Effect of changing urban farming landscape on financing livelihoods and food security of urban farmers' households in Ghana

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Abstract

High rate of concretization of urban areas presents a challenge to the sustainability of urban farms in Accra Metropolitan Assembly (AMA), as farms are outcompeted to built-up areas for residential and commercial purposes. A major result of this concretization is a growing loss of farmlands in the metropolis. Our study explores the effect of urban growth on livelihood financing and food security of urban farming households. This is an exploratory study based on purposive sampling and snowballing techniques to inquiry. This qualitative study uses interview guides (*semi-structured and structured*) to collect primary data from farmers in the Accra metropolis. We bolstered this approach with spatial imagery tool to map out changing farm sizes in the metropolis. We find participants displaying greater wakefulness of the community as a key factor of urban farming in relation to food security, income and employment. This was because of inadequate land use planning and support to urban farmers. Some of the significant challenges identified were limited space for farming, limited resources, continuous increase in buildings and inadequate education. Conscious efforts should be made by the assemblies at all 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 growth in buildings. Moreover, the organization of urban farmer associations is a prerequisite to the improvement of urban agriculture.

Keywords: Urban farming; sustainable livelihoods; sustainable financing; Food security; Ghana;

1. Introduction

Urbanization refers to a process through which an increasing proportion of a country's population becomes concentrated in towns and cities (Dadson, 2012). Urbanization is one of the most widespread anthropogenic causes of the loss of arable land and the decline in natural vegetation cover (Lawson & Laura, 2016). The main causes of urbanization are demographic factors such as, migration, natural increase due to a decrease in mortality rates while birth rates remain high (Gyabaah, 2019).

Urbanization brings about several effects on the environment and the world's urban areas as a whole. These effects includes, destruction of available farmlands for buildings, roads, rails, and other structures causing scarcity of land, increasing environmental problems including various forms of pollution such as air, water and soil pollution (Dadson, 2012). Other effects also include high rates of unemployment and underemployment, increase in lawlessness, insufficient water availability, waste-disposal problems and demands of urban environment among others.

In Africa, the process of urbanization is inevitable and rapid urbanization presents one of the greatest challenges to human security and sustainable development. In many African countries, urbanization has resulted in rapid population growth and concentration of people and industries in few urban areas such as Accra (Ghana), Lagos (Nigeria), Monrovia (Liberia), Abidjan (Cote d'Ivoire) etc. (Nsiah-Gyabaah, 2003). Urbanization in Africa present a great challenge to urban farming and food security in Africa, especially in West Africa. Urban farming is the main source of livelihood of some urban dwellers and constant growth of urban cities seriously threatens availability of land for agricultural purpose (Dabie, 2015). Allocation of agricultural land for residential development has resulted in a reduction in the size and quantity of farmlands. This affects livelihoods of urban farmers as they are left with little or no land to cultivate to feed their families (Campbell & Beckford, 2009).

Urban farmers are the least to get assistance from urban planners as they favor physical developments than farm lands (Chaminuka & Dube, 2017). Countries where urban farms are decreasing rapidly includes, Calabar in Nigeria, Addis Ababa in Ethiopia, Kenya, Zimbabwe, Zambia, etc. (Dabie, 2015). According to, Yohanna et al. urban farmlands in Adamawa State in Nigeria has reduced to 59.17%, the main reason for the reduction of the farmlands is primary due to the development connected with urbanization where rooms were made for houses and commercial activities (Yohanna, Bulus, & Mshelia, 2015).

Further, on the effects of urbanization, Nsiah-Gyabaah asserted that, as urban areas grow and the demand for land increases, it brings about an increase in pressure on farmlands, forests and water resources (Nsiah-Gyabaah, 2003). In addition, rapid urbanization accelerates desertification and environmental change, leading to water scarcity, soil erosion, and climate change. Owusu et al, also noted that, a key effect of the urbanization process is the rapid conversion of large amount of prime agricultural land to urban land use (mainly residential construction), mostly in the urban periphery. Owusu and Agyei continued that, when the physical expansion is not checked and regulated it brings about many serious consequences. These include the segregation of low-income groups in illegal settlements on the worst-located and the most hazardous sites (they would not be permitted to settle on better-located and safer sites) and a patchwork of high- and low density land uses to which it is both expensive and difficult to provide infrastructure and services (Owusu and Agyei, 2007).

Tornyie (2011) explains that, the process of urbanization in Ghana is highly influenced by the movement of people displaced by ethnic conflicts, economic hardship, and civil strife The result of this phenomenon is increasing strive for land and increase land prices (Kwarase, 2017). Fringes of water bodies and green spaces that is mostly used for farms by some urban dwellers has been taken over by physical developers (Tornyie, 2011). The effect on urban farmers and their families are loss of farmlands, unemployment, poverty, malnutrition and health related problems (Korir, Rotich, & Mining, 2015). These effects have implications of food security and achievement of the sustainable development goal two (2), which seeks to achieve zero hunger through sustainable farming and food security.

The contribution of this paper therefore is to explore the effects of urban growth on food security of urban farming households in the dominant decentralized communities in Ghana (Accra Metropolitan Assembly). This has a lot of implications as the importance of urban farms in urban centers in Ghana as explained by Cabannes (2006) includes its provision of income, employment, food, nutrition and revenue to the government. It is therefore important to protect urban farms for sustainable urban cities. Moreover, benefits move beyond just food but also, can help regulate urban floods, improve aesthetic of cities urban cities and help with urban fauna and flora. Per the benefits of urban farms and its importance in helping the world,

achieve food security status. It is important to understand the causes decreasing urban farms in Ghana. This will help understand the challenges faced by farmers and how it affects their livelihoods and the wellbeing of their households. Information on challenges and cause of diminishing urban farming can help design tailored solutions to improve livelihoods of urban farmers.

The paper is organized as follows: Section one is the introduction and set the objective and contribution thereof of the paper. It goes further to draw important implications for the need to undertake such this study emphasizing on financing livelihoods for a sustained for security. Section two-review literature on urban farming, causes of urban landscape change among others. Section three is the material and design of the study. The results of the study are discussed in section four and section five concludes and makes some policy recommendations.

2. Literature survey

2.1 Urban farming

Urban farming is not a recent phenomenon nor is it localized (Webb, 1994). Throughout history and different civilizations, urban populations have engaged in producing some of their food close to their own residence within or outside the city (Sawio, 1998). Food production in urban settlements of the time past has always been part and parcel of the urban economy (Islam & Siwar, 2012). There are plethora definitions for urban farming. Among others, Mougeout defined urban farming as a practice of cultivating, processing and distributing food in or around urban areas. Urban farming can also be defined as the growing, processing, and distribution of food and nonfood plant and tree crops and the raising of livestock, directly for the urban market, both within and on the fringe of an urban area. For the purpose of this study, urban farming refers to the practice of farming activities within the urban certain.

