UNIVERSITY OF CAPE COAST

AGRICULTURAL LAND USE CHANGE AND EMERGING PATTERNS OF LIVELIHOODS IN PERI-URBAN WA, GHANA

IBRAHIM ABU ABDULAI

2020

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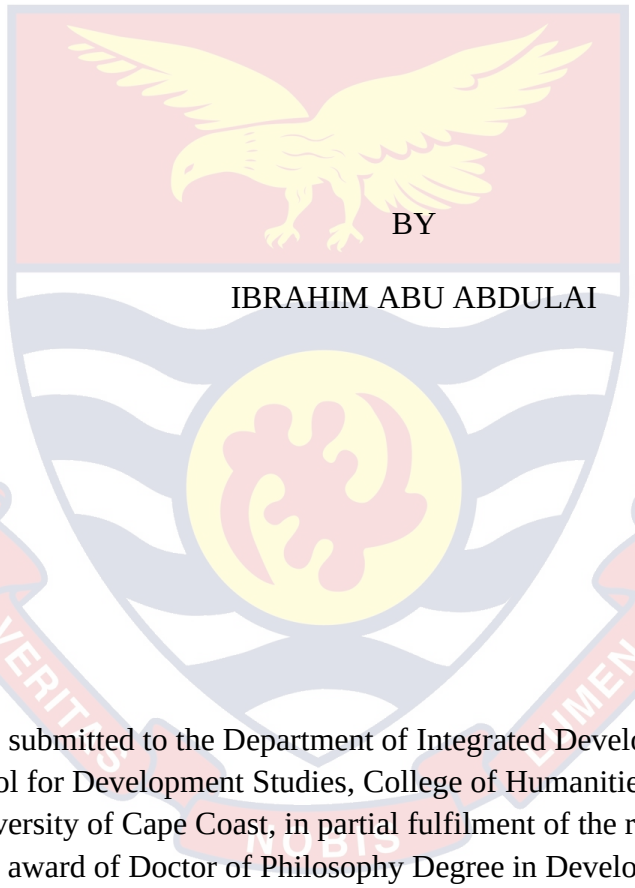

BY

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Thesis submitted to the Department of Integrated Development Studies of the School for Development Studies, College of Humanities and Legal Studies, University of Cape Coast, in partial fulfilment of the requirements for the award of Doctor of Philosophy Degree in Development Studies

SEPTEMBER 2020

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature.....Date.....

Name: .....

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature..... Date.....

Name: .....

Co-Supervisor's Signature.....Date.....

Name: .....

ABSTRACT

Fertile agricultural lands are disappearing in peri-urban areas due to encroachment from urban dwellers. This study, therefore, considered agricultural land use change and emerging patterns of livelihoods in the peri-urban areas in Wa, Ghana. The mixed research approach was deployed in the study. Specifically, the sequential explanatory mixed research constituted the study design. A sample of 408 household heads participated in the study. An interview schedule, observation guide, an interview guide and a group discussion guide were utilised in the collection of data. Quantitative data analysis entailed the use of change detection analysis, descriptive statistics, chi-square test of independence, Wilcoxon Signed Rank test, factor analysis, and binary logistic regression, while thematic analysis was applied to the qualitative data. The study found that between 1986 and 2019, Wa township had expanded beyond its initial official boundaries and this manifested in the increase in the number of residential housing. Most households have had their farmlands reduced and, in some cases, some have lost it completely. It also emerged that expected economic returns and the availability of buyers motivated the selling of peri-urban lands. Besides, construction-related activities and petty trading resulted as new livelihood strategies. The study concluded that increased population and migration, largely exert pressure on peri-urban agricultural land in Wa. It is recommended that the Physical Planning Department should collaborate with local landowners to develop local plans for areas that are earmarked for sale to ensure that areas without local plans are not sold out, while traditional households should begin to adopt more non-farm income generating activities to enable them to step out of poverty.

KEY WORDS

Agriculture

Ghana

Household

Livelihood

Peri-urban

Wa

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DEDICATION

To my late father, Abdulai Tojori

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LIST OF ABBREVIATIONS

CBD	Central Business District
CEMAT	Conférence Européenne Des Ministres Responsables De L'Amenagement Du Territoire
CHPS	Community Health Planning Services
CA	Compulsory Acquisition
DFID	Department for International Development
FAO	Food and Agriculture Organisation
GIS	Geographic Information System
GSS	Ghana Statistical Service
IRB	Institutional Review Board
LEAP	Livelihood Empowerment Against Poverty
LUC	Land Use Change
PCA	Principal Component Analysis
PPD	Physical Planning Department
SLA	Sustainable Livelihoods Approach
SLF	Sustainable Livelihoods Framework
SDGs	Sustainable Development Goals
SPSS	Statistical Product and Service Solutions
UDS	University for Development Studies
UN	United Nations
UNDP	United Nations Development Programme

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CHAPTER ONE

INTRODUCTION

Fertile agricultural lands in peri-urban areas are being threatened due to urbanization and inefficient use of land, and these developments have implications for livelihoods of traditional peri-urban households (Abelairas-Etxebarria & Astorkiza, 2012). Therefore, valuable agricultural land must be protected from vulnerable activities in peri-urban areas (Maasikamäe, Jürgenson, Mandel & Veeroja, 2014). United Nations (2016) reports that urban areas attract people from the countryside, thereby, increasing their population and physical size. Accordingly, urban expansion creates land use conflicts in peri-urban areas due to encroachment on agriculture lands (Jurgenson, Sikk, Hass & Maasikamae, 2017; Rahayu & Mardiansjah, 2018).

In Ghana, the urban population has grown from nine percent in 1931 to a national average of 51 percent in 2010 (Ghana Statistical Service [GSS], 2014; Yankson & Bertrand, 2012). The population of the Wa Municipality has also been growing since 1970 from 13,740 to 107,214 in 2010 and 66.3 percent of the population live in Wa [Upper West Region] (GSS, 2014) and this indicates that population will spill over into peri-urban areas. On the flip side, studies on peri-urban agricultural land use change and its effect on peri-urban households' livelihood have generally focused on large cities (Accra and Kumasi) in Ghana to the neglect of secondary cities such as Wa. It is this deficit in the knowledge that inspires this research.

Background of the Study

Meinel and Henersdorf (2002) explain that land use is the socio-economic purpose to which land is put to satisfy human needs. Land use change occurs when particular land use is altered to serve a purpose other than the original usage to which it was put (Briassoulis, 2000). Explaining further, Briassoulis indicates that land use change can take place at the individual, community, national and global levels. In a similar vein, Goetz, Shortle, John, and Bergstrom (2005) articulate that land use change denotes the location of economic activities and in general, how communities develop. This presupposes that people may decide to put their land to purposes that have the potential to yield a maximum level of satisfaction at any given period.

Agriculture land use change, therefore, entails the shift of cropland in and out of the production of food crops (Lubowski *et al*., 2006). Timms (2006) also posits that the conversion of farmland into housing, commercial, infrastructure, and waste dumps constitute agriculture land use change and in the view of Long, Wu, Wang and Dong (2008), agriculture land use change occasions the conversion of farmland and forests into urban development. Specifically, Abelairas- Etxebarria and Astorkiza (2012) assert that agriculture land use change involves the conversion of agricultural land into residential, commercial, industrial, and civic uses. It can, therefore, be presumed that agriculture land use change brings about the conversion of farmlands into non-agricultural purposes that maximises economic outcome.

Mok, Williamson, Grove, Burry, Barker and Hamilton (2014) and Mugish and Nyandwi (2015) have explained that in peri-urban areas, agriculture land use change occurs when farmlands are converted into non-

agricultural uses that support both rural and urban activities. However, Gündel (2006) had argued that land is fixed in supply and as such its quantity does not increase naturally with an increase in population and this indicates that once land is used for a permanent purpose such as residential housing, it cannot be simultaneously used for agriculture production. For this reason, the expansion of cities affects the peri-urban areas by the altering of the natural resource base and conversion of agricultural lands to new uses, thus challenging the environment and livelihoods of the people living in those areas (Gündel, 2006).

Iauiqnta and Drescher (2000) describe peri-urban as the area that is proximate to an urban area. In the view of Friedberg (2001) and Simon, MacGregor, Nsiah-Gyabaah and Thompson (2003), peri-urban areas are characterized by increasing population density, small landholdings, diverse sources of income, and non-enforcement of building regulation, land disputes, rapid conversion of farmland and absence of basic services. In this respect, the Council of Europe [CEMAT] (2007) explains that the peri-urban area is in the transition from rural characteristics to assume urban features. Thus, the peri-urban area evolves from the extension of urban activities beyond the established margins of cities (Webster, 2002). As such, Narain, Khan, Sada, Singh, and Prakash (2013) and Woltjer (2014) have indicated that the peri-urban area is characterized by mixed land uses and increasing land values.

Mazzocchi, Sali, and Corsi (2013) argued that the agriculture land use change in peri-urban areas is influenced by the population density on farmlands. As such, Thuo (2013) suggests that an increase in urban population brings about the conversion of farmlands, forests, open spaces and other

natural resources into residential, industrial and commercial uses in peri-urban areas. For this reason, urban population increase and the resultant increase in housing demand is a major contributor to encroachment on farmlands in peri-urban communities (Lasisi, Popoola, Adediji, Adedeji, & Babalola, 2017). This implies that increasing population in urban areas tends to generate increasing housing and commercial demand for land that may exceed the capacity of the city core. Thus, compelling people to move to peri-urban communities in search of land to satisfy their social and economic needs.

Simon (2008) has also indicated that the relocation of the middle-class and high-income people to peri-urban areas due to the relatively cheap cost of land results in the transformation of peri-urban communities into urbanized areas. Siciliano (2012) adds that the migration of people from the countryside to the major cities in search of better livelihood opportunities and the resultant demand for land for residential accommodation contribute to peri-urban agricultural land use change. It can be inferred from the discussion that when the demand for land meets the readiness of local landowners to sell land, agriculture land use change will occur.

As indicated in the urban land market theory, land use change causes land rent to rise in peri-urban areas. The focal argument of the urban land market theory, according to Koomen and Buurman (2002), is that land rent is usually high near the city centre and decreases gradually as one moves towards the edge of the city until the least rent is attained. The main thrust of the theory centres on land rent, transportation costs, the amount of land use and location decisions of households and enterprises. Thus, urban rent is a dominant influence on the physical transformation processes in peri-urban

areas (Cavailhés, Frankhauser, Peeters, & Thomas, 2004). In the view of Mazzocchi, Sali and Corsi (2013), the high demand for land from urban residents and the decline in agricultural production appear to have contributed to agriculture land use change in peri-urban spaces.

Because of the increasing demand for peri-urban lands, local landowners in the urban and peri-urban areas are motivated by the increased land value to direct their investment to activities with perceived higher future earnings than agriculture-based activities as suggested by the rational choice theory (Irwin & Geoghegan, 2001; Webster, 2002). The rational choice theory maintains that people always try to do the best they can in their circumstances and as such people respond to incentives (Hodgson, 2013). As such, individuals who find themselves in a difficult situation such as peri-urbanisation will usually base their decisions on cost-benefit calculations and choose the alternative that maximises gains (Krstić & Krstić, 2016). Thus, landowners and individuals will respond to increasing demand for lands by selling their lands to invest in other activities that appear to promise maximum gains.

However, the conversion of farmlands leads to the overexploitation of peri-urban resources (Brook & Dávila, 2000). Foley *et al.* (2005) also contend that urban expansion leads to the loss of croplands in peri-urban areas. In support of this, Douglas (2006) claims that peri-urbanization brings social and environmental challenges for peri-urban households. Furthermore, Cobbina and Amoako (2012) and Dekolo Nwokoro, and Oduwaye (2013) have both submitted that as cities expand, peri-urban areas undergo physical and socio-economic changes. In the view of Ravetz, Fertner and Nielsen (2013), the

increases in land values in the inner-city lead to the encroachment on peri-urban agricultural lands. Amoateng, Cobbina and Owusu-Adade (2013) and Mundoli, Manjunath, and Nagendra (2015). contribute that unplanned urban growth has adverse effects on peri-urban livelihoods.

Allen, Dávila, and Hofmann (2006) point out that the peri-urban poor are vulnerable to environmental conditions such as rapid agricultural land conversion. Peri-urban areas also exhibit a rapid increase in urban residential and commercial uses and decreased rural-based activities but without adequate service infrastructure (Buxton & Choy, 2007). Hence, rapid encroachment on peri-urban agricultural lands leaves many poor people without land or only limited access to land since they are unable to compete with the middle and high-income earners for land (Ravetz *et al*., 2013). Earlier, Angel *et al* (2005) had contended that the trend of encroachment of urban activities on peri-urban agriculture lands alters agricultural land uses and displaces traditional livelihoods.

A livelihood entails the set of actions taken by people within their capacity and capitals to make a living (Ding, Jimoh, Hou, Hou, & Zhang 2018). However, Yang *et al*., (2018) argue that the choice of livelihood strategies of households is influenced by the assets such as the amount of land available to the individual/or households. Previously, Eakin, Lerner, and Murtinho (2010) had indicated that peri-urbanisation has compelled households to shift their livelihood strategies from natural-resource base employment to more urban-based employment and services and this entails changes in cultural practices, values and livelihood priorities. Thus, households with the right assets can revert to non-agricultural employment in

response to rapid urbanisation than those without the appropriate resources (Davis & Lopez-Carr, 2014).

When agriculture land use changes due to peri-urbanisation, the individuals who are displaced and whose endowment sets do not enable them to adapt are likely to suffer deprivation and injustices as suggested by the entitlement theory. The entitlement theory hypothesises that individuals suffer food shortage because their entitlement set does not provide them with adequate capacity to acquire food and this is explained through pull and response failures (Devereux, 2001). A 'pull' failure occurs when people lose their sources of livelihoods and consequently, the loss of means of securing food (Devereux, 2006; Sen, 1986). On the other hand, a 'response' failure arises when food is in short supply and this indicates that entitlement failure such as agricultural land loss may be caused by the shortage of land due to peri-urbanisation or limited access to land for production (Devereux, 2006; Gasper, 1993).

Peri-urban agriculture land use change and its effects on the livelihoods of households raise philosophical issues of social justice and rights. According to O'Neill, Woods and Webster (2005), the central tenet of social justice rests on the ability of the individual to enjoy social and economic rights within a society. Arguing along similar lines but in a much broader context, Rawls (2005) explains that social justice is concerned with the fair distribution of basic rights and liberties, occupation, power and access to economic and political institutions, income and wealth in a society. Relatedly, the equal distribution of educational and occupational opportunities, income and wealth as determined by institutions are equally important (Vita, 2014).

For this reason, the people within a society, including peri-urban dwellers, have the right to enjoy their social, political and economic rights.

In the view of O'Neill (2003), the right-based approach grants individuals, families, or communities the right to demand the protection of their interest from state or private infringement. In this respect, Foresti, Ludi and Griffiths (2007) suggest that the state, private entities and individuals have a responsibility to respond to the needs of the affected by balancing conflicting interests in ways which conform to human rights. Based on this perspective, Hibbert (2017) advocates that the state has the responsibility to protect individuals such as traditional peri-urban households against social and economic vulnerabilities such as the loss of agricultural lands.

Because of this, the institutional theory argues that it is vital for a society to activate the legitimate institutional processes to provide guidelines to direct the behaviours of individuals and the state in an acceptable manner (Scott, 1987). The institutional theory suggests that social actions are taken when it gains legitimacy (Jan, Lu, & Chou, 2012). Legitimacy which relates to the self-interests of individuals and communities is the core element of the institutional theory (Sidani, & Thornberry, 2013). Therefore, individuals and public officials drive their legitimacy from the institutional environment (Pillay, & Dorasamy, 2010).

It is, however, vital to note that the suffering of injustice and loss of rights can be ameliorated if the affected have the knowledge, skills, competencies, and job experience to enter the labour market to make a living as indicated in the human capital theory (Royce, 2009; Soukup & Šrédl, 2009). The human capital theory states that people who have the requisite

skills and knowledge have the potential to earn higher incomes, while those with low-level skills and knowledge will earn less (Becker, 1993; Dess & Picken, 1999). Therefore, investment in the acquisition of knowledge, and skill, can help the individual to take advantage of emerging livelihood opportunities (Ployhart, Nyberg, Reilly & Maltarich, 2014). Fitzsimons (2015) also stresses that people with good education and appropriate skills can easily participate in a dynamic economy than those without skills, knowledge and work experience.

Heimlich and Anderson (2001) suggest that peri-urbanisation creates opportunities for residents in peri-urban communities to feed the new residents through farming and creates employment opportunities due to the labour pool, greater off-farm employment prospects, and the possibilities to grow new crops and to market them within the peri-urban zone and the main city. Besides, Zasada, Fertner, Piorr, and Nielsen (2011) argue that the presence of young people, educated, and affluent residents contribute to consumer potential in the peri-urban. Farm adaptation and diversification processes are also fostered and farmers with adaptive strategies can provide these services to a large number of consumers (Zasada *et al*., 2011). This is indicative of the fact that the local people with the right human capital will be able to diversify and/or intensify their agriculture and other activities.

According to Lin (2007), urban expansion has led to the conversion of agricultural lands into urban-based land uses in peri-urban areas in China. In a similar vein, Wei and Ye (2014) have stated that the total population living in cities in China increased from 126.57 million to 219.82 million between 1993 and 2009. Wei and Ye further submit that the build-up urban area had also

increased more than two folds over the same period from 10,549 sq. km to 26,100 sq. km. Dewan and Corner (2014) also reported that the build-up area of Dhaka city in Bangladesh had increased from 34,629 sq. km in 2001 to 49,182 sq. km in 2011 and the United Nations (2016) states that the inhabitants of Dhaka will increase from 18.2 million in 2016 to 22 million by 2025. It, therefore, appears that peri-urbanisation is a third world problem and thus, may compromise agriculture-based livelihoods in such areas.

The transformation concerns of urbanisation and its resultant consequences on peri-urban agriculture lands and livelihoods of households appear to have inspired the incorporation of sustainable urban development in the Sustainable Development Goals [SDGs] which at present, drives the global development agenda (Revi, 2016). Specifically, SDG 11 focuses on making cities and human settlements inclusive, safe, resilient and sustainable (Revi, 2016). In this regard, Revi (2016) and United Nations [UN] (2016) have both indicated that sustainable urbanisation has the potential to reduce poverty and inequality, create employment, and ensure food security, universal education, provision of health and basic services. Nonetheless, Revi admits that the achievement of this objective hinges on sustainable production and consumption.

The UN (2011) estimated that the world's population will exceed 9 billion by the year 2050 and UN (2018) projects that 68 percent of the global population is expected to reside in urban areas. Seto, Güneralp and Hutyra (2012) had earlier speculated that the size of urban areas will triple between 2000 and 2030, while Brook and Dávila (2000) and UN (2011) have both reported that more than half of the global population already lived in urban

areas, and in developing countries, a significant proportion was living in and around urban areas. Because of this, the future urban expansion will occur in Asia and Africa, especially in impoverished areas (d'Amour, Wenz, Kalkuhl, Steckel, & Creutzig, 2016; Puma, Bose, Chon, & Cook, 2015; Seto *et al.*, 2012). As such, d'Amour *et al*. (2016) opined that agricultural production in these areas will decline in the years ahead.

Leaf (2002) claimed that in China, Vietnam and India, peri-urban landowners were compelled to sell prime agriculture lands to developers to undertake urban-based activities. Naab, Dinye and Kasanga (2013) estimated that about 14 million hectares of agricultural lands in developing countries are expected to be converted into various non-agricultural uses between 1990 and 2020. Adesina (2005) had earlier estimated that 400,000 hectares of agricultural land had already been lost to urban expansion in many areas. Thus, we can conclude that urban expansion and its associated consequences on peri-urban agriculture lands and traditional livelihoods of households is not exclusive to sub-Saharan Africa, rather, it is a phenomenon that is posing serious challenges to households and planning authorities in other developing countries.

In sub-Saharan Africa, there is evidence to suggest that peri-urbanisation has led to encroachment on peri-urban agricultural lands. For example, Adeboyejo and Abolade (2007) and Angel *et al.* (2005) noted that urban expansion has led to changing of traditional livelihood strategies and displacement of agricultural land uses in many peri-urban areas, while Maitima, Olson, Mugatha, Mugisha and Mutie (2010) intimated that agriculture land use changes have serious environmental, economic and social

bearings on peri-urban livelihoods. In this respect, Dekolo *et al.* (2013) report that the build-up area in Ikorodu in Lagos State in Nigeria grew from 2,320.74 hectares in 1990 to 16,749.81 hectares in 2011. They also report the loss of forest and agricultural land of up to 58 percent over the same period. This suggests that peri-urban agricultural lands are disappearing.

Kalaba, Chirwa, Syampungani and Ajayi (2010) and Shackleton, Shackleton, Buiten, and Bird (2007) have also emphasized the importance of land in the scheme of livelihoods in Africa by stating that many people in rural areas draw their food, shelter, medicine and income from natural resources and environmental services. As such, agricultural land conversion in peri-urban areas has the potential to affect the cultivated land and livelihoods in Africa (Gamu, Le Billon & Spiegel, 2015; Gessese & Melesse, 2018). The submissions presented here signal that agricultural land use change is likely to have a severe impact on peri-urban families and communities in sub-Saharan Africa that rely on agriculture-based activities to earn a living.

Several researchers (Cobbina & Amoako, 2012; Owusu, 2008; Owusu, & Oteng-Ababio, 2015) have acknowledged urban expansion in Ghana and indicate that it is driven by different preferences, growth of service employment, weak institutions, and incentives of households, enterprises, and public sector. Yet, Ghana's spatial planning function operates at three levels; national, regional, and district levels. At the district level, the Physical Planning Department is mandated to develop physical development plans in collaboration with Survey department, Lands Commission, District, Municipal and Metropolitan departments of works and health (Cobbinah *et al*., 2015). However, the implementation of physical plans in Ghanaian cities, including

Wa tends to be ineffective due to weak institutions, and the land tenure system (Cobbinah, & Darkwah, 2017; Korah, Cobbinah, & Nunbogu, 2017).

As a result, peri-urban areas in Ghana including, Wa are characterized by unregulated and haphazard encroachment on peri-urban agricultural land (Yeboah & Shaw, 2013). The trend of the encroachment of housing on peri-urban agricultural land seems to benefit the former urban dwellers due to the relatively cheaper cost of the lands (Cobbina & Amoako, 2012). On the other hand, Owusu (2008) and Yeboah and Shaw (2013) have both indicated that traditional peri-urban dwellers appear to suffer significant loss of essential livelihood assets as a result of the invasion of urban dwellers to take over their farmlands

Given these challenges, a new Land Use and Spatial Planning Law was passed in 2016. The law is based on a three-tier planning system, involving the preparation of an indicative plan showing visions of future development covering between 15 to 20 years with a clear recognition of the role of actors and/stakeholders such as landowners to contribute to urban development planning (Korah, *et al*., 2017). Korah *et al*. (2018), however, indicate that the land tenure regime which grants the majority of the land to stool/skin lands, families, or clans is still in force and as such rapid conversion of land formerly used for farming into non-agriculture uses persists in peri-urban areas.

. There is evidence to show that Wa, the capital of the Wa Municipality and the Upper West Region, is fast growing in terms of population and physical expansion (GSS, 2014; Eledi & Kuusana, 2014; Peprah, 2014). The population of Wa has witnessed significant growth from 13,740 in 1970 through 36,067 in 1984 to 66,644 in 2000 [84.8% increase] (GSS, 2000; GSS,

2013a). The GSS (2014) reports that the municipality has a population of 107,214 constituting 15 percent of the total regional population as of 2010. GSS (2014) also reports that, in the Wa Municipality, the proportion of the population living in urban localities is approximately 66.3 percent which is higher compared to the national average of 51 percent. Thus, urban expansion and its associated demand for land have led to housing encroachment on peri-urban farmlands in Wa (Aduah & Aabeyir, 2012; Eledi & Kuusana, 2014; Peprah, 2014)

Statement of the Problem

Wa hosts the capital to the poorest region (Upper West) in Ghana with a poverty incidence of 70.7 percent (GSS, 2015). In this regard, Wa continues to entice people from all over the region and beyond in the search for social and economic opportunities. As such a growing urban population in Wa suggests that there will be pressure on agricultural lands in peri-urban communities yet, these communities rely on agriculture for a living (GSS, 2015). Undoubtedly, this development can exacerbate the poverty situation in the fringes. In providing evidence in support of the growth of Wa, Aduah and Aabeyir (2012) had earlier indicated that from 1986 to 2011 the built-up area had increased by 34 percent and this led to agricultural land use change in the peri-urban areas.

The probable cause of peri-urban agricultural land use change in Wa is the relatively low land rent and the economic incentive associated with the sale of land as pointed out by the urban land market theory and the rational choice theory respectively. The urban land market theory is premised on the assumption that as the price of the land reduces, the number of land increases

as one move towards the fringes of the city and the savings made from the low rent will compensate for commuting cost to the CBD (Alonso, 1960; Jordaan, Drost & Makgata, 2004). The rational choice theory also maintains that social actors choose an alternative that is believed to yield outcomes that optimize one's preference under certain constraints (Sato, 2013). Together, the relocation of people to peri-urban areas because of low land rent and the willingness of landowners to maximise gains contribute to agricultural land use change.

Sen (1986) and Johnston and Bargawi (2010) have indicated that the encroachment on peri-urban agricultural lands as a result of peri-urbanisation is comparable to entitlement failure which indicates that people's inability to secure food is related to entitlement failures such as loss of agricultural land and the efforts to assuage entitlement failure should aim at building the endowment sets of poorest people such as securing agricultural lands. Giving cash hand-outs, food vouchers, and agriculture inputs can also enable affected individuals to pursue livelihood strategies to earn a living (Barrett, Bell, Lentz, & Maxwell, 2009; Peppiatt, Mitchell, & Holzmann, 2001; Watts, 1991). As such, Hrelja, Monios, Rye, Isaksson, and Scholten (2017) advocated that social institutions should be activated to regulate the structure of political, economic, and social interaction as suggested by the institutional theory.

The consequences of agricultural land use change can, however, be moderated if the affected individuals have the right skills set, experiences and knowledge to enable them to enter the labour market as indicated in the human capital theory (Schultz, 1961). Salamon and Hornbeck (1991) claim that investment in human capital leads to increased incomes compared to the input

of land, and financial capital with the same level of investment. Therefore, knowledge and skills acquisition become important enablers for adaptation to changing circumstances such as agricultural land use change (Dae-Bong, 2009).

Globally, several studies have been carried out on peri-urbanisation and livelihood change. For example, Kontgis *et al*. (2014) focused on the physical expansion of cities and encroachment on peri-urban agricultural lands in China using satellite images. In a related study in Kigali, Rwanda, Mugisha and Nyandwi (2015) also focused on urban expansion and peri-urban land use change by relying on mere satellite images. However, these studies did not examine the activities that exert pressure on peri-urban agricultural lands and the new combinations of livelihood strategies of traditional peri-urban households as well as why the local landowners were converting agricultural lands into non-agricultural uses

While the subject of peri-urbanisation and its consequent impact on agricultural land use and livelihoods has been extensively studied in Ghana, the focus has largely been on Accra and Kumasi, the key and largest urban centres in the country. Studies on urban expansion and peri-urbanisation as a result of rapid urban sprawl in secondary cities such as Wa are limited. For example, Abass, Afriyie, and Adomako (2013) also examined household responses to livelihood transformation in the Kumasi peri-urban area. Similarly, Oduro, Adamtey, and Ocloo (2015) also explored the livelihood strategies adopted by peri-urban residents in peri-urban Accra. Yet, both studies failed to examine the new combinations of livelihood strategies and the

outcomes as well as the reasons that informed the choices of new livelihood strategies of peri-urban households

Related studies about Wa that come close to discussing peri-urban development and livelihoods are limited to Aduah and Aabeyir (2012) who reported that Wa town has witnessed significant physical growth from 1986 to 2011. Yet, the study did not examine why local landowners were selling their agricultural lands. In a related study, the challenges and opportunities of urban sprawl have been examined by Peprah (2014) but the study did not explain why peri-urban dwellers engage in such livelihood strategies and Eledi and Kuusana (2014) also focused on the impact of urban expansion on food systems in Wa but ignores the question of how the traditional livelihood assets have been affected. Hence, little is known about how the rapid encroachment on peri-urban agriculture land affects traditional livelihoods and new combinations of livelihood strategies pursued by peri-urban households around Wa town.

The empirical literature demonstrates that there is limited knowledge of the quantity of agricultural land loss to peri-urban households in Wa. The knowledge of the effects of agricultural land use change on traditional livelihood assets is limited. Besides, there is no consensus on the factors that explain why local landowners sell agricultural lands. Further, it is not clear if traditional peri-urban households have succeeded or failed to adopt new livelihoods in response to encroachment on agricultural lands and knowledge on the livelihood outcomes of new activities is limited. Thus, this addresses the following related research questions; what are the drivers of agricultural land use change? what the factors explain why local landowners sell their

lands? how does agricultural land use change affect traditional livelihoods? and what are the new livelihood activities of peri-urban households?

Research Objectives

The main research objective was to investigate the repercussions of agricultural land use change on livelihoods of traditional peri-urban households in Wa town. Specifically, the study sought to:

1. Examine the drivers of agricultural land use change in peri-urban areas;
2. Explore the factors that explain agriculture land use change in peri-urban areas;
3. Analyse how agriculture land use change contributes to transformation of traditional livelihood of peri-urban households, and
4. Examine the new livelihood strategies of traditional peri-urban households

Research Questions

The following specific research questions were pursued:

1. What are the drivers of agricultural land use change in peri-urban areas?
2. What factors explain agriculture land use change in peri-urban areas?
3. How does agriculture land use change contribute to transformation of traditional livelihood strategies of peri-urban households?

4. What are the new livelihood strategies of traditional peri-urban households?

Hypothesis

The research hypotheses that were tested were influenced by landholding size of households and farm income. Therefore, the two hypotheses stated related to research objective two and three. The null hypotheses were:

1. H_0: There is no significant difference between the peri-urban households' landholding size in 2009 and 2019
2. H_0: There is no significant difference between peri-urban households' farm income in 2008 and 2018

Significance of the Study

Upon successful completion of the proposed research, the researcher hope that other researchers will be provoked to expand the frontiers of discussions about agriculture land use change by delving into the nuances to gain a deeper understanding of the prospects and unique challenges that urbanization presents to traditional peri-urban dwellers. First and foremost, it is hoped that the research will facilitate an understanding of the peri-urbanization process of the Wa Municipality. The drivers of agricultural land use change in peri-urban areas will be explained to enhance understanding of these issues. Adequate knowledge on these issues will aid the design of appropriate policies and regulations which can help regulate development in peri-urban areas.

Furthermore, the research intends to highlight the factors that explain agriculture land use change in peri-urban areas. The appreciation of these

factors will help planners in Ghana to design physical development plans that will promote orderly development in peri-urban areas while securing livelihoods for traditional households. Also, an understanding of the factors will aid in the formulation of policies that seek to provide alternative livelihoods or source of income for traditional households such that the desire to sell their farmlands to generate funds for household expenditure requirement will be reduced. This way, the wasteful use of peri-urban agriculture land can be reduced and sustainable land management will be enhanced.

Peri-urban development somehow springs a surprise on traditional households and thus, causes a sudden switch from agriculture to urban activities. The emergence of newcomers and new activities will affect the livelihood strategies of traditional households. The study seeks to deepen our understanding of the extent to which these traditional livelihoods are affected by agriculture land use change as a result of pressure from private developers and government for lands. Furthermore, I hope that policy-makers will benefit enormously from the study in the sense that practical policy direction will be proposed to enable targeting of vulnerable peri-urban households and the creation of sustainable livelihood for them.

Delimitations

Thematically, this thesis concentrates on the agriculture land use change and emerging patterns of livelihoods in peri-urban areas. The thesis specifically captures the drivers of agricultural land use change in peri-urban areas. It also presents the factors that explain agriculture land use change in peri-urban areas. The effects of agriculture land use change on traditional

livelihoods are as well examined. Furthermore, it focusses on the emerging patterns of livelihoods of traditional per-urban households. The rest of the thematic issues that are presented are the factors that explain the choice of livelihood strategies of peri-urban households.

Geographically, this study was conducted in peri-urban communities around Wa township. It focuses on Wa because it is the capital of the poorest region (Upper West) and has witnessed significant growth and expansion over the years. The target population were the peri-urban indigenes' heads of families that owned/owns lands or their representatives in the selected communities (Cobbina, Gaisie & Owusu-Amponsah, 2015). This because the study seeks to measure changes over a period and its effect on indigenous households and these people were in the position to provide first-hand data on changes to enable me to generate answers to address the research questions. It is assumed that such households had land for agriculture purposes. It also covered Officials of Department of Agriculture, Physical Planning Department, Lands Commission, traditional rulers, men and women groups.

Definition of Concepts

Traditional peri-urban households refer to those households with people who originate from the study communities. These households, therefore, owned land because their great grandparents were among the first group of people to settle in the study communities and had assumed native status.

Organisation of the Thesis

The thesis has been organised in nine chapters. In chapter one, the introduction encompasses the background to the study, statement of the problem, research objectives, research questions, hypothesis, the significance of the study, delimitations and the structure of the thesis. The theoretical and conceptual review constitute Chapter Two. Chapter Three centres on the empirical overview, lessons learnt and conceptual framework. The methodology of the study is captured in the fourth chapter. Specifically, it focuses on the introduction, philosophical perspectives of the research, research approach, study design, profile of the study areas, and target population, sampling procedures, data collection, instrument design, pre-testing, ethical procedure, actual fieldwork, data processing and analysis.

Chapter five focuses on background characteristics of respondents, access, the nature and extend of growth of Wa from 1986 to 2019, and the drivers of agricultural land use change in peri-urban areas, while Chapter Six centres on the factors that explain agriculture land use change. Chapter Seven concentrates on the effects of agriculture land use change on traditional livelihoods of peri-urban households. It specifically centres on identifying traditional livelihoods, that is livelihood strategies of traditional households before peri-urbanisation. The Eighth Chapter covers the emerging patterns of livelihoods for traditional households. Chapter Nine, which is the final chapter, includes the summary, conclusions, recommendations, limitations of the study, contribution to knowledge and suggestions for further research.

CHAPTER TWO

THEORETICAL AND CONCEPTUAL OVERVIEW

Introduction

Marshal (2010) writes that literature review involves a logical identification, evaluation, and interpretation of previous research on a specific topic of interest. Similarly, Jaidka, Khoo and Na (2013) underscore the importance of literature review when they pointed out that it provides information on the level of knowledge on a topic. The literature review also provides synthesised knowledge on the topic of interest (Baker, 2016). While Jaidka *et al.* (2013) concentrate on available knowledge on a specific topic; Baker (2016) is concerned about the nature of the knowledge obtained and this suggests that literature review is an important ingredient for any useful research enterprise.

The literature review of this thesis is divided into theoretical framework and conceptual issues which constitute chapter two, while chapter three presents the empirical review and conceptual framework. The literature review is divided into two chapters to present a critical overview of the key issues first, the theories and concepts that are applied in the study, and secondly to elaborate on the appropriate empirical studies that have been conducted in the field. The current chapter, therefore, takes on board the theoretical framework and conceptual issues that underpin the study, while the next chapter presents a review of the empirical studies relevant to the subject matter of this study. This will aid the reader to have a better appreciation of the study.

Theoretical and Conceptual Overview

Bhattacherjee (2012) posits that a theoretical framework provides the primary logic of the issue under study by explaining the causes and effects and what basic processes influence the phenomenon. Bryman (2012) also notes that the theoretical framework provides the background, underlying principles, and structure within which social phenomenon can be analysed, and the results interpreted. Similarly, Grant and Osanloo (2014) argue that a theoretical framework presents the structure and support for the principle guiding the research, the problem statement, the purpose, the research questions and the methods, whereas Ngulube, Mathipa, and Gumbo (2015) explain that theoretical framework assists the researcher to identify the key variables to be measured. It, therefore, implies that without a theoretical framework and explanations of concepts, the research will be fuzzy.

Silverman (2000) defines concepts as the clearly defined ideas emanating from a particular theory. Silverman adds that concepts help in the understanding of the elements of a theory. Similarly, Puttergill (2000) explains that concepts help in crafting the conceptual framework that points out the relationship between the variables that are contained in the research topic. As pointed out by Anfara and Mertz (2006), the importance of concepts in research cannot be overemphasised since they assist in the distinction of social phenomena. It can be deduced that conceptual review assists the researcher to shape and pay attention to the relevant issues and strive to identify, and specify how they will be measured in a study.

Theoretical Overview

The study is guided by the urban land market, rational choice, entitlement, human capital and institutional theories. The decision to combine the theories in this study springs from the fact that not any one of them appears to sufficiently explain the agriculture land use change and emerging patterns of livelihoods in peri-urban areas. The five theories used here, therefore, turn to complement each other to assist in the understanding and explanation of the complexity of the drivers of agricultural land use change, its effects on traditional livelihoods and the new livelihood strategies that have emerged in the peri-urban areas of Wa for households in their quest to satisfy their needs and aspirations.

Urban Land Market Theory

The core argument of the urban land market theory (ULMT) is that land rent varies with distance from the city centre and that one will pay a high price for the land that is closer to the city centre and less as one move outwards the city centre (Hoover & Giarratnani, 1984). ULMT traces its roots from the agriculture land rent theory developed by von Thunen in 1826. Hoover and Giarratani (1984) assert that Von Thunen's theory seeks to explain how the optimum distribution of rural land uses around a market town can be achieved. In the same way, Fujita and Mori (2005) posit that the theory attempts to explain the concentration of manufacturing centres which are surrounded by agricultural land use via land rent function around an urban centre. Building on Von Thunen's theory, Alonso (1964) developed the urban land market theory.

Trussell (2010) explicates that urban land market theory centres on the argument that as one moves outwards of the central business district (CBD), rent begins to decline until the lowest rent is attained at the edge of the city. Consequently, rents are highest in areas proximate to the CBD, and only those who can afford the rent are located there (Huang, Parker, Filatova, & Sun, 2013). In furtherance of this argument, Huang *et al.* (2013) contend that in a monocentric city, the CBD is located in the centre where major economic and social activities are dominant thus attracting people from all directions in the city. Therefore, the choice of residents to locate near the CBD to optimize satisfaction is determined by commuting and housing costs (Huang *et al*., 2013). As a consequence, the location of households is a reflection of the bid rent (Anas, Arnott, & Small, 1998; Duranton & Puga, 2014).

The bid rent of a household is referred to as the highest rent that can be paid for a unit of land within a given distance from the city centre if the household is to continue to enjoy a given level of satisfaction (Hoover & Griarantani, 1984). Briassoulis (2000) opines that the bid rent curve reflects the result of bidding by individuals, households, firms and this, in turn, determines how land is allocated to the different uses. Manganelli and Murgante (2017) also elucidate that the location of different economic activities in the city is determined by the ability of households and commercial entities to pay rent. The implications are that ULMT seeks to explain location behaviour and the spatial structure of an urban area. Hence, the location behaviour of households and economic activities is underpinned by three assumptions that should hold in the application of the ULMT.

Alonso (1964) assumes a city with a single CBD where all employment opportunities are located. The theory also assumes a radial transportation system which implies that transportation cost is equal in all directions and residents only travel to and from work. Furthermore, theory assumes that the land is flat everywhere and it is meant for only residential and commercial use (Alonso, 1964; Fujita & Mori, 2005). Besides, the theory assumes that transportation cost is high for residents living at the city edge, and low at the CBD (Fujita & Mori, 2005). However, Trusell (2010) argues that transportation cost does not only refer to fares and fuel consumption but, the opportunity cost of travelling is an important factor to consider in location decisions.

Finally, the theory assumes a location rent which is the amount of money to pay for a household to be located within a given distance from the CBD (Fujita & Thisse, 1986). Besides, location rent is determined by four basic factors: accessibility, space, and environmental amenities, and a given budget constraint (Fujita & Thisse, 1986). Qin, Zhu, and Zhu (2016) note that space connotes the demand for land, its size, and quality of amenities, whereas Manganelli and Murgante (2017) posit that accessibility is measured in terms of time, money and convenience associated with traveling to workplace, market and social centres and finally, with environmental amenities comprising natural features, distance from service centres. The foregoing discussion indicates that the ULMT has been modified by different researchers to suit their purposes.

For instance, Wu and Plantinga (2003) also introduced spatial externalities, while Cavailhès, Frankhauser, Peeters, and Thomas (2004) and

Caruso, Peeters, Cavailhès, and Rounsevell (2007) applied it to urban reality. In this respect, Wilson and Frew (2007) determined the correlation between location and rent using distance to the CBD and highway instead of CBD alone as contained in the original theory. The various contributions suggest that the original theory has certain defects that have to be addressed for it to be useful in explaining the location behaviour of households and commercial entities within an urban milieu.

Consequently, the urban land market theory has suffered numerous criticisms. As such, Romanos (1976) indicates that the theory ignores the importance of other areas. Briassoulis (2000) also argues that as the city grows, not all employment opportunities will be located at the CBD. Furthermore, it provides weak grounds for the analysis of the complexities of decision-making processes regarding land use change (Fujita & Mori, 2005). Besides, Verburg, Schot, Dijst and Veldkamp (2014) note that it does not provide information about the amount of land use change. Finally, Jiang and Zhang (2016) indicate that it pays little attention to the institutional, social and economic context and the circumstances of the people who lose land. Thus, the theory can only explain peri-urban land use change from the demand side and this necessitates the use of the rational choice theory.

Rational Choice Theory

The central premise of the rational choice theory is that social actors choose those outcomes that are perceived to have the potential to yield optimal gains with given constraints (Lovett, 2006). The rational choice theory is traceable to the writings of Adam Smith and it was subsequently popularised by Gary Becker (Ogu, 2013; Wittek, Snijders, & Nee, 2013). Hodgson (2013)

suggests that social actors try to respond to incentives and circumstances. Thus, individuals who find themselves in difficult situations such as peri-urbanisation base their decisions on cost-benefit calculations and choose the alternative that maximizes their material gain (Wittek *et al*., 2013). Taken together, when individuals find themselves in a vulnerable situation such as rapid peri-urbanisation, they will respond by selling their lands to invest in high yielding activities.

The key assumptions of the rational choice theory related to five main issues. In this respect, Ogu (2013) noted that individuals take actions that will meet their self-interest and this is oriented toward maximization of social outcomes. The theory also assumes that the social actor considers the alternatives available and applies a choice procedure to determine the alternatives which promise the highest material gain (Burns & Roszkowska, 2016). In an earlier argument, Lovett (2006) indicates that human beings are capable of evaluating several different possible alternatives action, and deliberately selecting and carrying out one or more of them. This suggests that the individual occupies centre stage in the analysis of human behaviour to making decisions that will yield a social outcome.

The second key assumption of the rational choice theory centres on optimality and in this respect, Abell (2000) asserts that individuals choose their actions optimally given their preferences and opportunities or constraints. Abell further indicates that individuals are usually seeking self-interest in all their actions and as such, the actor chooses the alternative which maximizes gains. The third assumption indicates that individuals are innately irrational but manifest behaviour that is rational (Chai, 2005). According to Sato (2013),

the fourth assumption of the theory operates on the principle that social action takes place within the context of norms, social structures, inequality and social institutions that regulate human actions. As noted, the theory suggests that individuals seeking to maximise utility are limited by social structures.

The rational choice theory has been applied in several social fields. For instance, Ulen (1999) indicates that economists use rational choice theory to predict that when the wage rate rises, more people are willing to offer labour while the demand for labour decreases. In a similar vein, Leoveanu (2013) applied the rational choice theory in public decision-making and concludes that public office holders must prove extreme rigour in the manner of deciding and the public decision must follow due process and penalize violations of any kind committed by public authorities. The application of the rational choice theory in many fields of study particularly in social sciences suggests that it is versatile and can be adopted in land use studies.

The rational choice theory appears to provide the conceptual foothold for the agent-based model in which social actors make rational land use decision. An agent may represent a land manager, landowner, or household who combines individual knowledge and values, information on soil quality and topography, and compare the actions of other agents to plan and make a land-use decision (Parker *et al*., 2001; Showalter & Lu, 2009). Parker *et al*. (2001) suggested that land markets, social networks, and resource management institutions may provide important interaction environments for landowners and those seeking land to satisfy their needs. As such, Polhill, Sutherland and Gotts (2010) argue that individual households could also be studied using interviews and group discussions. This signals that the land use

decisions are incentive-driven and as critical in understanding agriculture land use change.

