku District?
(Tick as many as apply)

<i>Code</i>	<i>Response</i>
1	Rural-Urban Migration []
2	High price of land in the city of Accra []
3	Proliferation of estate developers []
4	Closeness to the capital city of Ghana []
5	Other, specify.....

Section (8): URBAN SPRAWL AND GENDER

47. Who has urban sprawl affected greatly in terms of gender?

<i>Code</i>	<i>Response</i>
1	Men []
2	Women []
3	Can't tell []
4	Both Men & Women []

48. Give reason (s) to your answer for question (47) above

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Section (8): THE ROLE OF STAKE HOLDERS IN PROVIDING LIVELIHOODS SECURITY TO FARMERS

49. Who is providing security to your livelihood asset against urban sprawling?

<i>Code</i>	<i>Response</i>
1	Shai Osudoku Dist. Assembly (SODA) []
2	The Traditional Council in SODA []
3	The Landlords []
4	Nobody []

50. What do you suggest could be done to protect food crop farmers as far as urban sprawling is concern?

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Thank you for your time and wish to reassure you that, information given will remain confidential and be used for academic purpose only.

APPENDIX 3**INTERVIEW GUIDES****URBAN SPRAWL, AGRICULTURAL LAND USE AND FOOD SECURITY
IN SHAI OSUDOKU DISTRICT****A. An Interview Guide for District Agricultural Development Unit-(DADU)**Section (1): CHANGES IN LAND COVER/USE

1. For how long have you been in this town as an officer?
2. Have you experience any change in the land cover or the vegetation?
3. What significant changes have you notice in the land cover or the vegetation for the past 10 years?
4. Have you experience any change in the land use?
5. What change have you seen?
6. Have you experienced decrease in your produce over the past ten years?
7. About what percentage has the District's/company's produce decreased per season over the past 10 years?

Section (2): CROPS LIKELY TO BE AFFECTED IN QUANTITY BY URBAN
SPRAWL

8. What types of crops do the District cultivates?
9. What is the total farmland of the District?
10. What is the current cultivable farm size of the District?
11. Which crops have significantly reduced in quantity?
12. Which crops are heavily cultivated in the District?

Section (3): FARMERS ADJUSTMENT TO FOOD INSECURITY AND LAND USE/
COVER CHANGE

13. How would you classify the farming system in the District?
14. What is the contribution of the District to the national food supply?
15. What is the total produce of these crops: mango, cassava, plantain, etc?
16. Does the food lost enough to cause food insecurity in the District and in the Greater Accra at large?
17. What is the highest land use practice in the District?

Section (4): FARMER'S INCOME

18. What is the highest livelihood activity in the District?
19. About what percentage of the produce are sold to the public/market?
20. About what percentage of the produce is exported?
21. Are the farmers in the District worse off? Why?

Section (5): LAND TENURE SYSTEM AND FOOD CROP PRODUCTION

22. What is the commonest land tenure system in the District?
23. How has the land tenure system affected food production?
24. Is the crop farming in the District sustainable? How?

Section (7): IMPLICATIONS FOR URBAN SPRAWL ON FOOD CROP
PRODUCTION AND FOOD SECURITY

25. What are the implications of urban sprawl on food crop production?
26. How is farming gendered?

Section (8): THE ROLE OF STAKE HOLDERS IN PROVIDING LIVELIHOODS SECURITY TO FARMERS

27. Who are the stake holders of farming in the District?
28. Who provides livelihoods security to the farmers?

B. Expert Interview Guide for Forestry Commission-Dodowa

Section (1): CHANGES IN LAND COVER/USE

1. For how long have you been in this town as an officer?
2. What is the vegetation type of Shai Osudoku District?
3. What is the highest land use practice in the District?
4. Have you experience any change in the land cover or the vegetation?
5. What significant changes have you notice in the land cover or the vegetation for the past 10 years?
6. Is deforestation evident in the District?
7. If yes, what is causing that?
8. Is the crop farming in the District sustainable? How?
9. Is the vegetation in the District endangered?
10. If yes, by who?
11. Who are the forest users in the District?
12. What role is the forest commission in in the District?
13. Who provides livelihoods security to the farmers?