Urban farms are important sources of food for many communities around the globe. Urban farms vary in size from small plots in private yards to larger farms that occupy a number of acres (Dabie, 2015). In 1996, a United Nations report on urban farming estimated that, there are over 800 million people worldwide who grow food and raise livestock in cities. Although some urban farms have paid employees, most rely heavily on volunteer labor, and some are run by volunteers alone while others operate as partnerships with local authorities (Lawson & Laura, 2016). Lawson et al. also noted that, urban farming reflects the varying levels of economic and social development (Lawson & Laura, 2016). It is a social movement for sustainable communities, where organic growers, foodies, and locavores form social networks founded on a shared ethos of nature and community holism. These networks can evolve when receiving formal institutional support, becoming integrated into local town planning as a "transition town" movement for sustainable urban development. For others, food security, nutrition, and income generation are key motivations for the practice. In either case, more direct access to fresh vegetables, fruits, and meat products through urban farming can improve food security and food safety. Urban farms also provide unique opportunities for individuals, especially those living in cities, to get actively involved with ecological citizenship. By reconnecting with food production and nature, urban community gardening teaches individuals the skills necessary to participate in a democratic society (Travaline & Hunold, 2010).

2.1.1 Importance of urban farms

Urban farming has been practiced throughout the world for centuries and is an integrated urban form in many places. They are practiced along city streets, in public gardens, parks schools, and in community gardens and offers many benefits to urban household. (Tornyie, 2011). Urban farming, despite the fact that, they are often overlooked in policy development and by city planners, it is very vital to enhance the health and wellbeing of its citizens (Bentley, 2005). The potential for food production in cities is great and the benefits to cities are many. Dozens of municipalities are demonstrating that urban farming is a necessary and viable urban land use (Tornyie, 2011). Urban farming, 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).

Urban households involved in urban farming are generally more food secure and benefit from a more diverse diet. Studies reveal that in Nakuru, Morogoro and Mbeya (Tanzania) a household's own urban agricultural production was among the most important food source for many urban poor households (Foeken D, 2008, Edem, 2011).

Urban farming expands the economic base of the city through production, processing, packaging, and marketing of consumable products. This results in an increase in entrepreneurial activities and the creation of jobs, as well as reducing food costs and improving quality. Urban farming provides employment, income, and access to food for urban populations, which helps to relieve chronic and emergency of food insecurity (Smit & Nasr, 1992). Chronic food insecurity refers to less affordable food and growing urban poverty, while emergency food insecurity relates to breakdowns in the chain of food distribution. Urban farming plays an important role in making food more affordable and in providing emergency supplies of food. In this case, the rational for urban farming 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 contributes to generating income and employment for many poor urban households (Tornyie, 2011). According to the World Bank, intensive 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 (World Bank, 2008). 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 (Tornyie, 2011).

Further, urban farming is in other cases part of an integrated environmental policy, with its main benefit being the greening of the city. It increases citizens' access to nature, recreation and leisure and their awareness of their environment. Urban farms also increase the access to a healthy environment by reducing the ecological footprint of cities (Cabannes, 2006). Tornyie, further asserted that, urban farming, if well planned and integrated into urban design, it can help to improve the physical climate. The production of trees, shrubs, flowers, and ornamental plants and food crops can beautify the city, cool its climate, curb erosion and absorb air pollution and odors (Tornyie, 2011).

2.1.2 Land cover/use and urban farm

The definition of land use and land cover has been used interchangeably in the land use research community because of the availability of many existing information systems. However, these two terms explain two different issues and meanings. Land use involves the management and modification of natural environment or wilderness into built environment such as settlements and semi-natural habitats such as arable fields, pastures, and managed woods (Prakasam, 2010). Land cover is the layer of soil and biomass, including natural vegetation, crops and manmade infrastructures that cover the land surface. Land covers include, asphalt, snow, grassland, forest, and bare soil, trees, bare ground, water, etc. (see Morshed, 2002).

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 (Fuller, & Gaston, 2009). Changes in both phenomena directly impact biotic diversity and farmlands worldwide (Sala, O. E et al., 2000). 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, remarked that such changes also determine, in part, the vulnerability of places and people to climatic, economic or socio-political perturbations (Kasperson, Kasperson & Turner, 1995).

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 (Dabie, 2015). 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. Urban expansion has increased the exploitation of natural resources and has changed land use and land cover patterns.

DESA (2010), concluded that as the population in the cities increase, people are compelled to move to the urban centers to flee from oppression, unemployment and other problem associated with over population. This intern put unnecessary pressure on the urban areas, thereby distorting the layout and the land use/cover patterns. Dabie, emphasized that, 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 (Dabie, 2015).

2.2 Causes of urban farming landscape change

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 further explains that, since land is needed for several uses in the urban center, its value has shifted from a consideration of its fertility and other favorable biophysical characteristics. The effect of the shift in land valuation has resulted in the acquisition of some of the most suitable agricultural lands for residential developments, in urban center (Dabie, 2015). According to Atu et al, 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, Offiong, & Eja, 2013). Atu et al. continued that, there is 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 farming (Atu, et al. 2013).

The loss of agricultural land to urbanization has become possible because of the high rate of natural population increase and migration of people to a number of towns and cities. Atu et al, made reference to Ghana where this phenomenon is more evident, especially Accra and other major cities. The urban farmer is the most affected in all of these cases since his source of livelihood is dependent on farming (Atu et al. 2013). They 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 because 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 urban lands and minimize landlessness.

2.3 Effects of urban farm degradation

The earth's surface, throughout history and existence, has undergone several changes and modifications at varying space and time scales (Dabie, 2015). Some of the changes occur over short time spans and others over many years; some reversible and others irreversible. The pace, magnitude and spatial reach of direct and indirect alterations of the earth's surface by humans in recent years are astronomical (Lambin, 2001). Lambin et al, posit that land use and land cover change are the most important effectors and outcomes respectively, of human induced earth surface alteration. Again, when urban land use/land cover changes are aggregated globally, both changes are so insidious that they considerably affect key aspects of earth system function (Lambin, Geist, & Lepers, 2003).

Maxwell, asserted that, due to the increasing urbanization, urban farms and vacant lots are being demolished to make way for new buildings. These developments take arable land and push farmers onto land with low fertility and production capacity. Farmers in Hanoi and Accra have already lost land to property developers, which have had a profound impact on the production and sustainability of urban farming in those cities (Maxwell, 1995).

Although studies have demonstrated improved air quality in urban areas related to the proliferation of urban farms, it has also been shown that increasing urban farm degradation (resulting specifically from a sharp rise in the number of automobiles on the road), has led to an increase in insect pests, which consume plants produced by urban farming. It is believed that changes to the physical structure of the plants themselves, which have been correlated to increased levels of air pollution, increase plants' palatability to insect pests. Reduced yields within urban farms decreases the amount of food available for human consumption (Maxwell, 1995).