Like any other, the rational choice theory has received its fair share of criticisms in a variety of forms. Dissenters have accused the theory of failing to demonstrate how people interpret their situation or identify the optimal choice they make (Hodgson, 2012). Hodgson further notes that the theory disregards the different interpretations that people give to situations and the possibility of different goals arising out of the same situation. Ogu (2013) also claims that the theory does not provide a universal way of determining what is rational and what is not and how these concepts are constructed in the theory. From the information perspective, Leoveanu (2013) asserts that people do not usually have the benefit of full information on the situation that people are trying to respond to. The theory also appears to ignore the long-term repercussions of inappropriate choices to the use of resources such as land

Based on the inadequacies of the rational choice theory to explain human behaviour to decision making particularly land use decision, it is clear that the theory cannot explain the effect of decisions that may be made by others which have negative consequences for another group of persons concerning their ability to make a living. As such, it cannot be concluded that people make rational decisions at all times in pursuit of material gain since the loss of endowment set such as land could disable the individual from making a living. The entitlement theory, therefore, provides a window of opportunity to explain the consequences of decisions with respect land use change.

Entitlement Theory

The core argument of the entitlement theory centres on the inability of people to access food through the endowment sets such as agricultural land and how the failure to secure resources can lead to deprivation (Sen, 1981). The entitlement theory was propounded by Amartya Sen in 1977 to explain the causes of famine and poverty based on observation of 'the great Bengal famine' in 1943, the Sahel area famine of 1968-73, the Ethiopian famine of 1972-74, and the Bangladesh famine of 1974 (Sen, 1981; Osmani, 1995). Based on the theory, Osmani (1993) and Devereux (2001) elucidate that food insecurity affects people with limited capacity to access adequate food whether as a result of poverty, loss of entitlement such as farmlands or other socio-cultural factors, irrespective of whether or not food is available. Consequently, the entitlement theory is predicated on four key tenets.

Firstly, Sen (1981, 1986) and Osmani (1993) argue that individuals are endowed with an endowment set such as land and other resources. Hence, Sen (1981) defines the endowment set as the different kinds of resources that are owned by a person through recognised norms and practices. Osman (1993) and Nayak (2000) add that the said resources include both tangible assets, such as land, equipment, animals and intangible assets such as knowledge and skill, labour-power, or membership of a community. Social and customary rights are also emphasised to indicate acceptable procedures for obtaining resources at the community level (Seaman, Sawdon, Acidri & Petty, 2014). This suggests that an individual or household with these resources such as land can make a living without external support and in the same breath, without these resources, the individual or household will suffer deprivation.

The second tenet of the theory is the entitlement set. Ravallion (1992) asserts that the entitlement set constitutes the various consumption sets of commodities that can be obtained via legitimate channels from a person's primary endowments, given prevailing market prices in a given period. As such, people may use the resources such as land to produce food or sell it to obtain goods and services or people can rely on transfer payment (Sen, 1984). However, Kabeer and Aziz (1990) and Kabeer (1991) argue that ownership and access to entitlements sets such as land are contingent on negotiations by members within the household or community. Also, Maxwell and Smith (1992) argue that the entitlement set suggests the transformation of an endowment set through production or trade-in commodities, and in the same way, Gasper (1993) advocates for the inclusion of financial ability as part of their entitlement set.

The entitlement mapping (E-mapping) is the third tenet. According to Sen (1981, 1986), E-mapping specifies the relations of the set of possible commodities or resources that can be obtained from a person's ownership, through trade and/or production. Simplifying E-mapping, Osmani (1993) describes it as the link between the endowment set and entitlement set. It is the rate at which the resources of the endowment set can be converted into goods and services in the entitlement set (Nayak, 2000; Osmani, 1993). Similarly, Gasper (1993) posits that E-mapping is the set of laws, circumstances, and processes which dictate how a person's entitlements are obtained from his or her ownership. The basic assumption is that people should be able to use their resource such as land to obtain basic goods and services (Sen, 1981, 1986:

Nayak, 2000; Osmani, 1993) that satisfy their food requirement and other needs.

Another important principle associated with the theory is entitlement failure. Musolino and Nucera (2016) illuminate that entitlement failure of a person or household to access benefits such as land to engage in the production of food for consumption or sale to augment household income. In an earlier argument, Maxwell and Smith (1992) had noted that if a person's entitlement set does not include commodity bundle with sufficient amount of food, the person will not be able to make a living. According to them, a person is said to suffer from the entitlement failure when s/he suffers production or work activities decline in the price of staple food. In this respect, Gasper (1993) indicates that people who cannot meet their subsistence needs will suffer starvation and death during famines and this triggers an understanding of entitlement relations.

Sen (1984) explains entitlement relations as the mechanism for obtaining goods and services in a given society. The four main mechanisms that have been prescribed in the entitlement theory are a trade-based entitlement, production-based, own-labour entitlement and inheritance or transfer (Sen, 1981). These entitlement relations form the basis for accessing food and when there is a disruption in them, then entitlement failure is said to occur. On this basis, De Waal (1997) posits that famine occurs when people lose their resources such as agricultural land and not the absence of food. For instance, studies on Bengal and Bangladesh famines suggest that inadequate regional distribution and hoarding were the main triggers (Grada, 2007; Sen,

1981). It can be concluded that people may lose their capacity to secure their subsistence needs due to deliberate actions or inaction of others.

According to Sen (1986), the inability of a person to command food in the market economy is determined by "pull failure" and/or "response failure" (Sen, 1986). Firstly, Sen (1997) argues that pull failure is triggered by the inability of a person to obtain food in the market as a result of unemployment, loss of land, output loss or reduction in real wages. Response failure, on the other hand, arises when there is a mismatch in demand and supply relationships in the market (Sen, 1997). It suggests that when there is the demand for a livelihood resource such as peri-urban agricultural land, landowners may be motivated to sell it and use the money to undertake non-agricultural activities. Accordingly, Sen (1997) states that poor people should be supported by creating employment opportunities and securing endowments such as lands (Barrett *et al*., 2009; Peppiatt, *et al*., 2001; Wilson, 1991) to enable them to make a living.

The recommendations above suggest the need to secure and protect peri-urban households from agricultural land loss and to guard against livelihoods destruction from the increasing demand for land for urban-based activities (Maasikamäe *et al*., 2014). Lentz and Barrett (2008) had earlier pointed out that any intervention efforts should pay attention to proper targeting such that vulnerable households can be protected, with Johnston and Bargawi (2010) suggesting that efforts should aim at building the endowment sets of the poorest people such as securing land for them to cultivate food crops. However, Musolino and Nucera (2016) warn that measures that do not restore individuals' entitlement such as access to productive agricultural land

will be unsuccessful in preventing deprivation and this is an indication that any attempt to secure peri-urban agricultural land should target the vulnerable.

Despite the influence that entitlement theory has had in emergency response and public policy, it has received several criticisms. For instance, Devereux (2001) points out that the theory ignores claims over collectively owned resources in the analysis of famine. Fine (2004) also argues that it is an investigative tool as such it cannot be used to analyse the loss of entitlement such as land. In furtherance of the criticisms, Rubin (2009) criticised the theory because it ignores issues concerning food production, legal structures and socio-political context within which entitlements are obtained. Nussbaum (2011) also opines that the theory disregards the cultural context of a group of people in the analysis. Finally, it assumes that entitlement loss can only be triggered by an external agent, ignoring the fact that individuals may voluntarily dispose of their endowments such as land.

Regardless of the limitations of the entitlement theory, it formed the theoretical basis for studies on peri-urban land loss. For instance, Johnson and Chakravarty (2013) claim that peri-urban land loss undermined the ability of landholders/owners to access resources. Adam (2014) also notes that the land rights and livelihoods of local landholders in peri-urban areas are ignored in the process of urban expansion in Ethiopia. Besides, Kleemann *et al*. (2017) assert that the transitional nature of land tenure and loss of entitlement, as well as user rights, generate conflicts in Ghana. This suggests that peoples' entitlements and rights have to be protected and the theory can assist in the gathering of empirical data in this respect. Though the theory indicates how the loss of entitlement can be assuaged, it fails to explain how people can rely

on their skills and knowledge and to adapt to changes which the human capital theory seeks to explain.

Institutional Theory

The central claim of the institutional theory is that institutions influence the beliefs, attitudes and behaviours of social actors (Jan *et al*., 2012). Institutions constitute the constraints that are devised by society to regulate the structure of political, economic and social interaction (Hrelja, Monios, Rye, Isaksson, & Scholten, 2017). Thus, institutions influence the pattern of attitudes and behaviours, which shape actors' attitudes and behaviours and provide stability and order in society (Scott, 2004). Hrelja *et al*. (2017) distinguished between formal and informal institutions. Formal institutions denote governance processes which are established in law, while informal institutions relate to a governance processes that are not founded in law (Hrelja *et al*., 2017).

According to Pillay and Dorasamy (2010), the institutional theory is premised on the assumption that institutional arrangements or processes reflect a pattern of cultural factors that evolve and become legitimized within a society. As such, Scott (1987; 2004) argues that institutional processes gain legitimacy, become authoritative guidelines for social behaviours and are accepted by individuals as social reality. Because of this, Jan *et al*. (2012) suggest that a social action is taken on an issue when it gains legitimacy in a society. Sidani, and Thornberry (2013) explain that legitimacy which relates to the self-interests of individuals and communities is the core element of the institutional theory. Pillay and Dorasamy (2010), therefore, insist that private

individuals and public officials derive their legitimacy from the institutional environment.

Given this, patterns of social interactions which are manifested in rules and shared beliefs shape how social actors such as individuals, families, communities and state institutions operate within a social system (Hrelja *et al*., 2017). However, Sidani, and Thornberry (2013) had earlier warned that state institutions may become arbitrary and lack the legal basis for the enforcement of laws and regulations to contain an undesirable phenomenon such as peri-urbanisation. In view of this, the institutional theory provides the theoretical basis for the analysis of land ownership and management as well as poor regulation of urban expansion, the demand for peri-urban lands for residential and other non-agricultural uses, and the loss of farm-based livelihoods in Ghana and Wa in particular.

In Ghana, customary practices dictate land ownership and management. The land is, therefore, vested in families and chiefs (Abdulai, & Ndekugri, 2007). According to Abdulai, and Ndekugri (2007) and Kuusaana, Kidido, and Halidu-Adam (2013), these corporate bodies (families, skin/stools) constitute the customary landholding institutions in Ghana and control more than 90 percent of the total land area, while the rest are vested in the state through compulsory acquisition. Kaunza-Nu-Dem, Tijani, Millar, and Humphrey (2016) add that these families, skins/stools and are believed to be equipped with the administrative capacity to manage the land. Korah, Cobbinah, and Nunbogu (2017), however, argue that this landownership arrangement makes it difficult for state institutions to govern land access and use which leads to unregulated peri-urbanisation in Ghana.

Human Capital Theory

The core argument of the human capital theory is hinged on the presumption that individuals or groups with higher levels of knowledge, skills, and other competencies will be able to achieve greater production outcomes than those with low levels human capital (Ployhart & Moliterno, 2011; Schultz, 1961). Schultz (1961) defines human capital (HC) as the "knowledge, skills and abilities of the people employed in an organisation." Recognising the deficiency in the above definition in terms of ignoring the ability of the individual to acquire new knowledge and or skills, Schultz (1981) refined human capital to include all human abilities either innate or acquired which can be augmented by proper investment. Becker (1993) adds that information and ideas of individuals are important elements of human capital for the effective performance of daily activities.

In the context of an organization, Dess and Picken (1999) clarify that human capital consists of the individual's capabilities, knowledge, skills and experience. The introduction of the concept of capabilities reinforces Sen's (1986) argument that competences represent real opportunities or freedom of a person to choose a way to live. In this case, the improvement in skills, knowledge and job experience can directly increase output (Arabi & Abdalla, 2013). Similarly, Olsaretti (2014) suggests that capabilities constitute the combination of actual freedoms such as participation in production or community activities, being food-secure, being healthy, and so on. This suggests that people with skills and knowledge can directly contribute to increasing production and the potential of a person to contribute to production is predicated on innate or acquired capabilities.

Grant (1996) and Hatch and Dyer, (2004) argue that knowledge and skills can be improved through investment in education or training, which is, learning a new skill or acquiring new knowledge. Parts (2003) also indicates that investment in healthcare can augment human capital and that education and training must be complemented by good health to enable an individual to earn more and become productive. In the same way, Miyamoto (2003) draws attention to the fact that formal schooling and vocational education also equip people with knowledge and skills that will later compliment training opportunities in the labour market and that continuous learning safeguards people from falling into the unemployment trap (Mayhew & Rijkers, 2004). It can be concluded that the acquisition of knowledge and skills is unending and efforts must be made to gain new knowledge and skills at all times.

Schultz (1961) and Nelson and Phelps (1966) contend that human capital is the ability to adapt to changing environments. According to Schultz (1961), human capital can assist in dealing with situations where people have to adapt to a changing environment. In the context of an organisation, human capital is a crucial factor in facilitating the adoption of new and more productive technologies (Schultz, 1961; Nelson & Phelps, 1966). As such, Schultze (1961) argues that people and families with high human capital may also migrate to other areas in search of better job opportunities. Furthermore, adult education and vocational training facilities and skills training can aid people without formal education to adapt to changing labour market requirement (Šlaus & Jacobs, 2011). It is, therefore, safe to conclude that the accumulation of human capital enables adaptation to changes such as land loss or work requirement.

Despite its potential contribution to human development, the theory has been criticised. For example, Little (2010) points out that the theory ignores the fact that learning is motivated, and learning itself can be motivating. Gillies (2011) also argues that it is inappropriate to reduce the goal of education to economics because moral and social life is equally important. Besides, it is not feasible to aggregate years of education in different schools because of differences in the qualities of education (Kolomiiets & Petrushenk. 2017). Furthermore, the theory fails to explain how education increases productivity or the variations in salaries or the role of the status of people with similar educational attainment (Marginson, 2017). Thus, productivity is not solely dependent on income, but also on social relations and natural resources and the conceptual discussions as indicate earlier follows next.

Conceptual Overview

This section of the chapter presents the mapping of conceptual territory that encloses the study. Here, the focal concepts are discussed. The concepts include; land use, land use change, livelihood, urbanization, peri-urbanization, and peri-urban area. These concepts are examined because they underpin the conceptualization of the research topic, research problem, and research objectives. The concepts also provide the benchmark for the measurement of the key variables in the research project and therefore, there is the need to demarcate their boundaries and what they entail in this research exercise. Besides, the delineation of the conceptual boundaries will aid in the comprehensive understanding of the complexities of the subject matter of the research project.

Land Use

Lambin, Geist and Rindfus (2006) elucidate that land use manifests in the exploitation of land cover to satisfy human needs. On the other hand, Aspinall and Hill (2008) explain that land use means the social, economic, cultural or political function of the land. Specifically, Ezeomedo and Igbokwe (2013) delineate that the kind of use to which man has put the land as land use and this includes all activities undertaken on land such as farming, construction of residential, civil and commercial structures to serve a specific purpose (s). Bičík *et al.* (2015) also summarised land use as a physical use of an area. While Aspinall and Hill (2008) highlight the social, economic and political functions of land, Ezeomedo and Igbokwe (2013) and Bicik *et al*. (2015) concentrate on the physical use of land. The various definitions suggest the functionality and benefits of land to humans depend on its usage.

According to Krausmann (2001), land use connotes human dominance over ecosystems and control of photosynthesis products. Krausmann further contends that colonization of ecosystems implies planned human intervention in the landscape to make it more appropriate for use by people. Furthermore, land use can be analysed through social and economic activities that manipulate the landscape that is caused by human interventions (Krausmann, 2001). On a broader scale, Wrbka *et al.*, (2003) indicate that land use is the conditional and historically variable outcome of the interplay between socio-economic and biophysical forces. In Environmental Science, Fischer-Kowalski and Haberl (2007) claim that the term land use includes social ecology. It can be concluded that the use of the term land use hints at human's conquest and domination of terrestrial ecosystems.

Kasa, Zeleke, Alemu, Hagos and Heinimann (2011) identify croplands, forest, and grasslands, respectively as the main land use types in peri-urban areas in Addis Ababa. Similarly, Balcika and Kuzucua (2016) posit that the main land use types are forests, artificial surfaces, water surfaces, wetlands, agricultural fields, pasture lands, and mining areas. On the other hand, Anderson, Hu and West (2017) categorize residential, commercial, industrial, and agricultural; growing annual or perennial crops, growing industrial crops, animal husbandry, and land-based aquaculture activities as land uses. Kasa *et al*. (2011) relate land use to agriculture, while Balcika and Kuzucua (2016) focus on the physical appearance of land and Anderson *et al*. (2017) stress commercial and industrial uses. In summary, the concept of land use varies and thus it does not lend itself to a precise definition.

A related concept that is often used alongside land use is land cover. Ellis and Pontius (2007) define land cover as the physical and biological cover over the surface of the land, including water, vegetation, bare soil, and/or human-constructed structures. Lambin *et al*. (2006) had earlier explained land cover as the observed features such as grass, roads, and building. In a similar vein, Duhamel (2012) describes the land cover as the physical overlay of the earth surface and comprises observed physical characteristics such as areas of vegetation, bare soil, rocks, and buildings. Lambin *et al*. (2006) and Duhamel (2012) focus on physical characteristics whereas Ellis and Pontius (2007) include biological attributes as part of land cover. Taken together, we can say that both man-made and natural features together constitute the land cover.

According to Goetz (1999), land use has become an important policy concern for urban planners and policymakers because it entails

interdependencies among individuals and communities that have significant influences on economic and social wellbeing. Consequently, Coskun, Alganci, and Usta (2008) suggest that land use activities which can lead to negative permanent changes should be kept under control to protect future generations. In the view of Metternicht (2017), sustainable land use and management can be guaranteed if there is effective and well-thought-out land use planning that caters for inconsistent objectives of social actors. The discussion suggests that land use planning is a prerequisite to securing agriculture lands in peri-urban areas to enable households to earn a living.

Duhamel and Vidal (1998) point out that the functional parts of land can be determined using physical factors. However, land use is difficult to observe because not all the attributes can be seen using spatial data and therefore there is the need for socioeconomic data from landowners and managers to supplement spatial data to determine the factors that drive land use (Meinel & Hernnersdorf, 2002). Son and Tu (2008), on the other hand, identify the socio-economic variables that determine the functionality of land as aquaculture land, land under irrigated rice, land under forestry, and land under upland crops. Also, total population, the total output value from agriculture, total income from the rural economy, and the number of enterprises also determined the functionality of land (Son & Tu, 2008). In sum, the data required for determining land use include both physical and socio-economic variables.

Miguel (n.d.) also calls for the integration of satellite remote sensing, GIS and historical recall data to generate information to study land use, which allows for a better understanding of the direction, nature and rate of land use

change. It thus appears that this represents an alternative method for land use studies, especially for those areas where there has been little or no long-term monitoring of agricultural land conversion. Similarly, Ehlers, Jadkowski, Howard, and Brostuen, (1990), Harris and Ventura (1995) and Yeh and Li (1999) have also suggested the use of land use pattern information to detect land use change and to propose policy direction. Besides, Lovett, Turner, Jones, and Weathers (2005) recommend the use of the patterns, causes, and consequences of spatial heterogeneity to ecosystem function as important vital elements in contemporary area landscape research.

Nonetheless, National Research Council (2001) and Masereka, and Wadembere, (2019) contend that the main challenge confronting decision-makers is how to integrate biophysical data, policy factors, and socio-economic data systematically to generate constructive understanding for effective management environmental stress in peri-urban areas. Consequently, Meinel and Hernnersdorf (2002) cautioned researchers and planners against the use remote sensing imagery alone in land use studies since such information does not indicate the processes that lead to the use of land for a particular purpose. Therefore, spatial and socio-economic data are required to enable one to plan land use changes in response to the needs of the community or region while preserving the land for people to make a living.

Land Use Change

Briassoulis (2004) defined land use change (LUC) relative to the individual by stating that land use change occurs when individuals modify land for their benefits. For instance, modifications can take the form of forest clearing, bushfires, intensive cultivation, overgrazing, construction, and

afforestation (Briassoulis, 2004). A different view offered by Moorman, Mason, Hess, and Sinclair (2006) is that LUC occurs when people transform natural habitats into man-made landscapes of residential, commercial, institutional, and industrial areas as well as the supporting infrastructure. Briassoulis (2006) broadened the earlier definition by introducing spontaneity and deliberate changes in the appropriation to satisfy human needs. Whereas Briassoulis (2004) narrows LUC to the individual level, Briassoulis (2006) and Moorman *et al* (2006) presume changes in a collective context.

In the view of Timms (2006), the conversion of farmland into housing, commercial, infrastructure, and waste dumps constitute agriculture land use change. Similarly, agriculture land use change occurs when urban residents buy up prime agricultural land in peri-urban areas to satisfy residential or commercial purposes (Nicodemus, & Ness 2010; Samat, Hasni, & Elhadary, 2011). In the same way, Mazzochi, Sali and Corsi (2013) describe LUC as the shift in urban population from the inner city to arable land on the edges of the city. Along similar lines, Amoateng, Cobbinah, and Owusu-Adade (2013) point out that any modification to land to create a conducive environment for human habitation is land use change. The common denominator here is the transformation of natural habitat to satisfy human needs but the difference in the definitions lies in where LUC is occurring.

Sala *et al*. (2000) contend that land-use changes are so pervasive and enduring that, when combined globally, they affect key aspects of the earth system considerably and that LUCs directly impact biotic diversity worldwide. In furtherance of this, rapid urbanization is projected to create ecological problems because urban expansion encroaches on peri-urban arable agriculture

land (Wang, Wang & Wu, 2009; Liu, Yue, & Fan, 2011). Emphasising the danger associated with rapid LUC, Wang, Chen, Shao, Zhang, and Cao (2012) advocate for the prioritisation of the control of urban expansion to protect agriculture land in peri-urban areas. Ultimately, any land use policy which calls for the restoration of cultivatable land has to occupy a central place in countries experiencing rapid urbanisation.

Ho and Lin (2004) reported significant agriculture land use change in China since the 1980s. According to FAO (2011), the world's population is expected to rise to about 9 billion by 2050, and this implies that demand for food and infrastructures will further swell. Consequently, agriculture land use change trends will be further intensified across the globe (Barati *et al*., 2015). In furtherance of this, the European Environment Agency (2006) and Mazzocchi *et al.* (2013) point out that urban sprawl has affected vast agricultural areas in some European regions. Therefore, agriculture land use change is the most important concern in many countries in which agriculture is the major source of livelihood (Barati *et al*. 2015).

Livelihood

Chambers and Conway (1992) conceive livelihood as a combination of the capabilities, assets, and activities required for living. In a much simpler form, Chambers (1995) regard livelihood as the way of earning a living. Baumann (2002) also describes livelihood broadly as the people, their land, their capabilities and their means of making a living. Though Hanstad, Nielsen and Brown (2004) consider secured access to land as livelihood, Datta, Kandarpa, and Mahajan (2014), however, assert that the way of life of people is their livelihood. Datta *et al.* ignored the fact that people can engage in other

activities that are alien to their culture as a means of livelihood and sustainable livelihoods approach (SLA) comes in handy to help explain the complexities of livelihood (Ashley & Carney, 1999; Carney, 1998; Chambers & Conway, 1992; Scoones, 1998).

However, Kranz (2001) asserts that SLAs emerged in response to the disappointment with conventional poverty reduction approaches, and to offer a new perspective to poverty. Department for International Development (DFID), CARE International, United Nation Development Program (UNDP), OXFAM, and Food and Agriculture Organisation (FAO) is credited with popularising sustainable livelihood approach [SLA] (Ashley & Carney, 1999). SLAs evolve a mechanism to identify the ways people try to make a living, and as such, development approaches should be people-centred and at the same time facilitate constant knowledge acquisition (Patnaik & Prasad, 2014). SLAs are regarded as a set of guiding principles for developing interventions that focus on building livelihood capacities and an analytical framework to improve understanding of poverty (Farrington, 2001; Patnaik & Prasad, 2014).

Ellis (1999) explains livelihood diversification as the process by which households create diverse activities and social support systems for survival and to enhance their standard of living. For example, Thanh, Anh, and Tacoli (2005) report that rural people in Vietnam depend on handicraft production, seasonal migration, farming, and provision of agricultural services, transport, and trade of agricultural produce as means of survival. However, resource-poor households are vulnerable and not capable of diversifying livelihoods due to weak asset base (Khatun & Roy, 2012). Khatum and Roy further state that resource-poor households are inhibited by the lack of credit facilities, the fear

of taking the risk, and lack of rural infrastructure and opportunities in non-farm ventures. In brief, livelihood diversification requires a strong asset base.

Leach, Mearns, and Scoones (1999) advocate that the disruption in the peri-urban areas as a consequence of population growth, the breakdown of traditional authority, commercialization, modernity, social change and new urban aspirations, the immigration, or the intrusion of inappropriate state policies warrant a deeper insight into how livelihoods are affected and the emerging livelihoods options. To capture the full ranges of influence of land use change on the livelihood's patterns of peri-urban households, Ashley and Carney (1999) recommend the Sustainable Livelihoods Framework (SLF). In furtherance of this recommendation, Oliver (2008) indicates that the SLF is grounded on the notion that vulnerable people draw on a range of material and intangible assets to pursue multiple strategies in the face of changes.

The sustainable livelihood framework was developed by the DFID to depict livelihoods as systems with feedback (Davies, White, Wright, Maru & LaFlamme, 2008; Pound, Snapp, McDougall & Braun, 2003). The essence is to show how participants learn and take action in response to change (Davies *et al*. 2008). The framework also specifies that the way to develop sustainable livelihoods is for people to draw on their assets to design strategies whose outcomes build those assets and to learn from their experience to influence rules to improve those strategies (LaFlamme, 2010). Earlier, DFID (2000) had pointed out that SLF facilitates wider and systematic understanding of the various factors that constrain or expand livelihood opportunities and their relationships. Undoubtedly, SLF could assist in identifying livelihood assets and the potential to contribute to obtaining a living as indicated in Figure 1.

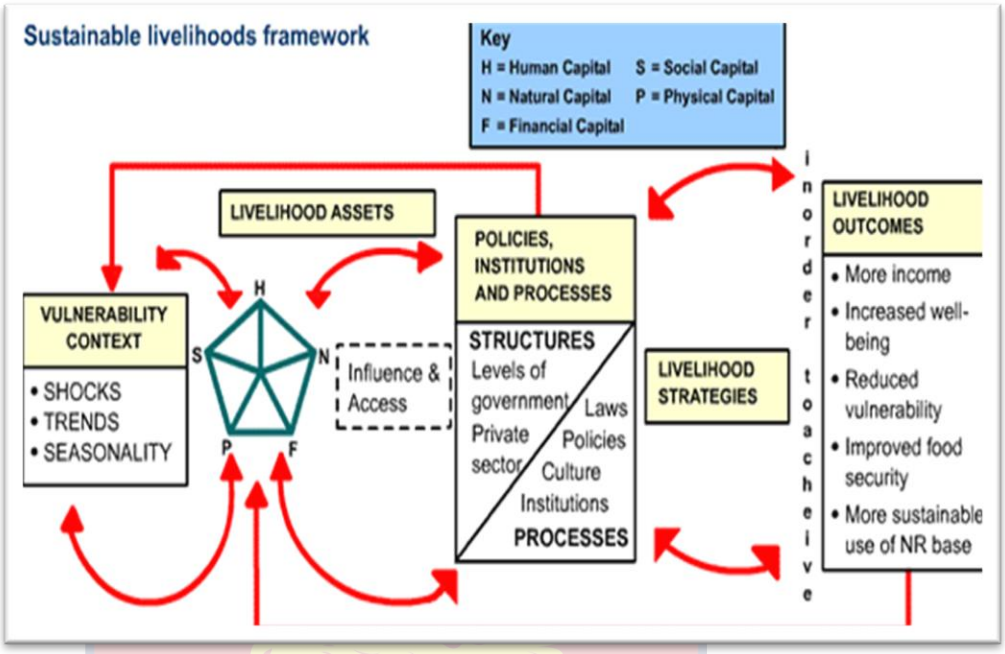

Figure 1: **Sustainable Livelihood Framework**

Source: DFID (2000, p.1)

People pursue different and diverse livelihoods with a given range of assets. Farrington, Carney, Ashley, and Cathryn (1999) identify a set of five asset capitals [Figure 1] to enable people to draw on them to survive. From Figure 1, assets include human capital which comprises the education, skills and health of household members. Physical capital includes possession of the household or individual such as farm equipment, tools, house among others. Social capital covers the claims, social networks, and membership of community-based associations (Bebbington, 1999; Ellis, 2000). According to Majale (2001), financial capital and its substitutes include regular remittance, pensions, savings and credit, whereas natural capital is the natural resource base such as land, water bodies, and economic tree (Ellis, 1999; Farrington *et al.*, 1999; Krantz, 2001; Conway, 2011).

People live and pursue livelihoods within a vulnerability context (DFID, 2000). Oliver (2008) and Patnaik and Prasad (2014) describe the

vulnerability context as the trends, shocks, insecurity, and seasonality which affect the peoples' assets. DFID (2000) asserts that policies, institutions and processes mediate and determine access to assets, terms of exchange between the types of capitals, and the benefits. In the same way, the on-farm and off-farm activities people engage in also constitute their livelihood strategy and thus, livelihood strategies are hinged on the access to assets, and institutions, policies and processes that mediate access to these capitals (Brocklesby & Fisher, 2003). Consequently, Kappel, Michelle and Pedersen (2010) conclude that livelihood strategies result in improved income, reduced malnutrition, and reduced poverty as livelihood outcomes.

In the opinion of Davies (1996), SLA helps to shift the focus of development interventions from changes in agriculture to the diversity of livelihoods in the context of rural development. In the same way, the World Bank (2000) states that the SLA assists development practitioners and policymakers in understanding poverty as a multidimensional phenomenon and a deprivation of wellbeing. Arguing along similar lines, De Haan (2012) emphasis that claims and access to resources by the poor is as valuable traits of the approach. Patnaik and Prasad (2014) draw attention to SLA focus on securing for poor households' adequate and decent livelihoods assets that inure to the quality of living by people recognizing their needs for enhanced incomes and abilities to cope with vulnerabilities and risks, whether in urban or peri-urban areas.

Perret (2002) points out that livelihood strategies can be farming, remittances from a spouse or children working outside the community, and pensions. Also, non-permanent casual local jobs, and access to welfare

payments constitute livelihood (Perret, 2002). Contrary to this, some researchers (Cobbinah *et al*., 2015; Mundoli *et al.,* 2015) have emphases that the role of agriculture as a livelihood strategy in peri-urban areas is diminishing. It can be inferred from the discussion that livelihood can take many forms, from farm to non-farm activities that households or individuals engage in to make a living and satisfy household expenditure requirement.

Acharya and Sharma (2016) explain the livelihood pattern as the multiple occupational activities that an individual undertake to secure a living. Acharya and Sharma further note that farming alone is unable to provide a sufficient means of survival for many rural poor families. In the same way, Ellis (2000) had earlier underscored the contribution of non-farming activities to rising the output of farming production. Sahal, and Bahal (2014) add that it is common for Individual households to engage themselves in different types of activities based on changes in endowments and infrastructure, depending upon the individual's capabilities, skills and assessment of opportunities and constraints. As a result, households endowed with the capacity to broaden their income sources are relatively better off than those that depend on one source (Acharya & Sharma, 2016).

On the other hand, Iiyama (2006) claims that individuals or households that depend on casual off-farm income may tend to earn less than the one dependent on regular off-farm income. A livelihood activity is relevant based on its percentage contribution to the total income of the individual or household (Ellis, 2000). Thus, a household is said to be primarily pursuing a livelihood strategy if it obtains more than two thirds its income from it (Rist, Feintrenie, & Levang, 2010). Nonetheless, the livelihood patterns undertaken

by individuals or households may be informed by different incentives (Barrett *et al*., 2002; Reardon & Vosti, 1995). In summary, livelihood strategy becomes important if it is a major contributor to household income and therefore, attracts investment.

Sahal and Bahal (2014) explain that livelihood patterns may emerge as a result of a continuous adaptive process whereby households add new activities, maintain existing ones or drop others. The process will, therefore, lead to maintaining diverse and changing livelihood portfolios. As such, land use changes may compel farmer households to change their principal occupation and engage in multiple activities (Mondal, 2008). However, Mondal reminds us that households who do not own land but with the changes of land use may change their occupation because though land use changes may have no direct effects on those categories of household, indirectly they have some effects on them. In sum, agriculture land use change affects both local landowners and non-landowners in peri-urban areas.

Thunberg, Jerker, Krantz, and Lasse (2003) aver that the livelihood pattern is explained by income earned through the various livelihood activities. Therefore, livelihood patterns related to income which implies that obtaining income from different and multiple sources tend to improve livelihood and increase standard of living (Thunberg *et al.*, 2003). For that reason, Ellis (2000) groups income sources of rural households into 'farm income', 'non-farm income' (non-farm wages and business income), and 'off-farm income' (wages of exchange labour on other farms). In conclusion, livelihood strategies can be categorized according to the issues of interest to the researcher or individual undertaking the categorization and in this case, the

categorization of livelihood strategies of peri-urban households becomes imperious.

Urban Area

In India, an urban area is delineated based on all places with a municipality, corporation, cantonment board or notified town area committee, and all places which have a minimum population of 5000, a settlement with at least 75 percent of the population engaged in non-agricultural activities, and population density of at least 400 persons per km^2 (Bhagat, 2014). Earlier, United Nations (2004) had noted that given different conditions in countries around the world, and agreed definition of an urban area is not practicable. According to the World Bank (2008), statistical definitions of urban areas vary from country to country. In India, an urban area is demarcated based on administrative boundaries, size, level of services, or population density (Bhagat, 2014). Taken together, different countries have a different criterion for determining what constitute an urban area.

In Ghana, an area is considered as urban if it has a population of 5,000 people (Ghana Statistical Service [GSS], 2014). This implies that unlike India where urban areas are demarcated based on population, municipalities, percentage of people engaged in non-agriculture activities, and population density, in Ghana, the population is the only criterion for defining an area as urban. Similarly, in Mexico, urban areas are defined as localities that have 2,500 people or more (United Nations, 2014). The differences in the criteria for the demarcation of urban areas between India, Mexico, and Ghana, reinforce the suggestion by the United Nations (2004) and World Bank (2008)

that there is no universally accepted definition of what constitutes an urban area.

Clark (1982) sees urban growth as a spatial and demographic process and refers to the recognized significance of towns and cities as a concentration of population within a particular economy. Urban growth involves the expansion of towns and cities, change of economic and socio-cultural variables, changes in land use pattern and conceptions of the descriptive interrelationship between them, and value judgments of the directions and qualities of changes (Clark, 1982). In a similar vein, Bhattacharjee (2016) defines urban growth as the process of enlargement and reduction of economic agglomerations. Chatterjee and Carlino (2001) accordingly contend that urban growth is the result of changes in arrangements that expand the scope and the strength of the driving forces of expansion in a city or country. Thus, the concept of urban growth entails both quantitative and qualitative characteristics.

A key concept associated with urban growth is urbanisation. Glenn (1984) defined urbanisation as the urban population divided by the total population of a region. Similarly, Hope Sr. and Lekorwe (1999) regard urbanisation as the annual rate of change in the percentage of people living in urban areas. On the other hand, Peng, Chen, and Cheng (2011) describe urbanisation as the process by which rural areas turn into urbanized areas as a result of economic development and industrialisation. Likewise, Bao and Fang (2012) and Nsiah-Gyabaah (2000, 2003) conceive urbanisation as the relocation of the population from rural areas to urban areas, accompanied by the transformation from agriculture to manufacturing. The variations in the

definitions point to the fact that population, movement of people, and transformation of the local economy seems to constitute the key characteristics of urbanisation.

Following the above, Bhatta (2010) and Jedwab *et al*. (2014) name demographic, economic, and political factors as well as natural population growth, rural-urban migration, international-to-urban migration, reclassification of urban settlements as the key drivers of urbanisation. On the other hand, Bekele (2005) posits that natural population growth is determined by excess births and low death rates. When the birth rate of urban areas exceeds the death rate, there is going to be a natural increase in the population (Bhatta, 2010). In the same vein, Jedwab *et al*. (2014) observe that mortality rate declined due to the epidemiological transition and high fertility rate over time caused natural population growth and urban expansion. Together, urban population growth will automatically result in spill over into proximate areas which will generate huge demand for lands in peri-urban areas.

Peri-urban

According to Phillips *et al.* (1999), peri-urban represents the area where urban and rural processes meet, mix and interact producing rural and urban characteristics. Therefore, Rakodi (1998) posits that the peri-urban interface has both spatial and structural dimensions and it's also marked by changes in the economic and social structure. The definitions offered by Phillips *et al*. (1999) and Rakodi (1988) suggest changes in social and economic activities in the periphery. Briquel and Collicard (2005) and Caruso (2001) also contribute that the peri-urban area is a mixed zone with urban characteristics in rural areas. Hence, the term is used to describe newly

urbanized areas or zones at the fringes of the city (Adell, 1999; McGregor, Simon & Thompson 2006). In summary, the peri-urban space exhibits the characteristics of the rural and urban environment and this presents a unique challenge for local people and authorities.

Other terms have been used to describe peri-urban; urban fringe, and sprawl. According to Hite (1998), urban fringe is a geographic space where the economic returns to land from new urban land uses are approximately equal to the returns from traditional land use. The peri-urban interface is thus, the result of urban processes than of territorial processes (Adell, 1999). However, in the European context, Caruso (2001) defines peri-urban areas as mixed areas which are largely under an urban influence but have a rural morphology. On the other hand, Burchell and Mukherji (2003) define sprawl from the perspective of low-density employment, and leapfrog development characterized by an endless spread of urban activities. The description of sprawl indicates that it is a kind of development that is unregulated and it is characterised by the inefficient use of land especially in areas adjacent to urban centres due to peri-urbanisation.

Ravetz *et al*. (2013) define peri-urbanisation as a process by which a rural area adjacent urban centre becomes fully urbanized over time. Thus, peri-urbanisation involves commuting and behavioural changes of residents as a result of the integration of the rural area into the urban system (Bhatta, 2010; Ravetz *et al.*, 2013). UN (2016) defined peri-urbanisation as a process characterized by the displacement of population, industries and services from the city centre to the edge, and the establishment of new centres governed by a new set of economic and social dynamics. While Bhatta (2010) and Ravetz *et*

al. (2013) consider peri-urbanisation as changing behaviour and commuting, UN (2016) looks at it as a movement of businesses and industries. It can be deduced that the peri-urbanisation is dynamic and transitional and does not certainly afford itself to a precise description.

Several researchers (Tacoli, 1998; Cobbinah & Amoako, 2012; UN, 2016) have attributed certain key characteristics to the peri-urban zone. The interaction consists of rural activities taking place in urban areas and urban activities as manufacturing and services taking place in rural areas, thus there is spatial segregation of activities in the zone (Tacoli, 1998). Cobbinah and Amoako (2012) posit that peri-urban area is characterized by increases in land values determined by market forces. Specifically, peri-urban areas in developing countries have become divided cities, marked by spatial segregation along socioeconomic lines (UN, 2016). Therefore, these areas consist of informal land-use patterns, inadequate basic infrastructure, poor or non-existent public services, with substandard housing quality and poverty (UN, 2016).

In terms of functionality, Anbumozhi (2007) describes the peri-urban zone as one that exhibits rural and urban land uses and it is in the transition from agricultural land uses to urban use. Maasikamäe, Hass and Jürgenson (2011) contribute that because development in peri-urban areas is unregulated, prime agricultural land is endangered from the incessant demand for land to support urban-based activities. From health and environmental perspective, peri-urban areas are characterized by rapid and spontaneous growth resulting in negative health issues and environmental degradation (Saxena & Sharma, 2015). Saxena and Sharma further state that it is unclear which jurisdiction

peri-urban areas fall under in terms of planning, land tenure, and land governance. In summary, peri-urban areas are often caught between two or more administrative jurisdictions leading to neglect and deprivation.

Several elements have been cited as contributing to peri-urbanisation. Friedmann and Miller (1965) assert that the introduction of mass commuter transport systems and the increased availability of the cheap cars encourage urban dwellers to move to immediate rural areas for living, recreation and work. This development leads to an expansion of cities, not only physical in terms of low-density housing, but also terms of functional relationships, creating an area of urban influence around cities (Friedmann & Miller, 1965). In the view of Ristimaki (2011), a change from a public transport-based to private car and highway network pattern drives peri-urban development. Contributing to the discussion, Rahayu and Mardiansjah (2018) posit that population growth drives the extension of urban areas towards proximate communities resulting in competition for land for agriculture and urban activities.

The incoherence of the government's policies towards decongesting in Indian cities contributes to peri-urbanisation (Pucher, Peng, Mittal, Zhu, & Korattyswaroopam, 2007). The non-existence of prepared regional land-use planning and uncoordinated local government structure also fuel encroachment on land in the periphery (Pucher *et al.*, 2007). Similarly, the absence of planning and enforcement of existing regulations has led to haphazard peri-urban development within the Istanbul metropolitan area (Küçükmehmetoğlu & Geymen, 2009). On the contrary, Pucher *et al.* (2007) and Xi et al. (2012) posit that in China, the failure of central planners to

consider the full range of impacts associated with development decisions contributes to peri-urbanisation. Undoubtedly, spontaneous development in peri-urban areas is caused by institutional weaknesses and human inaccuracies.

Kasanga and Kotey (2001) claim that peri-urban lands are taken over by relatively wealthy former urban residents when they get to know about the initiation or endorsement of a layout or plan for a particular peri-urban interface, depriving poor farming households of agriculture lands and livelihoods. Land rent is also cheaper in the peri-urban areas and thus encourages former city residents to buy lands in the neighbouring areas (Thuo, 2010). This position is supported by Mugisha and Nyandwi (2015) who draw our attention to the cost of land as the primary driver of peri-urbanization in Kigali city. Thus, communities near the city offered former city residents more opportunities for housing at a lower cost compared to the cost in Kigali City (Mugisha & Nyandwi, 2015). Accordingly, the amount of money spent on acquiring land is a contributory element to peri-urbanisation, especially in developing countries.

Webster and Muller (2004) note that personal security concerns at the core city may compel people to move to peri-urban areas and thus, estate developers often try to secure personal security by building integrated residential complexes comprising several gated housings in the peri-urban interface. Likewise, peri-urbanisation is driven by the desire of former urban residents to move outside the congested urban core where land is less expensive (UN, 2016). However, the search for new locations to gain access to larger consumer and cheap labour compel businesses to move to peri-urban

areas to serve larger populations better (Ravetz *et al*., 2013). It can be concluded that the search for personal security, comfort and economic incentives contribute to peri-urbanisation.

Zoomers (2002) notes that peri-urban traditional livelihoods come under increasing pressure from the influence of urban activities. Illegal settlements, disposal of solid and toxic waste and environmental stress on green and recreational spaces are also problems linked to peri-urbanisation (Douglas, 2012; Aguilar, 2008). Closely linked to this is the predominance of disorganized land markets and chaotic development in peri-urban areas (Iaquinta & Drescher, 2010). Furthermore, Saxena and Sharma (2015) indicate that the peri-urban areas do not have basic services, such as water, solid and liquid waste management. Peri-urban areas are also faced with rapid agricultural land conversion (Mugisha & Nyandwi, 2015). Therefore, traditional peri-urban dwellers are vulnerable to health hazards and loss of livelihoods due to peri-urbanisation and its related activities.

Chapter Summary

The chapter presented the five theories that guide the research into agriculture land use change and emerging patterns of livelihoods in peri-urban areas of Wa. The key tenets and the weaknesses of the theories have been highlighted with the aim that the identified gaps in the theories will be filled at the end of the study. The chapter also discussed the key concepts that reflect in the topic with particular emphasis on the definitions, characteristics and their measurement. The objective is to help readers appreciate the concepts and how they are measure when they are applied in the current study. The next chapter

presents a review of related relevant empirical studies on the topic under consideration.