C. An Interview Guide for Farmers' Associations (Mango Growers Association)

1. What is the actual name of your association?
2. For how long have you joined this association?
3. When was this association established?
4. Which people constitute the association?
5. What does the association produces?
6. What is the function of the association?

7. Have you experience any change in the land cover or the vegetation?
8. If yes, what may be the cause?
9. What significant changes have you notice in the land cover or the vegetation for the past 10 years?
10. Have the members been experienced any significant increase or decrease in annual produce over the past ten years?
11. If yes, about what percentage is the increased or decreased per year over the past 10 years?
12. Have you envisaged any expansion of the settlement towards your farm? or
13. Has the farm been encroached upon by build ups for the past 10 years?
14. If yes, what/who is causing the encroachment to the farm(s)? Is it individuals, companies, government, etc?
15. What is the highest land use practice in this town? (Example, farming, rent/leasing for building, quarrying, etc).
16. Is farming your livelihood activity?
17. About what percentage of the produce are sold to the public/market, especially the town folks?
18. About what percentage of the produce is exported?
19. How was the association's plots/lands acquired?
20. Has the company been confronted with any land litigation before?
21. If yes, how is that issue being solved?
22. How has the land tenure system affected the association's production?
23. What would be the implications of urban sprawl on food crop production?
24. What role do the stake holders play in the company's sustainability?

D. An Interview Guide for Some Workers of Golden Exotic Company Ltd-Asutsuare

1. What is the actual name of this company?
2. For how long have you been working in this town?
3. When was this company established?
4. Does the company produce any other product apart from Banana?
5. If yes, mention it/them
6. What is the company's total average production/output per year?

7. Where does the company market/sell its products?
8. Give the percentage of the product that sold internally as well as externally (export).
9. Have you experience any change in the land cover or the vegetation?
10. What significant changes have you notice in the land cover or the vegetation for the past 10 years?
11. If yes, what may be the cause?
12. Have the company experienced any significant increase or decrease in annual produce over the past ten years?
13. About what percentage is the increased or decreased per year over the past 10 years?
14. What is the total size of the farm?
15. How many workers are employed in this farm?
16. What is the gender ratio in the company?
17. What is the distance between this farm and the nearest settlement?
18. Have you envisaged any expansion of the Asutsuare Township towards the farm?
19. Has the farm been encroached upon by build ups for the past 10 years?
20. If yes, can it affect the company's operation in the next ten years?
21. Have the activities of other farmers in any way affecting the company's operation?
22. What is the contribution of the company to the national food supply?
23. Can the absent of this farm cause food insecurity in the District and in the Greater Accra at large? Why?
24. What is the highest land use practice in this town? (Example, farming, rent/leasing for building, quarrying, etc).
25. What is the highest livelihood activity in the town?
26. About what percentage of the produce are sold to the public/market, especially the town?
27. About what percentage of the produce is exported?
28. Are the farmers in the town worse off? Why?
29. How was the company's land acquired?
30. Has the company been confronted with any land litigation before?
31. If yes, has that issue been solved?
32. How has the land tenure system affected the company's production in any way?
33. Is this farm sustainable? How?
34. What are the implications of urban sprawl on food crop production?

35. Who are the stake holders of this farm?
36. What role do the stake holders play in the company's sustainability?

E. An Interview Guide for Castle Gate Estate Ltd

1. What is the name of this Estate?
2. How many acres of land have you acquired for this estate?
3. How many years have you acquired this land?
4. Was there a farm on this land?
5. About how many farmers were on this land?
6. If yes, have they been compensated?
7. Is there any farm nearby?

F. An Interview Guide for Traditional Leader/Assemblyman

1. For how long have you been in this town as an officer?
2. Have you experience any change in the land cover or the vegetation?
3. What significant changes have you notice in the land cover for the past 10 years?
4. Have you experience any change in the land use?
5. What change have you seen?
6. What do you think are the causes of the change?
7. How are lands acquired for farming and other uses?
8. Who are the custodians of the land in this area?
9. Is the crop farming in the District sustainable? How?
10. What are doing to provide a livelihood security to the farmers?

Thank You