Other studies also indicate that, the nutritional quality of wheat suffers when urban wheat plants are exposed to high nitrogen dioxide and sulfur dioxide concentrations. This problem is particularly acute in the developing world, where outdoor concentrations of sulfur dioxide are high and large percentages of the population rely upon urban farming as a primary source of food (Bell, Power, Jarraud, Agrawal, & Davies, 2011). These have implications on the nutritional quality of other staple crops that are grown in urban settings (Bell, et al., 2011, McClintock &

Nathan, 2008). Agricultural activities on land that is contaminated (with such metals as lead) pose potential risks to human health. These risks are associated both with working directly on contaminated land and with consuming food that was grown in contaminated soil. To ensure the security of urban farms, they must be legally protected and town planners must learn to incorporate them into the design of cities (Tornyie, 2011).

Moreover, farming which is one of the main sources of livelihood of urban dwellers is seriously being threatened by rapid urbanization because of the problem of scarcity of land for agricultural purposes that has arose. 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 (Dabie, 2015).

2.4 Urban farming and food security

Access to nutritious food, both economically and geographically, is another perspective in the effort to locate food and livestock production in cities. With the tremendous influx of world population to urban areas, the need for fresh and safe food is increased (Obosu-Mensah, 2002). Urban farming, also known as urban farming is a way for urban dwellers to grow their own food, or at least have access to local food (Alkon, Hope, Norgaard, & Marie, 2009). On the other hand, food security means that safe and nutritious food is consistently available, accessible, and reasonably priced. However, urban farming has continuously helped poor people cope with food scarcity and hunger (Beach, 2013). Growing crops or raising livestock in backyards or on undeveloped plots of land improves food sources and offers many urban poor a viable income. Urban farming improves food security by providing healthy and plentiful substitutes for purchased food, especially for poor households. Households that practice urban farming are also more likely to have access to a wider variety of nutritious foods such as vegetables and animal products (Beach, 2013).

Moreover, urban farming expands the economic base of the city through production, processing, packaging, and marketing of consumable products. This results in an increase in entrepreneurial activities and the creation of jobs, as well as reducing food costs and improving quality (Taslimi, Zare, & Zohari, 2018). Urban farming provides employment, income, and access to food for urban populations, which helps to relieve chronic food insecurity (less affordable food and growing urban poverty) and emergency food insecurity (breakdowns in the chain of food distribution). Urban farming plays an important role in making food more affordable and in providing emergency supplies of food (FAO, 2001). In addition, looking at the rate towns and cities are growing rapidly in the developing countries coupled with high levels of poverty and hunger, it is therefore advisable that urban dwellers engage themselves in farming activities to help satisfy their food needs. Also, policy makers have to recognize this as reality and actively seize the opportunities offered by urban farming.

2.5 Changes in technology

Ghana lacks the local technology to enhance productivity in the agriculture sector. Much work under the agricultural sector was still done with outdated practices that do not yield maximum production. The innovation systems needed to enhance technology commercialization are missing in most cases (Kwarase, 2017). The lack of these necessary ingredients within the agriculture sector has been one of the main arguments for the less performance and underdevelopment of agriculture in Ghana and other Africa countries. Many

studies have credited lack of technology as a failure on the part of governments not to compliment research institutions and universities to showcase their innovations to farmers across the country to improve production.

MoFA, report shows there are 17 agricultural manpower development and research support institutions in Ghana yet not much is known about the interventions or technologies being rolled out to both small and large-scale farmers for commercial production in the agriculture filed. This lack of technology has led to a persistent fall in productivity in most of the urban agriculture in Ghana. Innovative technologies must be commercialized to reach both the subsistence farmer and the large-scale "agripreneur" whose goal is to produce more for commercial purposes.

2.6. Conceptual framework for urban farming

The term ''framework'' encompasses the conceptual setting of a study including database resources that provide spatial and/or temporal organization of a specific investigation's context (Foresman, Pickett, & Zipperer, 1997). This presents the framework within which the study is organized. The figure below shows the Conceptual Framework of urban agricultural landscape change and food security. The components in the framework are interconnected.

There are causes that propel changes in the land cover. They include climate influence, population increase, and technological influence among others. It should be noted that population increase goes in tandem with demand for land for building, particularly in the urban centers. 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 areas in the Accra metropolis such as Osu, the demand for land is higher than its price. That is to say, the demand now determines the price of land. 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 causes great changes in the urban agriculture landscape (Dabie, 2015).

Land policies and processes in Ghana facilitate the driving forces (causes). 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 of towns and communities into residential, industrial, farming, reserves and other uses of which AMA is not an exception (Peter, 2015). The aftermath of this is the haphazard expansion of settlements.

According to Sarpong, about 80 percent of Ghana's lands are held under customary land tenure systems. 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. As put forward by Sarpong, 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.

From figure below, institutions and stakeholders influence the driving forces (cause) and land policies and processes. The effectiveness or otherwise of institutions and stakeholders (the government, opinion leader, etc.) largely determine the extent of the operation of the constituents of the driving forces and land policies and processes. For instance, land cover

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.

It should be noted that the livelihood asset of the farmers is the farmlands. Anything that negatively affects 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 above, 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 (AMA) and the nation as a whole. Finally, the effects of food insecurity are enormous. These include hunger, high food prices, poverty, and loss of government revenue and inadequate provision of social amenities.

In sum, the urban agricultural land cover change is driven by land planning institutions and urban land market. These driving forces have positive and negative effects on farmers. These negatively affect the livelihood asset (farmlands). When this happens, it leaves the farmers with no option than 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.

3. Material and Design

In this section, we elaborate on the methodology employed in this study. The section looks at the study area and describes its physical, social and economic properties. In addition, the chapter looks at the Population of the study, sampling method and techniques are discussed. In addition, the study looks at the material and instruments used in collecting data, while it took into consideration the analysis for the various data collected.

3.1 Study area

Accra metropolitan assembly lies within to 5º 35′ 40′′ N and 0º 12′ 5′′ E. Accra metropolis covers a land area of 200 km^2 (Yeboah et al. 2017) and bounded to the north by La Nkwantana Madina Municipal Assembly (LANMA), west, by Ga Central Municipal Assembly (GSMA), east by La Dade Kotopon Municipal Assembly (LADMA) and south by the Gulf of Guinea (see Figure 1).

Accra Metropolitan Assembly (AMA) began as a Town Council and was first established by the Town Council Ordinance of 1894, after the introduction of Native Authorities by the colonial government in 1878 (Accra Metropolitan Assembly, 2018). Accra City Council was dissolved to become Accra-Tema City Council in August 1964 which was designated as the Accra Metropolitan Assembly by PNDC Law 207 in 1993 (Act 462).