CHAPTER THREE

EMPIRICAL REVIEW AND CONCEPTUAL FRAMEWORK

Introduction

Review of empirical studies and the crafting of a conceptual framework provide the crucial grounding for worthwhile logical research. Empirical review keeps researchers from "reinventing the wheel" as Baumeister and Leary (1997) point out and helps to unearth connections between several empirical results. The empirical review also allows the researcher to build on what is already known and prevent duplication of results that have already been established (Griffee, 2012; Sternberg, 1991). The discussion suggests that empirical review helps in focusing the current research on the unknown issues and guides and directs the research questions, shapes the methodology adopted and provide guidelines for the analysis of data collected.

Generally, a conceptual framework provides the basis for the elucidation of research findings (Merriam & Simpson, 2000). In other words, the conceptual framework highlights the key factors, variables, and the presumed relationships among them. The key variables and the supposed linkages between them could be presented in graphic or narrative form (Brink, Van der Walt, & Van Rensburg, 2006; Silverman, 2000). Jabareen (2009) argues that a conceptual framework demonstrates how key concepts interlink and therefore helps researchers to gain a comprehensive understanding of the issue under study. It can be deduced from the explanations that the conceptual framework provides the researcher with the lens through which an issue of interest is investigated.

Empirical Review on Urban Expansion and Agriculture Land Use Changes

The empirical review is presented according to the themes reflected on the topic of the research project. Studies that focus on urban expansion into peri-urban areas and the resultant land use changes in peri-urban areas are presented first, followed by those that focused on land use changes and implications on livelihoods of peri-urban households. All the empirical studies reviewed here are studies that focused on urban expansion and the impact on peri-urban agriculture lands and most of them used concurrent mixed research methods comprising both quantitative and qualitative approaches in the collection and analysis of data. In all, 12 empirical studies were reviewed based on their availability and relevance to the key variables captured in the research topic.

First, Amoateng, Cobbinah, and Owusu-Adade (2013), using urban land market and rational choice theories, assessed the nature and extent of physical development in peri-urban areas and identified the factors contributing to the rapid development peri-urban Abuakwa, Kumasi, Ghana. The concurrent mixed research method was used along with a review of relevant literature. Amoateng *et al.* (2013) selected 143 house owners using a mathematical formula $n= N/1+N (\alpha)^2$ with a margin of error of (0.08). The purposive sampling method was used to select indigenes, relocated urban dwellers and officials of relevant institutions to collect data on perspectives on the peri-urban development through structured questionnaires and semi-structured interviews.

Land use changes in the form of residential, commercial, mixed uses, undeveloped uses and civic uses were measured on the ratio scale and factors influencing physical expansion were measured on the nominal scale and data collected were analysed using quantitative and qualitative methods. Frequencies, percentages and correlation were the main analytical procedures used to analyse the quantitative data. Qualitative data, on the other hand, were analysed using thematic analysis focusing on description and explanation of the pattern of peri-urban development. The two sets of data were integrated at the level of presentation to present a holistic picture of the situation in the study communities.

Amoateng *et al.* (2013) reported that between 1993 and 2010, Abuakwa witnessed significant physical expansion. The built-up areas in the town covered 713 acres, representing 165 percent change in size, an indication that the size of the settlement had tripled in less than two decades. Additionally, physical development in the town had spread and encroached on ecologically sensitive areas such as rivers, streams, waterlogged areas and open spaces. It was also reported that none of the areas earmarked for ancillary land uses like education, public open space, and sanitary areas had been utilized for such purposes, instead, such areas had been converted into residential uses.

Amoateng *et al.* (2013) identified the major land use types as residential, commercial, industrial, open space, educational, civic, cultural, sanitation, circulation (road network), mixed uses and undeveloped land. The study also revealed that physical development in the town had occurred in a spatially fragmented pattern, due to speculative buying of peri-urban land and

had been characterized by substantial land use conversion to residential and commercial uses. It was observed that the mixed uses were concentrated along the major roads and in the Central Business District of the town.

Besides, Amoateng *et al*. (2013) identified land tenure challenges, poor planning, government's housing policy, lack of coordinated institutional framework, low land values, good transport system and greenery environment as causes of peri-urban development. Further, Amoateng *et al*. (2013) reported the loss of agricultural land and the indigenous people, who are mainly farmers, have been denied their livelihood. They concluded that Abuakwa is characterized by rapid peri-urban development. In this study, the issues of the amount of land loss, effects on traditional livelihoods and their dynamics on peri-urban households were relegated to the background.

Second, Naab *et al*. (2013) assessed the impact of rapid urbanisation on agricultural lands in Tamale using entitlement theory and urban land market theory as well as the rational choice theory as theoretical frameworks. Random sampling was used to select 300 households at 0.1 margins of error based on the population of the communities involved to give each of them an equal chance of being selected. Purposive sampling was also employed to select officials of relevant decentralised departments. The questionnaire was used to elicit data from households while interview guide and direct observation of land uses were used to collect qualitative data.

The sources of land title use of land, and factors that facilitated land use change were measured at a nominal level, while quantitative data were analysed using frequencies and percentages and presented in tables and graphs. Qualitative data were transcribed and thematic analysis was used to

generate themes and categories, which were presented in the form of narrations. Naab *et al.* (2013) found that subsistence agricultural lands have attained higher values. The study revealed that 48 percent of land acquisition was through inheritance, whereas the rest was through gift and purchase. It was further reported that 92 percent of lands acquired were used for agricultural purposes with the remaining 8 percent used for residential and commercial activities in the peri-urban areas.

Naab *et al.* (2013) noted that the influx of migrants and their desire to own and use land contributed to the land use changes in Tamale. Besides, population increase, large family sizes, and the need for money to fight litigation, pay school fees, money for economic investment, the maintenance of skins, chiefs and their elders were found to drive landowners to sell land for urban-based activities and thus contributed to land use change in the study communities. It was further reported that 58.8 percent of indigenes were still engaged in agriculture. The increased need for accommodation, jobs, land loss to housing, economic transformation, agricultural intensification and commercialization, environmental degradation, and agricultural decline were identified as implications of land use change.

Naab *et al.* (2013) reported that 40 percent of the people experience a reduction in agricultural produce as a result of the reduction in farm size. Besides, 23.8 percent reported a loss of income and 27.5 percent reported scarcity of food. This poses serious livelihood problems as the majority of the population depends on agriculture as a means of sustenance. Naab *et al.* (2013) concluded that there were major agriculture land use changes to residential land use in the peri-urban areas in Tamale. However, the study

failed to report the amount of land loss per individual household, emerging combination of livelihoods and the issues informing new livelihood patterns as a result of land use changes. The study did not employ rigorous analytical procedures to enable the formulation of a robust policy response to agriculture land use changes in peri-urban areas, therefore, more work and testing are required to better understand the issues.

Third, Amoateng *et al.* (2013) and Naab *et al.* (2013) focused on the physical expansion of urban areas and their effects on peri-urban agricultural land. Both studies adopted the concurrent mixed study design to carry out the data collection, and data were analysed using frequencies and percentages. Both studies also found that urban expansion had led to the loss of agriculture lands to urban uses such as housing and related services. However, the two studies did not examine how urban expansion had affected the livelihoods of traditional households. The two studies also disagree on the issues causing land use change whereas, Naab *et al* (2013) reported social elements such as the need for funds to maintain skin, Amoateng *et al*. (2013) reported cheap cost of land and government policy as the issues and this raises uncertainty on the issues that lead to the conversion of peri-urban agricultural lands.

Another study in Kumasi, Ghana, conducted by Cobbina and Amoako (2012) examined urban sprawl and the loss of agriculture lands, and impact of sprawl as well as the planning efforts at addressing this phenomenon, using urban land market and rational choice theories as the basis. The qualitative study designed was employed while purposive sampling was used to select respondents from four selected communities within the 15-kilometre range at the fringes of Kumasi and relevant local authorities. Primary data were

collected using an institutional survey with the aid of a questionnaire, interviews and telephone conversation.

Traditional authorities, assembly representatives, unit and plot allocation committee members and heads of land-owning families were also interviewed for their perspectives on the impact of sprawl on peri-urban areas. The views collected from the interviews from the local level participants, institutional survey, informal interviews and telephone conversation were harmonised based on identified themes and validated through stakeholder workshops at community and institutional levels. The trend of physical growth was measured on the ratio scale, the manifestation of sprawl, causes and challenges of sprawls were measured on the nominal scale. Documents relating to urban growth and management in Ghana such as the master plans of 1962 and 2007 of Kumasi, and consultancy reports of decentralised departments were thoroughly reviewed using content analysis.

Cobbinah and Amoako (2012) found that the Kumasi metropolis had witnessed the physical expansion and changes in its land uses from 1995 to 2010. Between 1995 and 2010, there was an increase in total residential, commercial, and educational land uses. There was also a rapid reduction of the undeveloped lands by 12.3 percent. According to Cobbinah and Amoako (2012), urban sprawl had led to the loss of open space, rural character and farmlands. The study showed that more farmlands were consumed by sprawling suburbs compared to urban neighbourhoods. Therefore, urban land to meet the needs of the growing population is underutilized by the haphazard conversion of peri-urban agricultural land to residential and commercial uses in the city by developers.

Cobbina and Amoako (2012) discovered that residents' desire for new lifestyles in peripheral environments, high demand and cost of land in the built-up areas, limited space, improved transportation links, and enhanced personal mobility are the causes of peri-urban development. The study further reported that increasing immigration, cultural traditions and constraints, and the poor application of land use planning policies, poor environmental conditions, social problems and safety also contribute to wasteful use of land in peri-urban areas. Furthermore, pressure from developers and inefficiency of the Physical Planning Department were identified as some of the challenges of urban sprawl. In summary, the impacts of sprawl are detrimental to the development of Kumasi especially on the natural, economic, social and the physical environment.

The studies by Amoateng *et al.* (2013) and Cobbina and Amoako (2012) share a lot of things in common. The two studies report physical expansion between the periods studied and have attributed the expansion to increasing demand for peri-urban land as a result of low prices of land in those areas. The two studies have demonstrated that agriculture lands have been consumed, thus destroying livelihoods of households engaged in agriculture. However, both studies did not report the effects of peri-urbanisation on livelihood patterns, determinants of livelihoods and why local landowners sell land to new developers. Besides, Cobbina and Amoako (2012) also identified social issues such as safety, new lifestyle, increased mobility as the driving forces whereas Amoateng *et al.* (2013) reported only economic incentives and government policy as the key drivers of peri-urbanisation and this leads to smacks of doubt.

Fourth, Appiah, Bugri and Boateng (2014) studied a similar issue by applying more rigorous analytical tools. They examined the effects of peri-urbanisation on peri-urban land use change patterns, using a binary logistic regression model, in the Bosomtwe District, Ghana. The human capital theory and rational choice theory formed the theoretical basis for the study. The concurrent mixed research method was employed using a questionnaire to collect quantitative data. Using $n = (Z\alpha)^2 \times [P(1-P)]/d2$, a sample size of 270 was computed and proportionate sampling was adopted to select respondents from 14 communities. Sex, main occupation, marital status, and drivers of peri-urbanisation were measured on the nominal scale while, age, household size, ground rent, and income were measured on the ratio scale whereas, education was measured on an ordinal scale.

Quantitative data were analysed using a step-wise binary Logistic regression analysis, the Pearson's Chi-square, Cramer's V statistics and Nigelkerk's tests of association, strength and correlation coefficient of determination. The step-wise binary logistic regression analysis was undertaken at the 0.05 alpha level. Qualitative data from open-ended questions in the questionnaire were analysed using thematic analysis where the various issues that emanated from the interviews were categorized into themes for presentations.

Appiah *et al.* (2014) found that urban growth and peri-urbanisation were driven by population and infrastructure expansion; the availability of excess land for which reason people were moving towards the district in search for land for residential and recreational purposes, and the perceived availability of social amenities that attract people from other settlements into

the district. The study revealed that subsistence agriculture, residential, commercial and recreational activities were the main land uses in the study areas. It was also reported that land in some of the communities was put to particular land use types, due to their proximity to the main city and big towns or the relative location advantages.

Appiah *et al.* (2014) identified residential, commercial and recreational activities, and land for administrative purposes as the main uses of land in the district. Furthermore, expansion in residential accommodation, commercial and increased subsistent agriculture were found to be the main human drivers of peri-urban land uses. The study revealed that increasing availability of physical infrastructure correlated well with the increasing infrastructure as a description for peri-urbanization with a combined percentage response of 47 percent, while increasing population combination with availability and easy access to land and availability of social amenities yielded 24 percent response. A chi-square test of independence showed no significant association between peri-urbanisation and peri-urban land use change at 0.05 alpha level (χ^2 [5, N= 270] = 6.60, df = 4, p = .159).

Furthermore, chi-square test of independence between land uses and the associated challenges such as human and vehicular traffic congestion, social vices and problems of multiple sales of same lands to multiple buyers and land guards challenge indicate no significant association at 0.05 alpha level (χ^2 [5, N = 270] = 5.814, df = 4, p = .213). Moreover, easy access to land by tenants and changing demand trends were the major drivers of land use change decisions in the study communities. The study revealed that

respondents were more likely to convert their land from original uses to other uses if the market offers the right price.

Additionally, a step-wise binary logistic regression analysis was conducted to predict the dependent variable of whether the respondents would convert their arable land from present use to a different use. The model contained four independent variables (grounds rent, the major human activities that affect land use and land cover, the income category of the people living in the peri-urban areas and the criteria used in determining the price/rent of a plot of land. The full model containing all predictors was statistically significant at .05 alpha level (χ^2 [5, N= 270] = 24.453, df = 4, p = .000).

The study showed that three of the independent variables were statistically significant at .05 alpha level. The three independent variables were ground rent, major human activities on land use/cover changes and Criteria determining grounds rent. The Nagelkerke R^2 value of .37 suggests that 37 percent of the variation in whether respondents will convert present land use to different uses is accounted for by the four predictor variables. In conclusion, the Bosomtwe district is witnessing several determining factors that are contributing to land use changes. It was also concluded that agriculture and forest were losing their reputation as a source of livelihood due to the high demand for land.

The studies by Naab *et al* (2013) and Appiah *et al*. (2014) sought to examine the impact of peri-urban development on agriculture land use. Both studies used the concurrent mixed research approach and primary data were collected using questionnaire and interviews. However, Naab *et al.* (2013) used secondary data from document review while Appiah *et al*. (2014) used

only primary data. On the method of analysis, Naab *et al.* (2013) used frequencies and percentages to present quantitative data, while Appiah *et al.* (2014) used chi-square test, binary logistic regression, and NigelKerk's tests of association and correlation analysis. Both studies employed thematic analysis to analyse qualitative data, but also ignored the effects of land use change on traditional livelihoods patterns, amount of land loss per individual household, and the determinants of new livelihoods patterns of traditional peri-urban households.

Fifth, Mugisha and Nyandwi (2015) used a concurrent mixed method to study peri-urbanization and its implications on peri-urban land use dynamics in the peri-urban communities in Kigali City, Rwanda. The theoretical basis for the study was the urban land market theory. Kigali city and neighbouring peri-urban areas were selected for the analysis of spatial-temporal dynamics from 2008 to 2014. The data for spatial analysis were obtained from maps extracted from Kigali City Master Plan geo-referenced using ArcGIS 10.2. The orthophoto of 2008 was digitized using ArcGIS 10.2 to obtain all housing units. Interpolation technique was used to obtain urban housing density in 2008. The urban housing density in 2014 was obtained using Google earth imagery 2014.

The change in Kigali city urban housing density from 2008 to 2014 was detected using map algebra subtraction technique. In all, 150 households were statistically computed and randomly selected. Data from sampled households were collected using an interview schedule. Besides, key informants' interviews were conducted with land managers using an interview guide. Physical expansion and housing density were measured on the ratio

scale while factors explaining the land use change were measured on the nominal scale. Specifically, frequencies and percentages were the main statistical procedures used to compile and analyse data from households.

ArcGIS was used to map and analyse spatial-temporal dynamics and housing pressure on peri-urban areas. Microsoft Excel sheets were used to present data in tabular and graphic formats. Mugisha and Nyandwi (2015) reported an inefficient use of available urban land and a more rapid encroachment on peri-urban land. They found that in 2008, the highest housing density was 335 housing units per km^2, whereas, in 2014, the highest density was about 416 housing units per km^2 which represented an increase of 24 percent over the period. The two study communities; Muyumbu and Nyakaliro were reported to be located on high fertile land, which implies that housing development was encroaching on peri-urban agricultural lands.

Mugisha and Nyandwi (2015) found that migration from Kigali city has been the main driver of population increase in Muyumbu and Nyakaliro. The need to own a house, demand for a large parcel of land, inability to pay urban tax, denied building permits, expropriation, and cost of building a house, and obtaining permit were identified as the main social forces driving the conversion of peri-urban agricultural land to residential and commercial uses in the study communities. Mugisha and Nyandwi (2015) identified reduced demand for agriculture land, development of new informal urban settlements, strong need to enforce land use plans, inclusiveness and rigidity of land use plans in peri-urban areas as the implications of peri-urbanisation in the study communities.

It was concluded that about 1,200 hectares of peri-urban land initially used for agriculture were being built-up annually, especially due to out-migration from Kigali city. Spontaneous peri-urbanization of Kigali city implies a gradual decrease of land for agriculture. It was therefore recommended that there was the need for incremental housing, strict enforcement of regulations, effective coordination in the issuance of building permits, and regulation of land subdivisions in peri-urban areas. The study, however, failed to discuss the impact of the land use change on livelihoods and how traditional households were coping with the loss of agriculture lands. Appiah *et al.* (2017) took a different view by adding the factors that informed households' agriculture land use changes decisions.

Sixth, Appiah *et al.* (2017) followed their 2014 study with another one on farmer households' decisions on agricultural land uses in peri-urban Asante-Akim South District, Ghana. The study hinged on the urban land market theory, and rational choice theory as well as entitlement theory. A sequential explanatory mixed research method was used to collect quantitative and qualitative data. Three communities in the district were randomly selected and a statistical formula was used to determine a sample size of 120 households based on the number of farmer households in the district, and simple random and proportionate sampling was used to select the individual households. Purposive sampling was also employed to select officials of the department of food and agriculture in the district. A Questionnaire and an interview guide were the main instruments used to collect primary data.

Factors determining agriculture land use change, decisions behind land use change, and land use types were measured on the nominal scale, while the

size of the land was measured on a ratio scale. Data analysis was conducted using the chi-square test of independence, contingency and frequency tabulation. The qualitative data were analysed using thematic analysis. Appiah *et al.* (2017) reported similar factors determining agriculture land use change and reasons behind decisions about agricultural land use changes which include; weakening livelihoods, changing demand for land, economic returns, and easy access to land. Besides, the study found that household heads expressed the desire to change agriculture land use to other uses due to deteriorating livelihoods, and right economic motivation.

The study found no significant differences between the factors that determine agricultural land use change and those that influence households' decision to convert agricultural lands to other land uses. Appiah *et al.* (2017) uncovered that a significant number of landowners have lost their lands to other uses over a ten-year period ($\chi 2$ [5, N = 120] = 40.867, df = -20, p = 0.05). It was discovered that 10 percent of the respondents had more than six hectares of land however; seven percent indicated that they still had the same size of farmland. Again, it was reported that 15 percent claimed they had land between four and six hectares about 10 years ago. Furthermore, 37 percent of the respondents had lands up to four hectares. It was equally found that 34 percent of the respondents did not possess lands for agricultural activities 10 years ago, while 39 percent have been dispossessed of their land.

The study revealed that there was a significant difference between the number of people who owned lands up to six hectares 10 years ago and who had land more than six hectares. In summary, there was a progressive peri-urbanization in the Asante Akim South District. Increasing demand for land

for residential and commercial land use purposes at the expense of arable land, easy access to land, and the deterioration of rural economic livelihoods were identified as some of the key determinants of agricultural land use conversions in the District. The economic incentives expected from the conversion of agricultural land into residential and commercial land uses were the motivating factors for change. However, the study failed to state the effects of agriculture land loss on traditional livelihoods and the emerging patterns of livelihoods in the peri-urban areas.

The studies by Appiah *et al*. (2014) and Appiah *et al*. (2017) employed quantitative analytical procedures in analysing quantitative data. However, the two studies differed in the tools of analysis, while Appiah *et al*. (2014) used binary logistic regression model, Appiah *et al.* (2017) used chi-square test of independence to analyse quantitative data. The two studies are improvements over the study by Naab *et al*. (2013) which used frequencies and percentages in the analysis of quantitative data. Nonetheless, all three studies relied on content analysis to transcribe qualitative data into themes. While the earlier studies centred on urban expansion and agriculture land use change, the studies that follow, focus on peri-urban land use change and livelihood transformation.

However, the study by Mugisha and Nyandwi (2015) in Rwanda differ from studies conducted in Ghana in terms of the issues that explain peri-urbanisation. Mugisha and Nyandwi (2015) identified the need to own a house, demand for a large parcel of land, inability to pay urban tax, denied building permits, expropriation, and cost of building a house, and obtaining a permit as the main issues explaining peri-urban development. In contrast,

Cobbina and Amoako (2012) identified the cheap cost of land, desire for a new lifestyle, safety, increased mobility as the main drivers. Thus, making the findings on the reasons for peri-urbanisation questionable and begs the question of whether results ought to be contextualized based on the country in which the study is conducted or otherwise.

Seventh, Mezgebo (2014) examined livelihood transition and determinants of income diversification strategies of the farm households in peri-urban Tigray, Ethiopia. The human capital theory formed the basis for the study since households relied on their skills and knowledge to engage in diverse income-generating activities. The quantitative study design was adopted for the study and proportionate sampling strategy was employed in the sampling of households from communities within 15 kilometres from the city centre. A sample size of 949 was statistically computed based on the population of the communities in the peri-urban communities and questionnaire was the main instrument for data collection.

Household income was measured on the ratio scale whereas income sources and decisions informing households to give up lands were measured on the nominal scale. Data were analysed using multinomial logit analysis to identify factors that inform income diversification decisions of peri-urban households. Mezgebo (2014) reported that peri-urbanisation in Ethiopia is informed by a deliberate policy of the government that brings all villages at the edge of the city under the control of the urban areas. This had led to a sudden change in livelihood strategies. The study revealed that 40 percent of the respondents still considered agriculture to be the main source of livelihood and the majority (60%) of the peri-urban households were engaged in

agriculture. It was also reported that 25 percent of the peri-urban farm households earned their entire income from crop and livestock production.

It was, however, reported that better-off households perform better in agriculture production than poor-resource households. Poor households were consigned to low paying activities because of poor access to land, age, or poor health conditions. The study further revealed five livelihood patterns. Firstly, the study stated that combining farming and skilled nonfarm employments to earn income from cash-crops to be invested in high-return activities or savings from skilled nonfarm employments could be used as inputs to improve agricultural productivity. Secondly, households endowed with land and labour but do not have inputs to engage in high-paying non-farm activities depend on farming and unskilled employment and households. Thirdly, the study revealed that households with limited labour and non-agriculture skills depend on farming and transfer earnings.

Fourthly, households endowed with skill or labour might be engaged in non-farm activities and finally, households without the required skill or labour utilized transfer income as sources of livelihood. Besides, Mezgebo (2014) found that the decision to pursue a particular livelihood strategy depends on demographic characteristics, the asset of household, experience in diversification, the incidence of shocks and the local economy. The study uncovered that female-headed and older-headed households have the propensity of diversifying into unearned income sources. Also, it was reported that experience of illness, death, food shortages, divorce, and separation, reduce the possibility of a household's participation in the nonfarm sector but increase the likelihood of deriving income from transfer payment.

Additionally, the study revealed that low level of labour endowment limits the ability to diversify to transfer payment. Besides, the increase in price (significant at 10%) for food or farm input enhance the probability of a household to engage in unskilled nonfarm employment. In conclusion, agriculture continued to dominate livelihood strategies of peri-urban households and wealthy farm households derived their income from farm and skilled nonfarm employment. Also, households that are endowed with money but lack the requisite skills and knowledge will not be able to benefit from the emerging nonfarm employment opportunities in peri-urban areas. However, the study failed to discuss the factors informing household land use change decisions and the amount of land loss to individual households.

Eighth, Nicodemus and Ness (2010) examined the impact of peri-urban land use dynamics on livelihood and income using urban land rent, rational choice and entitlement theories as a theoretical framework. Random sampling was employed to select 52 household heads located in communities between 9 kilometres and 15 kilometres along major roads from the city centre. The study employed the concurrent mixed research method, wherein the questionnaire was used to collect household data and the interview guide was used to collect qualitative data. Landholding size was measured on the ratio scale, while agriculture land use change decision and income generation activities were measured on the nominal scale. Quantitative data were analysed using frequencies while qualitative data were analysed using thematic analysis.

Nicodemus and Ness (2010) found decreased household land holding size among the respondents which were attributed to the pressure from the

demand for land from new developers for residence, business use or both residence and agriculture. Nicodemus and Ness reported that 90 percent of the respondents indicated that the reduction in landholding size was a result of the division of land among family members. Those who attributed the reduction in land size to selling to developer indicated that they needed to raise funds for basic household needs as an important driver for a reduction in the size of their land.

The study revealed that peri-urban households engage in farms, off-farm and non-farm livelihood activities as a coping strategy to declining landholding size of households. A change from extensive agriculture to intensive agriculture practices was reported as well as a shift from traditional to new crops due to demand trends. The non-farm livelihood activities that respondents engaged in include business activities, professional employment, non-farm wage and farm wage labour. It was further reported that households which engaged in non-farm activities such as businesses and professional employment earn over 80 percent of their annual incomes from the non-farm activities while those who undertook farm labour and wage farm labour earned less than 50 percent of household income.

In summary, peri-urban Nyahururu had undergone some transformations in population composition, household land size and household land use changes that resulted in a decrease in the importance of agriculture and the adoption of diverse new non-farm activities and improvement in livelihood and income. The study, however, failed to analyse the various combinations (patterns) of household livelihoods. Besides, the study failed to show the effects of agriculture land loss on traditional livelihood in the study

communities. Besides, their depth of analysis was not rigorous enough since percentages and frequencies were used and thus readers may not appreciate the nuances and dynamics of peri-urban land loss and its implication on traditional peri-urban households.

Ninth, Tran and Lim (2011) studied a similar issue in Vietnam by quantifying the impact of farmland loss on livelihoods of peri-urban households in 2008 and 2009. The entitlement and human capital theories formed the basis for the study and disproportionate simple random sampling was adopted to select 480 peri-urban households. A questionnaire was used to collect quantitative data on livelihood asset holdings, economic activities and livelihood outcomes of peri-urban households. The key variables were farm work, non-farm work, wage labour, farmland owned per adult, and farmland loss which were measured on the ratio and interval scales. The multinomial logit techniques and cluster analysis were used to analyse the quantitative data.

The study revealed that households were engaged in a farm, off-farm, non-farm and transfer payments as the dominant livelihood activities in peri-urban areas. It was further reported that households that were engaged in farm and casual labour livelihood strategies were earning less than households that were engaged in formal and non-farm livelihood strategies. Tran and Lim (2011) also found that households' livelihood choices were explained by their location, farmland size, residential land size, and human capital of households. Besides, the study discovered that farmland acquisitions influenced households' likelihood of switching to the informal wage work-based strategy. However, those who lost farmland in 2008 had a much higher probability of

adopting this strategy than those in 2009 and their corresponding relative risk ratios were 39.15 and 8.44 respectively.

Tran and Lim (2011) reported that about half of the land-losing households cited old age and lack of education and skills as the main barriers that hinder them from being recruited into non-farm works. The study also found that farmland endowment had an influence in determining peri-urban livelihood strategies especially for those households with elderly members who could not find work in the non-farm sector. On the other hand, households with well-educated members were found to be engaged in more remunerative jobs while those households who were less well−endowed were hindered from undertaking this strategy as dominant livelihood strategy. Consequently, variations in access to livelihood opportunities were attributed to social differentials. It was concluded that rapid urbanisation and loss of farmlands in peri-urban areas has led to the switching of livelihoods.

The studies conducted by Mezgebo (2014) and Tran and Lim (2011) used the quantitative study design and the questionnaire was used to collect data. However, Mezgebo (2014) used the proportionate sampling technique to select households for the survey, whereas Tran and Lim (2011) used the disproportionate sampling technique to select the households. Both studies used a multinomial logit model to analyse quantitative data. Both studies also found that households who engaged in non-farm and formal sector work as dominant livelihood strategies earn more than those engaged in farm and wage labour employment. However, both studies ignored the issues that explain farmland loss.

Tenth, Abass, Afriyie and Adomako (2013) examined how households responded to land use change in peri-urban Kumasi. Using the entitlement and human capital theories as a theoretical framework. The study design was the concurrent mixed method using a questionnaire, in-depth interviews, focus group discussion and key informant interviews to collect primary data. Secondary data were obtained from documents relating to the effects of urbanization on peri-urban livelihoods. Snowball sampling was used to select 150 indigenous household heads because there was no information on the number of households which have lost land due to pressure from urbanisation. Purposive sampling was also employed to select community leaders, women and men for in-depth interviews and focus group discussions.

Three peri-urban communities within a 20 km radius from the city were purposively selected. Respondents were classified into farm and non-farm employment to compare their responses. The unit of analysis was the household represented by the household head. The key variables were the livelihood activities or source of income which were measured on the ordinal and nominal scales. Quantitative data were analysed using frequencies, cross-tabulations and data were presented in the form of graphs, and frequency tables, while qualitative data were tape-recorded and transcribed. The content of the transcripts was then analysed based on the themes which were presented in narration form.

Abass *et al.* (2013) found that the commonest form of land use changes was from agricultural to urban residential buildings and these changes posed a severe threat to peri-urban livelihoods. They reported that 98.7 percent of the respondents stated that urban expansion has consumed agriculture land in the

study communities, and the influx of migrants was cited as the main driver of urban expansion. Besides, the study found that 40 percent of respondents were engaged in farming, while 60 percent of traditional households were engaged in non-farm activities. However, Abass *et al*. (2013) reported that in the past, 89.7 percent and 10.3 percent of respondents were engaged in farming and non-farm activities respectively. Provision of services, artisan, construction, and manufacturing was the new form of livelihood opportunities identified.

Abass *et al*. (2013) identified diversification, intensification and migration, and reducing household expenditure as the main livelihood strategies adopted by indigenous peri-urban households. Intensification and diversification of crops were found to be an important livelihood strategy for farm households even though some combined both farm and non-farm activities. It was concluded that agriculture persists as a livelihood strategy among the people. The study, however, is deficient in stating the combinations of livelihoods pursued by households. However, Mezgebo (2014) reported agriculture as the dominant livelihood strategy, while Abass *et al*.'s (2013) findings emphasize that non-farm livelihood strategies dominate and thus, suggests inconsistency to the livelihood strategy in peri-urban areas.

Eleventh, Oduro, Adamtey and Ocloo (2015) investigated the related issue in peri-urban Accra, Ghana using the urban land market, rational choice, human capital and entitlement theories as the theoretical foundation. The case study design was used, accompanied by a quantitative method in the form of household survey and qualitative method involving key informant interview, and focus group discussion. Four communities were selected based on their proximity to Accra. Random sampling was employed to select 140 household

heads for the household survey and purposive sampling was used to select municipal officers, community leaders, farmers and youth groups, sand miners and stone quarries. Pictures of livelihood events were taken during observation to complement primary data.

Variables such as land use, livelihood activities and reasons for peri-urbanisation were measured on the nominal scale and the quantitative data was analysed using frequencies while, qualitative data were recorded, transcribed and analysed using thematic analysis. Oduro *et al.* (2015) reported that the stock and quality of natural and physical capitals had experienced transformation in the study communities. The increasing demands for land for residential, sand mining, industrial, and commercial purposes had led to the loss of agricultural lands. Oduro *et al.* (2015) established that livelihood strategies had largely shifted from agriculture to non-agricultural economic activities in the study communities except for Kwashiekuma, where agriculture remained relevant. The change in livelihood strategies is mainly geared towards non-farm activities.

It was reported that chiefs and heads of land-owning families took advantage of the escalating demand for land to make money by leasing out plots of land to developers and speculators. The sale of land had led to degradation of land, destruction of the natural forest, creation of pounds, reduction in farm size and reduction in crop yield and insecure land tenure. According to Oduro *et al.* (2015), the concentration of hotels, guest houses, resorts and related facilities in the Bortianor-Kokrobite enclave have served as an important source of employment for some residents. However, some peri-urban farmers still managed to have access to farmlands to take advantage of

the city's ready market for fresh farm produce. Agricultural intensification and/ or diversifying their livelihoods had become the main adaptation strategies of farm households.

Besides, while some farmers have shifted from crop farming towards livestock production, other residents had shifted from crop production towards retail, personal services, electronic and auto repairs, artisanal services, and industrial activities as livelihood strategies. Petty trading and personal services like hairdressing and dressmaking were found to be important livelihood strategies for women in the study communities. Out-migration among the youth was found to be an important adaptation strategy in Kwashiekuma. Oduro *et al*. (2015) concluded that urban growth and agriculture land use change present both opportunities and constraints. While some peri-urban household were able to take advantage of the opportunities, others were negatively affected. However, the study fails to discuss the amount of land loss, the determinants of livelihood patterns and livelihood outcomes among households in the study communities.

The studies by Abass *et al.* (2013) and Oduro *et al*. (2015) used a combination of qualitative and quantitative methods to collect data and used frequencies to analyse data. However, Oduro *et al*. (2015) used a case study design focusing on selected communities to bring out the peculiarities. The two studies also demonstrated that urban expansion has led to the loss of peri-urban agriculture lands and thus, there was a shift from farm to non-farm activities by peri-urban households. Although Oduro *et al*. (2015) reported that migration and agriculture are important livelihood strategies in one community, Abass *et al.* (2013) did not report a significant shift towards non-

farm activities. Both studies, however, did not demonstrate rigorous analysis of the issues. For instance, both studies failed to show the patterns of livelihoods and the factors that inform the choice of particular livelihood combinations.

Twelfth, Cobbina, Gaisie and Owusu-Amponsah (2015) investigated an equivalent issue in Feyiase in Kumasi, Ghana, using the concurrent mixed research approach as well. The study examined how indigenous households were coping with the rapid transformation of the physical environment. The study was underpinned by the urban land market, entitlement and human capital theories. Snowball sampling was used to select indigenous households due to the difficulty in identifying them as a result of displacement of the indigenous population. Also, purposive sampling was employed to select officials from the Physical Planning Department (PPD), Agriculture department and planning officers. Quantitative method (household survey) and qualitative method (semi-structured interview) were used to elicit primary data. In all, 32 households involving 18 women and 14 men participated in the survey.

Land uses, sources of livelihoods were measured on the nominal scale and quantitative data were analysed using frequencies as well as correlation analysis whereas qualitative data were analysed using NVIVO 10 which coded the data and categorised the data into themes for content analysis. The study revealed that Feyiase was characterised by haphazard physical development which resulted in the decline of agriculture land by 30 percent. The major land uses found in the community were residential, commercial, educational, civic and cultural, open-spaces, utilities undeveloped, and transportation. Among

the various land uses, residential was found to be dominant and this was attributed to the search for less expensive land by former urban residents. Added to that, the findings indicate that agriculture does not have a future in the community.

Furthermore, the study revealed that the rapid physical expansion on peri-urban Feyiase provides both opportunities and challenges to livelihoods of indigenous households. The opportunities presented by rapid physical expansion include the availability of alternative livelihood (51% of respondent indicated to have gained employment in the construction sector), improved infrastructure, social services, and social associations. However, the study showed that majority of the respondent (87.5%) reported a loss of agriculture land between 2009 and 2014; out of this, 78.6 percent indicated a decline in agriculture land and food crop production by 80 percent while 21.4 percent had been rendered landless. The study further revealed that majority of the respondents (68%) had their income reduced as a result of the loss of their farmlands.

The study further revealed that rapid physical expansion had led to the breakdown of the traditional family system and this was validated by 73.5 percent of respondent who indicated it as a negative effect of physical expansion. What is more, the study revealed that 83 percent of respondents were engaged in non-farm activities such as cleaning, shoe repairs, causal labour at construction sites, while 21 percent reported to migration to other communities, and 21 percent relied on remittances from relatives for their up-keep. The adoption of these low-level livelihood options was attributed to low education. It was concluded that the primary occupation (agriculture) of the

people was under threat and thus, compelled indigenous household to engage in unreliable livelihood options.

The review of the study by Cobbina *et al* (2015) shows it is an improvement over the studies by Abass *et al* (2013) and Oduro *et al.* (2015) in terms of the depth of analysis. The three studies agree that there is a shift from agriculture to non-agriculture livelihood strategies but only Oduro *et al.* (2015) reported on the effects of land use change on traditional livelihoods of peri-urban land use change. The study by Cobbina *et al* (2015) also failed to demonstrate the reasons for the households to sell their farmlands for urban uses, patterns of livelihood patterns, determinants of livelihood options, and the extent to which non-farm activities contribute to household income. The inconsistencies and lack of generality on effects of peri-urban land use change, effects on traditional livelihoods, emerging patterns of livelihoods and livelihood outcome create uncertainty.

In summary, the empirical review revealed that some authors relied on only satellite images, interviews with experts only, while few barely combined images or interviews with landowners, to determine land use change. The use of only satellite images, interviews with experts only leaves out landowners and traditional households as key stakeholders or decision-making units with regards to land use changes. Also, the livelihood patterns, determinants and livelihood outcome of traditional peri-urban households have not been sufficiently addressed. Furthermore, livelihood patterns have not been hierarchically ordered to show dominance. Besides, studies that focus on land use change have tended to ignore the benefits or otherwise of land use change

decisions. Finally, the studies reviewed have not been able to establish the contribution of new livelihood options to households' income.

The review further revealed that the concurrent mixed research method was the dominant approach employed in the collection of data. However, few studies used either quantitative design only or qualitative research designs alone to collect data. The dominant analytical procedures used to analyse qualitative data in the studies were frequencies, percentages and content analysis. On the other hand, quantitative data were subject to descriptive statistics, correlation, step-wise binary logistic regression analysis, test, Cramer's V statistic and NigelKeek's test of association. Also, the chi-square test, interpolation and multinomial logit analysis used in some of the studies in the analysis of quantitative data. Table 1 summarises the review of empirical studies.

Table 1: Summary of Empirical Review

Author (s), Year & Location	Issue of study	Study design	Study Pop & Sampling Procedure	Data collection instruments	Analytical procedure (s)	Key Findings	Research Gap
1. Amoateng *et al.* (2013), Kumasi, Ghana	The effects of the physical expansion on peri-urban agriculture lands,	Concurrent mixed research	Indigenes relocated urban residents, & official of state institutions *Random & purposive*	questionnaire	Frequencies, percentages & correlation	*Conversion of agriculture land into residential uses*	It failed to discuss how traditional livelihoods of peri-urban households are affected, ignored emerging patterns of livelihoods & failed to discuss reasons why local landowners sell land.
2. Naab *et al.* (2013) Tamale, Ghana	impact of rapid urbanisation on agricultural lands	Concurrent mixed research	Households & officials of state institutions. Radom & purposive	Questionnaire, interview guide, & observation	Frequencies & percentages Content analysis	*Reduction in farm produce due to declining farm size, need for money to fight litigation, maintenance of chief, increase family size led to a reduction in farm size*	Less rigorous analysis of the decisions of land use changes failed to order the reasons for the sale of land in order of importance, & failed to indicate new livelihoods livelihood strategies
3. Cobbinah, & Amoako (2012) Kumasi, Ghana	urban sprawl & the loss of Peri-urban agriculture lands	Concurrent mixed research	Community leaders, plot allocation unit, state officials, assemblypersons, traditional authorities. Purposive	Interview guide questionnaire, telephone conversation	Content analysis	*Inefficient land use led to a loss of farmlands at the peripheries*	Failed to discuss the decisions that led to land use changes and emerging livelihood patterns due loss of farmlands & failed to indicate the effects of land use change on traditional livelihoods
4. Appiah *et al.* (2014) Bosomtwe district, Ghana	The effects of peri-urbanisation on peri-urban land use change patterns,	Concurrent mixed research	Households Proportional	Questionnaire mixed with open-ended	Pearson's chi-square test, Cramer V statistic & NigelKerk's	*Land use changes due to deteriorating livelihoods*	Gap: fails to discuss the livelihood patterns of peri-urban households due to changes in land use and

Table 1 Continued: Summary of Empirical Review

Author (s), Year & Location	Issue of study	Study design	Study Pop & Sampling Procedure	Data collection instruments	Analytical procedure (s)	Key Findings	Research Gap
				questions	test of association & correlation coefficient of determination	*associated with Agric, demand for land and economic returns inform land use change decisions*	the outcome of such land use change decisions
5. Mugisha & Nyandwi (2015) Kigali, Rwanda	peri-urbanization and its Implications of peri-urbanisation on peri-urban land use dynamics	Concurrent mixed research	Households & land managers *Random & purposive*	Questionnaire & interview guide	Google Earth imagery, interpolation & ArcGIS, content analysis to determine themes	*Reduction in farmland due to conversion into residential and commercial use, declining profitability of agriculture drive land use change decisions*	The impact of a loss of agricultural land on traditional livelihoods was not discussed & new patterns of traditional livelihoods of local landowners were not reported
6. Appiah *et al* (2017) Asante-Akim South District, Ghana	farmer households' decisions on agricultural land uses in peri-urban areas	Sequential explanatory mixed research	Households & officials of state institutions Simple random, proportionate & purposive	Questionnaire & interview guide	Chi-square test of independence, contingency test, frequencies & content analysis to determine themes	*Significant reduction in farmland, significant association, weakening livelihoods, demand for land, economic returns inform land use change decisions*	Failed to discuss the extend of effects of peri-urbanisation on traditional livelihoods & to discuss the outcome of land use change decisions

Table 1 Continued: Summary of Empirical Review

Author (s) Year & Location	Issue of study	Study design	Study pop & sampling procedure	Data collection instruments	Analytical procedure (s)	Key findings	Research Gap
7. Mezgebo (2014) Tigray, Ethiopia	livelihood transition and determinants of income diversification strategies of the farm households in peri-urban	Quantitative	Households *Proportional*	Questionnaire	Multinomial logit analysis	*Households combined off-farm, farm, and non-farm activities. Decisions to undertake a particular livelihood strategy was informed by demographic, assets, experience etc.*	Failed to discuss the reasons why give up their lands
8. Nicodemus & Ness. (2010) Nyahururu, Kenya	the impact of the peri-urban development dynamics on household livelihood and income	Concurrent mixed research	Households *Random*	Questionnaire & interview guide	Frequencies & content analysis to determine themes	*The urgent need for money for school fees, availability of buyers informed the decision to sell land. Households engaged in farm, off-farm and non-farm livelihood strategies*	The study failed to disaggregate the combinations of livelihoods by households & factors that explain the choices of emerging livelihood patterns
9. Tran & Lim (2011) Hanoi, Vietnam	Impact of farmland loss on livelihoods	quantitative	Households *disproportionate*	questionnaire	Multinomial logit analysis	*Households endowed with well-educated members engaged in more lucrative livelihood strategies and hence earn more that households who are less endowed.*	Failed to discuss the factors leading to farmland loss & effects of farmland loss on traditional livelihoods
10. Abass *et al* (2013) Kumasi, Ghana	Household s' responses to livelihood transformation in peri-urban areas.	Concurrent mixed research	Indigenous household, community leaders, women and men	A questionnaire, interview guide	Frequencies, cross-tabulation & content analysis to	*Loss of peri-urban agriculture land and the majority had shifted to non-farm activities.*	Failed to discuss traditional livelihoods and the extent of effects of

Table 1 Continued: Summary of Empirical Review

Author (s) Year & Location	Issue of study	Study design	Study pop & sampling procedure	Data collection instruments	Analytical procedure (s)	Key findings	Research Gap
			groups etc. Snowball & purposive		determine themes	*diversification, intensification, migration & reduction in household expenditure as livelihood strategies*	peri-urbanisation on them, less rigorous analysis of the issues
11. Oduro *et al* (2015) Accra, Ghana	Livelihood strategies of peri-urban households	Case study	Household, community leaders, youth groups, miners & quarry workers Random	Questionnaire & interview guide	Frequencies & content analysis to determine themes	*Livelihood had shifted from agriculture-based activities to non-farm activities.*	Failed to examine the emerging livelihood patterns and the factors that inform their pursuit
12. Cobbina *et al* (2015) Feyaise, Ghana	Households' response to the rapid physical expansion	Concurrent mixed design	Household & officials of state institutions Snowball & purposive	Questionnaire & interview guide	Frequencies & content analysis to determine themes	*Rapid physical expansion had led to a loss of agriculture land, Households depend on non-farm activities, migration & remittance from family members,*	The study failed to rigorously analyse the reasons for the sale of land and the outcomes of emerging livelihood strategies

Source: Author's Compilation (2019).