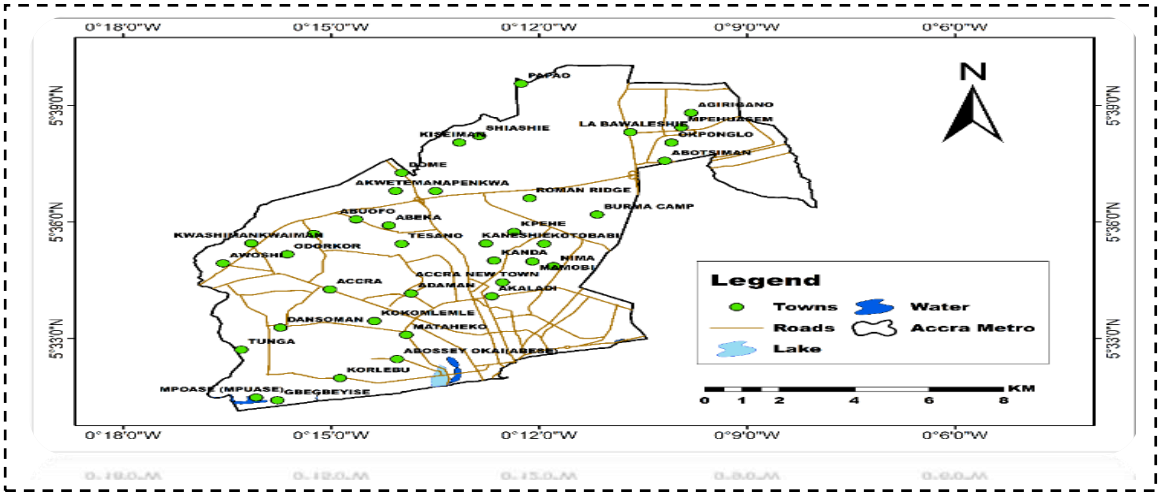
The population of AMA per the Ghana Statistical Service (2014) as 1,665,086, with a growth rate of 3.1%. For effective decentralization at the local level, the Assembly is further divided into six (6) Sub-Metropolitan District Councils as follows; Ablekuma South, Ablekuma Central, Ayawaso Central, Okaikoi South, Osu Klottey and Ashiedu Keteke. There are 13 Electoral Constituencies within the AMA jurisdiction, and these are Ayawaso North, Ayawaso East,

Ayawaso Central, Ayawaso West Wuogon, Okaikoi North, Okaikoi Central, Okaikoi South, Ablekuma North, Ablekuma Central, Ablekuma West, Ablekuma South, Odododiodioo, and Klottey Korley (AMA, 2016).

Physically, the metropolis lies in the tropical Savannah zone (koppens climate classification) with three main types of rocks in three identified geomorphic regions (Yeboah, 2017). The metropolis is characterized by double maxima rainfall seasons with an average annual rainfall is about 730 mm. The first begins in May and ends in mid-July with the second season starting mid-August and ending in October (Armar-Klemesu & Maxwell, 2014). Accra has fairly stable temperature from 24.7°C in August (the coolest) to 28°C in March (the hottest) with an annual average of 27.6°C (Yeboah, 2017). Natural drainage systems in AMA includes, streams, ponds and lagoons (Songo, Korle and Kpeshie). Floodwater drains and gutters are used for grey water, and often drain into the natural systems (Tornyie, 2011). The vegetation type in AMA is made up of coastal scrub and grassland with semi-moist deciduous forest found in the northeastern part of metropolis (Peter, 2015).

The sectors of AMA's economy consist of the primary, secondary (manufacturing, electricity, gas, water, construction) and tertiary sectors (supermarkets, shopping malls, hotel, restaurant, etc.). The tertiary service sector is the city's largest, employing about 531,670 people (AMA, 2016). The second largest, the secondary sector, employs 22.34% of the labor force, or around 183,934 people. 12.2% of the city's workforce are reportedly unemployed, totaling around 114,198 people Accra's smallest economic sector, the primary sector, employs approximately 91,556 people (World Bank, 2008). The predominant economic activities are fishery and urban agriculture, with fishery accounting for 78% of production labor. Urban agriculture in AMA centers on the growth of vegetables, several crops and poultry (AMA, 2018). The fishery industry is the most important sub-sector, with 10% of the catch being exported and the rest consumed locally. The industry is characterized by extreme seasonableness, operating primarily between June and September. Further, the occupational structure of AMA also shows that, 38.5% of residents are also engaged in sales and service, with 20.1 percent as craft and related trade works (World Bank, 2008).

Figure 1. Geographical location of Accra Metropolitan Assembly



Source: AMA Medium Term Development Plan (2019)

3.2 Population

According to Ritchie and Lewis, defining the study population involves two stages, first specifying the characteristics of the collective' units required and then specifying those of the individual(s) required within them (Ritchie & Lewis, 2003). Based on Ritchie et al, explanations of study population, this study have two population. The first population is inhabitants who farm within the AMA. Secondly, the study target persons who have farmed within the metropolis but are no more into farming.

3.3 Sample size and sampling technique

A sample is a portion of a population (Ary, Cheser, & Sorensen, 2010). In this study the researcher does not have a specific population to sample. It however, adopts a purposive sampling and snowballing approach to arrive at the target population. Purposively, the research selects farmers in the metropolis and those who once farmed within the metropolis. It also employed purposive to sample Metropolitan Planner and Agriculture Officer. Snowball was used to identify farmers in the metropolis, still based on the same technique, previous farmers where identified based on referrals.

3.4 Data collection and processing

Content Analysis is the data analysis method used in analyzing the study. According to Patton, content analysis refers to "any qualitative data reduction and sense-making effort that takes a volume of qualitative material and attempts to identify core consistencies and meanings". It describes what had been observed and presents information from conducted interviews (Patton, 2002). It aimed at producing answers to the research questions of the study (Kwarase, 2017). All data from the interviews and focus groups was transcribed using QDA minor lite. The transcriptions, along with field notes and journal entries, were coded according to the themes that emerged from the objectives and the questions that was quested. According to Yin, transcript analysis involved a search for common themes and patterns of words and ideas (Yin, 2009). To these ends, this study used a "code and retrieve" method of data processing. In this method, data is coded according to existing or emerging themes and then "retrieved" or grouped according to these. The code and retrieve method provide new perspectives on existing themes, or new themes may emerge on a subject. Findings from the interviews and secondary data were used to make recommendations to accelerate growth in the agricultural sector.

3.4.1 Data analysis

Data obtained during the survey was transcribed using Microsoft Word software. It was exported later into the QDA minor software for coding based on the themes that emerged from the objectives and the questions that was asked. The QDA minor software was again, used to categorized and summarize the information collected, which helped to ascertain the exact findings from the study area. In addition, the researcher generated a map by digitalized the farmlands of AMA in the year 2001 and 2019 using Google Earth Pro and ArcGIS 10.1 software.