Lessons Learnt

The empirical review revealed that some of the studies focus on the physical expansion of cities and the driving forces, while others paid attention to only the implications on livelihoods of peri-urban dwellers. While one study exclusively dealt with landowners, the rest of the studies did not make a distinction between the categories of people who participated in the study. Also, the review established that several and varied research approaches had been used. However, the concurrent mixed method design was the dominant approach used. The empirical review also showed that eight out of the 12 studies reviewed, used concurrent mixed research approach to study the peri-urban area. However, the quantitative approach also featured in studies that focused on only the physical expansion of cities and the management of peri-urban areas. Few studies used only qualitative design.

In terms of the sources of data, both secondary and primary data were used. While some studies relied exclusively on secondary or primary data, others combined the two sources of data. On the other hand, the empirical review showed that studies that focused on the physical expansion of cities used questionnaire, interviews, google earth images to collect data, for analysis, whereas Pearson's chi-square test, Cramer V statistic and NigelKeek's test of association and correlation were used to analyse the data. On the other hand, studies that used the mixed method approach and used frequencies, percentages, content analysis to analyse data. Only one of the studies used logistic regression and two used chi-square tests to analyse data, while two other studies used the Multinomial logit to analyse quantitative data and only one study used chi-square test of independence to analyse data.

In terms of findings, the empirical review demonstrates that there is no consensus on the reasons that account for agriculture land use change in peri-urban areas. Some authors indicated that households' decision to convert agriculture land to non-agriculture uses is driven by declining farm size, need for money to fight land litigation, and maintenance of traditional rulers. Whereas other authors identified deterioration of agriculture-based livelihoods and economic returns on the sale of land as the motive for agriculture land use change in peri-urban areas. Again, other authors mentioned the urgent need for money to pay school fees and availability of buyers as the reasons that inform households' decisions to convert their agricultural lands into non-agricultural uses.

Generally, the empirical review shows that peri-urban household adopts both agricultural and non-agriculture livelihood strategies to cope with the loss of agricultural lands as they encounter urban pressure. However, there is disagreement over the specific livelihood strategies that peri-urban households adopt. Some studies identified migration, agriculture intensification, a complete shift from agriculture-based activities, reduced household expenditure on food. On the other hand, other studies reported that peri-urban households depend on remittances from children and other relatives. The review further shows that only one study identified the reasons for the choice of livelihood strategies adopted by peri-urban households to be informed by demographic characteristics, assets and experience with difficult circumstances.

The review further shows that one study identified the reasons for the choice of a livelihood strategy adopted by the peri-urban household to be

informed by demographic characteristics, assets and experience with difficult circumstances. Therefore, these inconsistencies, disagreements and gaps in the studies imply that more work and testing are required to enable us to appreciate the challenges and opportunities that peri-urban agriculture land use change present to local households and institutions mandated to manage lands in general and peri-urban development in particular.

Conceptual Framework of Agriculture Land Use Change and Emerging Patterns of Livelihoods in Peri-urban Areas

The conceptual framework provides a mechanism through which the key variables to be measured are connected and interrelated and therefore, assists in focusing the research to address the objectives set out at the start of the thesis. The conceptual framework which is illustrated as Figure 2 demonstrates that there are four distinct areas for investigation; (i) drivers of agricultural land use change; (ii) factors that explain agriculture land use changes; (iii) contribution of agriculture land use change to livelihood transformation, and (iv) emerging patterns of livelihoods in peri-urban areas. For each of these areas, the key variables to be investigated and measured are established and how they are connected and interrelated with other variables in the framework. The starting point for the investigation is on the drivers of peri-urban agricultural land use change in peri-urban Wa.

The key variables to be investigated include; access to land, availability of land, increasing population, state demand for land for the provision social amenities and infrastructure, housing demand, commercial activities and cost of land. The assumption is that the various drivers

contribute to agricultural land use change in peri-urban areas such that traditional households or landowners will be compelled to sell prime agriculture lands to developers, government, private individuals for residential, commercial and recreational uses of land as indicated in the box

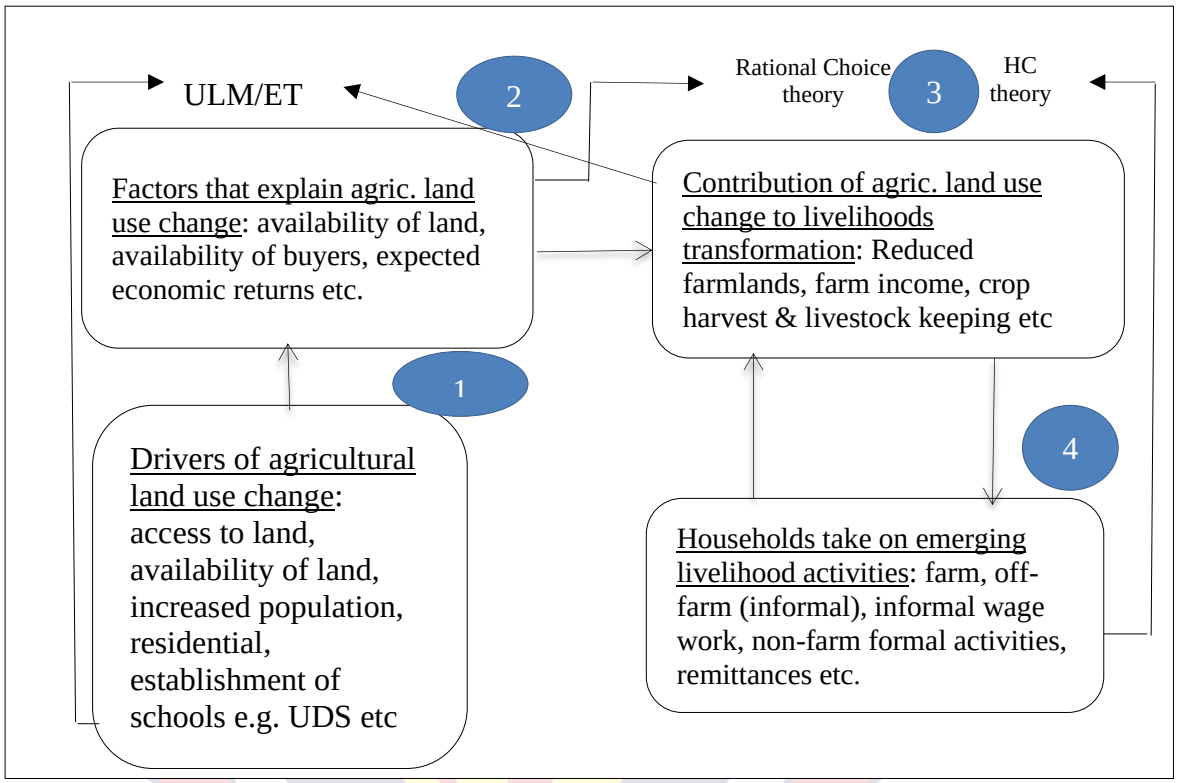

Figure 2: **Conceptual Framework for Agriculture Land Use Change and Emerging Patterns of Livelihoods**

Source: Author's construct

The drivers of agricultural land use change peri-urban agricultural lands are subject to the decision of the local landowners. The decision to sell agricultural lands may be influenced by such variables as land rent, availability of large parcel of land, the need for money to pay school fees, investment in economic activities, traditional rulers, to fight land litigation, proximity to commercial areas, increased crop yield, expected economic returns, decreased crop yield, availability of buyers among others. Depending on the situation at hand, one or more of these variables will then inform the

decision of a landowning family or individual to sell or not to sell their agricultural land to be used to undertake non-agricultural related activities.

The effects of agriculture land use change on traditional livelihood assets may include; natural (land for farming), social (relationships), financial (farm income) & human (education and training). The loss of agriculture land to urban-based activities will affect the amount of land that was used for cultivation of crop and rearing of livestock and poultry. The reduction in farmland implies that former farm households will not be able to depend on their farm harvest for household consumption throughout the year. The conversion of agriculture land to other uses will trigger a loss in physical assets. Besides, the influx of people into peri-urban communities will displace family members and the disintegration of families. Furthermore, household size and age of household head will imply livelihood strategy choice.

As a result, households or individuals may adopt a new combination of livelihood strategies due to agricultural land loss. The adoption of a new combination of livelihoods may be triggered by the conversion of agriculture lands to residential, commercial, recreational, civic and administrative purposes. Households may engage in farm-based activities such as intensification of crop production, diversification of crops and livestock production which requires small space of land.

Alternatively, households with the low-level human capital may turn to off-farm activities which may be formal or informal. Informal off-farm activities may include casual labour, petty trading, and remittance from working family members, processing of agriculture products and other activities that do not require a high level of skills or a huge sum of money to

start. In the same vein, households may engage in non-farm activities to generate income to support household expenditure. Also, Households' members with high human capital enter the public or private sectors for regular wages and/or salary employment. The emergence of new livelihood combinations may have a positive or negative impact on the wellbeing of household, food consumption, education, health, expenditure or income, increased working time of traditional peri-urban households.

Chapter Summary

The chapter commenced with the review of some empirical studies on the subject of agricultural land use change and livelihoods of traditional households. Some of the studies focused on the physical expansion of cities and the driving forces, while others paid attention to only the implications on livelihoods of peri-urban dwellers. The concurrent mixed method design was the dominant approach used. However, the quantitative approach also featured in some of studies that focused on only the physical expansion of cities and the management of peri-urban areas. The lessons learnt from the review of the empirical studies have also been discussed. The conceptual framework which guides the interpretation of the research results concluded the chapter

CHAPTER FOUR

METHODOLOGY

Introduction

This chapter focuses on the methodology that guided this study. Methodology in social research is important because it provides the roadmap and directs the process of knowledge creation (Dawson, 2002). The research philosophy that undergirds the study is first discussed, followed by an examination of study designs. Next, the study area is discussed to give the reader a fair idea about the characteristics of the Wa Municipality to forge an appreciation of the context within which the research will be conducted methods and followed by the target population. The sampling procedure, data collection instruments and methods data collections are also in this chapter. Additionally, the methods and techniques for data analysis are also discussed in this chapter. Finally, community entry, pre-testing, actual fieldwork, ethical concerns and challenges and limitations of fieldwork have been discussed.

Philosophical Perspectives of the Research

There are several and varied philosophical perspectives that underline the structure, processes, procedures and direction of any empirical research. The philosophical stands include; Positivistism, Interpretivistism and Pragmatism. Mkansi and Acheampong (2012) and Eriksson and Kovalainen (2015) assert that these philosophical positions are underpinned by the researcher's ontological, epistemological stances and the choice of methodology in any particular research. In the same vein, Holden and Lynch, (2004) and Mkansi, and Acheampong (2012) point out that the researcher's

philosophical orientation exerts a considerable influence on how one investigates an issue of interest.

Positivism is one of the philosophical standpoints that guide social research. Gilmer (1995) defined Positivism as a system of philosophy which holds that the source of positive knowledge is empirical evidence which can be elaborated and verified using the scientific methods. Steinmetz (2005) points out that positivism associates scientific knowledge with general laws and also connects existence with observable things. Positivists' researchers also observe and quantify phenomena such as agricultural land use change (Ihuah & Eaton, 2013). In this study, agriculture land use change can be observed and quantified. With the aid of Spatio-temporal data from google image, GIS, and recall of previous and current landholding size of peri-urban households and livelihood activities can also be observed and measured as indicated by the positivist philosophical stand.

Howell (2015) clarified that positivists hold the ontological position that an external reality exists and this external reality can be discovered independently and understood devoid of metaphysical considerations. In other words, the researcher and the external world one studies are separate and objectivity can be obtained through scientific procedures (Howell, 2015). Therefore, positivist researchers make use of quantitative techniques such as hypothesis testing using statistical analysis (Adam, 2014). In this respect, agriculture land use change can be observed independently using google images and Landsat pictures that will be obtained. The livelihood activities of peri-urban households could be observed devoid of my personal biases. Besides, the income earned through these activities can also be measured.

Thus, some aspects of the study fit into the assumption that an external reality exists.

As a logical sequence, the quantitative techniques were adopted in this study. Cohen and Manion (1980) explain that quantitative research employs methods to answer the research question about real issues or objects instead of the ideal situation. Quantitative research also explains phenomena such as agricultural land use change and livelihoods by collecting numerical data which can be analysed using appropriate statistical techniques (Creswell, 1994). Besides, Johnson and Onwuegbuzie (2004) note that the quantitative approach relies on testing theory/hypothesis and statistical analysis for generalisation (Creswell & Zhang, 2009; Nayak & Nayak, 2015). In this study, households' landholding sizes were quantified which falls in line with the positivists' ontology.

Nonetheless, quantitative designs have certain weaknesses that have been pointed out by scholars (Denzin & Lincoln, 1998; Schofield, 2007). Blaikie (2007) points out that quantitative research is accused of ignoring how the social reality is shaped and maintained, or how people interpret their actions such as decisions to convert agricultural land and the pursuit of livelihood strategies. Arguing along similar lines, Hammersley (2007) asserts that quantitative research cannot measure certain social issues such as beliefs, values and meanings. Furthermore, Ary, Jacobs, Sorensen, and Walker (2013) accused quantitative methods of ignoring the lived experiences and understanding of issues such as why people sell their farmlands. Rahman (2017) also contends that the approach does not bring researchers and

participants together and these weaknesses necessitated the emergence of the interpretivist's perspective.

Guba (1990) opines that interpretivist holds the ontological position that there are multiple realities and that these realities are socially constructed. Therefore, the epistemological assumption of interpretivists is that there is no single reality, but that reality is embedded in the meanings that people attach to an activity or action (Guba, 1990). In the opinion of Aliyu, Bello, Kasim and Martin (2014), truth resides in understanding issues such as the reasons for selling agriculture land and livelihoods choices of peri-urban households. that Interpretivism also provides researchers with the opportunity to gain insight into the meanings, perceptions and experiences of the people (Thanh & Thanh, 2015) such as why landowners sell farmlands. Therefore, households' decisions to convert agriculture land, how traditional livelihood has been affected and emerging livelihoods strategies were explored as indicated by interpretivists.

Interpretivist researchers usually adopt qualitative methods. Mack, Woodsong, Macqueen, Guest, and Namey (2008) define the qualitative method as one that provides data on behaviours, beliefs, opinions, emotions, and relationships of individuals. Qualitative methods help in identifying subtle issues, such as social norms, gender roles, ethnicity, and religion. Kumar (2011) adds that qualitative methods are usually flexible and evolving in nature because they deal with issues as they come into the research process. Qualitative researchers use interviews, observations to gather data which are analysed thematically. In consonance with this, key informant, interviews and group discussion were conducted to elicit the meanings and interpretations that

people attach to the decisions to sell farmlands and the pursuit of livelihood strategies since this aspect of the study cannot be observed and measured.

However, qualitative research has been criticised on the basis that information on issues like the amount of land use change cannot be obtained through interviews. It is also argued that qualitative research is subjective and open to different interpretations (Kvale, 1994). Johnson and Onwuegbuzie (2004) also note that it is not possible to generalise qualitative knowledge because such findings may be limited to the knowledge of the research participants. Furthermore, qualitative research tends to focus on meanings and experiences while ignoring the social context of the phenomenon of interest (Silverman, 2010). Finally, Subedi (2016) posits that the use of qualitative design may not aid the researcher to gather all information about some issues such as the amount of agricultural land loss. The shortcomings of the two designs inspired the emergence of the pragmatist philosophical perspective.

The ontological assumption of pragmatists is that there are different sides to an issue and that issues of research interest should be situated within a social context (Goldkuhl, 2004). Goldkuhl adds that pragmatism acknowledges mutual permeation of knowledge and action. Furthermore, Goldkuhl posits that pragmatists hold the assumption that the best way to know is to reorganise that reality is constantly changing. In this respect, Campbell (2011) explains that pragmatist's epistemology is that reality is continuously negotiated, debated and interpreted based on the situation the researcher is confronted with. This suggests that it allows for the combination of objectivity and subjectivity to find answers to research questions. The reality shows that pragmatist researchers do not rely on one research method

rather, they adopt what works under the circumstances to address research objectives.

The justification of the pragmatist approach for this research was based on the fact that land use change, income, and age can be measured whereas decisions regarding land use change and livelihood options are not subject to numerical measurement and observation (Aliyu *et al*., 2014). Therefore, a blend of the two styles aided the researcher to obtain the accurate picture of agriculture land use change and emerging patterns of livelihoods in peri-urban communities around Wa. The use of the pragmatist philosophy was also informed by the fact that the quantitative and qualitative data have their weaknesses and thus when combined, the flaws are minimised thereby providing reliable data. Thus, the pragmatist perspective offered the opportunity to collect data on issues that can be quantified such as the size of farmland loss and also collect data on issues such as the decision to sell farmland and pursue certain livelihood strategies.

Pragmatism was also appropriate for this research because agriculture land use change can be quantified whereas people's experiences and opinions with regards to agricultural land use change are not easily amenable to quantification (Thanh & Thanh, 2015). There was, therefore, the need to try to understand the issues that explain these decisions. Furthermore, the loss of agricultural land to urban-based activities implies that traditional livelihood [agriculture] of peri-urban households tend to give way or operate side-by-side with urban activities and the adoption of a particular pattern of livelihoods may be informed by certain issues that cannot be observed and quantified.

Thus, pragmatism helped the researcher to shed light on the issues by eliciting objective data about peri-urban livelihoods.

Nevertheless, it is important to point out that pragmatism has received its fair share of criticism. Martens (2003) notes that pragmatism fails to provide who the practical solutions are meant to serve. In the same vein, Johnson and Onwuegbuzie (2004) accuse pragmatism of failing to provide a solution to the philosophical debate between positivism and interpretivism. Rather, pragmatists assumed a middle position that depends on the two extreme positions on the divide. Johnson and Onwuegbuzie (2004) add that pragmatism is more applicable in research that seeks to solve practical problems than research for academic purpose. The ontological positions and their associated epistemological assumptions of social science research philosophy are summarised in Figure 3.

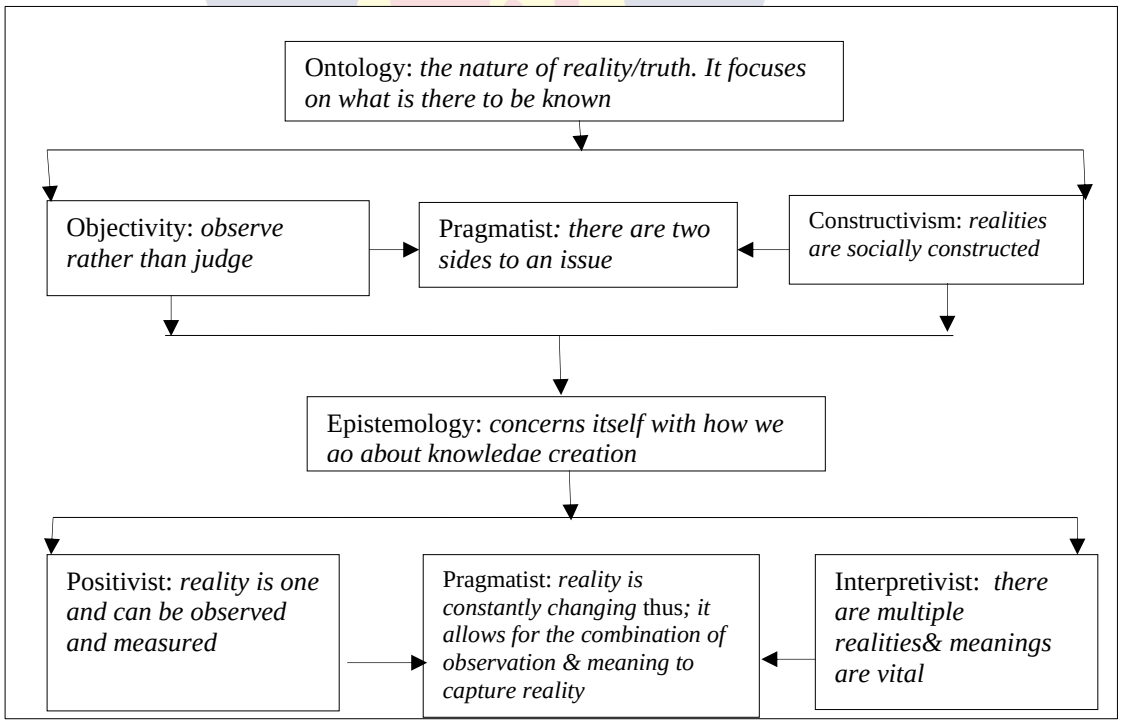

***Figure 3*: Ontological Positions and Epistemological Assumptions Underpinning Social Science Research**
Source: Based on Campbell (2011), Crotty (2003) and Howell (2015)

Research Approach

The mixed method approach was adopted in the research project. Johnson, Onwuegbuzie, and Turner (2007) define mixed methods research as the type of research in which both qualitative and quantitative techniques are utilised in a single study to collect and analyse data and make inferences for breadth and depth of understanding as well as corroboration. In other words, mixed methods study involve mixing methods within a single study which informed the choice of the pragmatists' philosophy to guide the study (Johnson *et al.*, 2007). Pandey and Pandey (2015) also spell out that mixed method provides the framework for the collection of relevant data with optimum effort, time and expenditure. It implies that quantitative and qualitative methods are employed throughout the research process starting from data collection to presentation of results.

The mixed method approach was appropriate for this research due to four reasons. Firstly, the mixed method allowed for the combination of quantifiable data in terms of measurement of agriculture land use change and income of households and qualitative data on the reasons why people sold prime agriculture lands. The two sets of data were integrated during analysis and interpretation of the results to ensure the actual situation of land use change is captured. Secondly, it allowed for triangulation of data and methods to ensure comprehension of the complexity of land use change and livelihoods. Thirdly, I took advantage of the strength of the methods while minimizing their weakness. Finally, the empirical review demonstrates that most studies on agriculture land use change and livelihoods adopted the mixed method approach (Abass *et al*., 2013; Naab *et al*. 2013).

Specifically, the sequential explanatory mixed design was adopted for the study. Creswell, Clark, Gutman and Hanson (2003) indicate that explanatory design entails sequential collection of data in two phases. They note that the first stage involves the collection of quantitative data and then followed by the qualitative phase to help corroborate and enhance the quantitative results. Similarly, Almalki (2016) explains that explanatory mixed research designs operate on two stages in which quantitative data is being used as the basis to build and explain qualitative data. Almalki also notes that quantitative data informs the kind of qualitative data to collect. Figure 4 summarises the sequential explanatory mixed research design.

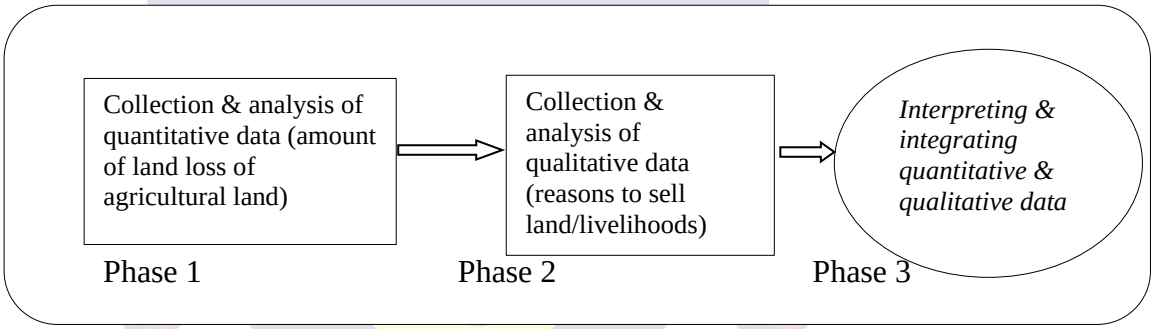

Figure 4: **Sequential Explanatory Research Design**

Source: Creswell and Clark (2017)

Study Design

Given that the research concerned agricultural land use change and emerging patterns of livelihoods in peri-urban areas, the explanatory study design was appropriate because it enabled the researcher to provide a proper description of the issues of interest. Doyle, Brady and Byrne (2009) elucidate that the explanatory design helps the researcher identify specific quantitative findings, such as unexpected results, outliers or differences that need further interrogation. In this respect, Cohen, Manion and Morrison (2013) explained

that explanatory research helps to find out the reasons behind the occurrence of a phenomenon such as agricultural land use change in the form of casual relationships. Rahi (2017) also indicates that explanatory research assists the researcher to gain insight into a situation to build, elaborate, extend or test a theory and to identify issues and key variable in a given research problem.

Creswell and Clark (2011) indicate that explanatory study design involves the collection of data first, by collecting quantitative data and then collecting qualitative data to complement the quantitative data to assist the researcher to explain or elaborate on the quantitative results. In this respect, Subedi (2016) asserts that the approach allows the researcher to use the quantitative results as a general picture of the research problem and then use the qualitative results to refine and explain the picture provided by the quantitative results. Further, the quantitative results seek to inform the types of participants to be purposefully selected for the qualitative phase and the types of questions that will be asked of the participants (Creswell & Creswell, 2017). This set of authors also note that the interpretation of results involves first, reporting the quantitative and following it with the qualitative phase results.

In this study, land use change was measured first and then followed by interviews with landowners, and state agencies to understand peri-urbanisation processes and why people sold their farmlands to private developers and or organisations to undertake non-agriculture activities. Numerical data were also collected on livelihoods outcomes of strategies being pursued by peri-urban households, followed by an inquiry into the reason for the adoption of the identified livelihood strategies of households. As indicated by Wachira (2015),

the adoption of this approach assisted the me to clearly define the complexities of the issues to agricultural land use change and emerging livelihoods in peri-urban areas of Wa Municipality.

Despite the usefulness of the explanatory mixed research design in carrying this study, it is important to acknowledge that it has certain limitations. The explanatory research design poses a challenge with regards to the selection of participants so that pertinent information can be obtained (Almalki, 2016). Almalki further notes that the approach is relatively time-consuming. However, it was the appropriate method to be adopted for this study because it enabled the researcher to capture and understand the complexity that characterises the agricultural land conversion and livelihood patterns of peri-urban households of Wa by first collecting data on the amount of land use change and then followed with the issues informing land use change and livelihood strategies.

Profile of the Study Area

Wa is the capital of the Wa Municipality and the Upper West Region. The Wa Municipality is one of the eleven District/Municipalities in the Upper West Region (Figure 5). The District was upgraded to a Municipality status in 2004. The Wa Municipality is bordered by Nadowli District, Wa East District and the Wa-West District to north, east and south respectively (GSS, 2014). Wa Municipality lies within latitudes 1º40'N to 2º45'N and longitudes 9º32'W to 10º20'W. It covers a land area of approximately 579.86 square kilometres (GSS, 2014). The physical characteristics of the municipality include the savannah high plains with gentle undulating lands with an average height between 160 m and 300m above sea level (GSS, 2014).

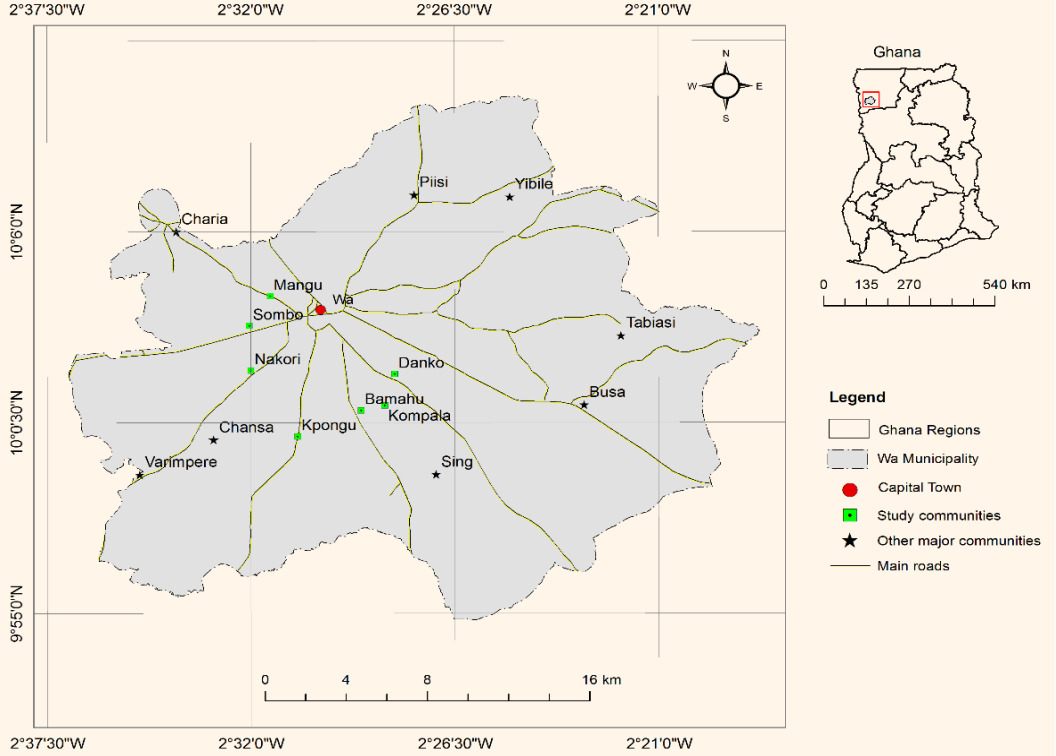

Figure 5: **Study Areas in the Regional and National Context**

Source: Adapted from GSS (2014)

The GSS (2014) reports that 107,214 people were living in the Municipality in 2010, which represents 15.3 percent of the population in the region. The GSS (2014) also reported that 49.7 percent and 50.6 percent were males and females respectively with a sex ratio of 97.7 and the age dependency ratio was 65.1. Furthermore, GSS (2014) indicates that migrants account for 22.6 percent of the total population. Besides, the GSS (2014) reports that there were 9,592 houses with an average of two households per house. Therefore, using the average of two households per house, the number of households can be estimated to be 19, 184 in the municipality.

The major occupations of the inhabitants were agriculture, forestry, fishery, craft, technicians, professionals, retail, repair, and manufacturing (GSS, 2014). According to the GSS (2014), agriculture, forestry and fishery employed the largest (29.3 percent) of the labour force in the Municipality,

whereas the service and sales sector employed 25.7 percent of the labour force. Craft and related trades also take 18.5 percent. About 20.6 percent of the labour force was also employed in the wholesale and retail sector, while the repair of motor vehicles and motorcycles account for 20.6 percent of the labour force. The manufacturing industry constitutes 12.5 percent, while 7.3 percent of the employed are engaged in education (GSS, 2014).

Origin, Growth, and Expansion of Wa

Wa, which is the capital of the Upper Region and the Wa Municipality is home to the Waala (natives). Wa traces its history to the 15th century, when it became the headquarters of the Wala State and centre of trade between the people and the Mande and Hausa traders (Songsore, 1985). It operates a centralised chieftaincy society (Salih, 2018). The natives of Wa are made of four segments; "Tendaamba, Nabihi, Limanhi, and Yarihi". The Tendaamba who are of Lobi origin are considered as the original custodians of the land but have subdivided it to the Nabihi, Limanhi, and Yarihi (Salih, 2018). This suggests that each of the groups has some ownership right to land in the area and as such land tenure system operates on customary practices on inheritance, sacrifices and ownership of land in Wa (Kuusaana, Kidido, & Halidu-Adam, 2013)

The annexation of the Northern Territories in 1901 arguably, also contributed to the urbanisation of Wa and as a centre of population growth and urban expansion. The population of Wa increased from 2,806 in 1921 to 5,206 in 1931 before increasing to 5,129 in 1948 (Ahmed *et al*., 2020). In 1960, the population of the town was 14,406 and by 1970 it had increased to 21,393 (Ahmed *et al*., 2020). The population of the municipality further increased

from 36,067 in 1984 to 66,441 in the year 2000 before increasing to 107,214 in 2010 (GSS, 2000;2013).

The large-scale urbanisation in Wa has been attributed to the upgrading of the town as a regional capital and a municipality in 1983 (Akanbang, Sulemana, & Yachori, 2018; Oteng-Ababio, Owusu & Asafo, 2019). The designation of Wa as the regional capital led to the development of several decentralised state offices and departments (Ahmed *et al.*, 2020). The extension of the national electricity grid to Wa, and expansion of the road network and other infrastructure have also facilitated the development of the town (Ahmed *et al.*, 2020; Oteng-Ababio *et al*., 2019). Consequently, the population of the town witnessed an increase between 1984 and 2000 (Ahmed *et al,* 2020; Oteng-Ababio et *al*., 2019).

Akanbang, *et al*. (2018) and Ahmed *et al*. (2020) have also indicated that public investment in infrastructure has also influenced the growth and expansion of Wa. For instance, the establishment of the Wa Campus of the University for Development Studies in 2002, the Wa Polytechnic in 1999, Nursing training college in 2015, the new Regional Hospital, and several second cycle schools, primary schools, and the Wa Airport, have also contributed to the growth of the population of Wa in recent times (Ahmed *et al.*, 2020; Akanbang, *et al*., 2018).

Boundary delineation is the spatial arrangements for service provision, patterns of economic development, and the exercise of political power in a particular area (Owusu & Oteng-Ababio, 2015). This suggests that determinates of the limits of a city boundary may vary from place to place. For example, Cobbina and Amoako (2012), consider peri-urban communities as

those that fall within 15 km radius from the official boundaries of the city. In this study, the peri-urban communities are those communities that lie within 10 km radius from the official boundaries of Wa and exhibit both rural and urban characteristics. These include; Danko, Bamahu, Konpaala, Nakori, Kpongu, Sombo, and Mangu. The distance of the study communities from the official boundary of Wa township varied from 4.23 km to 9.27 km.

Target Population

In this research, all the peri-urban households in the Wa Municipality qualified to be members of the population because they share the one characteristic of being members of the Municipality. GSS (2014) reports that 107,264 inhabitants lived in the Wa Municipality in 2010 and these people were living in 9,592 houses. The target population in this research were all those traditional peri-urban households around the main Wa township. The researcher conducted a field survey to obtain the specific data on population, number of houses, and the number of households in communities to enable the calculation of the sample size for the study as indicated in Table 2.

Table 2: Demographic of Characteristics of Study Communities

Community	Population	Male	Female	No. Houses	No. Households
Kpongu	2,374	1,180	1,194	246	461
Nakori	3,121	1,551	1,570	196	216
Danko	1,208	580	628	421	842
Bamahu	2,245	1,075	1,170	280	627
Kompala	444	221	223	66	201
Mangu	2,798	1,378	1,420	298	592
Sombo	2,645	1,325	1,330	224	436
Total	14,845	7,310	7,535	1,731	3,375

Source: Field survey (2019)

Sample Size Determination and Sampling Procedures

The unit of analysis of the research was the household. The household was represented by the household head or any member of the household that could provide the needed data. This enabled the researcher to gain first-hand perspective on the issues of interest. The total households in the selected communities were 3,375. The sample size was calculated using the Yamane's (1967) formula of sample size with a margin of error of five percent and with a confidence coefficient of 95 percent. The formula is given by the relation: $n = N / [(1 + N (e)^2]$. Where, n = the sample size, N = the size of the population, and e = the margin of error of 5 percent. Given that N = 3,375 and e = 0.05, the computed sample size for the research was = 358. However, to account for attrition, Fernandez *et al*. (2009) recommend that 15 percent of the computed sample size should be added. The computed 15 percent of the 358 is equal to 53.7 or approximately 54 and as such the actual sample size was 412.

The communities were selected based on the existence of peri-urban characteristics of the co-existence of rural and urban socio-economic activities. As regards the distribution of the number of households that participated in the study, the sample size of 412 households proportionally allocated to the communities based their total number of households (Table 3) to ensure fair representation of each community. Ahmed, Koenig and Stephenson (2006) note that proportional allocation is suitable for the survey since there are no sharp differences in terms of social and economic characteristics between the communities from which the sample was drawn and the purpose is to describe some shared characteristics of the population.

The simple random and purposive sampling techniques were utilised in the study. In this regard, simple random sampling without replacement was employed to select the required number of households in the study communities. The lists of houses were obtained from the Community Health Planning Service (CHPS) zones under which the communities fall.

Table 3: Sample Proportional Distribution of Peri-urban Households

Community	No. of Households	Sample
Kpongu	461	56
Nakori	216	47
Danko	842	79
Bamahu	627	67
Kompala	201	34
Magu	592	74
Sombo	436	55
Total	3,375	412

Source: Field survey (2019)

The researcher assigned numbers to the households and then used the lottery method without replacement to select the sample for each community until the sample size was attained. This technique was employed to select the proportion of peri-urban households allotted to each study community. The technique was appropriate for the study because the traditional houses in the study communities could be identified in the list with assistance from officials of the CHPS zones.

Purposive sampling technique was employed to select key informants such as assemblypersons, chiefs, community gatekeepers, and officials of relevant state institutions as well as family heads and women leaders to participate in the research. This procedure was used to select this category of respondents because they were presumed to be well-positioned to provide

certain information about agricultural land use change and livelihoods practices. Specifically, the technique was used to select four women leaders, family heads, chiefs, assemblypersons, and one official each from the Department of Agriculture, Physical Planning Department, and Lands Commission. These people were chosen because per their position in society and the state institutions, they possess in-depth information about issues bordering on agriculture, land issues and livelihoods practices in peri-urban areas.

Above all, groups were constituted for discussions and they involved male and female peri-urban households head. For each of the communities, two group discussions were conducted with males and females who were selected from the existing community groups. Community landowning men who were available at the time of the study were also constituted into groups to discuss the issues relevant to the objectives of the study. For each of the groups, the number of participants varied between 6 – 12 members. This number is presumed to be manageable in conducting the group discussion. Finally, seven in-depth interviews were conducted with women leaders and family heads. The distribution of the group discussions and in-depth interviews is indicated in Table 4.

Table 4: Distribution of Group Discussions and In-depth Interviews in the Study Communities

Community	Chief/elders	Men/women groups	Women leader	Family head	Total
Kpongu	1	2	1	1	5
Nakori	1	2	1	1	5
Danko	1	2	1	1	5
Bamahu	1	2	1	1	5
Kompala	1	2	1	1	5
Magu	1	2	1	1	5
Sombo	1	2	1	1	5
Total	7	14	7	7	35

Source: Field survey (2019)

Data Collection

Primary and secondary data were collected for the study. The researcher collected primary data on drivers of peri-urban agricultural land use change such as access to land, availability of land, availability of social infrastructure and others. Data on variables that explain agriculture land use change such as land rent, access to land, income categories of settlers, crop yield among others were also collected. Besides, data were collected on how agriculture land use change affects traditional livelihoods and assets such as natural, social, physical, financial, and human capitals. Furthermore, data were obtained on the emerging patterns of livelihoods such as farm, off-farm, informal wage employment, formal employment. Above all, data was collected on activities of the planning authorities and the department of agriculture to secure peri-urban agriculture lands as well as challenges of peri-urban agriculture.

Secondary data were also sought for the analysis of land use/cover changes in the Wa Municipality over time. The land use/cover changes data was obtained from the United States Geological Survey Department for the years 1986, 1998, 2006 and 2019. The data were obtained from Landsat 5, Landsat 7 and Landsat 8 for the study years respectively. The data obtained covered 1986 to 2019 because Wa became the regional capital of the Upper West region in 1983 which attracted large-scale public investment and people to the town. As such, it was expected that the town might have started experiencing large-scale urbanisation in 1986. The data assisted the researcher to demonstrate the extent of growth of the town and the resultant land use/cover change over the period. Table 5 presents a summary of the research objectives, methods of collecting data, types of data, measurement scale and analytical procedures.

Table 5: Summary of Objectives and Associated Methodological Procedures

Specific Objective	Key variables	Type of data	Data Source	Data collection methods	Tool/Instrument (s)	Measurement scale	Analytical procedure (s)
1. Examine drivers of agricultural land use change in peri-urban areas	Access to land, availability of land, increasing pop, availability of social infrastructure/amenities	Quantitative & qualitative	Primary & secondary [Landsat/google earth images]	Observation, Interviewing, focus group discussion & observation.	ArcGis, Edas, Interview schedule, interview /discussion guides & observation checklist	Nominal, & ratio	Change detection, Frequencies, percentages, & thematic analysis
2. Explore the factors that explain agriculture land use change in peri-urban areas	Availability of excess land, demand for land, yield reduction, need for money to fight land litigation etc.	Quantitative & qualitative	Primary	Interviewing, & Focus group discussion	Interview schedule, & interview and discussion guides, & checklist	Ratio & nominal	descriptive statistics, frequencies, percentages, Wilcoxon-sign-rank test, factor analysis, binary logistic regression thematic analysis.
3. Analyse how agriculture land use change contributes to the transformation of traditional livelihoods of peri-urban households	Assessment of assets (social. Financial, physical, human and natural)	Quantitative & qualitative	Primary	Interviewing, observation & Focus group discussion	The interview schedule, discussion guide observation checklist & interview guides	Nominal & ratio	Descriptive statistics, frequencies, chi-square test, percentages, Wilcoxon-sign-rank test and thematic analysis
4. Examine the new livelihoods strategies of traditional peri-urban households	Farm, off-farm formal and informal livelihood activities	Quantitative & qualitative)	Primary	Interviewing, & Focus group discussion	The interview schedule, discussion guide, observation checklist & interview guides	Nominal & ratio	Frequencies, percentages, descriptive statistics, chi-square test & thematic analysis

Source: Author's Compilation (2019)

Instrument Design

This section presents information on the instruments that were designed for the collection of primary data from research respondents. All the instruments were constructed based on the objectives of the study. For the interview schedule, Bryman (2012) indicates that it entails the interviewer reading the items on the interview schedule to an interviewee. Here, the same set of items were administered to all participants. The goal was to ensure that responses can be aggregated. The interview schedule was administered to traditional peri-urban households. The interview schedule is appropriate for the study because most of the respondents were not formally educated and therefore, were not able to read or write. The interview schedule was used to collect qualitative data from household heads.

The first section of the interview schedule covered the background characteristics of the research participants. The next section contained items that sought to address the first objective; the drivers of peri-urban agriculture land use change. Specifically, the section captured issues relating to residential activities, commercial activities, recreational activities, administrative activities, civic activities, industrial, and others. These variables are categorical and were treated as such. This data set helped in obtaining the answers to issues that assisted in addressing research question one.

The third section of the schedule comprised items that sought to obtain answers that assisted in addressing the second objective which examined the variables that explain why peri-urban landowners will sell agriculture lands to be used for non-agricultural uses in peri-urban communities around Wa town. Specifically, the section encompassed items on social issues such as the need

for funds to finance land litigation, need for funds for investment, economic incentives associated with the sale of land, the proximity of the land to economic activities, and proximity to commercial centres among others and these items are nominal variables and, in this respect, they were treated as such.

Items that sought to address how agriculture land use change contributes to variations in traditional livelihoods assets were captured in the fourth section of the schedule. The specific items included; reduced availability of land for farming; land degradation; tenure security, and destruction of natural forest. These variables were measured on a nominal scale. On the other hand, land hold size/availability of land (acres), crop yield (number of bags), livestock and poultry (number of animals) were measured on the ratio scale. These sets of data facilitated the determination of the extent of the effect of agricultural land use change on livelihood assets of traditional households in peri-urban communities around Wa.

The fifth section of the schedule encompassed items that aided in examining the emerging patterns of livelihoods among traditional peri-urban households. The section focused on identifying the new combination of livelihood strategies that have emerged in peri-urban communities and their combinations to households' income. Specifically, the aspect contained items on the factors that explain the choice of the patterns of livelihoods adopted by each traditional household. Furthermore, the section comprised items on the income-generating capacity of each livelihood strategy adopted by traditional households. The incentives for the adoption of livelihoods, other sources of

income, and food crop and livestock/poultry production systems were contained in the section.

Furthermore, an observation checklist was developed and deployed to collect data. The observation contained items that relate to things/activities that served as indicators of the growth of Wa, infrastructure, activities that pose as a threat to peri-urban agricultural lands, types of livestock/poultry kept by households, livelihood activities of households, and activities that exert pressure on peri-urban agricultural land. A digital camera was also used to take pictures of the activities.

An interview guide was employed to collect data from family heads, women leaders, chiefs, landowners, assemblypersons. An interview guide was used to elicit data from key informants including officials from the Physical Planning Department, Department of Food and Agriculture and Lands Commission. Here, the researcher had a face-to-face conversation with the informants where they had the freedom to ask questions and provide details about the issues under discussion. It contained themes based on the objectives of the study. The interview guide covered issues on activities that put pressure on peri-urban agriculture lands, issues that explain agriculture land use change, effects of agricultural land loss on traditional livelihoods and new patterns of livelihoods. In all, nine key informant interviews were conducted.

The interview method was appropriate for this study because it allowed respondents to express themselves on the issues in such a way that all the relevant issues will be discussed. It also offered the opportunity to probe for in-depth data to ensure that I obtained complete data in terms of breadth and depth. Furthermore, the method permitted the informants to ask questions, and

also allowed me to seek clarification on unclear issues. Besides, the method generated findings that corroborate or otherwise, the findings that were obtained using the interview schedule. This triangulation of methods and data assisted me to understand the complexity of agriculture land use change and patterns of livelihoods in peri-urban areas of Wa.

Another instrument that the researcher employed to elicit data was a group discussion guide. The discussion guide was deployed to direct group discussions that were held in all communities. Group discussions offered the opportunity to elicit a wide range of ideas at a single platform where discussants debate the issue of interest. In the context of this study, 21 group discussions were held with women groups, men groups, and traditional rulers. The group discussions allowed me to elicit rich and in-depth data that was necessary for addressing the research objectives.

Pre-Testing

The interview schedule was pre-tested at the Jirapa municipality on a similar target population such as traditional peri-urban households. The interview schedule was administered to 22 households in peri-urban communities around the municipality. Perneger, Courvoisier, Hudelson and Gayet-Ageron (2015) note that at five percent margin of error for a sample of 22 respondents will be sufficient to achieve a 90 percent power to detect a problem in an interview schedule. Pre-testing of the instrument assisted in identifying the problems with improper interpretations relating to infrastructure, diversification, social amenities and intensive system of livestock keeping. The items were then restructured and the appropriate interpretations defined. Furthermore, pre-testing of the instrument ensured that

it was valid in terms of content and construct validity. The pre-testing, thus, aided the researcher to determine its suitability for data collection.

Ethical Concerns

Ethical clearance was obtained from the University of Cape Coast Institutional Review Board (IRB) before the field data collection. Informed consent was also sought from the respondents before the administration of the instrument. The enumerators were required to read the statement of informed consent to respondents before the commencement of each interview. Informed consent for key informants was sought through a letter of consent from the University of Cape Coast, introducing the researcher and the purpose of the research. Informed consent was necessary because it informed the respondents that their rights, anonymity and confidentiality was going to be guaranteed and protected if they agreed to participate in the study. However, the researcher did not anticipate any physical or psychological harm of the study to the participants.

Community Entry

Smith, Blake, Olson and Tessaro (2002) assert that a smooth community entry aids the researcher in the identification and involvement of members of the community, gain access to community members, give research local credibility, ensure sufficient participation and effective data collection. As such, community entry involved the engagement of community gatekeepers to help me and my research assistants to gain access and involve residents in the data collection. The community gatekeepers; assemblypersons, chiefs and community group leaders were contacted to help the research team

to meet the relevant community leaders and ordinary members of the study communities. The aim was to introduce ourselves and the research project and to establish a collaboration for a successful and effective data collection.

Field Work/Data Collection

Seven enumerators were hired to assist me in the collection of household data. Native speakers of the language were contracted to the collect the data. The research assistants were given training on the items on the interview schedule so that there was consensus on how to interpret them. The research assistants were also trained on how they were expected to behave on the field to avoid ethical lapses. The first phase of the data collection was the administration of the interview schedule to the sampled households and the second part was used to conduct group discussions and key informant interviews. Data collection covered 45 days. The number of days spent in each community depended on the number of respondents assigned to the community. Provisions were made for debriefing at the end of data collection for each community to discuss lessons learnt and consider adjustment.

Data Processing and Analysis

The interviews generated both quantitative and qualitative data. Therefore, quantitative and qualitative procedures were used to analyse the data. The quantitative data were edited, coded, and inputted into the Statistical Product and Service Solutions (SPSS) version 21 and cleaned before analyses commenced. Descriptive statistics, chi-square test of independence, Wilcoxon Signed Ranked Test, factor analysis and binary logistic regression were deployed to analyse the quantitative data. The quantitative results were

presented in tables and figures. Thematic analysis was applied to qualitative data and presented in narrations and quotations. The quantitative and qualitative data were integrated under each of the objectives to give a comprehensive understanding of issues being analysed.

The first objective was analysed using change detection. In detecting the growth of Wa between 1986 and 2019, the study made use of Landsat imagery with a spatial resolution of 30 meters by 30 meters (30m x 30m) sourced from United States Geological Survey Department (usgs.gov). The images were chosen carefully to be around the dry season. Because using images from different seasons may result in over or underestimation of the vegetative cover since the area is much greener during the rainy season. The date of the first year (1986) was used as the reference point/season from which the rest of the images were chosen. The years were used because there was cloud cover for 1996, 1988 and 2016 and as such, they could not be used to determine the land cover changes. Table 6 presents a detailed description of the satellite images used.

Table 6: Characteristics of Satellite Images Used

Year	Satellite	Sensor	Spatial Resolution	Bands	Date
1986	Landsat	Multi spectral scanner	30 x 30	4,3,2	March 27, 1986
1998	Landsat	Thematic Mapper	30 x 30	4,3,2	February 20, 1998
2006	Landsat	Enhanced Thematic Mapper	30 x 30	4,3,2	April 19, 2006
2019	Landsat	Operational Land Imager	30 x 30	5,4,3	January 13, 2019

Source: Field survey (2019)

The satellite images were processed using Erdas Imagine 2014 software. The various brands of the images were stacked to form composite

images for the respective years. A shapefile of the study area – Wa Municipality was then used as the area of interest (AOI) to subset the extent of Wa municipal out of the larger images. Image enhancement techniques were employed to improve the brightness and contrast of the image to make the pixel colours clearer. The signature file was generated where training samples were selected and used to perform a supervised classification using the land cover classification scheme. Initially, the images were classified into a minimum of 50 classes after which some of the classes were recoded to form the original 5 cover classes identified in the classification scheme.

The maximum likelihood classifier was used. Areas of the various classes were also generated using the erdas imagine and the maps were produced using ArcMap 10.4.

The statistics for the change analysis were computed using Microsoft excel spreadsheet.

$$Change = T_2 - T_1$$

$$Percent\ Change = \frac{Change}{T_1} * 100$$

$$Rate\ of\ Change = \%\ change/interval$$

Where; T_1 = Time 1 and T_2 = Time 2

Besides, objective one was analysed using frequencies, percentages, chi-square test, and descriptive statistics for the quantitative aspects whereas thematic analysis was used for the qualitative data. The nature and extent of growth of Wa and the encouragement on peri-urban communities were also considered. The drivers of peri-urban agricultural land use change included residential, commercial, administrative, civic, and others. These variables

were measured on a nominal scale. Consequently, analysis entailed change detection analysis, chi-square test of independence, descriptive statistics, percentages and frequencies. The test was conducted at .05 alpha level.

As regards objective two, descriptive statistics, frequencies, percentages, Wilcoxon-sign-rank test, factor analysis, binary and logistic regression were utilised to analyse the quantitative data. Factor analysis entails the selection of items that measure the concept of interest in an attempt to improve construct validity (Ofori & Dampson, 2011). Therefore, as indicated by Yong and Pearce (2013) factor analysis assisted the researcher to reduce large datasets that consist of several variables by assembling common variables into descriptive categories for easy understanding. Binary logistic regression was also used to determine the variables that better the sale of agricultural lands in peri-urban Wa. Thematic analysis was deployed to analyse the qualitative data.

Objective three was analysed using quantitative procedures including descriptive statistics, frequencies, percentages, and Wilcoxon-sign-rank test. The quantitative data that relates to the land uses that pose a threat to agriculture, food crop production, livestock/poultry keeping, and agricultural income were analysed first, at the aggregate level and later based on location. On the other hand, thematic analysis was deployed to analyse the qualitative data. Thematic analysis was employed to determine themes from qualitative data that were generated from personal interviews and focus group discussions. It is important to note that in the analysis of food crop production and farm income, 2008 and 2018 were used because I used the cropping season as the benchmark.

Finally, for the fourth specific objective, quantitative data were subjected to frequencies, percentages, descriptive statistics, and Chi-square test of independence. The quantitative data that relate to non-agricultural livelihood strategies, reasons for the engagement in such livelihood activities, food crop production systems, livestock keeping system, poultry keeping system, income from livelihood activities and other sources of income were analysed first on aggregate and later based on location. However, thematic analysis was applied to the qualitative data.

Fieldwork Challenges

This section discusses the challenges the researcher encountered during the field, and the measures that were taken to resolve them. Firstly, the location of traditional households was a challenge. Even though a list of the households was obtained from the CHPS zones, the houses were not numbered and as such, it was difficult to locate them to participate in the study. The researcher had to leverage his network to get four indigenes in each community to take the research team around. Secondly, two of the mobile devices malfunctioned during the data collection. On day three of the household data collection, two of the seven research assistants reported that their mobile devices had malfunctioned. The researcher had to quickly mobilise additional four mobile devices and gave two to the research assistants, while the rest served as a backup.

Thirdly, the interpretation of the items on the household survey instrument was a challenge on the first day of the data collection even though the instrument had been pre-tested. The differences in dialect in Jirapa where the pre-testing was done and Wa accounted for this challenge. A training

session was therefore reorganised for the appropriate interpretation of the items in the Waale (local language). This helped in ensuring the validity of the data collected to address the research objectives. Fourthly, the researcher found some inconsistency in the responses to the survey instrument. Therefore, the researcher had to edit the data to ensure consistency in responses. To ascertain the consistency and general reliability of the instrument, a reliability test was conducted. The results revealed that a Cronbach's alpha value of 0.919 which indicated that generally, the instrument was reliable.

Chapter Summary

The chapter began by discussing the philosophical perspective that underpinned the research project. Specifically, it discusses the ontological and epistemological positions of the objectivist and constructionist/subjective have been espoused. Furth more, the positivists, interpretivist and pragmatic philosophical perspectives and their associated combination of quantitative and qualitative methods and data and mixed research designs have been examined.

The next item explained under chapter four is the research approach, it centres on the sequential mixed design. The explanatory design study was also discussed. Eight out of the 12 empirical studies reviewed adopted the concurrent mixed design in the collection of primary data. Next, the profile of the study area was discussed. Specifically, the location of Wa municipality, the population, geographic characteristics, and vegetation of the area have been described. The study communities included Danko, Magu, Nakori, Bamahu, Kpongu, Kompala and Sombo. The research design has also been

discussed under this chapter with an emphasis on the philosophical perspectives that underpinned the research.

Data collection has also been covered in the chapter. The study utilised primary data which were elicited from traditional peri-urban households, chiefs, elders, landowners, women groups, officials of departments of agriculture, Physical Planning and Lands Commission. Instrumentation has also been discussed in this chapter. The main instruments for the collection of data were the interview schedule and interview guide. The interview schedule was administered to households, while the interview guide was used to elicit data from key informants such as landowners, assemblypersons, relevant state officials.

Issues relating to pre-testing of instruments, ethical concerns and community entry have been discussed. Pre-testing of the interview schedule took place in Jirapa municipality and it was administered to similar respondents- traditional peri-urban household heads. The pre-testing was to ensure that weaknesses, ambiguities and uncertainties in the instruments were identified and addressed before the actual fieldwork for the collection of data. The challenges the researcher encountered during the data collection and analysis have also been discussed in this chapter.

The actual fieldwork lasted from June to August 2019. Data processing and analysis is also presented in this chapter. Both quantitative and qualitative data analysis was conducted. Quantitative data were analysed with the aid of frequencies, percentages, descriptive statistics, chi-square test of independence, chi-square test of independence, Wilcoxon Singed Ranked Test, factor analysis and binary logistic regression, Spearman's rank

correlation, whereas thematic analysis was utilised to analyse qualitative data. Ethical clearance was sought from the institutional review board (IRB) of the University of Cape Coast before going to the field and informed consent of respondents was also be sought.

CHAPTER FIVE

DRIVERS OF AGRICULTURAL LAND USE CHANGE IN PERI-URBAN WA

Introduction

This chapter is dedicated to finding answers to the research objective one. The chapter focuses on the background characteristics of study communities, respondents and nature and extent of the growth of Wa town between 1986 and 2019. Specifically, the chapter centres on the spatial growth of the town over the period, the changes that have occurred, the nature of the changes, drivers of peri-urban agricultural land use change and the contributory reasons that motivate the movement of people to the peri-urban areas.

The urban land market theory, entitlement theory as well as the human capital theory formed the foundation for the analysis of objective one. The core argument of the urban land market theory centres on the premise that land rent is highest at the centre of the city and as one moves outwards the central business district (CBD), rent begins to decline until the lowest rent is attained at the edge of the city (Trussell, 2010). The entitlement theory also maintains that the capacity of people to access food predicates on their endowment sets such as agricultural land and the failure to secure such resources can lead to deprivation (Sen, 1981), while the human capital theory proclaims that individuals or groups with higher levels of knowledge, skills, and technical training will be able to achieve greater production outcomes than those with low levels human capital (Ployhart & Moliterno, 2011; Schultz, 1961).

Objective one was analysed based on the quantitative data first then followed by the qualitative data. In respect of this, change detection analysis, frequencies, percentages, and thematic analysis were deployed to analyse the data. Some of the analyses of the primary quantitative data were based on varied samples due to multiple responses. The issues of the land use change, the nature of the changes, past and current land uses, and drivers of peri-urban agricultural land use change were analysed from the aggregate level and later disaggregated using location. The reasons that motivate the movement of people to the peri-urban areas were, however, analysed from the aggregate level. For the qualitative data, thematic analysis was deployed.

Background Characteristics of Respondents

The background characteristics considered here include the distribution of the research participants from each community, age, and level of education of household heads. Out of the 412 interview schedules administered, 408 were found to contained valid data, giving a response rate of 99 percent. According to Fincham (2008), a response rate of 60 percent is good enough and should be the goal of researchers. This indicates that the response was within the acceptable level and as such, all the analyses are based on the 408 respondents. As shown in Table 7, over 19 percent of the respondents were from Danko, 18.1 percent of them were from Mangu, and 14. 7 percent from Bamahu. The rest were distributed among Sombo, Kpongu Kompala, and Nakori.

Table 7: Research Participants of Study Communities

Community	N	Percent
Danko	78	19.1
Bamahu	60	14.7
Kompala	47	11.5
Nakori	45	11
Kpongu	51	12.5
Sombo	52	13
Mangu	74	18.1
Total	408	100

Source: Field survey (2019)

The second background characteristic examined was age. The ages of respondent were analysed and the result shows that the minimum age was 34 whereas the maximum age was 83, and a median age of 48.58 years (Mean = 49.58; Std Deviation = 10.78; Skewness = 0.78) with a related quartile deviation of 7.5. This suggests that most of the respondents were relatively young and as such, they may be able to adapt to the land use changes. Age is critical for this analysis because it may either facilitate or hinder their switch-over from agricultural activities to non-agricultural activities in response to the loss or reduction in farmlands which they previously depended on for their livelihoods (Tran & Lim, 2011). This implies that old age may serve as a barrier to the uptake of activities that require physical strength, while young people can easily engage in manual work (Tran & Lim, 2011).

The educational attainment of household heads was also analysed. The examination of education is necessary because households that are endowed with individuals with knowledge, skills and other competencies will be able to adapt to changes and engage in more lucrative jobs compared to those with lower levels of these attributes (Ployhart & Moliterno, 2011; Schultz, 1961).

The allotment of educational attainment of respondents showed that out of the 408 respondents 60.3 percent had no formal education, while 11.5 percent had attained Middle or Junior High School level. The result also showed that only 5.1 percent of the respondents had attained tertiary education. The distribution of the educational accomplishment of respondents is shown in Table 8.

Table 8: Distribution of Educational Attainment of Household Heads

Level of education attained	Number	Percent
No formal education	246	60.3
Non-formal education	25	6.1
Primary	43	10.5
Middle/Junior High School	47	11.5
Secondary	28	6.1
Tertiary	21	5.1
Total	408	100

Source: Field survey (2019)

Physical Expansion in Wa from 1986 to 2019

Wa has witnessed physical expansion between 1986 and 2019. The built-up areas are non-vegetative parts of the earth surface, including built-up infrastructure, and impervious surfaces like pavements. In 1986, the built-up area covered 471.92 ha of land. By 1998, it increased by 85 percent from the area of 471.92 ha to 875.34 ha of land. As regards the share of the built-up area between 1998 and 2006 it accounted for 7.6 percent of the total change that had occurred. Between 2006 and 2019, the share of the built-up area was 15.1 percent of the total change and as a result, consumed 3,022.51 ha of land area (Table 9). The persistent expansion of the built-up areas denotes that

more of the other land cover will be converted in the built-up areas as evident in the diminution in closed savannah woodland. Dekolo *et al.'s* (2013) found a similar trend in Ikorodu in Nigeria,

Table 9: State of the Land Cover (Ha) in 1986, 1998, 2006 and 2019 in Wa

Year/Land use/cover	1986	1998	2006	2019
Built	471.917	875.34	1487.43	4509.94
Open woodland	11474.7	16824.9	20209	26445.0
Close woodland	45468.6	39969.8	36321.9	26254.9
Bare ground	708.607	483.75	68.31	775.642
Water	8.7723	22.23	55.71	52.425
Total	58132.6	58176.02	58142.35	58037.91

Source: Field survey (2019)

During an interview with a key informant from the PPD, it emerged that there had been an expansion of Wa into peri-urban areas. This passage taken from field notes explains his assertion.

> Wa town has witnessed significant physical expansion over the years. The genesis of the physical expansion of Wa dates back to the 1980s when the town was named as the capital of the Upper West Region. The initial structural plan of Wa was about 6 km^2. However, the same cannot be said about it today. Wa has grown to engulf the surrounding communities of Nakori, Aahiyuo, Sombo, Bamahu, Danko, Loho, Piisi, Kpongu and Siriyiri (a community in the Wa-West). These communities were hitherto not part of the structural plan for Wa but have been consumed by the physical expansion of Wa. Besides, most of the wetlands along the major roads have been converted into petrol filling stations (Key Informant from PPD, 15th July 2019).

The above quotation insinuates that there had been a conversion of farmland into non-agricultural purposes, causing land use change in the peri-urban areas. This falls in line with the relationship described in the conceptual

framework that shows that peri-urban land conversion into non-agricultural uses will displace agricultural livelihoods. The finding also agrees with Mazzochi *et al.*'s (2013) assertion that when people in the city move to settle in peri-urban areas, it leads to land use changes. The finding also agrees with the tenet of the entitlement theory that suggests that the loss of endowments such as land may render the affected unable able to produce food for household consumption (De Waal, 1997).

Open woodland comprises grasses, shrubs interspersed with scattered trees and deforested lands. The share of the open woodland area increased by 46.6 percent between 1986 and 1998. By 2006, open woodland also increased by 41.8 percent over the 8 years (Table 10). For 2006 and 2019, open woodland accounted for 31.05 percent of the total change that had occurred. The increase in open woodland could be attributed to the cutting down of trees and clearing of shrubs for the building of residential accommodation (Peprah, 2014). It also appears to agree with the aspect of the conceptual framework that shows that peri-urban land use change will affect agricultural livelihoods. The finding is also consistent with previous literature (Adeboyejo & Abolade, 2007; Angel *et al.*, 2005; Maitima *et al.*, 2010) that urban expansion had led to the displacement of agricultural land uses in many peri-urban areas.

Table 10: Land Use/Land Cover Change from 1986 – 1998, 1998 – 2006 and 2006 – 2019

Year	1986-1998			1998-2006			2006 -2019		
Land use/cover	Change (ha)	% change	Rate of change	Change (ha)	% change	Rate of change	Change (ha)	% change	Rate of change
Built	403.42	3.5	0.29	612.09	7.6	0.95	3,022.51	15.1	1.16
Open woodland	5,350.2	46.6	3.88	3384.1	41.8	5.23	6,236	31.05	1.0
Closed	-5498.8	-47.9	-3.99	-3,647.9	-45.1	-5.63	-10067	-50.3	-3.86
Bare ground	-224.86	-1.9	-0.16	-415.44	-5.1	-0.64	707.332	3.5	0.27
Water	13.46	0.1	0.01	33.48	0.4	0.05	-3.285	-0.05	-0.001
Total	11.490.74	100		8093.01	100		20,016.127	100	

Source: Field survey (2019)

Regarding closed savannah woodland, it encompasses woodland with close trees. It includes parklands, forests and wilderness with a high density of trees. As can be seen in Table 10, close savannah woodland had reduced by 47.9 percent for the total change between 1986 and 1998. Between 1998 and 2006, the share of closed savannah woodland also declined by 45.1 percent. A similar trend is observed from 2006 to 2019 where the share of closed savannah woodland decreased by 50.3 percent of the total change. The continuing decline in closed savannah woodland can be ascribed to the persistent increase in the built-up area (Figure 6). Since savannah woodland is easy to clear, it can be converted into other uses including residential accommodation to house the growing population in the town.

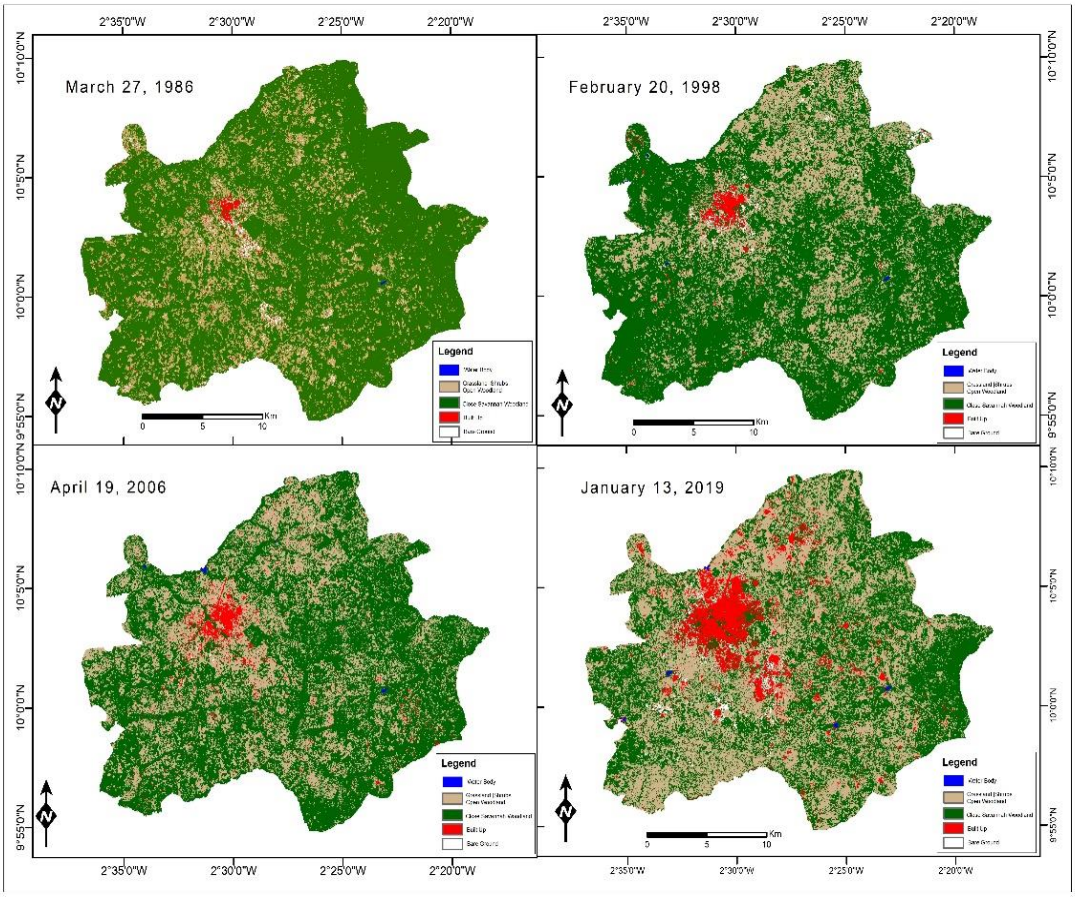

Figure 6: **Land Use /Land Cover Map of Wa in 1986, 1998, 2006 & 2019**

Source: Field survey (2019)

Bare ground refers to areas which are not covered by vegetation, infrastructure and water bodies. The bare ground had decreased from 708.607 ha to 483.75 ha between 1986 and 1998. Likewise, the bare ground had dropped from 483.75 to 68.31 ha between 1998 and 2006. However, it increased from 63.31 ha to 775.642 between the period 2006 and 2019. This can be attributed to the period (January) when the satellite image was captured. In January, grasses are dry and burnt and as such it further exposes the bare ground to erosion (Aduah & Aabeyir, 2012).

As regards water bodies/or wetlands, this class is made up of all bodies of water, including rivers, streams, reservoirs/dams, dugouts and ponds. Water

bodies covered 8.77 ha in 1986 but by 1998, this had increased to 22.23 ha which resulted in a 0.1% increase of the total change in water bodies over the period (Figure 6). This insinuates that water bodies/or wetlands increased between 1998 and 2006 but declined thereafter

Meinel and Hernnersdorf (2002) argued that the use of spatial data alone cannot represent land use changes because not all the attributes can be seen and therefore there is the need for socio-economic data from landowners and land managers to supplement spatial data to determine land use changes. Thus, it is crucial to know respondents' perception of the growth of Wa and the resultant land uses changes observed in the selected peri-urban communities. The specific issues covered here are the perception of peri-urban households about the growth of Wa, the specific changes that have occurred, the nature of changes, past and current land uses, drivers of peri-urban agricultural land use change and the reasons that contribute to encroachment on peri-urban agriculture lands.

According to 20.4 percent of the respondents, the growth of peri-urban Wa is evident in the increased residential houses. This perception was corroborated by a key informant from the Physical Planning Department (15^{the} July 2019). The key informant explained that Wa town had expanded beyond its initial official boundaries and this is manifested in the increased residential housing. The key informant further explained that the initial structural plan of Wa was about 6 km^2, however, people seeking to settle in Wa had constructed several houses in Nakori, Sombo, Bamahu, Danko, Mangu, Piisi and some communities in the Wa-West District leading to land loss. Similar findings have been reported by other researchers (Appiah *et al.*, 2017; Cobbina *et al.*,

2015; Mugisha & Nyandwi, 2015) that Kumasi and Kigali cities had witnessed growth and encroachment on peri-urban lands.

The increase in the number of residential housing as an indication of the growth of Wa and the surrounding communities was apparent in all the study communities. Specifically, in the past Nakori community was made up of five compound houses and they were all confined to the left-hand side of the trunk road that links Wa to the Wa-West District. Nakori community was also limited to the bridge at the entrance of the community and the rest of the land beyond the bridge was vacant up to Wa. However, there had been an upsurge in residential houses in the community due to the spill over demand for accommodation from Wa town. During a group discussion with men in Nakori (10th July 2019) it emerged that people could hunt game in the area lying between Nakori and Kpaguri Taaga (a suburb of Wa). However, people cannot hunt there anymore due to residential development.

The finding illuminates that the physical expansion of urban centres is largely manifested in the upsurge in the demand for peri-urban land for housing. The finding reflects the aspect of the conceptual framework that shows that demand for land for residential housing drive peri-urban agricultural land conversion. The finding is also consistent with the tenet of the urban land market theory which indicates that the price of land is highest at the city centre and begins to decline as one moves towards the periphery (Huang, *et al*., 2013) which motivates people to buy land and build in the peripheries. Furthermore, Appiah *et al*. (2017) reported similar finding that urban expansion and the peri-urban development are manifested in the

increased residential houses in peripheral communities of Juaso, Obogu and Atwedie in the Asante-Akim South District.

Out of the 778 multiple responses, more of the responses (20.4%) cited residential houses, followed by increased population (18.9%) and then followed by the increased presence of electricity (14.8%) as the manifestations of peri-urbanisation in the selected communities. The rest of the indicators cited were increased economic activities, increased schools, increased traffic on the roads, reduced farmlands, increased religious centres, and expanded water supply systems (Table 11). They also mentioned increased infrastructure, increased number of shops, reduced open space, increased hotels/guesthouses and increased blockhouses.

Table 11: Respondents' Perceptions of Manifestation of Peri-urbanisation in Wa

Indicators of Peri-urbanisation	Number	Percent
Residential accommodation	159	20.4
Increase in population	147	18.9
Presence of electricity	115	14.8
Increased infrastructure	115	14.8
Increased in economic activities	93	12.2
Increased traffic on the roads	35	4.5
Reduced farmlands	34	4.4
Increased religious centres	28	3.6
The improved water supply system	20	2.6
Increased number of shops	14	1.8
Reduced open space	8	1.0
Increased hotels and Guesthouses	8	1.0
Block Houses	2	0.3
Total	778*	100

Note * Indicates Multiple Responses

Source: Field survey (2019)

Increased residential houses, increased population and presence of electricity emerged as indicators of peri-urbanisation. The finding was validated during a group discussion with women in Kpongu (9th July 2019) when it emerged that the availability of electricity in the community was an important indicator of the influence of Wa on Kpongu. This implies that the springing up of houses in the community had compelled the authorities to extend electricity to the community and created an opportunity for the integration of the rural area into the urban system (Ravetz *et al*., 2013). In Ghana, Naab *et al.* (2013) reported similar findings that population increase, as well as the desire to own houses, contributed to peri-urbanisation in Tamale. The finding, however, contradicts the aspect of the conceptual framework that suggests that peri-urban development generates may negative consequences for peri-urban households.

The perceptions of respondents about the manifestation of peri-urbanisation were considered based on communities. This was to assist in establishing whether variations existed in perception about peri-urbanisation. The results (Table 12) showed that in Danko, the most cited response was increased population (22.5%). On the other hand, in Bamahu, the most cited response was increased residential housing (37.3%). As regards Kompala, the most cited responses were increased residential housing and increased population (22.7% each). Similarly, in Nakori, increased residential houses (33.8%) was recorded as the most cited indicator of peri-urbanisation. In Kpongu, the most cited response was increased residential houses in Kpongu (24.5%) and Sombo (18.5%), while in Mangu, the most cited was increased infrastructure (19.6%).

Table 12: Respondent Perception about Peri-Urbanisation in Wa by Location

	Community						
Indicators	Danko	Bamahu	Kompala	Nakori	Kpongu	Sombo	Mangu
Increased in Residential accommodation	35 (18.3)	19 (37.3)	10 (22.7)	26 (33.8)	27 (24.5)	12 (18.5)	30 (12.5)
Population increase	43 (22.5)	8 (15.7)	10 (22.7)	13 (16.9)	26 (23.6)	10 (15.4)	37 (15.4)
Presence of Electricity	38 (19.9)	5 (9.8)	1 (15.9)	8 (10.4)	16 (14.5)	8 (12.3)	33 (13.8)
Increased economic activities	11 (5.8)	12 (23.5)	5 (11.4)	9 (11.7)	9 (8.2)	9 (13.8)	38 (15.8)
Increased infrastructure	36 (14.6)	3 (5.9)	7 (15.9)	9 (11.7)	7 (6.3)	7 (10.8)	52 (19.6)
Reduced farmlands	-	1 (2)	2 (4.5)	2 (2.6)	12 (10.9)	9 (13.8)	8 (3.3)
Increased traffic on the roads	1 (0.5)	-	3 (6.8)	6 (7.8)	6 (5.5)	6 (9.2)	13 (5.4)
Improved water supply system	13 (6.8)	1 (2)	-	1 (1.3)	3 (2.7)	-	2 (0.8)
Block houses	1 (0.5)	-	-	-		-	1 (0.4)
Increased religious centres	11 (5.8)	-	-	1 (1.3)		2 (3.1)	14 (5.8)
Reduced open spaces	-	-	-	-	2 (1.8)	-	4 (1.7)
Increased in shops	6 (3.1)	2 (3.9)	-	2 (2.6)	1 (0.9)	-	3 (1.2)
Increased in hotels & Guesthouses	2 (1)	-	-	-	1 (0.9)	-	5 (2.1)
Total	191 (100)	51 (100)	44 (100)	77 (100)	110 (100)	65 (100)	240 (100)

Note: Numbers in Parenthesis are Percentages
Source: Field survey (2019)

Increased residential houses emerged as the dominant response as an indicator of peri-urbanisation in all the localities except in Danko and Mangu where increased population and increased infrastructure were the most cited respectively. This insinuates that a lot of residential houses had sprung up in the communities which are in line with the aspect of the conceptual framework that shows that demand for land for residential housing will trigger peri-urban land use change. Because of the springing up of residential housing in the peri-urban communities, many households will lose the lands and as such may not be able to produce food for household consumption which falls in line with the entitlement theory (Sen, 1981). The finding also supports the results reported by Cobbina *et al*. (2015) that increased residential housing was a major land use in Feyiase in Kumasi, Ghana.

As an aspect of the study, the researcher wanted to know if there had been earlier changes in infrastructure in the communities due to peri-urbanisation and in this respect, changes in general infrastructure such as education, road, water, electricity, among others, that are considered the manifestation of peri-urbanisation were investigated. The results indicate that there have been changes in overall infrastructure in all the communities. As shown in Table 13, the most cited change was increased water infrastructure (17.1%), followed by education infrastructure (16.3%), and road infrastructure (16%) and this signals that portable water supply had improved over the period. This corroborates Rakodi's (1998) assertion that the peri-urban interface experience changes in its economic and social infrastructure. Appiah *et al.'s* (2014) also found similar evidence in peri-urban Kumasi.

Table 13: Distribution of the Perception of Changes in Infrastructure

Infrastructure	Number	Percent
Water infrastructure	350	17.1
Education infrastructure	334	16.3
Road infrastructure	327	16.0
Presence of electricity	314	15.4
Commercial infrastructure	256	12.5
Administrative centre	253	12.4
Hotels/guesthouses	211	10.3
Total	2,045*	100.0

Note: * Indicates Multiple Responses
Source: Field survey (2019)

The location of the community relative to the urban core plays an important role in the changes that are expected to take place due to peri-urbanisation. Land rent determines the location of households and businesses to the CBD (Fujita & Thisse, 1986) as it influences the number of money households and businesses are willing to pay to be located within a given distance from the CBD. In this respect, it was vital to consider the general changes in infrastructure due to peri-urbanisation based on a community of origin.

The results in Table 14 indicate that the most noted response as an indicator of changes was changed water infrastructure. The most cited response changed water infrastructure in Bamahu (25.8%), Kompala (20.2%), Nakori (20.2%) and Kpongu (27%). On the other hand, in Danko, the indicators were changes in educational infrastructure, road infrastructure water infrastructure and electricity infrastructure (15.2% each). In Sombo, however,

changes in electricity infrastructure and commercial infrastructure (14.5% each) were the most cited, while changes in educational infrastructure (15.5%) was the most cited in Mangu. Generally, the issues were similar in Bamahu, Kompala, Nakori, and Kpongu but differed in Danko, Sombo and Mangu.

Table 14:Distribution of the Perceived Changes in Infrastructure by Location

	Perceived Changes							
Community	Education infrastructure	Road infrastructure	Water infrastructure	Electricity infrastructure	Administrative centre	Commercial Infrastructure	Hotels & Guesthouses	Total
Danko	77 (15.4)	76 (15.2)	76 (15.2)	76 (15.2)	71 (14.2)	71 (14.2)	54 (10.8)	501 (100.0)
Bamahu	30 (18.9)	34 (21.4)	41 (25.8)	23 (14.5)	17 (10.7)	9 (5.7)	5 (3.1)	159 (100.0)
Kompala	34 (15.2)	36 (16.1)	37 (16.6)	33 (14.8)	29 (13.0)	27 (12.1)	27 (12.1)	233 (100.0)
Nakori	34 (17.6)	30 (15.5)	39 (20.2)	36 (18.7)	18 (9.3)	21 (10.9)	15 (7.8)	193 (100.0)
Kpongu	33 (26.2)	28 (22.2)	34 (27.0)	19 (15.6)	7 (5.6)	2 (1.1)	3 (2.4)	126 (100.0)
Sombo	52 (14.2)	52 (14.2)	52 (14.2)	53 (14.5)	51 (14.1)	53 (14.5)	52 (14.2)	365 (100.0)
Mangu	74 (15.5)	71 (14.9)	71 (14.9)	33 (14.8)	60 (12.6)	73 (15.3)	55 (11.5)	478 (100.0)

Note: Total more than Sample Size because of Multiple Responses
Source: Field survey (2019)

During an in-depth interview with a woman leader from Kpongu (10th July 2019), she indicated that a small-town water supply system had been constructed in the community and that had reduced the burden of the search for water, particularly in the dry season. This corroborates the findings in Bamahu, Kompala Nakori, and Kpongu that traditional households benefited in terms of expansion in water infrastructure as a result of peri-urbanisation and the associated influx of people into the communities. However, this finding contradicts UN's (2016) claim that peri-urban areas in developing countries areas are bereft of basic infrastructure and social services. It also does not conform to the relationship described in the conceptual framework that suggests that peri-urban development breeds negative consequences. Figure seven shows a small-town water supply system in Kpongu.

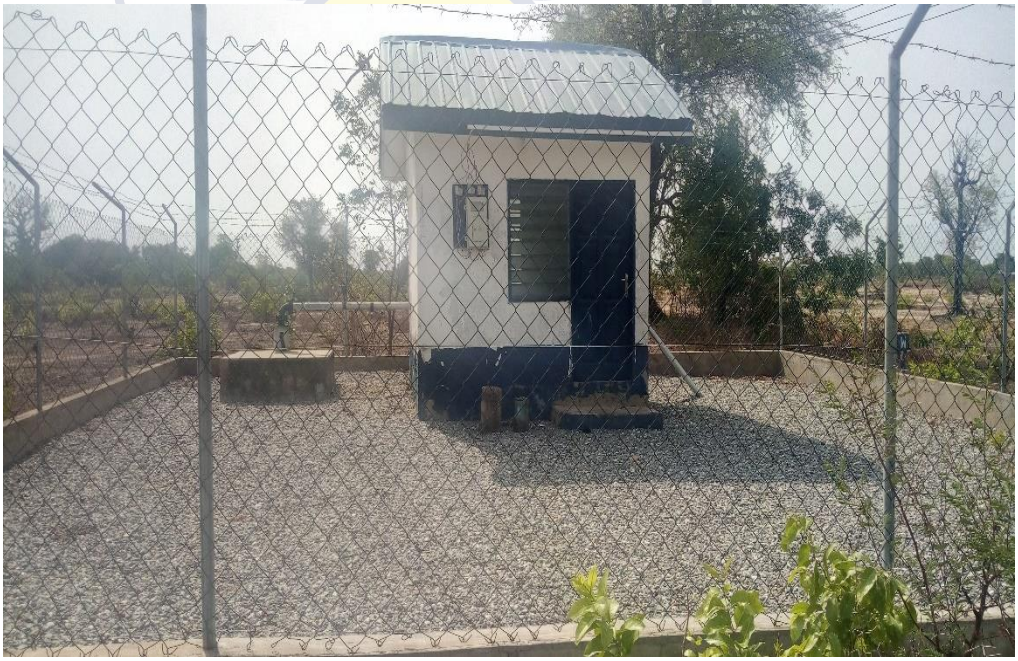

Figure 7: **Small-town Water System in Kpongu**

Photo Credit: Author (2019)

On the whole, the revelation that the most cited indicator of change at the aggregate level was increased water infrastructure as reflected in the cases

of Bamahu, Kompala, Nakori, and Kpongu but not in Danko, Sombo and Mangu. The possible explanation for the similarities to Bamahu, Kompala, Nakori, and Kpongu could be the late advancement of the Wa town towards them while that of the other communities could be ascribed to their early integration into the urban system. The finding is in sync with the philosophy of social justices that advocate for fair and equal distribution of social and economic opportunities (Vita, 2014) such as water supply. The finding also supports the proposition of the urban land market theory that accessibility and convenience influence the location of households (Manganelli & Murgante, 2017; Caruso, 2001).

The pattern of changes in infrastructure was assessed. As evident in Table 15, between 68.9 percent and 93.6 percent of the respondents indicated that there have been increases in infrastructure relating to hotels/guesthouses through to education. The table showed that in all cases, less than 20 percent of the respondents felt that infrastructure had decreased. During an interview with a key informant from the Wa Municipal Assembly (13th July 2019), he indicated that the provision of water infrastructure is important and as such there have been efforts to increase access to water in his electoral areas. This hints that people now have access to potable water in peri-urban areas. Appiah *et al.* (2014) reported similar findings that peri-urbanisation had led to infrastructure expansion and the availability of social amenities in the Bosomtwe District, Ghana.

Table 15: Pattern of Changes in Infrastructure

Infrastructure	Pattern of Change			Total
	Increased	Decreased	Unchanged	
Education	382 (93.6)	20 (4.9)	6 (1.5)	408 (100.0)
Road	361 (88.5)	23 (5.6)	24 (5.9)	408 (100.0)
Water	377 (92.4)	22 (5.4)	9 (2.2)	408 (100.0)
Electricity	367 (90.0)	33 (8.1)	8 (2.0)	408 (100.0)
Administrative	290 (71.1)	63 (15.4)	55 (13.5)	480 (100.0)
Commercial	307 (75.2)	69 (16.9)	32 (7.8)	480 (100.0)
Hotels & Guesthouses	281 (68.9)	56 (13.7)	71 (17.4)	480 (100.0)

Note: Numbers in Parenthesis are Percentages
Source: Field survey (2019)

During a group discussion with a women's leader from Nakori (14th July 2019), it emerged that the pupils who completed primary school had to commute to Wa to access Junior High School education and that had led to the drop out of some of the children. However, with the construction of a new 3-unit classroom block to accommodate the Junior High School students in the community, pupils have been relieved of the burden of commuting (Figure 8). This hints that the improvement in educational infrastructure had brought relief to school pupils which do not agree with the aspect of the conceptual framework that appears to suggests that peri-urban development and land use change only bring about detrimental consequences to traditional households.

***Figure 8*: Junior High School Block in Nakori**

Photo Credit: Author (2019)

Drivers of Peri-Urban Agricultural Land Use Change

Literature discloses that rapid urbanization creates ecological problems because urban expansion encroaches on peri-urban arable agriculture land (Wang, *et al*., 2009; Liu *et al*, 2011a). Similarly, agriculture land use change is occasioned by urban residents buying prime agricultural land in peri-urban areas to satisfy residential or commercial purposes (Nicodemus, & Ness 2010; Samat *et al*., 2011). In the same way, Mazzochi *et al*. (2013) noted that the shift in urban population from the inner city to arable land on the edges of the city exerts pressure on peri-urban lands. In this respect, it is vital to know the drivers of peri-urban agricultural land use change in Wa.

Table 16 shows that the drivers of peri-urban agricultural land use change in the order of magnitude were: increased urban population (14.8%), migration (14.3%), the desire of urban resident for space (14.2%), increased

practice of the nuclear family system, and demand for land for residential housing (14% each). This hints that there had been an increase in urban population and consequently the rise in demand for peri-urban lands. This supports the aspect of the conceptual framework that shows that population growth and demand for housing will drive peri-urban agricultural land use change. In the light of increased population, migration and subsequent increase in the demand for peri-urban lands, it appears that the relatively low rent areas in these areas may have influenced people to move there (Koomen & Buurman, 2002; Mugisha & Nyandwi, 2015).

Table 16: Drivers of Peri-urban Agricultural land Use Change

Activity	Number	Percent
Increases urban population	400	14.8
Migration into the town	386	14.3
The desire of urban residents for space	383	14.2
Increased practices of the nuclear family system	380	14
Demand for land for housing	379	14
Availability of infrastructure	286	10.6
Availability of social amenities	258	9.5
Cheap access to land	234	8.6
Total	2,706*	100.0

Note: * Indicates Multiple Responses
Source: Field survey (2019)

Friedmann and Miller (1965) proffer that expansion of cities exerts physical and functional influences on peri-urban communities. Similarly, the urban land market theory maintains that rents are highest in areas contiguous to the CBD and only those who can afford the rent are located in there (Huang,

et al., 2013). Therefore, the location of households and businesses is a reflection of the amount of money they are willing and able to pay for land relative to the distance from the city centre (Duranton & Puga, 2014). This indicates that the relative distance of a peri-urban community from the city will determine the amount of influence it receives from the city. Thus, the drivers of peri-urban agricultural land use change were disaggregated by location.