4. Results and Discussion

Urban Landscape Change in AMA

In the Accra Metropolitan Assembly (AMA), the total area of farmlands mapped in the year 2002 was 19.95 km². In 2010 the farmlands reduced to 7.44 km² in size. Farmers interviewed talked about decrease in farm sizes. A farmer at Labadi (LA) bemoaned that:

"…..in those days, I was having about 15 acres of land that I used to farm on every year. Now as you see it, built-up has taken all over and is nearly not more than 1 acre"

Indeed, results from the 2002 to 2019 analysis (see Table 1) shows a significant reduction in farmland cover as the years goes by.

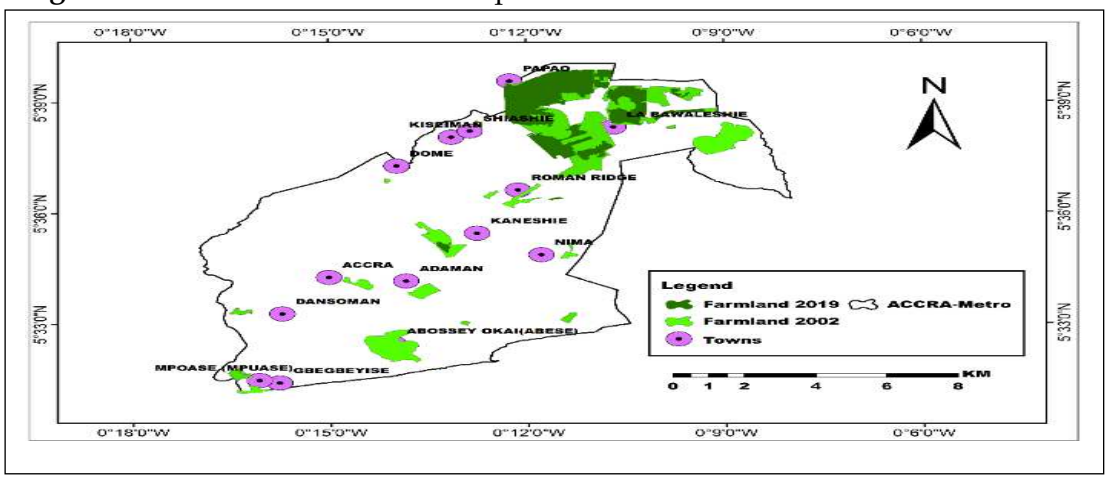
Table 1. Urban Farmland Landscape change

Year (Farmland Size)	Total Area of AMA/km2	Length /m²	Area/ km²	Percentage (%)
2002	139.94	651532	14.95	10.76
2019	139.94	580019	7.44	5.32

Source: Authors' construct (2019).

As shown on the above Table, the total area of the farmlands in AMA in the year 2002 was 14.95 km² representing 10.76% and 7.44 km² representing 5.3% in 2019. It was revealed that between 2002 and 2019, farmlands have lost a total land size of 7.52 km² representing 9% which were potential farmlands to built-up and other land use (see Figure 2). These findings are quite different from what other studies have revealed. For instance, Peter saw an increased in cultivated land mainly due to more engagement in mechanized farming, especially in the northern part of SODA. Further, it can be deduced that, places that were initially occupied by farmlands have been taken over by buildings. This is due to rapid increase in population, the desire to own houses as well as introduction of numerous estate developers.

Figure 2. Loss of farmland to built-up land use



Source: AMA Medium Term Development Plan (2019).

From the maps (Figure 1 and 2), it can be seen that, there were more farmlands in the year 2002 than that of 2019. This is of the fact that much of these farmlands have been used for built-ups. These processes are continuous until all farmlands are eventually wiped away by

buildings. From the maps it can be seen that, there were more farmlands in the year 2002 than that of 2019. This is of the fact that much of these farmlands have been used for built-ups. These processes are continuous until all farmlands are eventually wiped away by buildings. Our finding confirms what was done by Appeaning (2010) and Odame (2019) in Accra Asante Akim south respectively.

Causes of urban agric. landscape changes in Accra Metropolis

Urban growth

Our observation however did show 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 built-up. One of the farmers at LA said:

> *"…the issue of built-up has been a major challenge to not only me but also to all the farmers in this metropolis. Formally, all this place was a farmland but now people has built their houses on them. Now even we are not free because, people are still claiming ownership of the ones left. It has affected the size of my land that was 10 acres when I started farming to nearly 1 and half acres'"*

This issue of increment of built-up has resulted in declining of crop production in the study area as was revealed from the survey. The major challenge to the viability of urban agriculture, as highlighted by all the respondents remains land availability and access. Urban growth has intensify the competition for land among industrial, commercial, residential and agricultural uses, especially in the peri-urban transition and urban areas. In an instance, high levels of in-migration and urban growth in Accra have resulted in increased land prices and pressure on agricultural land, with many converting agricultural land to non-agriculture uses. In Accra, finding larger areas of land seems to be the most common problem by farmers, especially those located in AMA.

Respondents who have lost between 5 and 10 acres represent majority of the farmers interviewed. Majority of the respondents were found to have lost at least 5 acres of land to built-up. From the survey, a lot of people who were once farming has lost their entire farmland in all the communities the researcher visited during the observation period in the metropolis. This findings once again sides with study of Dabie (2015) in SODA, where respondents who have lost between 1 and 2 acres represent 22%. According to Dabie (2015) majority of the respondents were found to have lost at least a parcel of land to urban sprawl. However, the case of SODA is quite different since none of the respondents has lost his/her entire farmland in all the communities visited in SODA.

Otoo, Whyatt, and Ite (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 increasing infrastructural 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 built-ups.

When the respondents were asked about the benefits of urban growth, they unanimously agreed that, there is no benefit of urban growth to farmers. It was inferred that, urban growth has no positive impact on the urban farmers in the metropolis since, it has been continuously

taken their lands. The questions the farmers keep on asking was that, if their land is taken for buildings, where are they going to farm?

Changes in crop yield

The farmers posed that much of land acquisition problems was a reason for these changes in productivity. One of the farmers at Burma camp on this issue explained that:

"…formally the land was very rich in nutrient due to the fallow period that was practice then, and this led to high productivity but now land is short in supply hence we are only depending on the few that is available without observing fallow period and this has led to loss of nutrient and low productivity"

This calls for interventions, as they would always continue to be sidelined in the bid for land. From the survey, majority of the respondents agreed to the fact that, there has been a drastic change in crop yield over the years. These massive changes was associated to several reasons. According to the interviewees, one of the reason was that, land value has increased more than thousand folds over the past 5 years. An acre of land that was rented for farming in the year 2010 at GHC100.00 per year is now going for between GHC 400.00 and GHC1000.00 in 3 months. This concur the observation by Dabie (2015), who showed that, land in the Central Business District attracts higher values than those at the peripheries. 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 now is expensive, food production has reduced because the cost of production has increased. Another reason given by farmers interviewed was rain dependent water supply that was inadequate. One of the farmers at LA recounted that:

"The change in crop yield was brought about by inconsistency in rainfall. Now the weather has change and the rain does not even fall during it season. To adapt to this situation, it has compelled me to reduce the intervals I used in planting. This has resulted in an increased in the seeds I used to plant. For instance, I was using 2 bottles of the seed for 1 acre but now am using 4 bottles for that same 1 acre"

When respondents were asked about the reasons for the changes in the crop yield, almost all the people associated it to the irregularity of the rainfall. They made it clear that rainfall in this recent time has not been favorable to their farming processes and hence, it has contributed to low productivity even though there were alternatives. This revelation by the farmers was quite different from that of Dabie (2015) who concluded 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.