In Danko (18.1%), Nakori (17.1%), Bamahu (14.9%) and Kpongu (14.6%) increased urban population was the most cited as the predominant drivers of peri-urban agricultural land use change (Table 17). Similarly, respondents in Kompala (13.5%) and Mangu (13.1%) also cited increased urban population as the driver of peri-urban agricultural land use change, although at lower percentage levels. This signals that urban population growth in the city is the driver of peri-urban development which is in line with the relationship described in the conceptual framework that indicates that population increase in the urban core drives peri-urban land use change. The finding is also similar to earlier literature (Naab *et al.*, 2013; Rahayu & Mardiansjah, 2018; UN, 2016) that urban population growth and migration drive the extension of urban areas towards fringe communities.

Table 17: Drivers of Peri-urban Agricultural Land Use Change by Location

	Socio-Economic Activities								
community	Increased population	Migration	Access to cheap land	DURS	INFS	SA	Infrastructure	LRH	Total
Danko	78 (18.1)	77 (17.9)	10 (2.3)	78 (18.1)	78 (18.1)	12 (2.8)	21 (4.9)	77 (17.9)	431* (100.0)
Bamahu	60 (14.9)	57 (14.1)	50 (12.4)	54 (13.4)	55 (13.6)	34 (8.4)	38 (9.4)	55 (13.6)	403* (100.0)
Kompala	43 (13.5)	42 (13.2)	28 (8.8)	41 (12.9)	43 (13.5)	39 (12.3)	40 (12.6)	42 (13.2)	318* (100.0)
Nakori	45 (17.1)	42 (16)	18 (6.8)	42 (16)	37 (14.1)	16 (6.1)	24 (9.1)	39 (14.8)	263* (100.0)
Kpongu	49 (14.6)	45 (13.4)	33 (9.9)	45 (13.4)	44 (13.1)	37 (11)	40 (11.9)	42 (12.5)	335* (100.0)
Sombo	52 (13.1)	51 (12.8)	30 (7.6)	53 (13.4)	53 (13.4)	53 (13.4)	53 (13.4)	52 (13.1)	387* (100.0)
Mangu	73 (13.1)	72 (12.9)	65 (11.6)	70 (12.5)	70 (12.5)	67 (12)	70 (12.5)	72 (12.9)	559* (100.0)

Note: * = Multiple Responses, DURS = Desire of Urban Residents for Space, INFS = Increased Practice of the Nuclear Family System, SA = Availability of Social Amenities, LRH = Demand land for Residential Housing, Numbers in Parenthesis are Percentages

Source: Field survey (2019)

On the other hand, the most cited responses in Sombo were the desire of urban residents for space, increased practice of the nuclear family system, availability of social amenities and infrastructure (13.4% each) (Table 17). This hints that the four responses were dominant in Sombo community. The finding appears to be similar to prior research findings (Bao & Fang, 2012; Nicodemus & Ness, 2010; Nsiah-Gyabaah, 2000, 2003) that, increased practice of the nuclear family system and the desire of urban residents for space drive agricultural land use change in the peripheries. The finding is also consistent with the urban land market theory that maintains that the behaviour of households and businesses is determined by their distance from the CBD (Manganelli & Murgante, 2017).

Overall, the increased urban population was the frequently cited driver of peri-urban agricultural land use change in Danko, Bamahu, Kpongu, Kompala, Nakori, and Mangu. However, the desire of urban residents for space increased practice of the nuclear family system and infrastructure were the most cited drivers of peri-urban agricultural land use change in Sombo. In light of increased urban population being the predominant driver of peri-urban agricultural land use change, it was, therefore, prudent to ascertain the reasons why peri-urban landowners were prepared to sell their farmlands to the private developers to be used for non-agricultural purposes. Thus, the next chapter explores the factors that explain agricultural land use change in peri-urban areas in Wa.

Chapter Summary

The chapter begun by discussing the background characteristics of the research respondents and distribution of the research participants from each community. The age, and level of education of household heads were the background characteristics considered. The nature and extent of the physical expansion of Wa from 1986 to 2019 was also discussed. Furthermore, the chapter discussed the perceptions of respondents about the manifestation of peri-urbanisation and the pattern of changes in infrastructure observed in the study communities. The chapter concluded with a discussion on drivers of peri-urban agricultural land use change in peri-urban Wa.

CHAPTER SIX

FACTORS THAT EXPLAIN AGRICULTURAL LAND USE CHANGE IN PERI-URBAN AREAS OF WA

Introduction

The chapter is devoted to addressing the issues that relate to research objective two which explores the factors that explain agricultural land use change. In particular, the chapter centres on the past land use past and current landholding size of traditional peri-urban households, how land was lost, the factors that explain agricultural land use change, and the sale of land among local peri-urban landowners in the selected communities.

Urban land market theory, entitlement theory and the rational choice theory formed the basis for the analysis of objective two because of the varied but complementary issues therein. The urban land market theory is hinged on the argument that the cost of land is highest at the centre of the city but declines gradually as one move outwards the central business district (CBD) (Trussell, 2010) which motivates people to move to peri-urban areas for relatively cheap lands. On the other hand, the entitlement theory centres on the capacity of people to access food through the endowment sets such as agricultural land and how the failure to secure resources can lead to deprivation such as food insecurity (Sen, 1981). The rational choice theory, however, proclaims that social actors always try to maximise benefits from every decision (Burns & Roszkowska, 2016) such as selling land in anticipation of higher gains.

Quantitative data were first collected and analysed and then followed by the collection and analysis of qualitative data. The two sets of data were

integrated at the presentation stage. In respect of this, quantitative data were subjected to descriptive statistics, frequencies, percentages, chi-square test of independence, Wilcoxon-sign-rank test, factor analysis, binary logistic regression, whereas thematic analysis was applied to the qualitative data. The analysis of some of the quantitative data was based on varied samples due to multiple responses. The quantitative data that relate to landholding size, land use changes, the nature of the changes, previous and current land uses and means by which land was being lost, were analysed first on aggregate and later based on location. However, the opinions and experiences were analysed by identifying, analysing and categorising the issues into themes.

Traditional Peri-urban Households' Previous Land Uses

This section of the chapter focuses on the previous uses to which traditional households put their land to. The section also discusses the landholding size of households in the previous and the present as well as the mechanism by which land had been lost by traditional households**.** According to Ezeomedo and Igbokwe (2013), land use denotes all activities undertaken on land such as farming, residential housing, civil and commercial. Anderson, Hu and West (2017) also note that residential, commercial, industrial, agricultural and land-based aquaculture activities constitute land uses. This suggests that peri-urban lands areas were used for agriculture and its related activities before the urban encroachment due to the relatively cheap lands in these areas (Ravetz *et al*., 2013; Trussell, 2010). It is therefore vital to know the uses to which peri-urban household put their land in the past.

Households' land uses in the past were examined and the results are presented in Table 18. Out of the 408 respondents, 52.7 percent mentioned

they used their land for farming, while 37.3 percent indicated that they had idle land. During a group discussion in Danko (3rd August, 2019), it emerged that households built on a small portion of their land and the rest of it was either used for food crop farming and rearing livestock or left idle and this suggests that farming was the main use to which households put their land to in the past. Naab *et al*. (2013) found similar results that peri-urban lands in Tamale were large land was used for agriculture, while small portions were used for residential and commercial activities. The finding also relates to the results reported by Bičík *et al*. (2015) that land use represents the physical use of an area for the benefit of the individual or household.

Table 18: Households' Past Land Uses

Land use	N	Percent
Farming	215	52.7
Vacant/open space	152	37.3
Residential/commercial	41	10.0
Total	408	100.0

Source: Field survey (2019)

Furthermore, households' past land uses were disaggregated based on location and the results are presented in Table 19. Based on the percentages, larger portions of land in Danko (93.6%), Bamahu (58.3%), Kompala (53.25), and Kpongu (62.7%) were used for farming purposes, while large portions lands were vacant in Sombo (54.7%) and Mangu (55.4%). This implies that farming was the main land use of households in many of the localities. A chi-square test of independence was conducted to determine whether there were differences in past land uses for the community of origin. The results were significant at five percent alpha level (χ^2 = 108.8, df = 12, *p*-value = 0.000, phi

= .543, Cramer's V = .314) and this shows that there is a significant association between location and past land uses which is similar to Appiah *et al.'s* (2014) findings in peri-urban Kumasi.

Table 19: Households' Past Land uses by Location

Community	Farming	Vacant/open space	Residential/ Commercial	Total
Danko	73 (93.6)	1 (1.3)	4 (5.1)	78 (100.0)
Bamahu	35 (58.3)	21 (35)	4 (6.7)	60 (100.0)
Kompala	25 (53.2)	21 (44.7)	1 (2.1)	47 (100.0)
Nakori	19 (42.6)	21 (46.7)	5 (11.1)	45 (100.0)
Kpongu	32 (62.7)	18 (23.1)	1 (2.0)	51 (100.0)
Sombo	13 (24.5)	21 (54.7)	11 (20.8)	53 (100.0)
Mangu	18 (24.3)	41 (55.4)	15 (20.3)	74 (100.0)

Notes: Numbers in Parenthesis are in Percentages
Source: Field survey (2019)

The various past household land uses suggest that traditional peri-urban households had land for different purposes and some even had idle land. However, Maasikamäe *et al.* (2011) argue that the demand for land for urban-based activities in peri-urban areas poses a threat to prime agricultural lands. Johnson and Chakravarty (2013) also pointed out that peri-urban land loss undermined the ability of landholders/owners to access local resources such as land. As such, the entitlement theory argues that the loss of endowment set such as land may weaken the capacity of the affected to obtain food (Osmani, 1993; Sen, 1996). The expansion of Wa and the subsequent encroachment on peri-urban agricultural lands hints that households may have lost wholly or part of their land through several means. In this regard, the prior (2009) and current (2019) landholding size of households were considered.

The results showed that 96 percent of respondent households had land for farming in 2009, while 82 percent of them still had land in 2019. The results showed that in 2009, the maximum landholding was 85 acres whereas the minimum was one acre. The median was nine acres (Mean = 12.80; Std Deviation = 12.043; Std Deviation = 4; Skewness = 2.291) with an associated quartile deviation of five. However, in 2019, the highest landholding size was 30 acres, while the least was one acre. The median was two (Mean = 3.98; Skewness = 2.71) and a related quartile deviation of 1.5. Comparing the medians, it is realised that the median in 2009 was higher than that of 2019. To determine whether differences existed for landholding size over the period, a Wilcoxon signed-rank test was also conducted. Results showed that the mean rank in 2009 (183.47) was higher than the mean rank in 2019 (13.50).

The test results showed a statistically significant difference in landholding size between 2009 and 2019 at five percent alpha level a with large effect size (z = - 16.58; *p*-value = 0.000, r = 0.82). This hints that households had less landholding size in 2019 as compared with the landholding size in 2009. Therefore, the hypothesis that there is no significant difference in landholding size in 2009 and 2019 is not upheld. The finding is consistent with the description of the relationship in the conceptual framework that the demand for land for residential and other urban-based activities will lead to a decline in land for agricultural purposes. It also concurs with the entitlement theory's position that the loss of endowment such as farmlands could weaken the capacity of households to obtain food (Devereux, 2001; Sen, 1981) and as such make them susceptible to food insecurity.

Landholding size of households in 2009 and 2019 were disaggregated based on location. The descriptive statistics (Table 20) revealed that in 2009, the highest landholding size was recorded in Bamahu which had a value of 85 acres, while the lowest was 16.3 acres with a median of 14.8 acres (Mean = 10.5; Std Deviation = 14.8; Skewness = 2.5) with a related quartile deviation of six acres. In 2019, on the other hand, the maximum landholding size was recorded in Kpongu which had a value of 30 acres, while the minimum was one acre and a median of two acres (Mean = 3.1; Std Deviation = 4.6; Skewness = 4.9) with a corresponding quartile deviation of half an acre. In comparing the medians, it is noticed that the medians in 2009 were higher than the medians in 2019. Table 20 shows the other relevant details for the various communities.

Table 20: Land Holdings Across Localities in 2009 and 2019

Place	Land Size (Acres)													
	2009							2019						
	Min	Max	Mean	Med	SD	QD	Skw	Min	Max	Mean	Med	Std Dev	Qtile Dev.	Skw
Danko	1	40	8.4	6.5	12	5	2.2	1	15	3.2	3	4	1.5	2.5
Bamahu	3	85	16.3	10.5	14.8	6	2.5	1	21	3.7	2	3.9	2.2	2.6
Kompala	2	54	13.8	7	14.5	6	1.9	1	20	4.7	3	4.2	2	2.1
Nakori	3	50	15	13	9.6	5.5	1.5	1	4	2.2	2	1.2	1	1.1
Kpongu	1	60	14.4	11	13.3	4	2.1	1	30	3.1	2	4.6	0.5	4.9
Sombo	2	30	9.7	8	6.3	3.5	1.3	1	16	3	4.1	3.3	1.5	1.6
Mangu	1	60	14.1	9	6.3	8	1.6	1	23	5.2	3	5.4	2.7	1.5

Source: Field survey (2019)

To test for significant differences in households' landholding size in 2009 and 2019 across localities, Wilcoxon signed-rank test was conducted. The results indicated that Mangu had the highest mean rank in 2009 (38.5) while Sombo had the lowest mean rank (22). However, Kpongu had the highest mean rank in 2019 with a value of three, whereas Sombo had the lowest mean rank in 2019 (Table 21). The results showed a statistically significant (at five percent alpha level) decrease in landholding size with large effect sizes in all communities except Nakori. The finding supports the relationship described in the conceptual framework that peri-urbanisation will lead to the reduction or loss of land among peri-urban households. The loss of land also raises a philosophical issue of rights that grants families or communities equal access to economic resources such as land (O'Neill *et al.*, 2005; Rawls, 2005).

Table 21: Test for Differences in Land Holding by Locality

Place	Mean rank 2009	Mean rank 2019	Z-score Test statistic	*p*-value	Effect size
Danko	30.5	1.92	-6.4	0.000	0.72
Bamahu	30.5	1.43	-5.97	0.000	0.77
Kompala	17.0	1.38	-4.94	0.000	0.72
Nakori	22.5	2.7	-3.3	0.000	0.49
Kpongu	26.46	3.0	-5.75	0.000	0.80
Sombo	22.0	1.3	-5.66	0.000	0.78
Mangu	38.5	1.6	-6.85	0.000	0.79

Note: 0 .1 = Small Effect Size, 0.3 = Medium Effect Size, & 0.5 = Large Effect Size
Source: Field survey (2019)

The finding hints that peri-urban households had lost or reduced landholding between 2009 and 2019. It is, therefore, vital to know the mechanisms by which they lost their land or had their landholding size reduced over the period. The results (Table 22) showed that, of the 712 multiple responses, the more cited reason was selling the land (34%). Other reasons included; land fragmentation due to increased family population (29.2%) and giving to it relatives (20.8%). This suggests that more people had sold their land to private developers.

Table 22: Mechanisms by which Land was Lost to Households

Means of land loss	N	Percent
Sold	243	34.1
Given to relative	148	20.8
Compulsory acquisition	49	6.9
Forcefully taken	64	9.0
Land fragmentation	208	29.2
Total	712*	100.0

Note: * Indicates Multiple Responses
Source: Field survey (2019)

The finding validates the assertion made by a key informant from the Lands Commission. This passage taken from the field notes illuminates the point.

> The expansion of Wa town into peri-urban communities had increased the value of land in those areas and as such many families have sold their farmlands. Bamahu, Kpongu, and Nakori are the primary target of land speculation since these communities are close to the University for Development Studies, Wa Campus and the Wa Polytechnic. The establishment of these tertiary institutions has spurred land speculation thereby increasing the land value and consequently the rapid sale of lands in these areas (Key Informant, 19th July 2019).

The narration reflects the weakness in the land tenure arrangement in Ghana which grants individuals, families, and skins/stools the power to own and manage land and grants individuals the power to act arbitrarily (Jan *et al*., 2012; Kuusaana *et al*., 2013). Thus, landowners were trying to take advantage of the high demand for land to make money and this is consistent with the tenet of the rational choice theory that individuals make decisions to maximize gains (Krstić & Krstić, 2016). It also relates to the relationship described in the conceptual framework that demand for land will drive local landowners to sell their lands. Furthermore, the results are consistent with Cobbinah and Amoako's (2012) finding that increase in land values drive farmland reduction and loss in peri-urban areas.

Additionally, how households lost their lands were analysed based on location (Table 23). On Danko, the result revealed that out of the 98 multiple responses, the most cited reasons were selling the land (48%) followed land fragmentation due to increased family population (37.8%). During an in-depth interview with a family head from Danko, he had this to say;

> The rent in Wa town is high yet everyone wants to build a house. The landlords in Wa town keep increasing their rent year after year but the tenant is still not secured because one can be asked to leave the room or apartment at the whims and caprices of the landlord. The peri-urban communities, therefore, appear to offer relatively cheap lands for people and as such people begin to move here [Danko] to purchase land to build houses (Family head, 1st August 2019).

The above quotation illustrates that increased rent in the urban core compels people to move to the peripheries in search of cheap lands to buy to meet their needs. The quotation situates well within the tenet of the urban land

market theory that maintains that land rent is usually high near the city centre and decreases gradually as one moves towards the edge of the city until the least rent is attained (Koomen & Buurman, 2002). The results also fall in line with the finding reported by Oduro *et al*. (2015) that heads of land-owning families took advantage of the demand for land to lease land in peri-urban Accra.

Table 23: Mechanisms by which Land was Lost to Households

	Means by which land was lost					
Community	Sold	Given to relative	CA	Forceful taken	LF	Total
Danko	47 (48)	5 (5.1)	-	9 (9.2)	37 (37.8)	98* (100.0)
Bamahu	37 (37.8)	19 (21.1)	5 (5.6)	3 (3.3)	29 (32.2)	90* (100.0)
Kompala	20 (35.7)	10 (17.9)	9 (16.1)	3 (5.4)	14 (25)	56* (100.0)
Nakori	21 (17.6)	23 (30.3)	3 (3.9)	8 (10.5)	21 (17.6)	76* (100.0)
Kpongu	37 (41.6)	19 (21.3)	4 (4.5)	3 (3.4)	26 (29.2)	89* (100.0)
Sombo	32 (50)	14 (21.9)	-	-	18 (28.1)	64* (100.0)
Mangu	66 (27.6)	58 (24.3)	28 (11.7)	38 (15.9)	49 (20.5)	293* (100.0)

Notes: * Indicates Multiple Responses, LF = Land Fragmentation, CA = Compulsory Acquisition, Numbers in Parenthesis are Percentages
Source: Field survey (2019)

In Bamahu, the results indicated that out of the 90 multiple responses, the most cited reasons were selling the land (37.8%), followed by land fragmentation due to increased family population. Similarly, in Kompala, the most cited reason was also selling the land (35.7%), followed by land fragmentation due to increased family population. Comparable trends can be observed in Kpongu, Sombo, and Mangu. During an in-depth interview with a woman leader from Sombo, she explained that:

> The families used to live together in one big compound house and ate from the same bowl. But times have changed and everyone wants to own his or her house. As the families grow, young people will certainly want to move out of the family house to build their own houses. In this respect, the family head will go and demarcate a portion of the family land including farms for them to build. Therefore, the family ends up sharing the land among members especially the male members (Women Leader from Sombo, 22nd July 2019).

The account suggests that families ensure that every member enjoys a fair share of the family property which is consistent with the tenets of the philosophy of social justice which advocates for the fair distribution of basic rights and liberties, occupation, power and access to economic and political institutions, income and wealth in society (Rawls, 2005). The finding also demonstrates that land is owned by families in Ghana and every member has the right to its fair share (Kuusaana *et a*l., 2013).

The penchant for selling of peri-urban agricultural land was further investigated. During an interview with a key informant from the Physical Planning Department of the Wa Municipality, it emerged that some peri-urban landowning families had to resort to the selling of land as an occupation. The following quote taken from field notes illuminates the point:

> I agree that the increased in population and the demand for land have contributed to agricultural land use change in the peri-urban communities in Wa. However, it is important to indicate that some of the landlords sometimes go out there to search for people to just buy their land. I was here last week when a landlord came to tell me that he needed money to marry a third wife so I should come and buy his land or find someone to buy it. Then I sought to find out why he would want to sell land to marry a third wife and this is what he said: “the

> other two wives are pregnant so I need another one to satisfy myself in the meanwhile". Such actions of senior landowners have resulted in rifts in many families. Some young people have even revolted against the elderly members of their families and we in the office are usually flooded with issues of this sort to deal with (Key Informant from PPD, 23rd July 2019).

The above quotation illustrates that agricultural land conversion may not necessarily be attributable to the physical expansion of Wa or increased population and the consequent demand for land. Rather, some local landowners see it as a product to sell and make money to meet their social needs such as marriage. The finding is inconsistent with the rational choice theory that maintains that social actors are economic beings who usually seek higher economic benefits for the decisions that they take relative to resource use (Burns & Roszkowska, 2016; Lovett, 2006). However, the findings demonstrate that the land tenure system which grants about 90 percent of land ownership to families, clans, skins/stools and private individuals tend to undermine the capacity of state institutions such as the PPD to control land access and management in Ghana (Korah, *et al*., 2017).

With regards to Nakori, out of 76 multiple responses, the commonly cited reason was that the land was given to relatives (30.3%). Other reasons included selling the land and sharing among family members (17.6% each). During a group discussion with men in Nakori (30th July 2019), it emerged that their social arrangement dictates that a relative can go to their landowning relatives to obtain land for free to build a house or to engage in any activity of their choice. This finding contradicts the assumption of the rational choice theory which states that individuals usually seek their self-interest and always try to maximise economic gains from every decision including land use

(Abell, 2000; Lovett, 2006; Ogu, 2013). It also contradicts the tenet of the urban land market theory that appears to suggest that land rent is the only determinant of the location of households in urban settings (Briassoulis, 2000).

Factors that Explain Agricultural Land Use Change

The factors that explain agricultural land use change in the peripheral communities around Wa town were considered. This was to assist in establishing why local landowners sell their lands to private developers and speculators. Before the analysis, a reliability test was conducted to determine the internal reliability of the items. The test results assisted me to determine whether the items measured what they were intended to measure. The test results revealed a Cronbach's alpha of 0.919. The level of Cronbach's alpha indicates that generally, the variables were tapping into the latent constructs and as such, the instrument was reliable.

Bartlett's test of sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy was used to determine the factorability of the matrix. The 14 items that measure the decision to sell land were subjected to principal component analysis (PCA) using SPSS version 20. An inspection of the correlation matrix indicated that many coefficients of 0.3 and above were present. The results of the Kaiser-Meyer-Olkin measure of sampling adequacy show a value of 0.934 which exceeds the generally accepted value of 0.6 (Pallant & Manual, 2007). The Bartlett's test of sphericity was significant (*p*-value = 0.000) and this suggests that factor analysis was appropriate for the analysis.

The results of the PCA indicated that two components had an eigenvalue above 1. In sum, the two components explained 57 of the total

variances. Component one explained 47 percent of the variance, whereas component two explained 10 percent of the total variance. An inspection of the scree plot showed a sharp break at the second component. As a result, I decided to maintain the two components for further investigation. The Varimax rotation was conducted to assist me in the interpretation of the two components and the results show that there was strong factor loading on the two components, however, almost all variables were loading on component one.

The factor loading of the items also examined by performing Varimax Rotation with Kaiser Normalization. The results (Table 24) showed that component one comprised eleven items with factor loadings varying from 0.754 to 0.563. Component two, on the other hand, comprised three factors with loading varying from 0.821 to 0.757. The items in component one included a decrease in crop yield, accessibility of land to economic activities, availability of buyers, demand for land, proximity to the urban centre, sale of land decrease crop yield, availability of social amenities, the need for money to fight land litigation, availability of infrastructure, availability of extra land, and expected economic returns. On the other hand, component two comprised sale of land increases crop yield, an increase in crop yield, and profitability of agriculture.

Table 24: Rotated Component Matrix

Item	Component	
	1	2
Factor 1: Economic incentives		
Decreased crop yield	0.754	
Accessibility of land to economic activities	0.734	
Availability of buyers	0.731	
Demand for land	0.729	
Proximity to the urban centre	0.700	
Sale of land decreases crop yield	0.675	
Availability of social amenities	0.665	
The need for money to fight land litigation	0.659	
Availability of infrastructure	0.644	
Availability of extra land	0.637	
Expected economic returns	0.563	
Factor 2: Land rent		
Sale of land in increases my crop yield		0.821
Increase in crop yield		0.810
Profitability of agriculture		0.757
Eigenvalues	7.16	1.5
% of Variance	47	10

Notes: KMO = 0.934; Bartlett's Test of Sphericity (*p*-value = 0.000)
Source: Field survey (2019)

Therefore, two new factors were successfully constructed using factors that explain the decision by peri-urban local landowners to sell their agricultural land. The new names of the two variables and percentage of the variance of the new factors are shown in Table 24. Economic incentives showed the highest percentage of variance (47%) when it was extracted and land rent indicated the least percentage of the total variance (10%) explained. Thus, the two components accounted for 57 percent of the total variance.

According to Pallant and Manual (2007), it is important to show the full display of loadings for each item used in the factor analysis. The full display of the loadings will allow readers to appreciate the issues that inform the researcher's decision to retain the chosen factors for further analysis. In this regard, two-factor oblimin rotation was performed and the results in Table 25 showed the loadings of each of the 14 items that were subject to PCA. In this case, the pattern and structure matrix for PCA with Oblimin Rotation of

the two factors extracted from the factor analysis that explain the willingness of local landowners is shown in Table 25.

Table 25: Pattern and Structure Matrix for PCA with Oblimin Rotation of Two Factor Solution of Sale of Land Items

Item	Pattern coefficient		Structure coefficient		Com
	C1	C2	C 1	C 2	
Decrease in crop yield	0.785	0.010	0.781	0.382	0.610
Accessibility of land to economic activities	0.771	0.055	0.781	0.307	0.563
Demand for land	0.758	0.002	0.765	0.430	.0573
Availability of buyers	0.749	0.079	0.757	0.304	0.615
Proximity to urban centre	0.707	0.144	0.749	0.257	0.603
Sale of land decrease crop yield	0.699	0.016	0.736	0.439	0.498
Availability of social amenities	0.667	0.170	0.731	0.493	0.565
Need for money to fight land litigation	0.661	0.165	0.728	0.432	0.553
Availability of infrastructure	0.635	0.237	0.719	0.473	0.581
Availability of extra land	0.631	0.218	0.706	0.298	0.557
Expected economic returns	0.627	0.287	0.511	0.033	0.330
Sale of land increase crop yield	0.069	0.810	0.396	0.838	0.706
Increase in crop yield	0.035	0.808	0.362	0.823	0.678
Profitability of agriculture	0.066	0.746	0.368	0.773	0.601

Notes: C = Component, Com = Communalities
Source: Field survey (2019)

Table 25 shows the strong loading for each of the items at 0.3 (Pallant, & Manual, 2007). The pattern coefficients for Component one constitutes decreases in crop yield, accessibility of land to economic activities, and demand for land and availability of buyers. The rest were proximity to the urban centre, sale of land decreases crop yield and availability of social amenities. The need for money to fight land litigation, availability of infrastructure, availability of extra land, and expected economic returns which together constitute economic incentive. On the other hand, the pattern coefficient for component two comprises sale of land increases crop yield, increase in crop yield, and profitability of agriculture which also constitute land rent. The structure coefficients for economic incentive had a factor

loading that varied from 0.781 to 0.511, while land rent showed a factor loading varied from 0.838 to 0.773.

Sale of Land among Peri-urban Local land Owners

The 14 factors were subjected to further investigation to determine which of them will significantly predict the sale of land by peri-urban landowners. A multicollinearity diagnosis to check that the correlation between the independent variables is not above 10 was undertaken. According to Pallant and Manual (2007), a multicollinearity diagnosis which reveals a variance inflation factor of 10 and above could lead to unusual results. The diagnosis that was conducted showed that out of the 14 variables, seven variables had a variance inflation factor above 10 when they were tested against each other. Thus, seven of the variables which had an inflation factor less than 10 were retained and used to conduct binary logistic regression.

Binary logistic regression was performed on the variables. The model contained income category of settlers, demand for land, availability of extra land and availability of buyers served as independent variables. The rest were accessibility of land to economic activities, availability of social amenities, demand for land, and expected economic incentives. The willingness to sell land served as the dependent variable which elicited a response of yes (1) or no (0).

When these predictor variables were put in the model, they were statistically significant in predicting the sale of land (χ^2 = 133.88, *df* = 7, n = 407, p <.05). The whole model explained between 28.1 percent (Cox and Snell R Square) and 37.4 percent (Negelkerke *R*-Square) of the variance in the sale of land. The Negelkerke R^2 value of 0.280 suggests that about 28 percent

of the variation in the willingness of local landowners to sell land is accounted for by the seven predictor variables in the model.

Table 26: Binary Logistic Regression Predicting Sale of Land among Peri-urban Local land Owners

Variable	B	S.E.	Wald	df	Sig.	Exp(B) Odds Ratio	95% C.I. for EXP(B) Lower	Upper
Income category of settlers	-.121	0.098	1.523	1	0.28	0.886	0.731	1.074
Availability of extra land	0.061	0.205	0.087	1	0.77	1.063	0.711	1.588
Demand for land	0.009	0.182	0.002	1	0.96	0.991	0.693	1.417
Access of land to economic activities	0.040	0.108	0.139	1	0.71	1.041	0.843	1.285
Expected economic returns	0.651	0.091	50.888	1	0.000	0.522	0.436	0.624
Availability of buyers	0.590	0.120	24.176	1	0.000	0.554	0.438	0.701
Availability of social amenities	0.035	0.114	0.094	1	0.76	1.036	0.828	1.296
Constant	3.299	1.301	6.429	1	0.01	27.074		

Note: Significant at 5% level. ($\chi^2 = 133.88$, $df = 7$, n = 407, p <.05)
Source: Field survey (2019)

Out of the seven predictor variables, only two emerged as significant and they were availability of buyers and expected economic returns. These two variables predicted the willingness to sell land as shown in Table 26.

Table 26 presents the beta (B) and odds ratios. According to Pallant, and Manual (2007), the B column indicates the log odd units used as values by the logistic regression equation for predicting the dependent variable (willingness to sell land), from the predictor variables. As regards the odds ratios/Exp(B), the odds ratio for the availability of buyers is 0.554, which means for every extra person that offers to buy land from local landowners, the odds that landowners will sell land decreases by a factor of 0.554, all other things being equal. In addition, the odds ratio for expected economic returns is

0.522 which also suggests that for every extra-economic benefit that will be gained from the sale of land, the odds that local landowners will sell land decreases by a factor of 0.522 if all other things are held constant.

The emergence of expected economic returns suggests that if local landowners expect higher economic returns on land, they will not sell their agricultural land, they will hold on in anticipation of future increase in land values to maximise returns. Similarly, if the availability of buyers increases, then they will hold on for higher prices due to competition, so they will not sell. This hints that local landowners are economic human beings and as such, they will always make decisions which maximise their gains. The finding is in agreement with the aspect of the conceptual framework which shows that peri-urban landowners will take advantage of the severe competition for land to make more money. The result also relates to the central argument of the rational choice theory that maintains that people always try to do the best they can in their circumstances and respond to incentives (Hodgson, 2013).

Chapter Summary

The chapter discussed the landholding size of households in the previous and the present as well as the mechanism by which land had been lost by traditional households. The mechanisms via which traditional households lost their farmlands were also discussed in the chapter and the results showed that land was mostly lost through selling. Furthermore, the factors that explain agricultural land use change in the peripheral communities around Wa were also examined in the chapter. The chapter concluded with a discussion on the willingness of traditional peri-urban landowners to supply land for conversion.

CHAPTER SEVEN

CONTRIBUTIONS OF AGRICULTURAL LAND USE CHANGE TO LIVELIHOODS TRANSFORMATION IN PERI-URBAN WA

Introduction

Chapter seven concentrates on addressing the issues that relate to research objective three which focuses on examining how agriculture land use change contributes to the transformation of traditional livelihood of peri-urban households. Precisely, the chapter is dedicated to the specific land uses that pose threat to food crop production, livestock rearing, the previous and current quantity of crops harvest, livestock kept, and income earned from agricultural activities.

The entitlement and rational choice theories formed the theoretical foundation for the analysis of the issues herein. The entitlement theory proposes that the capacity of people to access food is based on their endowment sets such as agricultural land and as a result, the failure to secure land to engage in production for consumption or sale could lead to entitlement failure and deprivation (Musolino & Nucera, 2016; Sen, 1981). The rational choice theory, on the other hand, postulates that individuals choose their actions optimally given their preferences, opportunities or constraints and as such, the social actor chooses the alternatives that promise the highest economic gains (Abell, 2000; Burns & Roszkowska, 2016). The two theories were used to complement each other due to the different but complementary issues that relate to objective three.

The analysis of the issues that relate to objective three was based on an explanatory sequential approach which involves first, analysing the quantitative data and then qualitative which are integrated at the presentation stage. In respect of this, descriptive statistics, frequencies, percentages, and Wilcoxon-sign-rank test were deployed to analyse the quantitative data. Some aspects of the analysis of quantitative data were based on varied samples due to multiple responses. The quantitative data that relates to the land uses that pose a threat to agriculture, food crop production, livestock keeping, and agricultural income were analysed both at the aggregate level and based on location. On the other hand, opinions lived stories and experiences that were gathered from interviewees and discussants were examined by focusing on identifying, analysing and interpreting patterns of meaning which were then put into themes.

Activities that Pose a Threat to Agriculture

The activities that pose a threat to agriculture land was considered. This is vital because peri-urban communities previously depended on the land to eke out a living. The results (Table 27) showed that out of the 1,245 multiple responses, the most cited threat was the construction of residential housing (29.4%), followed by sand wining (27.2%) and then by construction of commercial centres (24.6%). This implies that the construction of residential housing was the dominant threat to agriculture land in the study communities.

Table 27: Activities that Pose a Threat to Agriculture

Land use	Number	Percent
Construction of residential housing	366	29.4
Construction of commercial centres	306	24.6
Construction of recreational centres	234	18.8
Sand winning	339	27.2
Total	1245*	100.0

Note: * Indicates Multiple Responses
Source: Field survey, (2019)

As evident in Figure 9, there has been a rapid conversion of farmlands into residential housing in Sombo. The finding concurs with the conceptual relationship that shows that influx of people into the peri-urban may affect the livelihood assets of traditional households. It is also consistent with the entitlement theory that indicates that households will suffer pull failure if they lose their endowment sets such as land and thus compromise their ability to obtain food (Sen, 1996).

***Figure 9*: Construction of Residential Housing in Sombo**
Photo Credit: Author (2019)

The next stage of the analysis examined the activities that had affected agricultural production based on location. This was to assist in establishing whether opinions vary for the communities. The results (Table 28) showed

that in Kpongu (36%), Nakori (32.8%) and Bamahu (30.8%) construction of residential housing poses a threat to agriculture. A similar trend existed in Danko (28.3%) and Sombo (25.7% each) that construction of residential housing and commercial centres were the predominant threats to agriculture even though at lower percentage levels. The finding mirrors the overall results in Table 27 which corroborate earlier literature (Abass *et al.*, 2013; Nicodemus, & Ness, 2010; Samat, *et al*., 2011) which argues that the commonest form of land use changes in the peripheries was from agriculture to residential uses.

Table 28: Activities that Pose a Threat to Agriculture by location

	Land Uses				
Community	CRH	CC	CRC	Sand winning	Total
Danko	77 (28.3)	72 (26.5)	48 (17.6)	75 (27.6)	272* (100.0)
Bamahu	49 (30.8)	34 (21.4)	30 (18.9)	46 (28.9)	159* (100.0)
Kompala	40 (27.4)	29 (19.9)	34 (23.3)	43 (29.5)	146* (100.0)
Nakori	45 (32.8)	33 (24.1)	23 (16.8)	36 (26.3)	137* (100.0)
Kpongu	40 (36)	22 (19.8)	22 (19.8)	27 (24.3)	111* (100.0)
Sombo	47 (25.7)	47 (25.7)	43 (23.5)	46 (25.1)	183* (100.0)
Mangu	68 (27.7)	69 (29.1)	34 (14.3)	66 (27.8)	237* (100.0)

Notes: *Indicates Multiple Responses, Numbers in Parenthesis are Percentages, CRH = Construction of Residential Housing, CC = Construction of Commercial Centres, and CRC = Construction of Recreational Centres

Source: Field survey (2019)

During an in-depth interview with a household head from Nakori (2nd August 2019), he lamented that "this land was where I cultivate crops last year (2018), but it has been sold out by my elder brother to a private developer and it means that I can't farm here anymore". This indicates that the household had lost an endowment and as such may suffer food shortages as suggested by the

entitlement theory (Osmani, 1993; Sen, 1987). The quotation illuminates the rapid rate of land conversion in the peripheries. Besides, from the observation conducted it was realised that there was a rapid conversion of agricultural land to other uses (Figure 10).

***Figure 10*: Conversion of Agricultural Land at Nakori for Residential Purposes**

Photo Credit: Author (2019)

In Kompala, on the other hand, out of the 146 multiple responses, more (29.5%) indicated sand winning, followed by conversion of farmlands into residential accommodation (27.4%) as issues affecting agriculture. The results in Kompala varied concerning sand winning with the general results and that of Danko. During an in-depth interview with a family head from Kompala, it emerged that the sand winning poses a threat to farming because many households had lost farmlands to sand winning. The quotation here illustrates the situation.

> In the past, our farmland stretched from the back of the family house to faraway into the bush and we could farm anywhere and even move from one piece of land to allow the other to regain its

> fertility. However, due to the activities of sand winners, we can no longer farm on the lands because the lands have been destroyed to the extent that they cannot support crop cultivation (Family Head from Kompala, 2nd August 2019).

The quotation signals that the endowment set of households in the form of land is under threat and as such, they may suffer from food insecurity as indicated by the entitlement theory (Nayak, 2000; Osman, 1993) and this contradicts the philosophy of social justice. As shown in the conceptual framework, the activities of developers concerning land grabbing and its associated construction-related activities such as sand winning may jeopardise the assets of households. In Ghana, Oduro *et al.* (2015) reported similar results in peri-urban Accra and pointed out that the activities of sand winners had led to land degradation, destruction of the natural forest, creation of ponds, and reduction in farm size. Thus, a great deal of agricultural land had been lost to traditional peri-urban households due to these activities. From the observation, it was confirmed that sand winning affected land for farming (Figure 11).

***Figure 11*: Degraded Agricultural Land at Kompala due to Sand Winning**

Photo Credit: Author (2019)

In Mangu, it emerged that out of the 237 multiple responses, 29.1 percent cited the conversion of agricultural lands into commercial uses as the main threat to agricultural land and production. It was followed by sand winning (27.8%) and the conversion of agricultural land into residential purposes (21.7%). This implies that Mangu differs from Wa concerning the issues that pose a threat to agriculture. While the general issues in Wa were the conversion of farmlands into residential housing and sand winning, the dominant issue in Mangu was the construction of commercial centres. This is similar to UN's (2016) assertion that peri-urban areas are attractive, hence, the movement of businesses and industries into these areas.

In brief, the construction of residential housing and sand winning post was the dominant threats to agricultural land and crop production in Wa. This reflected in Danko, Kpongu, and Bamahu communities. However, sand winning assumed prominence in the Kompala community while the construction of residential housing and commercial centres attracted equal attention in Sombo. Mangu presented a unique scenario where the dominant response indicated that the construction of commercial centres was the issue affecting agricultural land and production.

Food Crop Harvest under Agricultural Land Use Change

Abelairas and Astorkiza (2012) assert that fertile agricultural lands in peri-urban areas are being threatened due to urbanization and inefficient use of land, and these developments may perhaps deprive traditional households the capacity to produce food (Sen, 1987; Musolino & Nuccera, 2016). Such a development raises philosophical issues of social justice and rights. As an aspect of the study, therefore, I wanted to know whether land use change had

affected food crop production between 2008 and 2018. Five major crops (maize, millet, groundnuts, rice and yam) which according to GSS (2014), were the major crops cultivated in the municipality were considered. The years 2008 and 2018 were chosen because prior literature (Amoateng *et al.* 2013) indicate that 10 years is long enough to measure the change in land use and its consequences.

The first crop to be considered was maize. The results (Table 29) indicated that the median maize harvest in 2008 was eight bags (one bag weighed 50 kg) with a related quartile deviation of 4.5. However, the median harvest in 2018 was three bags with an associated quartile deviation of two. As regards millet, the median harvest in 2008 was six bags with a related quartile deviation of four. The median groundnuts harvest in 2008 was eight bags with a corresponding quartile deviation of four. However, in 2008, the median harvest of rice was four bags with an associated quartile deviation of four bags while the median harvest in 2018 was one and a half bags with a related quartile deviation of one bag. Concerning yam, the median harvest in both 2008 and 2018 was 300 tubers but with different quartile deviations of 175 tubers (2008) and 200 tubers (2018).

Table 29: Food Crop Harvest in 2008 and 2018

	2008							2018						
Crop	Max	Min	Mean	Med	Std Dev.	Qtile Dev.	Skn	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skn
Maize	78	1	11.1	8	9.2	4.5	2.7	30	1	4.4	3.0	4.1	2.0	2.7
Millet	100	1	8.6	6	9.5	4.0	3.9	15	1	3.4	2.3	2.98	1.5	1.7
Groundnuts	54	1	10.2	8	8.2	4.0	2.1	40	1	4.7	4.0	4.7	2.3	2.6
Rice	60	1	7.2	4	8.5	4.0	3.7	15	1	2.6	1.5	2.9	1.0	2.5
Yam	1000	40	520	300	912.9	175	6.3	2000	10	361	300	371.3	200	2.4

Notes: Yam was measure in number of tubers while the rest were measured in number of bags, Qtile Dev = Quartile Deviation, Skn = Skewness, one bag of maize, millet, groundnuts and rice weighed 50 kg

Source: Field survey (2019)

To find out whether differences existed in the production of food crops in 2008 and 2018, their mean ranks were calculated using the Wilcoxon signed-rank test. As shown in Table 30, the mean ranks for maize, millet, groundnuts, and rice in 2008 were higher than the mean ranks in 2018. However, the mean rank for yam in 2008 was lower than the mean rank in 2018. This suggests that yam production had increased. This also implies that the harvest of all the crops, except yam, had declined over the period. The results were significant at five percent alpha level with large effect sizes for all the crops except rice and yam. The finding agrees with the aspect of the conceptual framework that shows that peri-urban development will lead to the decline in agricultural production since the loss of agricultural land renders traditional households unable to produce food (Devereux, 2001).

Table 30: Test for Differences in Food Crop Harvest in 2008 and 2018

Crop	Mean Rank 2008	Mean Rank 2018	Z-score Test-statistic	*p*-value	Effect size
Maize	172.76	102.34	-13.75	0.000	0.68
Millet	92.7	55.5	-10.57	0.000	0.52
Groundnuts	120.46	63.88	-11.56	0.000	0.57
Rice	14.25	7.5	-4.37	0.000	0.21
Yam	30.33	46.9	5.7	0.000	0.28

Note: 0.1 = Small Effect Size, 0.3 = Medium Effect Size, & 0.5 = Large Effect Size
Source: Field survey (2019)

The study then focussed on each crop across the communities starting with maize. The results (Table 31) indicated that the maximum harvests varied across the communities, while the minimum harvests were relatively similar for 2008 and 2018. The highest maize harvest in Danko in 2008 was 78 bags,

while the minimum was two bags. The median was 10 bags (Mean = 14, Std Deviation = 13.1, Skewness = 2.9) while the quartile deviation was 4.5. For 2018, the highest maize harvest of 25 bags was recorded in Mangu, while the lowest harvest was one bag. The median was 3.5 bags (Mean = 5.4, Std Deviation = 5.2, Skewness = 2) with an associated quartile deviation of two.

Table 31: Maize Harvest Across Localities in 2008 and 2018

location	2008							2018						
	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skn	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skn
Danko	78	2	14.0	10	13.1	4.5	2.9	16	1	7.8	7	3.4	2.0	0.13
Bamahu	40	2	2.3	2	7.7	5.0	1.6	6	1	2.3	2	1.7	1.0	1.3
Kompala	45	1	9.1	6	8.0	3.3	2.6	10	1	2.1	2	2.1	1.1	1.7
Nakori	35	5	12	10	7.9	4.5	1.7	30	1	5.9	4	7.9	1.5	2.6
Kpongu	34	1	9.4	8	6.8	3.5	1.6	7	1	2.4	2	1.9	1.5	1.1
Sombo	26	1	8.4	8	4.6	2.5	1.2	20	1	3.5	2	3.4	1.0	3.0
Mangu	50	2	12.2	9	10.3	5.0	1.9	25	1	5.4	3.5	5.2	2.0	2.0

Note: Qtile Dev = Quartile Deviation, Skn = Skewness, Each Bag Weighed 50 kg
Source: Field survey (2019)

To determine whether differences existed for maize harvest between 2008 and 2018, their mean ranks were computed and compared. The results (Table 32) indicated that the mean ranks for maize production in 2018 were lower than the mean ranks in 2008. The highest mean rank for maize production in 2008 was recorded in Nakori (36.5), while the highest mean rank in 2018 was recorded in Danko (22.94). The test results were significant at five percent level with large effect sizes in all the communities. This insinuates that maize production had declined across localities. In light of this, Maxwell and Smith (1992) had argued that the people may not be able to rely on land as their endowment set to be able to obtain food. Hence, Foresti *et al*. (2007) advocated that the state and individuals must respond to the needs of the affected in ways which conform to social justice and human rights.

Table 32: Test for Differences in Maize Harvest in 2008 and 2018

Community	Mean Rank 2008	Mean Rank 2018	Z-score Test-statistic	*p*-value	Effect size
Danko	33.87	22.94	-4.56	0.000	0.51
Bamahu	20.97	2.0	-5.49	0.000	0.71
Kompala	17.81	12.5	-4.67	0.000	0.68
Nakori	36.5	21.65	-5.27	0.000	0.78
Kpongu	20.95	3.0	-5.48	0.000	0.77
Sombo	24.59	12.67	-4.9	0.000	0.68
Mangu	35.93	17.5	-6.35	0.000	0.73

Note: 0.1 = Small Effect Size, 0.3 = Medium Effect Size, & 0.5 = Large Effect Size

Source: Field survey (2019)

In an interview with a key informant from the Department of Agriculture, it was reported that farmlands have actually declined in the peri-urban areas and this had affected food crop production in these areas. A passage taken from field notes explains the point.

> The Department of Agriculture has been working with them [peri-urban farmers] and their interaction with the farmers and personal observations have indicated that farmlands have declined considerably. It was reported that people used to cultivate about 40 to 50 acres of maize in these communities especially in Kompala and the harvest was huge. However, with the reduction in farmlands, it was not possible to engage in that kind of farming. So, food crop harvest has declined significantly (Key Informant from the Department of Agriculture, 20th July, 2019).

This narration is well-situated within Osmani's (1993) argument that the loss of endowment sets, such as land, inhibits the capacity of the affected to obtain food through production and hence will suffer deprivation since traditional households may not be able to cultivate not only maize but also millet for consumption through farming.

As regards millet harvest in 2008, the results indicated that the maximum harvest varied across the localities, while the minimum was similar across communities for 2008 and 2018. For instance, in 2008, Mangu recorded the highest harvest of 100 bags, whereas the minimum was one bag (Table 33). The median was six bags (Mean = 116.5, Std Deviation = 14, Skewness = 3.7) with a related quartile deviation of four bags. Mangu recorded the maximum harvest of 15 bags in 2018, whereas the minimum harvest was two bags. The median was 3.5 (Mean = 4.4, Std Deviation = 3.2, Skewness = 1.9) with a quartile deviation of two bags. The other descriptive statistics indicating millet harvest in 2008 and 2018 in the various communities are shown in Table 33.

Table 33: Millet Harvest Across Localities in 2008 and 2018

Community	2008							2018						
	Max	Min	Mean	Med	Std Dev	Qtile Dev	Skn	Max	Min	Mean	Median	Std Dev.	Qtile Dev	Skn
Danko	30	1	10.0	10	5.6	3.0	0.98	13	1	5.7	6.0	3.27	1.0	2.9
Bamahu	35	1	8.2	5	8.9	4.0	1.6	6	1	2.5	2.5	1.2	1.0	0.51
Kompala	46	1	7.0	4	8.8	3.2	3.1	8	1	2.0	1.0	1.7	1.0	1.8
Nakori	35	1	8.1	6	7.0	3.0	2.4	15	1	3.9	2.0	3.9	2.5	1.8
Kpongu	34	1	9.0	8	7.5	4.5	1.3	10	1	2.8	2.5	1.8	1.0	2.0
Sombo	46	1	5.1	3	7.4	1.5	4.5	3	1	1.0	1.0	0.62	0.4	1.1
Mangu	100	1	11.6	6	14.1	4.1	3.7	15	2	4.4	3.5	3.2	2.0	1.9

Note: Qtile Dev = Quartile Deviation, Skn = Skewness, Each Bag Weighed 50 kg
Source: Field survey (2019)

A Wilcoxon signed-rank test was used to compute the mean ranks for 2008 and 2018 and compared. As shown in Table 34, generally, the mean ranks in 2008 were higher than the mean ranks in 2018. The highest mean rank in 2018 was 12.67 (Danko), while the highest mean rank in 2008 was 22.43 (Danko). The test results were significant at five percent alpha level with large effect size across the localities, except Mangu. This suggests that millet harvest had declined across the localities between 2008 and 2018, which falls in line with the aspect of the conceptual framework that shows that the reduction or loss of peri-urban agricultural land may affect food crop production. According to Zoomers (2002), peri-urban traditional livelihoods such as food crop production come under increasing pressure from the influence of urban activities.

Table 34: Test for Differences in Millet Harvest in 2008 and 2018

Community	Mean Rank 2008	Mean Rank 2018	Z-score Test-statistic	*p*-value	Effect size
Danko	22.43	12.67	-4.6	0.000	0.52
Bamahu	13.46	2.0	-4.33	0.000	0.56
Kompala	12.12	10.75	-3.55	0.000	0.52
Nakori	12.50	2.0	-4.29	0.000	0.64
Kpongu	15.36	7.33	-4.13	0.000	0.58
Sombo	10.5	1.0	-3.93	0.000	0.54
Mangu	9.97	1.5	-3.66	0.000	0.42

Note: 0.1 = Small Effect Size, 0.3 = Medium Effect Size, & 0.5 = Large Effect Size
Source: Field survey (2019)

About groundnut harvest, it is noticed that the maximum harvest varied across the communities, while the minimums were relatively similar for 2008 and 2018. The maximum harvest for groundnut in Bamahu in 2008 was 54 bags, while the minimum was one bag. The median was nine bags (Mean = 7;

Std Deviation = 8.9; Skewness = 3) with an associated quartile deviation of four (Table 35). With respect to 2018, Mangu recorded the maximum harvest of 40 bags, while the minimum was one bag. The median was 4.5 bags (Mean = 6.3; Std Deviation = 7.3; Skewness = 2.6) with a corresponding quartile deviation of 3.3. Table 35 shows the other relevant details concerning groundnut harvest across localities.

Table 35: Groundnuts Harvest Across Localities in 2008 and 2018

Community	2008							2018						
	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skw	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skn
Danko	45	1	11.0	8.5	8.6	4.4	1.9	15	1	5.4	5.0	8.63	2.5	0.69
Bamahu	54	1	7.0	9.1	8.9	4.0	3.0	10	1	3.9	3.0	2.1	1.0	1.6
Kompala	45	2	11.0	9.0	8.4	5.0	1.9	18	1	2.0	1.0	3.9	2.0	0.79
Nakori	45	2	12.5	10.0	2.0	9.6	2.0	25	1	5.6	4.0	5.49	1.8	2.0
Kpongu	40	2	8.4	5.0	2.0	7.6	2.0	10	1	2.9	2.5	1.6	.94	2.0
Sombo	19	3	8.9	9.0	-	4.9	0.48	15	1	5.0	4.0	3.7	1.5	1.3
Mangu	35	1	10.3	6.0	8.6	4.8	1.5	40	1	6.3	4.5	7.3	3.3	2.6

Note: Qtile Dev = Quartile Deviation, Skn = Skewness, Each Bag Weighed 50 kg
Source: Field survey (2019)

As part of the study, the researcher wanted to know whether there were significant statistical differences for groundnuts harvest in 2008 and 2018 across communities. A Wilcoxon signed ranked test results (Table 36) indicated that the mean ranks in 2008 were higher than the mean ranks in 2018, which were significant at five percent alpha level with large effect size level for all the communities except Mangu. This suggests that groundnut production had decreased in all communities. The finding relates to the aspect of the conceptional framework that shows that peri-urban agricultural land loss will lead to the displacement of traditional livelihoods.

Table 36: Test for Differences in Groundnuts Harvest in 2008 and 2018

Community	Mean Rank 2008	Mean Rank 2018	Z-score Test-statistic	*p*-value	Effect size
Danko	32.62	18.5	-5.87	0.000	0.66
Bamahu	9.76	5.0	-4.33	0.000	0.56
Kompala	16.9	5.9	-3.55	0.000	0.52
Nakori	16.94	3.0	-4.29	0.000	0.64
Kpongu	9.75	5.5	-4.13	0.000	0.58
Sombo	19.0	18.5	-3.93	0.000	0.54
Mangu	18.1	13.0	-4.2	0.000	0.48

Note: 0.1 = Small Effect Size, 0.3 = Medium Effect Size, & 0.5 = Large Effect Size
Source: Field survey (2019)

The reduction in harvest can exposes peri-urban households to food insecurity as indicated by the entitlement theory argues that the loss of endowment set such as land makes individuals and/or households unable to produce food (Sen, 1981, 1986, Osmani, 1993). The finding is consistent with the results of several studies conducted in different parts of Ghana and Africa. For instance, while Appiah *et al*. (2014) and Oduro *et al.* (2015) concluded

that land conversion in Bosomtwe and peri-urban Accra had led to losses in food crop production. Gamu *et al*. (2015) and Gessese and Melesse (2018) also found similar losses in Ethiopia and other developing countries. The finding also relates to the conceptual framework that farmland reduction will affect livelihoods, including crop harvest.

For rice harvest, it is noticed that the maximum harvest varied across the communities while the least harvests were relatively similar for 2008 and 2018 even though the maximum values for 2018 were much lower. Hence, rice was not a major crop in 2018. The highest number of rice harvest of 60 bags in 2008 was recorded in Mangu, whereas the least harvest was two bags (Table 37). The median was seven bags (Mean = 11.5; Std Deviation = 13.2; Skewness = 2.7) and an associated quartile deviation of 5.6. On the other hand, the highest rice harvest of 15 bags which was produced by one household in 2018 was recorded in Danko.

Table 37: Rice Harvest Across Localities in 2008 and 2018

Community	2008							2018						
	Max	Min	Mean	Med	Std	Qtile Dev	Skw	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skn
Danko	23	2	6.3	4.0	5.4	3.5	1.9	15	-	-	-	-	-	-
Bamahu	15	2	8.1	9.0	4.0	-	0.15	-	-	-	-			-
Kompala	6	1	2.2	1.5	1.7	1.1	1.5	2	1	-	0.5	-	0.25	-
Nakori	20	1	6.9	6.0	5.6	4.0	1.3	6	1	2.1	1.0	-	1.0	-
Kpongu	18	2	8.3	6.0	6.2	6.0	.71	2	-	-	-	-	-	-
Sombo	9	1	2.7	1.5	2.9	1.2	1.6	2	1	0.75	0.9	-	0.38	-
Mangu	60	2	11.5	7.0	13.2	5.6	2.7	10	1	4.0	3.0	-	1.88	-

Qtile Dev = Quartile Deviation, Skn = skewness, Each Bag Weighed 50 kg
Source: Field survey (2019)

The mean ranks for the two periods were calculated and compared using the Wilcoxon signed ranked test and the results revealed that the mean ranks in 2008 were higher than the mean ranks in 2018 (Table 38). The highest mean rank in 2008 was six whereas the highest mean rank in 2018 was two. The test results were significant at five percent level for Nakori (Z = -2.28, *p*-value = .017, r = 0.35) and Mangu (Z = 2.94, *p*-value =0 .003, r = 0.34) but not important as shown by the effect size. However, the differences in Kompala (Z = -.74, *p*-value = .461, r = 0.10) and Sombo (Z= -1.82, *p*-value = .068, r = 0.25) were not significant. This hints that rice harvest had declined in Nakori and Mangu, however, the production of rice in Kompala and Sombo had not experienced a noticeable reduction.

Table 38: Test for Differences in Rice Harvest in 2008 and 2018

Community	Mean Rank 2008	Mean Rank 2018	Z-score Test-statistic	*p*-value	Effect size
Danko	-	-	-	-	-
Bamahu	-	-	-	-	-
Kompala	3.2	2.0	-0.74	0.461	0.10
Nakori	4.0	0.05	-2.38	0.017	0.35
Kpongu	-	-	-	-	-
Sombo	2.5	0.01	-1.82	0.068	0.25
Mangu	6.0	0.01	-2.94	0.003	0.34

Note: 0.1 = Small Effect Size, 0.3 = Medium Effect Size, & 0.5 = Large Effect Size
Source: Field survey (2019)

The cessation of rice production in Bamahu was further investigated and it emerged that wetlands appear to have disappeared due to the activities of private developers in the community. The following quotation taken from an in-depth interview with a family head from Bamahu illustrates the situation:

> Where is the land for us to plant rice? Rice cultivation requires wetland or piece of land that is waterlogged so that the crop will do well. However, such pieces of land are non-existent in the community anymore because they have all been sold out to private individuals. Where the Gas Filling Station (Figure 12) is constructed used to be my rice farm but it has been sold out (Family Head from Bamahu, 16th July 2019).

The quotation situates well with the central argument of the entitlement theory that indicates that the inability of a person to access benefits such as land to engage in the production of food for consumption or sale can result in deprivation in the form of decreased output (Musolino & Nucera, 2016). This implies that the fundamental tenet of social justice which rests on the ability of the individual to enjoy social and economic rights such as farming had been curtailed since land is not available for rice cultivation (O'Neill *et al*., 2005). The finding is consistent with that of Naab *et al* (2013) that farmland reduction had led to a decrease in farm produce in peri-urban Tamale, Ghana.

***Figure 12*: Wetland Converted into a Fuel Station in Bamahu**
Photo Credit: Author (2019)

In 2008, the maximum yam harvest of 1000 tubers were recorded in Mangu, while the least was 150 tubers. The median harvest was 375 tubers (Mean = 779.7; Std Deviation = 4.1; Skewness = 4) with an associated quartile deviation of 107.9. Concerning 2018, Danko and Nakori recorded the highest harvest of 2,000 tubers respectively. In Danko, the minimum was 10 tubers. The median was 40 tubers (Mean = 190.8; Std Deviation = 544; Skewness = 3.6) while the quartile deviation was 17.5 (Table 39). In Nakori, the least harvest was 40 tubers. The median was 220 tubers (Mean = 389.5; Std Deviation = 470.1; Skewness = 2.5) and a corresponding quartile deviation of 187.5 tubers. The rest of the details are presented in Table 39.

Table 39: Yam Harvest Across Localities in 2008 and 2018

Community	2008							2018						
	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skw	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skn
Danko	560	5	247.5	200	171.6	127.5	0.79	2000	10	190.8	40	544.0	17.5	3.6
Bamahu	2000	50	365.5	285	369.8	158.8	3.1	100	100	-	-	-	-	-
Kompala	2000	45	428.0	300	399.3	150.0	2.5	680	100	357.2	300	182.0	150.0	0.014
Nakori	3000	40	625.9	365	732.7	396.3	2.0	2000	40	389.5	220	470.1	187.5	2.5
Kpongu	500	130	226.6	200	120.9	85.0	0.9	300	10	177.5	200	146.2	-	-0.32
Sombo	3,400	90	915.0	840	770.4	340.0	1.9	1,500	100	483.0	455	322.1	131.0	1.7
Mangu	10,000	150	779.7	375	4.05	107.9	4.0	1,400	50	487.1	450	435.9	150.0	1.8

Qtile Dev = Quartile Deviation, Skn = Skewness
Source: Field survey (2019)

To determine whether differences existed for yam harvest in 2008 and 2018, their mean ranks were compared. The Wilcoxon signed rank test result (Table 40) showed that the mean ranks in 2008 varied from 14.59 to three whereas that of 2018 varied from 10 to one. It is noticed that the mean rank for Danko increased from three in 2008 to 10 in 2018 and this signals an increase in yam harvest. The test results were significant at five percent level for Sombo (Z = -3.69, p-value = 0.000, r = 0.51), Bamahu (Z = -2.03, p-value = 0.042, r = 0.26) and Nakori (Z = -2.95, p-value = 0.003, r = 0.44) with medium effect size for Nakori. On the other hand, the results were insignificant at five percent level for Danko Kompala, Kpongu and Mangu. This suggests that while yam harvest may have declined in Sombo, Bamahu and Nakori, it appears the rest had not experienced a reduction in yam harvest.

Table 40: Test for Differences in Yam Harvest in 2008 and 2018

Community	Mean Rank 2008	Mean Rank 2018	Z-score Test-statistic	*p*-value	Effect size
Danko	5.0	10	1.78	0.074	0.20
Bamahu	3.0	1.0	-2.03	0.042	0.26
Kompala	12.14	7.0	-1.55	0.120	0.22
Nakori	9.93	4.67	-2.95	0.003	0.44
Kpongu	2.5	1.0	-1.06	0.289	0.14
Sombo	14.59	7.5	-3.69	0.000	0.51
Mangu	4.0	3.4	-1.36	0.173	0.15

Note: 0.1 = Small Effect Size, 0.3 = Medium Effect Size, & 0.5 = Large Effect Size
Source: Field survey (2019)

While the finding for Sombo, Bamahu and Nakori reflect the tenets of the entitlement theory that maintains that individuals suffer food shortage when they suffer the loss/reduction in their sources of livelihoods (Devereux, 2001) such as farmlands and consequently a decrease in crop output, those for

Danko, Kompala, Kpongu and Mangu appear to be inconsistent with the tenets of the theory. The possible explanation for the differences in yam harvest for Sombo, Bamahu and Nakori and the rest of the communities is that Sombo and Bamahu host the University for Development Studies and thus have attracted a lot of encroachment on their lands which could have been used for yam production. Nakori, on the other hand, is closer to Wa town and as such many people may have stopped cultivating yam because yam can easily be obtained from the Wa market.

Livestock Keeping under Agricultural Land Use Change

Livestock keeping in the selected communities may perhaps have been affected due to agricultural land loss and the increased in number of people which may not be conducive for livestock keeping. However, Mezgebo (2014) opine that the demand for land for residential and non-agricultural uses had compelled traditional peri-urban households to diversify their livelihood portfolio to include livestock production. As an aspect of the study, therefore, it was crucial to know whether agricultural land loss had affected livestock keeping. First, livestock keeping was examined on aggregate and later based on location.

It surfaced that majority of the respondents (64.4%) kept livestock. The results (Table 41) indicated that the maximum livestock kept varied across the communities, while the minimum was similar for 2009 and 2019. Concerning cattle, the highest was 250 in 2009, while the minimum was one. The median was 12 (Mean = 23; Std Deviation = 39.7; Skewness = 4) with a related quartile deviation of 7.5. For 2019, the highest of 65 goats were kept, while the minimum was one. The median was six (Mean = 7.8; Std Deviation = 7.1;

Skewness = 3.1) with a quartile deviation of 3.5. Table 41 shows the other relevant descriptive statistical details for livestock keeping among peri-urban households in 2009 and 2019.

Table 41: Livestock Keeping in 2009 and 2019

	2009							2019						
Livestock	Max	Min	Mean	Median	Std Dev.	Qtile Dev.	Skn	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skn
Sheep	65	1	17	15	12.6	13	1.3	56	1	9.5	8	7.7	3.5	2.14
Goat	79	1	14	12	11.2	4.6	2.2	65	1	7.8	6	7.1	3.5	3.1
Cattle	250	1	23	12	39.7	7.5	4,0	30	1	7.2	6	5.9	4.0	1.8
Chicken/fowls	200	2	24.2	19	23.4	9.0	4.2	60	1	14.2	12	9.4	5.5	1.3

Notes: Qtile Dev. = Quartile Deviation, Skn = Skewness
Source: Field survey (2019)

The mean ranks for 2009 and 2019 were also calculated using the Wilcoxon signed-rank test. The results (Table 42) indicated that the mean ranks for sheep, goat, cattle, and chicken/fowls kept in 2009 were higher than the mean ranks in 2019. The test results were insignificant at five percent alpha level for cattle with a small effect size but were significant for the rest of the livestock with medium effect sizes. This implies that there was a reduction in sheep, goats and chicken/fowl keeping over the period which situates well with the aspect of the conceptual framework that peri-urban development will lead to a reduction in agricultural production, including livestock. According to O'Neill *et al.* (2005), such a development violates the principles of social justice and the right to enjoy social and economic opportunities, including the right to keep livestock.

Table 42: Test for Differences in Livestock Keeping in 2009 and 2019

Livestock	Mean Rank 2009	Mean Rank 2019	Z-score Test-statistic	*p*-value	Effect size
Sheep	94.88	56.97	-7.09	0.000	0.35
Goat	138.77	98.26	-8.79	0.000	0.43
Cattle	15.08	11.08	-.499	0.618	0.02
Chicken/fowls	95.34	71.14	-7.97	0.000	0.39

Note: 0.1 = Small Effect Size, 0.3 = Medium Effect Size, & 0.5 = Large Effect Size
Source: Field survey (2019)

The study then focused on livestock keeping based on location. In 2009, the highest number of sheep kept was recorded in Danko and Mangu (Table 43). In Danko, the maximum number of sheep was 65 while the minimum was three. The median was 19 (Mean = 19.8; Std Deviation = 10.4; Skewness = 1.65) with a related quartile deviation of 6.5. Concerning Mangu,

the highest number that was kept was 65, while the lowest was three. The median number was 24 sheep (Mean = 24.6; Std Deviation = 15.2; Skewness = .53) whereas the quartile deviation was 12.5. In 2019, the maximum number of sheep kept (56) was recorded in Nakori, while the least was two. The median number was five sheep (Mean = 12.9; Std Deviation = 8.4; Skewness = .98) with an associated quartile deviation of 6.5. Comparing the medians, it is noticed that they were higher in 2009 than in 2019. Table 43 presents the other important details.

Table 43: Sheep Keeping Across Localities in 2009 and 2019

location	2009							2019						
	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skn	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skn
Danko	65	3	19.8	19.0	10.4	6.5	1.65	45	2	10.7	8	7.5	4.1	2.3
Bamahu	52	3	16.8	8.0	16.8	11.6	1.3	30	1	8.0	5	7.7	4.0	1.4
Kompala	52	1	11.8	10.5	10.9	5.9	2.0	11	1	5.9	6	3.0	2.2	-.28
Nakori	35	3	15.3	15.0	9.2	7.0	0.43	56	2	9.6	5	10.9	4.3	3.14
Kpongu	40	1	15.6	15.5	11.2	8.5	0.66	23	1	8.0	6	6.6	3.5	1.38
Sombo	31	3	11.3	8.5	7.6	6.0	1.18	21	2	7.8	6	4.9	3.5	0.84
Mangu	65	3	24.6	24.0	15.2	12.5	0.53	35	1	12.9	11	8.4	6.5	0.98

Notes: Qtile Dev. = Quartile Deviation, Skn = Skewness
Source: Field survey (2019)

A Wilcoxon signed ranked test results (Table 44) indicated that the mean ranks in 2009 were higher than that of 2019 across all the localities. The test results were insignificant at five percent alpha level in Kompala and Kpongu communities with small effect sizes. However, the results were significant with medium effect size in the rest of the communities. This indicates that while there had not been a reduction in sheep keeping in Kompala and Kpongu, there had been losses in the other communities. The reduction reflects the conceptual framework which shows that agricultural land use change will displace traditional livelihoods, including sheep keeping. In this respect, Abell (2000) had argued that social actors choose the alternatives relative to the constraints they are confronted with.

Table 44: Test for Differences in Sheep Keeping in 2009 and 2019

Community	Mean Rank 2009	Mean Rank 2019	Z-score Test-statistic	*p*-value	Effect size
Danko	26.0	19.31	-.3.99	0.000	0.45
Bamahu	7.0	3.75	-2.47	0.013	0.32
Kompala	16.71	9.58	-1.02	0.306	0.15
Nakori	9.36	6.75	-2.98	0.003	0.44
Kpongu	3.67	2.0	-.94	0.345	0.13
Sombo	20.98	14.12	-2.35	0.019	0.32
Mangu	20.58	10.10	-3.36	0.001	0.39

Note: 0.1 = Small Effect Size, 0.3 = Medium Effect Size, & 0.5 = Large Effect Size
Source: Field survey (2019)

For goat keeping, the maximum varied across the communities, whereas the minimums were similar for 2009 and 2019. In 2009, the results in Table 45 indicated that the maximum number of goats (79) kept was recorded in Mangu, while the minimum was one. The median number was 13 goats (Mean = 17.2; Std Deviation = 15.5; Skewness = 1.9) with a quartile deviation

of 6.5. On the other hand, the maximum number of goats kept (65) in 2019 was recorded in Nakori, while the minimum was one. The median number was nine (Mean = 10.7; Std Deviation = 11; Skewness = 1.4) with a related quartile deviation of four. In juxtaposing the medians, it is realised that the median in 2009 was greater than the median in 2019. Table 45 provides information on the other relevant descriptive statistics to aid understanding.

Table 45: Goat Keeping Across Localities in 2009 and 2019

Community	2009							2019						
	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skn	Max	Min	Mean	Median	Std Dev.	Qtile Dev	Skn
Danko	50	2	13.1	12	8,6	4.0	2.0	23	1	6.8	5	4.63	3.0	1.1
Bamahu	23	3	12.0	13	5.7	5.0	-0.095	19	1	5.2	5	4.1	2.8	1.37
Kompala	45	2	14.4	12	11.1	8.0	1.4	45	1	7.7	5	8.2	3.5	2.9
Nakori	60	2	16.9	13	14.4	5.5	1.8	65	1	10.7	9	11.0	4.0	1.4
Kpongu	45	2	12.5	11	10.5	5.0	1.7	34	1	7.4	5	8.0	2.5	2.7
Sombo	42	1	10.5	10	7.2	4.0	2.3	45	1	7.9	5	7.5	4.0	2.9
Mangu	79	1	17.2	13	15.5	6.5	1.9	24	1	8.5	8	5.9	5.0	0.66

Notes: Qtile Dev. = Quartile Deviation, Skn = Skewness
Source: Field survey (2019)

A part of the study I wanted to know whether differences existed in goat keeping in 2009 and 2019. Wilcoxon signed ranked test results (Table 46) showed that the mean ranks in 2009 were higher than that of 2019. The results were also significant at five percent alpha level for all communities, except Sombo (z = -1.71, p-value = 0.088, r = 0.23). Danko and Nakori recorded large effect sizes, while Bamahu, Kompala, Kpongu and Mangu had medium effect sizes. This signalled that there had been a reduction in goat keeping in six communities which is consistent with the conceptual framework which indicates that peri-urban development may adversely affect livelihoods. In light of this, traditional households may not be able to enjoy their social and economic rights (Vita, 2014) as a result of the displacement of agricultural livelihoods (Adeboyejo & Abolade, 2007; Angel *et al.*, 2005).

Table 46: Test for Differences in Goat Keeping between 2009 and 2019

Community	Mean Rank 2009	Mean Rank 2019	Z-score Test-statistic	*p*-value	Effect size
Danko	34.15	23.73	-4.79	0.000	0.59
Bamahu	13.0	4.83	-3.75	0.000	0.48
Kompala	16.90	15.31	-2.64	0.008	0.38
Nakori	17.94	11.36	-3.45	0.001	0.51
Kpongu	8.68	3.17	-2.7	0.007	0.38
Sombo	22.50	21.0	-1.71	0.088	0.23
Mangu	29.12	17.75	-3.88	0.000	0.45

Note: 0.1 = Small Effect Size, 0.3 = Medium Effect Size, & 0.5 = Large Effect Size
Source: Field survey (2019)

Cattle production was the next to be considered. The results (Table 47) indicated that the maximum number of cattle (250) kept in 2009 was recorded in Mangu, while the minimum was six cattle. The median number was 30 cattle (Mean = 30; Std Deviation = 67.4; Skewness = 2.2) with a related

quartile deviation of 20.5 cattle. For 2019, the highest number of cattle (30) kept was recorded in Kompala whereas the lowest was one. The median number was 10 cattle (Mean = 10.7; Std Deviation = 3.3; Skewness = .87) with a quartile deviation of three cattle. Comparing the medians, it is realised that the median in 2009 was higher than the median in 2019. However, it is realised that cattle keeping had ceased in Danko, Bamahu and Kpongu over the period. This could be as a result of the unavailability of land to house them. Table 47 shows the other relevant details concerning the reduction in cattle keeping.

Table 47: Cattle Keeping Across Localities in 2009 and 2019

Community	2009							2019						
	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skw	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skn
Danko	120	2	21.2	12	30.1	5.9	2.9	-	-	-	-	-	-	-
Bamahu	45	20	32.5	32.5	-	-	-	-	-	-	-	-	-	-
Kompala	15	4	7	4.5	5.4	4.3	1.9	30	7	10.5	10	3.3	3	0.87
Nakori	30	3	12.4	10	8.7	7.0	.93	15	1	5.4	5	4.3	2.5	1.5
Kpongu	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Sombo	15	3	6.9	5	4.3	4.3	.913	15	1	5.9	6	4.1	-	0.30
Mangu	250	6	52.0	30	67.4	20.5	2.2	16	2	9.0	9	9.8	-	-

Notes: Qtile Dev. = Quartile Deviation, Skn = Skewness
Source: Field survey (2019)

The mean ranks for 2009 and 2019 were calculated and compared using the Wilcoxon signed-rank test and the results indicated that the mean ranks in 2019 were statistically significantly lower than the mean ranks in 2009 (Table 48). However, the test results were insignificant at five percent level with large effect sizes in Kompala, while Nakori, Sombo and Mangu recorded small effect sizes. This signalled that there had not been a reduction in cattle keeping in the four communities. On the other hand, cattle keeping appears to have stopped in Danko, Bamahu and Kpongu over the period which can be explained by the conceptual framework which shows that peri-urban development may lead to the displacement of agricultural activities as a result of the loss of the reduction in landholding size or loss of land (Musolino & Nucera, 2016).

Table 48: Test for Differences in Cattle Keeping in 2009 and 2019

Community	Mean Rank 2009	Mean Rank 2019	Z-score Test-statistic	*p*-value	Effect size
Kompala	3.0	2.33	-7.36	0.461	1.1
Nakori	4.5	1.5	-1.57	0.116	0.23
Sombo	7.1.	5.0	-1.5	0.133	0.20
Mangu	1.5	.01	-1.34	0.180	0.15

Note: 0.1 = Small Effect Size, 0.3 = Medium Effect Size, & 0.5 = Large Effect Size
Source: Field survey (2019)

As shown in Table 48, the mean rank of cattle in Kompala marginally declined between 2009 and 2019 with an unusually large effect size (1.1) which the researcher found curious. Therefore, a Paired sample t-test was conducted and the results were insignificant at five percent alpha level (t-value less than 2). This suggests that some households were still keeping cattle in the community as shown in Figure 13. Cattle keeping in Kompala, therefore, may perhaps be a livelihood diversification strategy to cope with dwindling

agricultural land. This is so because the keeping of cattle does not require bigger space even though they require large parcel of land for grazing which can be found in communities that are a little further away from the urban core.

***Figure 13*: Cattle Kept by a Farmer in Kompala**
Photo Credit: Author (2019)

The maximum number of Chicken/fowls kept varied across the communities, while the minimums were similar for 2009 and 2019. For example, the maximum number of chicken/fowls kept in 2009 was recorded in Nakori with a value of 200 while the minimum was six. The median number was 30 chicken/fowls (Mean = 38.9; Std Deviation = 42.4; Skewness = 2.9) with a related quartile deviation of 15.5. The maximum number of chicken/fowls kept in 2019 was also recorded in Nakori with a value 60 whereas the minimum was three. The median was 15 (Mean = 17.2; Std Deviation = 12.3; Skewness = 1.8) while the quartile deviation was 6.1. In comparing the medians, it is noticed that the median in 2009 was weightier than the median in 2019. Additional information on the other important descriptive statistics for the various communities is shown in Table 49.

Table 49: Chicken/Fowls Keeping Across Localities in 2009 and 2019

Community	2009							2019						
	Max	Min	Mean	Med	Std	Qtile Dev	Skw	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skn
Danko	56	3	16.0	12.0	11.4	7.5	1.6	25	1	9.1	8	6.0	3.8	0.93
Bamahu	56	3	20.6	15.5	12.5	5.5	1.7	40	5	15.8	12	10.8	7.6	1.2
Kompala	60	4	24.9	22.0	13.3	5.9	1.2	33	2	16.4	15	10.1	8.0	0.54
Nakori	200	6	38.9	30.0	42.4	15.5	2.9	60	3	17.2	15	12.3	6.1	1.8
Kpongu	45	5	22.3	20.0	11.5	7.9	0.39	20	6	12.0	10	5.3	4.5	0.81
Sombo	87	2	23.4	21.0	14.9	6.8	1.1	34	6	18.8	18	7.8	6.5	0.30
Mangu	150	2	26.3	17.0	30.10	9.5	3.2	35	2	11.6	10	7.8	4.5	1.5

Notes: Qtile Dev. = Quartile Deviation, Skn = Skewness
Source: Field survey (2019)

The mean ranks for 2009 and 2019 were computed and compared using the Wilcoxon signed ranked test to establish whether differences existed. The results revealed that the mean ranks in 2009 were higher than the mean ranks in 2019 in all communities except Danko community which had a higher mean rank in 2019 (18.58) than the mean rank in 2009 (18.48). The results were also insignificant at five percent level in Bamahu and Kpongu, with only Nakori recording a large effect size. However, the results were significant in the rest of the communities (Table 50). This suggests that chicken/fowl production had declined over the period. In the light of people losing the resources they were endowed with, traditional households are likely to suffer deprivation which links to the tenets of the entitlement theory (Nayak, 2000; Osmani, 1993) and this may put them at risk of food insecurity.

Table 50: Test for Differences in Chicken/Fowls Keeping in 2009 and 2019

Community	Mean Rank 2009	Mean Rank 2019	Z-score Test-statistic	*p*-value	Effect size
Danko	18.48	18.56	-3.48	0.000	0.39
Bamahu	4.80	2.0	-1.69	0.091	0.21
Kompala	12.11	7.67	-3.36	0.001	0.49
Nakori	14.54	5.5	-4.04	0.000	0.60
Kpongu	2.5	1.0	-1.07	0.285	0.15
Sombo	22.73	22.0	-2.18	0.029	0.30
Mangu	22.60	16.0	-4.24	0.000	0.49

Note: 0.1 = Small Effect Size, 0.3 = Medium Effect Size, & 0.5 = Large Effect Size
Source: Field survey (2019)

On the whole, discussion indicated that peri-urban development had contributed to a reduction in livestock/chicken production in Wa over the period. However, the sheep production in Kompala and Kpongu communities

appears not to have been adversely affected by peri-urban development. Cattle production appears to have remained as an important livelihood strategy in Kompala, Nakori, Sombo and Mangu since production had not been negatively affected by the reduction in farmlands due to peri-urban development in Wa.

Farm Income under Agricultural Land Loss

As part of the study, it was important to know whether the farm income of peri-urban households had been affected by peri-urban development. This is crucial because traditional peri-urban dwellers are vulnerable to loss of livelihoods due to peri-urban development and its related activities. In this respect, Zoomers (2002) notes that peri-urban traditional livelihoods come under increasing pressure from the influence of urban activities such as the conversion of farmlands into residential housing. Barati *et al*. (2015) also argue that agriculture land use change is the most important concern in many countries in which agriculture is the major source of livelihood. Mugisha and Nyandwi (2015) contribute that peri-urban areas are faced with the rapid agricultural land conversion.

The maximum farm income in 2008 was GH₵ 9,000.00 whereas the minimum farm income was GH₵ 30.00. The median income was GH₵ 780.00 (Mean = 1, 262.68 Std Deviation = 1,391; Skewness = 2.205) and an associated quartile $deviation of GH₵ 542.50 (US$ 1 = GH₵ 1.06 in 2008, whereas US$ 1 = GH₵ 4.55 in 2018). On the other hand, in 2018, the highest farm income was GH₵ 6,000.00 whereas the lowest was GH₵ 40.00. The median was GH₵ 500.00 (Mean = 958; Std Deviation = 1,166; Skewness = 2.32) and an associated quartile deviation of GH₵ 500.00. Comparing the

median incomes, it is realised that the median income for 2008 (GH₵780) was higher than that of 2018 (GH₵500) suggesting a reduction in farm income. Besides, it shows that the households had become worse of given that the value of the cedi in July in 2008 (GH₵ 1 = the US $ 1.0505) was higher than that of 2018 (GH₵ 1 = US 21 cent).

I also wanted to know whether differences existed in farm income in 2008 and 2018. A Wilcoxon signed ranked test revealed that the mean rank in 2008 was higher (GH₵ 173.08) than that of 2018 (GH₵ 167.35). The results were statistically significant at five percent alpha level with a medium effect size (z = 6.53, *p*-value = 0.000, r = 0.32) and this suggests that there had been a marginal reduction in farm income. During an in-depth interview with a family head from Danko (18th July 2019), he explained that they could not earn as much farm income from their farming activities as they did in the past. This signals that households could no longer solely depend on farm income as livelihood asset as described in the conceptual framework. The conceptual framework espoused that agricultural land loss will adversely affect livelihood assets.

Traditional peri-urban households had reported a significant reduction in farm income in 2008 and 2018. In respect of this, Foresti *et al*. (2007) had argued that the responsibility of the state and private individuals to balance their interest with that of the human rights of the traditional household to enjoy social and economic benefits as advocated by the right-based approach had been violated. Because of this, Gasper (1993) and Devereux (2006) have argued that such a situation may lead to deprivation and injustices as a feature of the entitlement theory. The finding is similar to the results reported by Naab

et al. (2013) that peri-urban households had reported a decline in farm income in Tamale. The finding also falls in line with d'Amour *et al.'s* (2016) assertion that agricultural production and related income will decline in peri-urban areas in the years ahead.

Farm income was examined based on location. The results of the descriptive statistics indicated that maximum income varied across the communities, while the minimums were similar even though those for 2018 were lower. For instance, in comparing the medians it is realised that the median for 2008 was higher than that of 2018 (Table 51). This signalled that farm income had declined across the communities over the period which may perhaps be attributable to the reduction or loss of agricultural land to enable households in the selected communities to engage in agriculture and its related activities. Table 51 shows the other relevant descriptive statistics on the extent of changes for the amount of farm income earned between 2008 and 2018 in the various communities.

Table 51: Farm Income Across Localities in 2008 and 2018

Community	2008							2018						
	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skw	Max	Min	Mean	Median	Std Dev	Qtile Dev	Skw
Danko	3,500	100	887.0	605	892.1	457.5	1.6	3,000	50	424	245	491.2	165.5	2.6
Bamahu	5,600	100	1,343.7	800	1,446.3	562.5	1.6	6,000	100	1,515	600	1,826.7	875	1.5
Kompala	8,000	200	1,479.	1,000	1480.6	520	2.5	5,000	80	1,188	850	1,050.2	412.5	1.8
Nakori	5,000	100	1144.1	750	1,188.8	442.5	1.9	5,000	100	1383	1,000	1,292.2	495	1.5
Kpongu	9,000	50	1205.7	600	1695.5	400.0	2.9	5,000	58	844.8	500.0	937.3	250	2.8
Sombo	6,000	200	1436.5	800	1501.7	500.0	1.8	3,500	40	870.2	500.0	851.8	200	1.7
Mangu	6,000	30	1461.0	850	1516.6	450.0	1.6	6,000	40	924.1	500.0	1211.1	200	2.3

Note: Qtile Dev. = Quartile Deviation, Skn = Skewness, Values are in GH₵
Source: Field survey (2019)

A Wilcoxon signed-rank test was performed to determine whether differences existed in farm income levels in 2008 and 2018. The results (Table 52) revealed that the mean ranks in 2018 were lower than that of 2008 for Danko, Kompala, Kpongu, Sombo and Mangu, while those for Bamahu and Nakori were higher in 2018 than that of 2008. The results were significant at five percent alpha level for Danko, Bamahu, Sombo and Mangu with large effects in Danko and Mangu. This implies that there had been a reduction in farm income in Danko, Bamahu, Sombo and Mangu which situates well with the conceptual framework that peri-urban development may adversely affect farm income.

Table 52: Test for Differences in Farm Income in 2008 and 2018

Community	Mean Rank 2008	Mean Rank 2018	Z-score Test-statistic	*p*-value	Effect size
Danko	39.5	19.5	-6.57	0.000	0.75
Bamahu	19.9	20.0	.998	0.032	0.12
Kompala	20.63	20.25	-1.70	0.089	0.25
Nakori	16.36	24.71	-.42	0.675	0.06
Kpongu	19.64	18.11	-1.48	0.139	0.21
Sombo	22.85	17.43	-2.41	0.016	0.33
Mangu	34.89	33.0	-4.35	0.000	0.50

Note: 0.1 = Small Effect Size, 0.3 = Medium Effect Size, & 0.5 = Large Effect Size
Source: Field survey (2019)

However, the results showed that there was a marginal reduction in farm income in Kompala, Nakori, and Kpongu between 2008 and 2018. This finding is inconsistent with the entitlement theory which indicates that the loss of an endowment set such as land decreases the individual's capacity to earn income (Sen, 1981).

Chapter Summary

The commenced with a discussion on the activities that pose a threat to agriculture land which they previously depended on the land to eke out a living. The construction of residential housing and sand winning post was the dominant threats to agricultural land and crop production in Wa. This reflected in Danko, Kpongu, and Bamahu communities. However, sand winning assumed prominence in the Kompala community while the construction of residential housing and commercial centres attracted equal attention in Sombo. The effects of agricultural land use change on the production of maize, millet, groundnuts, rice, yam as well as livestock were also discussed. In all cases, the production of these crops and livestock had declined over the study period. The effects of agricultural land use change on the farm income of peri-urban households conclude the chapter.

CHAPTER EIGHT

EMERGING PATTERNS OF LIVELIHOODS IN PERI-URBAN AREAS IN WA

Introduction

Chapter eight is focused on discussing the issues that relate to objective four which concentrates on the new livelihood strategies of traditional peri-urban households that had emerged due to the decline in agricultural lands in the peri-urban areas in Wa. The focus here is on non-agricultural livelihoods, reasons for the engagement in such livelihood strategies, non-farm income, other sources of income to households, systems of crop production, systems of livestock keeping.

The rational choice theory and the human capital theory underpinned the analysis of the issues herein. The rational choice theory maintains that individuals choose their actions optimally, given their preferences, opportunities or constraints (Abell, 2000) and as such, the individual considers the alternatives available and selects the option which promises the highest material gain (Burns & Roszkowska, 2016). The human capital theory, however, proclaims that individuals who possess the appropriate knowledge, skills, and technical training will be able to participate in the labour market than those without knowledge and skills (Ployhart & Moliterno, 2011; Schultz, 1961). As a result, individuals with the requisite education or training can easily adapt to changes such as peri-urban development and earn a higher income than those without training and education (Nelson & Phelps, 1966; Schultz, 1961).

Quantitative data and qualitative data were elicited to assist in addressing issues relating to objective four. First, the quantitative data were collected and analysed and then followed by the collection and analysis of qualitative data. The quantitative data were subjected to frequency analysis, percentages, descriptive statistics, and chi-square test of independence. The analysis of some of the quantitative data was based on varied samples due to multiple responses. The quantitative data relate to the type of livelihood strategies, reasons for the engagement in such livelihood activities, food crop production systems, livestock keeping system, non-farm income and other sources of income. On the other hand, opinions and experiences regarding livelihood choices were analysed by focusing on identifying, analysing and categorisation of the issues that emerged into themes.