Some of the farmers added that, rainfall contains certain minerals, which boost the productivity of crops, as well as helps the land to regain its fertility. Thus, in so far as there has been a tremendous decline in rainfall, so as productivity will also decline. Some of the reasons also includes loss of soil fertility, over usage of the land and certain chemicals, and high cost of farming equipment.

Changes in technology

Responses from the farmers also revealed there has been several changes in the mode and the technology used in farming over the years. They attributed the changes in technology to the

changes in quantity produced. Some said, there has been an application of certain chemicals like fertilizers, pesticide, herbicides and many more. Thus, positive change in quantity produced now depends on the amount of chemicals you will apply on the crop. A respondent to this issue said:

"Continual use of the land and more so the chemicals that we have been using have over powered the land because when we started those days, there were no herbicide. Weeding was done manually and when it becomes impossible, we call the laborers to come and help us. But now you just stand up and say I want to kill these grasses and get your sprayer knowing, it is destroying the land"

In spite of the changes in technology, some of the respondent also said they are still holding to their technology that they started farming with and therefore there has not been changes in technology. This assertion support that of Coelli, and Rao (2005), who saw African countries having a technology regression while the developed economies have technology progress. In addition, Kwarase (2017) also found out that, Ghanaian farmers lacks the local technology to enhance productivity in the agriculture sector. Moreover, much work under the agricultural sector was still done with outdated practices that do not yield maximum production. The innovation systems needed to enhance technology commercialization are missing in most cases.

Changes on food security and livelihood financing of urban farmers

Responses from the farmers' further reveals that, increase in built-up and unreliable rainfall are the reasons for the decline in food production in AMA. One of the farmers at Chado explained that:

"With the issue of built-up is a big problem that I don't want to talk about it again. It has taken up the farmlands of many farmers in this community and has rendered them jobless. Like I said ….this entire place was the land I was farming on and now you can see it has left me with about only 1 acre of land which has greatly affected my productivity"

We also found from the respondents that persistent increase in built-up and unreliable rainfall are the major reasons for the decline in food production in the metropolis. In the interview with the farmers, they hinted that the increase in built-ups has robbed most farmers of their farmlands. This findings was also confirmed by that of Peter (2015) who the perpetuation of urban sprawl to be the key factor that reduce food production and eventually lead to food insecurity. On the contrary to the studies conducted by Peprah (2014), on urban expansion in Wa has rather encouraged the extensive livestock rearing at the periphery communities. In the words of Peprah (2014) emphasized that, the expansion has made peripheral livestock farmers closer to human settlements, thereby improving their security (see Baah-Ennumh, & Forson, 2017; Baah-Ennumh, Forson & Mmbali, 2020).

One thing the farmers 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 walls are guarding them.

Furthermore, it became evident that people's attitude towards farming has changed of late. They stressed that, people's attitude has changed primarily due to increase cases of land litigation and confrontations of farmers in the Metropolis. Dabie (2015) in his study at SODA

also found this same phenomena of change in attitudes towards farming in urban areas in SODA. However, this finding is opposite to that of Bon, Parrot, and Moustier (2010), who saw a growing attention and increasingly positive attitudes towards urban agriculture. Moreover, the respondents also mentioned gradual decline of soil fertility due to continuous cropping 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. A significant contribution can be made by urban agriculture to the economic and wellbeing of urban residents. This study found that urban agriculture promotes food security of households living in the urban certain. Through creation of production processes and marketing of produce, the study further found that urban agriculture provides employment and promotes Savings for the urban farmers. This concurs with a study by Veenhuizen (2006), who found that urban agriculture supports rural food production, and that it also contributes to the supply of food in the cities.

According to some of the farmers that was interviewed, farming has contributed significantly in meeting their food requirements especially those who had no other means of survival. This is of the fact that, farmers can obtain other foodstuffs such as plantain and cassava rather than buying foodstuffs. As narrated by some farmers, farming has saved households income by eliminating the need to buy food from the market. Some urban farmers stated that farming also acts as a source of revenue by selling their maize grain and other crops to the market thereby obtaining some revenue. This revelation also side with the analysis of Diao (2010), who revealed that, crop production or the crop sub-sector is the most important sector or activity of many households in rural areas as it serves as an income generating activity and as a source of income.

However, from the responses, all of the people who responded to the interview on 'how supportive farming was to their livelihood and family' recounted that farming was supportive and furnishing. They made it clear that, farming has helped them to send their children to school and catered for their needs as well as the livelihood of the family. One respondent emphasized that, if not farming, he would not have sent his children to school. The findings are in line with that of Game, and Primus (2015), who stated that urban agriculture provides a mechanism for improving urban food security and providing entrepreneurship opportunities for low-income individuals.

Almost all the farmers emphasised that, currently, farming is still supportive but not as compared to when they started farming. The reason being that, the land has almost been taken up by built-up. They added also that, it was because of lost in soil fertility that was cause by over utilization of some chemicals.

Effects on urban farming

We also found out that because of the galloping nature of built-up, most of the farmers in the metropolis have lost their land completely. The narration from the respondents indicate that, most of the farmers in the metropolis are now out of farming because their land that some of them has worked on it for more than 40 years was taken over by buildings. Some of the respondents narrated that their lands was taken for built-up without them being compensated. One respondent sadly narrated his story as:

"I stopped farming because my land that I used to farm on was taken from me by the military command for built-up. Even my maize that I have planted was destroyed by the military people without giving me anything"

Quite a number of factors have contributed to the decline of urban agriculture amongst the urban dwellers in AMA. From the narrations given by respondents, the practice of urban agriculture has been influenced by rapid population growth and increase in built-up. According to the respondents, many people have migrated from rural areas to the city of Accra, resulting in the urban population soaring and encroachment into fertile farmland by buildings.

This has however increased the rate of built-up in the metropolis. This findings support that of Appeaning (2010) who also found out that, Population increase due to rural-urban migration and natural increase, coupled with infrastructure developments are competing with urban farming for available space and scarce resources such as water for irrigation. Also, 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 such as farmlands. This clearly shows that built-up has been the main reason why the farmers in the metropolis has got out of farming. Since there is no land for them to farm on.

The effect on crop

It was surprising to identify a maize farmer who has lost about half of his 10-acre maize farm to built-up. He estimated the loss to be around 50 bags of maize. 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 the person who bought the land"*

In terms of changes in the quantity produce, the survey further investigated into the extent of loss they have experienced. About 90 percent of the respondents narrated that they have experienced great reduction or loss in their seasonal yields. Out of these 14 affected farmers, 12 of them have lost between 3 and 5 ton annually. This is not quite different from the findings of Dabie (2015) in SODA. Dabie (2015), found out that 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 tons annually/seasonally. Also, they survey indicates that, few of the 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 built-up. There was another instance where 3 okra farmers who used to produce about 2 tons of okro have lost about 90% of their farmlands to Estate developer.

Effects on income

With the evident received from the respondents on the extent of loss of yield, it revealed that all farmers interviewed have been battling with an increase in built-up into their farmlands. A greater number of farmers have been affected negatively at the time of the interview, yet they expressed optimism that much of them will be affected in the nearby future looking at the demand for land, and the rate of expansion of the AMA and its neighboring areas. Among the said affected, 90% of them mentioned that their income is also extremely affected (very high) by the activities of urban growth.

When farmers were quest about the measures they employed to survive with their family, majority of the respondents responded by stating categorically that, farming was their source of

income that they were depending on it when crop yield is low. And that, they were also using the food that they were getting from the farm to support the family when there is no money". This assertion was confirmed by Obosu-Mensah (2002), who gave an account of one cultivator in his interview at Osu. The cultivator recounted the event as:

"When we received the order we came together and sent a petition to the President. We told him that we are law-abiding citizens with no source of income aside from the income we get from farming. Since we are not rich enough to buy land to cultivate, we cultivate public land near the Castle. Now the Department of Parks and Gardens say it is their land so we should quit. What shall we live on if we stopped farming?"

In as much as people's demand for land has not dropped, and population increase is sustained, farmlands would continue to decrease through encroachment of building. When the farmlands are affected, crops yield (output) is reduced and the resultant effect would be reduction in farmer's income, which would go a long way to affect how they are able to finance their livelihoods leading to poverty.

5. Conclusion and Recommendations

The study researched into the effect of changing urban farming landscape on financing livelihood and food security of urban farmers' households. It was acknowledged in this study that; AMA is experiencing rapid population increase, which has led to high rate of urban growth. Considering the period of seventeen (17) years, that is, from 2002 to 2019 and using Google Earth Pro software supported by field survey data, the research has shown that farmland landscape within the AMA is decreasing at the rate of 5.44% per annum. This has caused drastic reduction in access to agricultural land and has threatened food security in the study area. This however shows that in the next few years to come the entire farmlands in AMA will be lost. Again, most of the expansion in human settlements has been experienced within the study area and has involved in a rapid loss of hitherto arable farmlands and current croplands. Interestingly, while the farmland cover declined, urban physical infrastructure expanded enormously within the period.

Apart from the natural increase in population, there are other factors causing rapid urban land cover change in the study area. These include migration, high price of land in the city of Accra, proliferation of estate development and the Metropolis being the capital city of Ghana. Economically, urban growth has led to a 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, and loss of government revenue and inadequate provision of social amenities in the study area and beyond.

Finally, the study's findings have confirmed built-up encroachment on hitherto urban agricultural lands. The reduction in farmers' farmlands because of increase in built-ups has subsequently threatened food security in the study area. 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. 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.

Inferring from these findings, the study makes a number of recommendations. First, the study proposes the need for adequate planning strategies to be formulated by the town planners in AMA in order to properly monitor and control the uncoordinated land occupation such as the extension of built up area into natural reserves and farmlands. Secondly, conscious efforts should be made by the assemblies at all 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 growth in buildings. Moreover, the organization of urban farmer associations is a prerequisite to the improvement of urban agriculture. Programs such as *From Seed to Table* (FSTT) ought to be intensified. This will help improve the production and marketing of lettuce and other vegetables, including direct sale to restaurants and at farmer kiosks.

Reference

Accra Metropolitan Assembly. (2016). *The composite budget of the Accra Metropolitan Assembly*. Accra, Ghana.

Alkon, Alison Hope, Norgaard, & Kari Marie. (2009). *Breaking the food chains: an investigation of food justice activism*. *79*(3), 289–305. https://doi.org/10.1111/j.1475-682x.2009.00291.

AMA – Accra Metropolitan Assembly. (2018). retrieved from ama.gov.gh/welcome/

Atu, J. E, Offiong R. A, & Eja I. (2013). urban sprawl effects on biodiversity in peripheral agricultural lands in Calabar, Nigeria. *Journal of Environment and Earth Science*, *3*(7).

Baah-Ennumh, T.Y., & Forson, J. A. (2017). The Impact of Artisanal Small-Scale Mining on Sustainable Livelihoods: A Case Study of Mining Communities in the Tarkwa-Nsuaem Municipality of Ghana. *World Journal of Entrepreneurship, Management and Sustainable Development*, *13*(3), 204–222. https://doi.org/http://dx.doi.org/10.1108/WJEMSD-09-2016-0042

Baah-Ennumh, T.Y., Forson, J.A., & Mmbali, O. S. (2020). Sustainable Livelihoods in Artisanal Small-Scale Mining Communities: a Case Study of Tarkwa-Nsuaem Municipality of Ghana. *Global Social Welfare*, *7*(1), 81–95. https://doi.org/10.1007/s40609-017-0093-5

Balmer, k. (2005). the diggable city: making urban agricultural a planning priority. *Portland state university*.

Bell, J. N.B, Power, S. A, Jarraud, N, Agrawal, M, & Davies, C. (2011). The effects of air pollution on urban ecosystems and agriculture". *International Journal for Sustainable Development & World Ecology*, *18*(3), 226–235.

Bentley, S. (2005). *Community garden background paper. prepared for the social planning department, city of Vancouver.* Colombia: School of Community and Regional Planning, University of Colombia.

Cabannes, Y. (2006). financing and investment for urban agriculture. *RUAF foundation/ idrc/iirr.*

Chaminuka, & Dube. (2017). urban agriculture as a food security strategy for urban dwellers: a case study of Mkoba residents in the city of Gweru, Zimbabwe. *International Journal of Social Sciences*, *3*(2), 2645.https://doi.org/https://dx.doi.org/10.20319/pijss.2017.32.2645

Maxwell, D. (1995). Alternative food security strategy, a household analysis of urban agriculture in Kampala, world development. *a Journal of Environment and Earth Science*, *23*(10), 1669. https://doi.org/10.1016/0305-750x(95)00073-l

Dadson, I.Y. (2012). *Integrated human and regional geography*. Accra, Ghana: salt & light.

David William Olivier. (2015). *The physical and social benefits of urban agriculture projects run by non-governmental organizations in cape town* (dissertation). Faculty of Arts and Social Sciences at Stellenbosch university, South Africa.

Donald A., Cheser-Jacobs, J, & Sorensen, C. (2010). *Introduction to research in education* (8th ed.). USA: wads worth, Cengage learning.

Donovan, C., & Clinton, B. (2009). *Negotiating uncertainty: Jamaican small farmers' adaptation and coping strategies, before and after hurricanes – a case study of hurricane dean*. *1*(4), 1366–1387. https://doi.org/10.3390/su1041366

Ericksen, P. J. (2007). Conceptualizing food systems for global environmental change research. *a Journal of Environment and Earth Science*, *18*(1), 234–245.

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*. Leiden, the Netherlands: brill academic publishers.

Food and Agriculture Organization of The United Nations. (2001). *Urban and peri-urban agriculture, household food security and nutrition*.

Yeboah, F., Awotwi, A., Forkuo, E.R., & Kumi, M. (2017). Assessing the land use and land cover changes due to urban growth in Accra, Ghana. *journal of basic and applied research international*, *22*(2), 43–50.

Fuller, R. A, & Gaston K. J. (2009). The scaling of green space coverage in European cities. *European Journal of Basic and Applied Science*, *5*, 352–355.

Ghana Statistical Service. (2014). *2010 population and housing census* [district analytical report].

Heilig, G. K. (2002). *The multifunctional use of landscapes– some thoughts on the diversity of land use in rural areas of Europe*. European Environmental Agency presented at the 2nd expert meeting on European land use scenarios, Copenhagen, Denmark.

Jac Smit, & Joe Nasr. (1992). Urban agriculture for sustainable cities: using wastes and idle land and water bodies as resources. *a Journal of Environment and Earth Science*, *4*(2), 141–152. https://doi.org/10.1177/095624789200400214

Ritchie, J., & Lewis, J. (2003). *Qualitative research practice: a guide for social science students and researchers*. London • thousand oaks • New Delhi: Sage publications.

Nsiah-Gyabaah, K. (2003). *Urbanization, environmental degradation and food security in Africa*. presented at the global environmental change research community, Montreal, Canada.

Kasperson, J. X, Kasperson, R. E, & Turner, B. L. (1995). *Comparisons of threatened environments.* Tokyo: United Nations University Press.

Travaline, K., & Hunold, C. (2010). Urban agriculture and ecological citizenship in Philadelphia, local environment. *the International Journal of Justice and Sustainability*, *15*(6), 581–590. https://doi.org/10.1080/13549839.2010.487529

Gyabaah, K. (2019). *Location of industries*. presented at the lecture, Winneba.

Kortright, R., & Wakefield, S. (2011). Edible backyards: a qualitative study of household food growing and its contributions to food security. *Springer*, *28*, 39–53. https://doi.org/10.1007/s10460-009-9254-1

Obosu-Mensah, K. (2002). Changes in official attitudes towards urban agriculture in Accra. *Journal of African Studies*, *6*(3), 26.

Lambin, E. F, Geist, H. J, & Lepers, E. (2003). *Dynamics of land-use and land-cover change in tropical regions*, *28*(1), 205–241.

Lambin E.F, Turner B I, Geist H, Agbola S, Angelsen A, Bruce J, … Folke C. (2001). (2001) Our emerging understanding of the causes of land-use and land cover change. *Journal of Global Environmental Change*, *11*, 261–269.

Lawson, & Laura. (2016). Agriculture: sowing the city. *Springer*, *540*(7634), 522–524. https://doi.org/10.1038/540522a

Armar-Klemesu, M., & Maxwell, D. (2014). *Accra: urban agriculture as an asset strategy, supplementing income and diets* (case study). Accra.

Mcclintock, & Nathan. (2008). *From industrial garden to food desert: unearthing the root structure of urban agriculture in Oakland, California*. UC Berkeley: institute for the study of societal issues.

Beach, M. (2013). Urban agriculture increases food security for poor people in Africa. retrieved from https://www.prb.org/urban-agriculture-poor-africa

Owusu, G, & Agyei, J. (2007). *Changes in land access, rights and livelihoods in peri-urban Ghana: the case of Accra, Kumasi and tamale metropolis*. Accra: ISSER.

Patton, M. (2002). *Qualitative research and evaluation method*. California: thousand oaks: sage.

Peter Kofi Dabie. (2015). *Assessing the impact of urban sprawl on agricultural land use and food security in Shai Osudoku District*. University of Ghana, Legon, Accra.

Prakasam C.
(2010).Land use and land cover change detection through remote sensing approach: a case study of Kodaikanal Taluk, Tamil Nadu.*International Journal of Geomatics and Geoscience s*, *1*(2), 151.

Kwarase, P.K. (2017). *Analyzing trends in agricultural output in Ghana 1995 2015: underlying causes and options for sustainable growth*.

Rabiul Islam, R., & Siwar, C. (2012). The analysis of urban agriculture development in Malaysia. *Research Gate*, *6*(3), 1068–1078.

Sala, O. E, Chapin, F. S, Armesto, J. J, Berlow, E, Bloomfield, J, Dirzo, R, … Wall D. H. (2000). Global biodiversity scenarios for the year 2100. *Journal of Science*, *287*, 1770–1774.

Salome C. R. Korir, Jacob K. Rotich, & Pacifica Mining. (2015). Urban agriculture and food security in developing countries: a case study of Eldoret municipality, Kenya. *European Journal of Basic and Applied Science*, *2*(2).

Sawio, C.J. (1998). *Urban agriculture in Tanzania: its role, planning and management implications university of dar es salaam paper prepared for an international conference on urban agriculture, conference center of Technikon Pretoria.*

Siamak Taslimi, Parto Zare, & Tony Zohari. (2018). Urban farming. Retrieved august 9, 2019, from the educator's website: www.theeducators.co/2018/01/08/urban-farming/

Morshed Anwar, S.K. (2002). *Land use change dynamics: a dynamic spatial simulation*. Asian Institute of Technology School of Advanced Technologies Thailand, Thailand.

Timothy W. Foresman, Steward T. A. Pickett, & Wayne C. Zipperer. (1997). Methods for spatial and temporal land use and land cover assessment for urban ecosystems and application in the greater Baltimore Chesapeake region. *Springer*, *1*, 201–216.

Webb, N. (1994). *Urban open space: potential for productive utilization paper: urban vegetable production in the eastern cape.*

World Bank. (2008). *Africa region working paper*. retrieved from 37. http://www.worldbank.org/afr/wps/wp110.pdf

Yin, R. K. (2009). Design and methods. *thousand oaks, ca: Sage publications.*, *5*.

Yohanna Peter, Bulus L. Gadiga, & Alfred D. Mshelia. (2015). Land use/landcover change detection of Mubi metropolis, Adamawa state, Nigeria. *Sky Journal of Soil Science and Environmental Management*, *4*(6), 070–078. retrieved from http://www.skyjournals.org/sjssem