Non-agricultural Livelihood Strategies of Traditional Peri-Urban Households

An aspect of the study attempted to know the non-agricultural livelihood strategies that were being pursued by traditional households in the face of rapid conversion of agricultural lands into residential uses. Rural households create diverse activities and social support systems for survival and to enhance their standard of living (Ellis, 1999). Therefore, Leach *et al*. (1999) advocate that the disruption in the peri-urban areas and the associated consequences warrant a deeper insight into how livelihoods are affected and the emerging livelihood options available to peri-urban households. In respect of this, Thanh *et al*. (2005) posit that rural people in Vietnam depend on handicraft production, seasonal migration, farming, and provision of

agricultural services, transport, and trade of agricultural produce as methods of survival.

As shown in Table 53, 38 percent of the respondents were engaged in construction-related activities such as carpentry, masonry, causal labour, while 31.1 percent were engaged in petty trading and another 19.4 percent were engaged in services provision. This implies that households had diversified into non-agricultural livelihoods as coping strategies amid rapid agricultural land conversion. The finding supports the aspect of the conceptual framework that shows that peri-urban development will compel households to diversify into non-agricultural livelihoods strategies as a means to cope with farmland loss.

Table 53: Non-agricultural Livelihood Strategies of Traditional Households

Livelihood strategy	N	Percent
Construction-related activities	155	38.0
Petty trading	127	31.1
Provision of services	79	19.4
Food vending	25	6.1
Salary employment	22	5.4
Total	408	100.0

Source: Field survey (2019)

The results in Table 53 indicate that more of the respondents had resorted to providing casual labour at construction sites which were on-going in the peri-urban areas as a means of earning income. Thus, traditional households in peri-urban Wa have engaged in construction-related activities (Figure 14) as complementary livelihood strategies to earn income to support

their households which situates well within the tenets the rational choice theory which maintains that people are capable of adopting alternatives livelihoods that promise higher returns (Lovett, 2006).

***Figure 14*: Construction Labourers from Sombo**
Photo Credit: Author (2019)

Non-agricultural livelihood strategies were considered based on localities. The results (Table 54) showed that in Bamahu (50%), Kompala (40.4%), Nakori, (42.2%), Kpongu (39.2%) and Mangu (43.2%) more respondents cited construction-related activities as their non-agricultural livelihood strategy. On the other hand, more of those in Danko (61.5%) and Sombo (30.2%) cited petty trading as their main livelihood strategy. A chi-square test of independence was conducted to determine whether there was an association between location and non-agricultural livelihood strategies. The results were significant at five percent alpha level ($\chi^2 = 122.2$, df = 24, *p*-value = .000, phi = .54, Cramer's V = .27) and this hints that the location may have determined the livelihood activities for the communities.

Table 54: Non-agricultural Livelihood Strategies of Traditional Households based on Localities

Community	Construction -related	Petty trading	Services provision	Food vending	Salary employment	Total
Danko	20 (25.6)	48 (61.5)	10 (12.8)	-	-	78 (100.o)
Bamahu	30 (50)	18 (30)	9 (15)	2 (3.3)	1 (1.7)	60 (100.0)
Kompala	19 (40.4)	16 (34)	11 (23.4)	1 (2.1)	-	47 (100.0)
Nakori	19 (42.2)	8 (17.8)	12 (26.7)	1 (2.2)	5 (11.1)	45 (100.0)
Kpongu	20 (39.2)	16 (31.4)	9 (17.6)	6 (11.8)	-	51 (100.0)
Sombo	15 (28.3)	16 (30.2)	17 (32.1)	4 (7.5)	1 (1.9)	53 (100.0)
Mangu	32 (43.2)	5 (6.8)	11 (14.9)	11 (14.9)	15 (20.3)	74 (100.0)

Note: Numbers in Parenthesis are Percentages
Source: Field survey (2019)

During an interview with an Assembly Person, it was discovered that many of the young men and women have turned to construction-related activities such as casual labour as means of making a living. He had this to say:

> All the farmlands have been sold or shared among family members and as such, there is not much land for all of us to continue to farm. Many of us have resorted to construction-related activities popularly known as "by-day" to make a living. Some of us are engaged in sand winning, carpentry, masonry, and causal labour at construction sites to earn some income to feed ourselves and our families. Those who have money or who are entrepreneurs have also resorted to trading to make ends meet. We engage in any activity that will enable us to make some money for our daily expenditure (Key Informant from the Wa Municipal Assembly, 23rd July 2019),

It is evident from the quotation that the conversion of farmlands has compelled households to diversify towards non-farm livelihood strategies. The finding coincides with the findings reported by Tran and Lim (2011) that

farmland acquisitions induced peri-urban households' likelihood to adopt informal wage work-based livelihood strategy in Ethiopia. The finding also falls in line with prior research (Abass *et al*., 2013; Oduro *et al*., 2015; Sahal & Bahal, 2014) that indicates that traditional peri-urban households had shifted into construction-related activities, petty trading and provision of services as livelihood activities to cope with encroachment on peri-urban lands. Figure 15 shows a petty trading shop operated by a respondent from Kompala.

***Figure 15*: Grocery Shop Operated by a Respondent in Kompala**
Photo Credit: Author (2019)

Reasons for Undertaking Non-Agricultural Livelihoods Activities

Reardon and Vosti (1995) and Barrett *et al*. (2002) have noted that the livelihood patterns undertaken by individuals or households may be informed by different reasons. Saha and Bahal (2016) add that it is common for individual households to engage in different types of activities based on changes in endowments and infrastructure, depending upon the individual capabilities, skills, and assessment of opportunities and constraints. In this

respect, the reasons for the pursuit of current non-agricultural livelihood activities were investigated on aggregate and later based on localities.

The results showed that 39.7 percent of the respondents indicated that the level of education informed their choice of livelihood activities (Table 55). The rest were job experience (16.9%) and asset ownership (13.7).

Table 55: Reasons for Undertaking Non-Agricultural Livelihood Strategies

Reason	Frequency	Percent
Education	162	39.7
Job experience	69	16.9
Asset ownership	56	13.7
Funds	52	12.7
Physical ability	40	9.8
Age	16	3.9
Sex	13	3.2
Total	408	100.0

Source: Field survey (2019)

This suggests that households without educated or skilled members had to engage in casual labour which requires little or no skill. The finding concurs with a tenet of the human capital theory that individuals with the right skills set, and job experiences can easily enter the labour market to undertake livelihood activities (Schultz, 1961). It also situates well with Saha and Bahal's (2016) view that households engage in different activities based on opportunities and constraints. Furthermore, the finding supports the philosophy of social justice that centres on the equal distribution of educational and occupational opportunities (Vita, 2014) based on people's capacities.

Peri-urban areas are constantly under the urban influence, as such, the peri-urban areas exhibit rural and urban land use mix (Anbumozhi, 2007; Caruso, 2001). In this respect, Tran and Lim (2011) argue that households' livelihood choices are informed by their location and human capital. It is, therefore, important to know whether variations existed for the reasons that informed the livelihood activities of households based on place of origin.

As shown in Table 56, the most cited reason was an education in Danko (94.9%), Bamahu (26.7%), Kompala (31.9%), Nakori (62.2%), and Kpongu (31.4%). On the other hand, in Sombo (22.6%) and Mangu (25.7%), job experience was the reason that informed their livelihood activities.

Table 56: Reasons for Undertaking Non-Agricultural Livelihood Activities based on Location

	Reason							
Community	Education	Job exp.	Assets	Funds	Physical ability	Age	sex	Total
Danko	74 (94.9)	-	1 (1.3)	3 (3.8)	-	-	-	78 (100.0)
Bamahu	16 (26.7)	9 (15)	12 (20)	13 (21.7)	8 (13.3)	2 (3.3)		60 (100.0)
Kompala	15 (31.9)	13 (27.7)	10 (21.3)	-	6 (12.8)	2 (4.3)	1 (1.2)	47 (100.0)
Nakori	28 (62.2)	7 (15.6)	4 (8.9)	3 (6.7)	3 (6.7)	-	-	45 (100.0)
Kpongu	16 (31.4)	9 (17.6)	9 (17.6)	10 (19.6)	6 (11.8)	1 (2)	-	51 (100.0)
Sombo	3 (5.7)	12 (22.6)	8 (15.1)	5 (9.4)	8 (15.1)	8 (15.1)	9 (17)	53 (100.0)
Mangu	10 (13.5)	19 (25.7)	12 (16.2)	18 (24.3)	9 (12.2)	3 (4.1)	3 (4.1)	74 (100.0)

Note: Numbers in Parenthesis are Percentages

Source: Field survey (2019)

This signals that the level of education was the dominant reason in all communities except Sombo and Mangu. A chi-square test of independence was conducted to determine whether associations existed between the communities concerning the reasons. The results were significant at five percent alpha level (χ^2 = 232.31, df = 36, p-value = .000, phi = .75, Cramer's

V = .3). The χ^2 results showed that the various respondents for Danko, Bamahu, Kompala, Kpongu, Nakori, Sombo, and Mangu pursued different livelihood choices as they encountered peri-urban pressures.

During a group discussion with a chief and his elders (28th, July 2019), the researcher realised that people's ability to undertake livelihood activities predicated on their level of education, experiences, and age. For instance, during the discussion, it emerged that those who had formal education could be employed in the formal sector or private organisation. However, those without education or technical skill have to resort to casual labour or trading to make a living. The finding situates well within the rational choice theory that maintains that individuals choose their livelihoods given their opportunities or constraints (Abell, 2000) and that social action takes place within the context and as such, the actor chooses the option that promises maximum gains (Chai, 2005; Sato, 2013).

It also surfaced that the aged cannot undertake activities such as casual labour. This implies that the age of the individual plays an important role in his or her livelihood choice. This revelation appears to be inconsistent with the human capital theory's suggestion that only the knowledge and skills that an individual possesses can lead to greater production outcomes (Ployhart & Moliterno, 2011; Schultz, 1961) because the age of an individual is also an important reason that informs livelihood choices.

Since respondents were engaged in non-agricultural livelihood activities, it was crucial to examine the monthly earnings of households from these livelihood activities. Specifically, the income from non-agricultural livelihoods and the relationship between non-farm income with the level of

education of respondents were examined. Iiyama (2006) claims that individuals or households that depend on casual off-farm income may tend to earn less than those dependent on regular off-farm income. In an earlier argument, Ellis (2000) and Freeman and Ellis (2005) had contended that a livelihood activity is relevant based on its percentage contribution to the total income of the individual or household. They explain that a household is said to be pursuing a livelihood strategy if it obtains two thirds or more of its income from it or a combination of activities

The issue of income was analysed at the aggregate level and later disaggregated based on location. At the aggregate level, the results showed that 402 households reported that they engaged in non-farm livelihoods. The highest income from non-farm activities was GH₵2,500.00 whereas the lowest was GH₵10.00. The median income was GH₵ 500.00 (Mean = 589.11; Std deviation = 476.396 Skewness = 1.213) with an associated quartile deviation of GH₵ 275.00. This suggests that half of the respondents earn less than or equal to GH₵500.00 and the other half earn greater than or equal to GH₵ 500.00 in a month.

Based on location, the monthly earnings from non-farm activities were investigated. The results (Table 57) indicate the maximum varied slightly across the communities, while the minimums were relatively similar. In Danko, the descriptive statistics showed a median of GH₵ 230 (Mean = 264.58; Std Deviation = 258.56; Skewness = 2.064) with an associated quartile deviation of GH₵ 165.75. The maximum income was GH₵ 1,600.00 while the minimum was 10. On the other hand, in Bamahu, the highest income was GH₵ 2,500.00 whereas the lowest was GH₵ 200.00. The median was

GH₵ 520.00 (Mean = 775.25; Std Deviation = 513.065; Skewness = 1.219) and a related quartile deviation of GH₵ 390. In comparing the medians, it is realised that the median income in Bamahu was higher than the median income in Danko. The other details are presented in Table 57

Table 57: Monthly Earnings of Respondents from Non-agricultural Livelihood Strategies

Com	Max	Min	Mean	Med	Std	Qtile	Skn
Danko	1,600	10	264.58	230	258.56	165.75	2.06
Bamahu	2,500	200	775.25	520	513.07	390	1.22
Kompala	1,600	12	619.83	450	343	320	0.95
Nakori	2,000	25	622.89	500	520.89	350	1.21
Kpongu	2,000	100	655.43	590	372.27	400	1.44
Sombo	2,000	10	864.43	750	550	375	0.64
Mangu	2,000	10	864.15	425	420.13	298.75	1.14

Notes: Qtile = Quartile Deviation, Skn = Skewness, Values are in GH₵
Source: Field survey (2019)

Households may not solely depend on their income for survival. This is because they complement it with remittances from relations, friends, government, and/or nongovernmental organisations. As part of the study, therefore, I wanted to know the other sources of income to peri-urban traditional households. According to Majale (2001), households' financial capital and its substitutes include regular remittance, pensions, savings, and credit. Ellis (1999) had earlier observed that households create diverse activities and social support systems for survival to enhance their standard of living.

Out of the 408 households, only 18.3 percent had unearned income and or transfer payments aside their normal livelihood activities. The results in

Table 58 showed that the more cited source of other income was family and friends (56.6%), followed by rent (25.3%) and gift (10.7%).

Table 58: Other Sources of Household Income

Sources of Income	N	Percent
Family/friends	127	56.6
Land/house rent	57	25.3
Gift	24	10.7
LEAP	13	5.8
Pension	4	1.8
Total	225	100

Note: Total Less than Sample Size due to Non-response
Source: Field survey, (2019)

This suggests that traditional households depended on their family and friends to assist in their livelihood. The finding agrees with the tenet of the entitlement theory that households and or individuals that suffer entitlement failure such as loss of farmlands need external assistance (Johnston & Bargawi, 2010; Musolino & Nucera, 2016) to enable them to survive and make a living.

Other sources of income to households were considered based on location. This was to assist in establishing whether sources of income differ based on the community of origin. As Table 59 shows, more of the responses cited by family and friends in all the communities. The finding supports prior literature (Bebbington, 1999; Ellis, 2000) that people can rely on their assets, family members, and social networks to survive in times of unfavourable circumstances such as farmland loss. It also appears to agree with Tran and Lim's (2011) assertion that households depended on working members for

remittances and support in challenging environments such as agricultural land loss. The finding is in line with the results reported by Perret (2002) that livelihood strategies can be remittances from a spouse or children working outside the community, and pensions.

Table 59: Other Sources of Household Income by Location

	Other Sources of Income					
Community	Family & friends	LEAP	Land/House rent	Gift	Pension	Total
Danko	6 (54.5)	1 (9.1)	-	-	4 (36.4)	11 (100)
Bamahu	15 (55.5)	-	12 (44.4)	-	-	27 (100)
Kompala	10 (52.7)	1 (5.3)	5 (26.3)	3 (15.8)	-	19 (100)
Nakori	18 (62)	3 (10.3)	3 (10.3)	5 (17.2)		29 (100)
Kpongu	2 (33.4)	1 (16.7)	3 (50)	-	-	6 (100)
Sombo	35 (56.5)	-	18 (29)	9 (14.5)	-	62 (100)
Mangu	41 (57.7)	7 (9.9)	16 (22.5)	7 (9.9)	-	71 (100)

Notes: Numbers in Parenthesis are Percentages, LEAP = Livelihood Empowerment against Poverty,
Source: Field survey (2019)

Food Crop and Livestock Production Systems under Agricultural Land Loss

One issue of interest was the relevance of agriculture and its related activities and the production systems that traditional households have adopted for food crop production and livestock keeping to cope with peri-urban development. In respect of this, Abass *et al*. (2013) and Oduro *et al*. (2015) had earlier argued that intensification and/or diversification of crops was found to be an important livelihood strategy for farm households even though some combined both farm and non-farm activities for livelihood. The systems of food crop production and livestock keeping were analysed both at the aggregate level and based on location.

The results reveal that 68 percent of the respondent households were still engaged in agriculture, while the rest had abandoned agriculture completely. Three reasons were cited for their continual involvement in agricultural activities. Out of the 482 multiple responses, the most cited response was household consumption (57.5%), followed by production for sale (29.7%) and access to land (12.9%) as the motivations for their engagement in food crop farming. This hints that farming was still an important livelihood strategy for households. The finding is inconsistent with the finding reported by Appiah *et al.* (2014) that the importance of agriculture was declining due to the high demand for peri-urban lands. The probable explanation of the differences could be the fact that Bosomtwe District is closer to Kumasi so the demand for land for non-agricultural purposes is intense, unlike peri-urban Wa.

On the other hand, the respondent households that had stopped farming cited unavailability of farmlands (30.9%), reduction in farmlands (23.9%), lack of interest of the youth in farming (24.3%) and unprofitability of agriculture (20.9%) as the reasons for not undertaking agricultural activities and this implies that farming was no longer considered as an important livelihood strategy among those households. In light of this, people will be unable to obtain food through production and thus put them at risk of food insecurity (Devereux, 2001, 2006; Sen, 1986). The finding is similar to Angel *et al.*'s (2005) finding that urban expansion had led to the displacement of agricultural land uses around major cities in the world. Furthermore, the finding agrees with the aspect of the conceptual framework that shows that land loss will impede food crop production.

Next to be investigated was the food crop production system. The results in Table 60 revealed that 70.3 percent of the respondents cited intensification, while 28.5 percent indicated diversification. Those who stated intensification explained that the shrinking of fertile agricultural lands had compelled them to optimise the use of every available land by applying organic fertilizer, lining and pegging to increase plant population, and adoption of high yielding crop varieties which subsequently led to increased crop yield.

Table 60: Food Crop Production System under Agricultural Land Loss

Food crop production system	N	Percent
Intensification	239	70.3
Diversification	97	28.5
Extensive	4	1.2
Total	340	100

Note: Total Less than Sample Size due to Non-response
Source: Field survey (2019)

In Ghana, Abass *et al*. (2013) reported similar findings that peri-urban households adopted intensification and diversification and as the food crop production strategies in Kumasi. However, some respondents indicated that the cost associated with the adoption of the practices limits their ability to adapt them as measures to cope with the loss of farmlands

Food crop production systems were also considered based on location. This was to ascertain whether production systems from place to place. The results (Table 61) showed that more respondents cited diversification of food crop farming in Danko (53.3%), Bamahu (85.2%), Kompala (82.6), and

Mangu (63.1%) and Nakori (57.1%). On the other hand, more respondents indicated intensification in Kpongu (88.2%) and Sombo (68.9%).

Table 61: Crop Production Systems under Agricultural Land Loss by Location

Community	Crop Production System			Total
	Extensive	Intensive	Diversification	
Danko	2 (2.7)	33 (44)	40 (53.3)	75 (100.0)
Bamahu	-	8 (14.8)	46 (85.2)	54 (100.0)
Kompala	-	8 (17.4)	38 (82.6)	46 (100.0)
Nakori	-	24 (42.9)	18 (57.1)	42 (100.0)
Kpongu	-	45 (88.2)	6 (11.8)	51 (100.0)
Sombo	-	31 (68.9)	14 (31.1)	45 (100.0)
Mangu	2 (3.1)	22 (33.8)	41 (63.1)	65 (100.0)

Note: Numbers in Parenthesis are Percentages
Source: Field survey (2019)

This implies that diversification was the dominant food crop production system in all the communities except Kpongu and Sombo. The finding contradicts Nicodemus and Ness's (2010) results that decreased farmlands had compelled indigenous peri-urban households to change from extensive agriculture to intensive agriculture practices in peri-urban Nyahururu in Kenya.

The results in Table 61 also indicated that some people from Danko and Mangu were still engaged in an extensive system of crop production. During an in-depth interview with a family head from Danko, I found that some families still had enough land to continue to practice extensive agriculture which requires the use of small inputs of labour, fertilizers, and capital in food crop farming. The family head had this to say:

> The growth and expansion of Wa and the consequent encroachment on peri-urban lands are real. Most families have sold either part or all of their land to private developers. It is, however important, to note that three issues may influence the sale of land. Firstly, the location of the land. If the land is located in the direction of the expansion, then households may be compelled to sell the land. Secondly, if the land is located on the other side where development had not to catch up with it may not be sold. Finally, the attitude of the family head is a contributory factor. The family head may decide not to sell the land and guard for future generation and as such, the family will still have land to engage in extensive food crop farming (Family Head from Danko, 25th July 2019).

It is obvious from the quote that despite the high demand for peri-urban lands and subsequent conversion into non-agricultural uses, some households were protecting their lands for future generations and still had enough land to practice land rotation for food crop farming. The finding is different from the results reported by Oduro *et al.* (2015) that agricultural intensification and or diversification of livelihoods had become the main adaptation strategies of peri-urban farm households in Accra.

Since respondents kept livestock, it was crucial to know the keeping arrangement adopted by the farmers. Thus, the next issue to be examined was livestock keeping systems. On aggregate, out of the 329 respondents who kept livestock, 47.7 percent mentioned that they used a semi-intensive system, while 30.7 percent stated they used the intensive system as the system of keeping livestock (Table 62). This signals that more households adopted the semi-intensive system of livestock and poultry keeping in peri-urban areas in Wa. The finding is similar to Oduro *et al.'s* (2015) that traditional households'

practice agricultural intensification to cope with declining space for farming and rearing livestock and poultry in peri-urban areas.

Table 62: Livestock keeping System under Agricultural Land Loss

Livestock keeping system	N	Percent
Semi-intensive	157	47.7
Intensive system	101	30.7
Free-range system	71	21.6
Total	329	100

Note: Total Less than Sample due to Non-response

Source: Filed survey (2019)

Livestock keeping systems were further examined based on location. This was to assist in establishing whether livestock keeping systems varied from place to place. The results in Table 63 showed that more respondents indicated that they used the semi-intensive system of livestock keeping in Sombo (79.1%), Nakori (76.2%), Kompala (64.4%), and Bamahu (38%). On the other hand, more respondents indicated that they used the intensive system in Mangu (62.5%), while 86.8 percent cited that they used the free-range system in Danko and 58.3 percent indicated that they used the intensive system in Kpongu.

Table 63: Livestock Production Systems under Agricultural Land Loss by Location

Community	Intensive	Free-range	Semi-intensive	Total
Danko	-	44 (86.3)	7 (13.7)	51 (100)
Bamahu	19 (38)	12 (24)	19 (38)	50 (100)
Kompala	11 (24.5)	5 (11.1)	29 (64.4)	45 (100)
Nakori	7 (16.7)	3 (7.1)	32 (76.2)	42 (100)
Kpongu	30 (58.8)	14 (27.5)	7 (13.7)	51 (100)
Sombo	7 (18.6)	1 (2.3)	36 (79.1)	43 (100)
Mangu	25 (62.5)	3 (7.5)	12 (30)	40 (100)

Note: Numbers in Parenthesis are Percentages
Source: Field survey (2019)

During a group discussion with men in Mangu (23rd July 2019) it emerged that those who operate the semi-intensive system did so because of the potential of the system to reduce the incidence of theft of livestock. They also mentioned that the semi-intensive system helps to reduce the burden of feeding the livestock since they go out to look for their feed in the day and come back in the evening to be housed. The farmers insinuate that the lack of financial resources compelled them to adopt the free-range system. The results are inconsistent with that of Abass *et al*. (2013) that indigenous households had resorted to the intensification of production in response to agricultural land loss concerning livestock. The differences could be attributed to the differences in the context of Wa and Kumasi.

Chapter Summary

The chapter begun by discussing the non-agricultural livelihood strategies that were being pursued by traditional households. The reasons for undertaking the non-agricultural livelihood activities were also examined in the chapter. Also, other sources of income to the traditional households were

also considered in the chapter. Finally, the chapter discussed food crop and livestock production systems peri-urban households adopted as they encounter urban pressures.

CHAPTER NINE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The chapter brings the research journey to an end. The chapter presents a summary of the research processes and major findings as well as the conclusions drawn from these findings. It, further, presents recommendations based on the findings and conclusions. Additionally, it describes the contribution of the study to knowledge and the limitations of the study and suggestions for further research.

Summary

Peri-urban development leads to agricultural land use change in peri-urban areas and as such livelihoods of the traditional peri-urban households become vulnerable to these activities. This study, therefore, considered agricultural land use change and the emerging patterns of livelihoods in peri-urban areas in Wa. It was guided by four main objectives: it examined the activities that exert pressure on peri-urban agricultural lands, the factors that explain agriculture land use change in peri-urban areas, how agriculture land use change contribute to the transformation of traditional livelihood activities of peri-urban households, and the new livelihood strategies of traditional peri-urban households. It is crucial to note that the urban land market theory, the rational choice theory, the entitlement theory, and the human capital theory guided the interpretation of the results.

A mixed methods research approach was adopted for the study while the "sequential explanatory" study design directed the study. The quantitative

sample size comprised of 408 randomly chosen households. With regards to the qualitative approach, family heads, or their representatives, assemblypersons, women leaders, men, officials of relevant state agencies, and traditional rulers were purposively selected to participate in the study. Interviewing was used to collect data with the aid of the interview schedule for the randomly sampled, group discussion guide, and interview guide for the purposively sampled respondents. An observation checklist and a camera were also deployed to collect some of the data. Descriptive statistics, chi-square test of independence, Wilcoxon Signed Rank test, factor analysis, binary logistic regression, and thematic analysis were deployed to analyse the data.

Based on the analysis, results, and discussion of the results, the key findings based on the objectives are thus presented. The first objective dealt with the drivers of peri-urban agricultural land use change, and these were the highlights:

1. Between 1986 and 2019, the built-up area of Wa town had expanded beyond its initial official boundaries from 471.7 ha in 1986 to 45,09.94 ha in 2019 with a cumulated increase of 26.2 percent of the total change that has occurred over the period. The growth of Wa is manifested in the increase in the number of residential housing. Peri-urbanisation manifested in the increased urban population (94.4%), increased physical infrastructure (85%), increased social amenities (59.6%), decreased excess land (69.1%), and decreased access to land (80.4%);
2. The more cited changes in infrastructure in Wa was water infrastructure (17.1%), followed by education infrastructure (16.3%)

over the period. In Bamahu (25.8%), Kpongu (27%), Nakori (20.2%), and Kompala (20.2%), changes in water infrastructure were the most cited, while 15.2 percent each cited water infrastructure, education infrastructure, electricity and road infrastructure in Danko. Changes in electricity infrastructure and commercial infrastructure (14.5% each) were the most cited in Sombo, whereas educational infrastructure (15.5%) was the most cited in Mangu;

3. Respondents' perception of the pattern of changes in infrastructure revealed that between 68.9 percent and 93.6 percent cited increased infrastructure relating to hotels/guesthouses through to education. This may be attributable to the Wa Municipal Assembly's initiative to provide water infrastructure and supply services to electoral areas under its jurisdiction, and
4. The dominant driver of peri-urban agricultural land use change in Wa was increased urban population (14.8%) which was followed by migration (14.3%). At the community level, population increase increased practice of the nuclear family system and desire of urban residents for space (18.1% each) were the most cited in Danko. For Bamahu, increased population (14.9%) and migration (14.1%) stood out. Increased urban population (13.5%) and increased practice of the nuclear family system (13.5%) stood out in Kompala, while increased urban population (17.1%) were the most cited in Nakori, Kpongu (14.6%) and Mangu (13.1%). In the case of Sombo, the desire of urban residents for space, increased practice of the nuclear

family system and infrastructure (13.4% each) were the dominant drivers.

Objective two focused on exploring the factors that explained agricultural land use change in peri-urban areas. In this respect, the focal findings are as follows:

1. Economic incentives and land rent were the predominant factors that explained agricultural land use change;
2. Previously, farming (52.7%) was the major land use among peri-urban households;
3. Differences existed for land uses between the communities. The results of the chi-square test of independence were significant at five percent alpha level (χ^2 = 108.8, df = 12, *p*-value = 0.000) indicating that there was a significant association between land use and community of origin;
4. Majority of the respondents had less land in 2019 as compared to 2009. The differences in landholding size in 2009 and 2019 were significant at five percent level with large effect size (z = - 16.58; *p*-value = .000, r = .79);
5. In peri-urban Wa, land was mostly being lost through selling (34%), followed by sharing among family members (29.2%) and giving to a relative (20.8%). In Nakori, however, land was being lost by giving it to relatives (30.3%);
6. The physical expansion of Wa and the associated demand for land had increased land values in peri-urban communities in Wa especially in Bamahu, Kpongu, and Nakori due to their proximity

to University for Development Studies and the Wa Polytechnic. As a result, a large number of the respondents had sold either part or all of their lands to private developers and speculators, and

7. Seven variables (availability of extra land, demand for land, access to land to economic activities, expected economic returns, availability of buyers and accessibility to social amenities) together were significant at five percent level in predicting the sale of land (χ^2 = 133.88, *df* = 7, n = 407, p <.05). The model explained between 28.1 percent (Cox and Snell R Square) and 37.4 percent (Negelkerke *R*-Square) of the variance in the sale of land. However, expected economic returns and availability of buyers emerged as better predictors of the sale of land (p = .000).

For objective three, which centred on the contribution of agricultural land use change to livelihood transformation, the following are worthy to note:

1. The construction of residential housing (29.4%), followed by sand wining (27.2%) were the activities that pose a threat to peri-urban agriculture in Wa;
2. The activities that pose a threat to peri-urban agriculture varied slightly in the study communities. In Danko (28.3%), Kpongu (36%), and Bamahu (30.8%) the conversion of agricultural land into residential purposes was the most cited, while the conversion of farmlands into residential and commerical purposes each recorded 25.7 percent in Sombo. For Mangu, the conversion from farmlands into commercial uses was the most cited (29.1%) activity that poses a

threat to agriculture. In the case of Kompala (29.5%), sand winning was the most cited activity;

3. The activities of sand winners had destroyed large parcels of farmlands in the communities and this was particularly predominant in Kompala. Therefore, farmers could not cultivate any crop on the land because the upper part of the land had been scooped rendering the land infertile for crop cultivation;
4. Significant changes occurred in food crop production in peri-urban Wa in 2008 and 2018. There has been a fall in maize harvest from a median number of eight bags in 2008 to a median of three bags in 2018 and millet harvest also declined from a median six bags in 2008 to a median number of 2.3 bags in 2018. Groundnuts and rice exhibited a similar trend. However, yam harvest was stable with a median number of 300 for both 2008 and 2018 at five percent alpha level with a small effect size ($z = 5.7$, p-value = .000, $r = .28$) signalling that despite the reduction in farmlands, the level of yam harvest had been stable in peri-urban areas in Wa;
5. Rice production had ceased in Bamahu community. It emerged that wetlands that were being used to cultivate rice had been converted into other uses and that had inhibited rice production in the community. Rice production had not declined in Kompala but the change was insignificant at five percent level in Kompala ($z = -.74$, p-value = .461) and Sombo ($z = -1.82$, p-value = .068), and
6. For livestock production, there were changes but not significant. For example, the median number of sheep kept in 2009 was 15 while that

of 2019 was eight. However, cattle keeping appears to have ceased in Danko, Kpongu, and Bamahu over the period.

The final specific objective focused on the issues that relate to the emerging livelihood strategies of traditional peri-urban households in response to agricultural land loss. The following are the high points:

1. Intensification was adopted by the majority (63.2%) of the respondents as the crop production system to cope with dwindling farmlands. Concerning the specific communities, the crop production system adopted varied. In Kpongu (88.2%) and Sombo (68.9%) the intensive system was used, while in Danko (53.3%), Bamahu (85.2%), Kompala (82.6%) and Nakori (57%) diversification has become the practice;
2. The dominant non-agricultural livelihood strategy (38%) was construction-related activities, followed by petty trading (31.1%) in peri-urban areas in Wa;
3. Non-agricultural livelihood strategies varied slightly in the communities. In Bamahu (50%), Kompala (40.4%), Nakori, (42.2%), Kpongu (39.2%), and Mangu (43.2%) construction-related activities were the most cited livelihood activities. In the case of Danko (61.5%) and Sombo (30.2%), petty trading was the most cited livelihood activity. Chi-square test results revealed that there was significant association between livelihood activities and place at five percent alpha level (χ^2 = 122.2, df = 24, *p*-value = .000, phi = .54, Cramer's V = .27) signalling location played a role

in determining livelihood activities households undertook as a result of per-urban pressures;

4. The level of education was the most cited (39.7%) reason that informed livelihood choice of households in the peri-urban areas in Wa. Specifically, it informed livelihood choice in Danko (94.9%), Bamahu (26.7%), Kompala (31.9%), Nakori (62.2%), and Kpongu (31.4%). Concerning Sombo (22.6%) and Mangu (25.7%), job experience was the most cited reason. Chi-square test results of the association between livelihood choice and community were significant at five percent alpha level (χ^2 = 232.31, df = 36, p-value = .000 phi = .75, Cramer's V = .3) showing that respondents pursued different livelihood strategies based on different opportunities in the communities;
5. Majority of the households (68%) were still engaged in agricultural activities in peri-urban areas in Wa, and
6. Some households in Danko and Mangu still practiced the extensive system of food crop farming because they still had enough land despite the rapid expansion and encroachment on peri-urban lands.

Conclusions

Although other drivers contribute to per-urban agricultural land use change in Wa, to a large extent, increased urban population, migration, and the desire of urban residents for space stood out. As a result, the built-up area of Wa had expanded beyond its officially demarcated boundary to encroach on peri-urban communities. Peri-urbanisation, therefore, manifested in an increased urban population and decreased excess agricultural land. However,

peri-urban development appears to have brought about increased physical infrastructure especially expansion in water infrastructure which was palpable in all the communities but quite revealing in the Bamahu and Kpongu communities.

Economic incentives and land rent were the factors that explained agricultural land use change in peri-urban. Therefore, the landholding size of most households had declined as a result of the selling of the land in peri-urban Wa. Concerning the prediction of the sale of peri-urban agricultural land, it emerged that when landowners expect the availability of buyers to increase, they will not sell land, they would rather wait in anticipation of future increase in competition for land which will drive up prices to sell their land. In the same way, when expected economic returns are expected to increase, landowners will hold on and will not sell their land but wait until such a time that higher economic returns will be realised to sell their land.

Agricultural land use change such as the conversion of lands into residential accommodation and sand winning in peri-urban Wa appears to have contributed to a decline in the production of food crops, including maize, rice, groundnut, and millet. In Bamahu and Danko in particular, rice production has ceased due to the unavailability of wetlands. There had also been a reduction in the keeping of livestock in general, but these changes appear not to be important in the communities since many households still keep livestock to complement crop production.

The loss of peri-urban agricultural land had compelled households to diversify their livelihood activities into construction-related activities and petty trading to cope with the declining availability of land for farming in peri-

urban Wa. Petty trading was the most important livelihood activity in Danko and Sombo communities. It is important to note that the level of educational attainment was an important reason that informed livelihood activities in peri-urban Wa except in Sombo and Mangu where job experience was the main reason. Nevertheless, food crop farming remains an important livelihood strategy among households which is done by adopting the intensive system. However, some households in Danko and Mangu still practice the extensive system of crop farming because they still had sufficient land.

Overall, agricultural land use change had affected traditional livelihoods of peri-urban households in Wa through the conversion of farmlands into residential housing and the activities of sand winners and as such there had been a reduction or loss of land to engage in agricultural activities. These developments were borne out of the increased population and the consequent demand for land to satisfy the residential needs of the population. As a result, the majority of the respondents had sold either part or the whole of their lands to private developers and speculators to enable the newcomers to meet their residential needs. Construction-related activities, therefore, emerged as the new livelihood activities for peri-urban households to cope with dwindling farmlands.

Recommendations

Based on the key findings and conclusions drawn from this study, the following are recommendations submitted to the relevant stakeholders.

Peri-urban household heads should:

1. Begin to adopt more non-farm activities as an avenue for income generation to complement dwindling agricultural income that could enable them to step out of poverty. This could be done by learning a trade or acquiring new skills that will enable them to undertake sustainable livelihood activities. Once people undertake these activities, it will bring them money and may change their situation in a significant way;
2. Endeavour to preserve agricultural lands since that could halt the disappearance of farmlands and this could be achieved by making a deliberate effort to continue to engage in crop farming on their lands. This way, such lands could be utilised to engage in the production of fresh food crops to feed the increasing population in the peri-urban communities and the city at large. This can transform the lives of these households in ways that protect sensitive ecological spaces while feeding the population;
3. Begin to pay attention to yam production since its production makes intensive use of land even if land is limited in supply. This has the potential to enable households to feed themselves and also sell some to the growing population in both the peri-urban and urban core. The sale of yam tends to generate income for households and this can improve their living conditions;
4. As a matter of urgency, begin to invest the proceeds from the sale of land into the economic activities that will enable them to increase their income and undertake livelihood activities such as

grocery shop operation, services, learning a skill or trade, and food vending. This may perhaps enable them to secure sustainable livelihoods in the face of declining farmlands in both the short and long term, and

5. With immediate effect, adopt the intensive system of livestock keeping by using local resources such as trees, and grasses to construct housing accommodation where they can keep the livestock throughout the day.

Traditional authorities in Kompala are also advised to:

1. Immediately engage community members and landowners to agree and work towards stopping the activities of sand winners. This should be done in such a way that no member of the community should engage in or be seen to be encouraging sand winning. This should be enforced to the latter regardless of who is involved. Since this will help to reduce land degradation and to improve land for food crop cultivation in the future.

For the officials from the Physical Planning Department, the suggestion is for them to:

1. As a matter of urgency, begin to roll out a project that seeks to develop local plans that make provision for agricultural activities in the peri-urban communities. This will ensure orderly development while securing agricultural land for food crop production and livestock keeping. It also has the potential to reduce the incidence of multiple sales of land to private developers which often leads to land disputes.

2. Begin to develop a common digital platform where all local plans for the peri-urban communities could be uploaded and monitored to ensure that lands are not sold out haphazardly. This has the potential to limit the incessant sale of land and to secure land which is particularly important for efficient development control and sustainable land management.
3. Begin to encourage private developers to undertake the vertical incremental building of residential accommodation to ensure the efficient use of land. This way, several households can be housed in a few residential accommodations, while the rest of the land can be used for food crop farming and livestock keeping. This could be done by advising national policymakers to enact legislation that empowers the department to designate some areas for such buildings.

In the case of the Lands Commission, I suggest that the officials should:

1. Begin to inform local landowners about the need to develop local plans for their lands before they can be sold. This could be achieved by reducing the bureaucracy and cost involved in the development of local plans. The Commission should also embark on public education on the need to develop local plans for lands, particularly in undeveloped areas. This will add value to their land and help local landowners earn more income from the sale of land. It also has the advantage of preventing encroachment on areas demarcated for social and economic infrastructure.

The officials from the Agriculture Department of the Municipality are also advised to:

1. Immediately begin to design a project that seeks to help traditional peri-urban households to undertake agricultural intensification. This could be done by embarking on technology transfer to maximise the use of small space such as lining and pegging that increase plant population and subsequently crop yield. Besides, the officials should build the capacity of local households to enable them to make use of local resources which will enable them to practice intensive livestock keeping since it has the potential to prevent the livestock from being stolen and also to increase output.

Contribution to Knowledge and the Literature

The novelty of a piece of research lies in its ability to take on a new spin on previous research and produce new ideas or provide astute knowledge on an issue of interest as well as confront beliefs and explore the unknown. As such, this study challenges the second tenet of the urban land market theory that proclaims that where households and businesses are located in the city is determined by rent and their ability to pay rent. This study found that this tenet does not apply to all households and businesses since some households obtained land because they are members of landowning families or have been gifted with the land by a relative or family member.

Land use change in peri-urban areas is a reflection of the growth of the nearby city as more people move to these areas in search of land to satisfy their residential and other purposes. Thus, it is important to know the extent of

growth of the city and in particular, the encroachment on peri-urban lands over the period. This way, policymakers and planners will have a deeper understanding of the extent of growth and the peri-urbanisation process in Wa. This study contributes to knowledge by providing information for updating land use plans in Wa.

Prior studies tend to adopt frequencies and percentages as analytical procedures to determine the factors that explain the decision of landowners to sell land. As such it is unclear what the main factors are. This study, thus, employed the explanatory sequential study design which has the advantage of using quantitative data to explore unclear issues using qualitative data. This design was rarely used in previous studies. This study also contributes to knowledge by combining factor analysis with binary logistic regression to determine the factors that better predict the sale of land among traditional households in the selected communities. This has not been used in previous studies to the best of my knowledge.

Studies on peri-urbanisation and livelihoods often suggest that the reduction in farm produce without providing numerical evidence to support this claim. This study contributes to knowledge by providing numerical evidence to support the claim that agricultural land loss had contributed to the reduction in the yield of four major crops; maize, millet, groundnuts, and rice in the peri-urban communities in Wa. This will give researchers and policymakers a sense of the severity of the effect of peri-urban development on food crop production among peri-urban households.

A review of the literature shows that previous studies in Ghana have not paid attention to the effect of peri-urban development on livestock

keeping. This study extended the frontier of the research on peri-urban development and the resultant impact on livelihoods by providing information on the state of livestock keeping among traditional peri-urban households in the sampled communities in the face of peri-urban development.

Finally, the determination of the factors that explain why landowners sell their agricultural lands contributes to knowledge. Other researchers have provided different factors. One set of researchers attribute the willingness of landowners to sell/lease land to the income category of those seeking land, demand for land, and availability of social amenities. Some also named the availability of infrastructure, availability of buyers, availability of excess land, and proximity of the land to urban centres. Yet, another group assigned a decrease in the importance of agriculture, accessibility of land to economic activities, expected economic returns, and the need for money to fight land litigation. This study has contributed to the debate by providing evidence to support the side of the debate that ascribes expected economic returns and the availability of buyers as the prime drivers of the sale/leasing of peri-urban lands.

Limitations of the Study

The peri-urban communities in Wa in particular and Upper West Region, in general, are made of Tendambas (Landowners), chiefs, and permanent settlers. The Tendambas gave the chiefs and the permanent settlers parcels of land as their properties. However, with the increased demand for land and the consequent increase in land values, the Tendambas have decided to take over the lands from the chiefs and permanent settlers and sell to private developers on demand. This creates conflict in the communities between the

Tendambas on one side and the chiefs and permanent settlers on the other side. Therefore, the effect peri-urban development on food security of the different groups may perhaps vary. This study, however, did not consider how these dynamics affect the food security of the different groups of people in the communities.

Issues regarding the methodology and data quality are inherent to every academic research. Some aspects of this study relied on recalled data for analysis. The use of recalled data was necessitated by the fact that there were no other sources of the required information, and alternative procedures for obtaining household-specific information, such as past landholding, crop harvest and the number of livestock kept were not feasible. Yet, the use of recalled data raises issues about over or underestimation. Even though efforts were made at guiding respondents to recall the figures to curtail the errors, there could still be an exaggeration or underestimation of the figures. It is, therefore, important for one to be careful in the generalisation of the findings of this research

For analytical procedures, this study is deficient for establishing the direct connection between reduction landholding size and crop harvest as well as livestock keeping. However, the establishment of the direct connection between the reduction in landholding size and decline in crop harvest and the number of livestock kept is key to grasping the nexus between land use change and traditional livelihood strategies. Since this will provide the opportunity for a better appreciation of the relationship and to guide policy formulation and implementation that seek to ensure sustainable urbanisation. Besides, the use of Wilcoxon signed ranked test for cattle keeping generated curious results

that showed high z-score and effect size with a p-value that appears far away from the p-value of 0.005.

Suggestions for Further Research

In the light of the findings, conclusions, recommendations, and limitations of the study, it will be exciting for other researchers to in the future:

1. Examine the dynamics of access to land and food security among traditional households in peri-urban Wa;
2. Use secondary data on landholding, food crop harvest, and livestock with current data to enable researchers to track the landholding, crop harvest and livestock kept over time. This will help to establish the link between the reduction in landholding and crop harvest and livestock kept by traditional households, and.
3. Investigate the impact of agricultural land loss on cattle keeping in the study area.

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APPENDICES

APPENDIX A

INTERVIEW SCHEDULE FOR TRADITIONAL PERI-URBAN HOUSEHOLDS

Dear Participant,

I, the Principal Investigator, Ibrahim Abu Abdulai, from the University of Cape Coast, humbly request you to participate in this PhD research project on the topic; *Agriculture land use change and emerging patterns of livelihoods in peri-urban areas of Wa*. The research is designed to elicit and gather data on the above topic that will contribute to the production of a PhD thesis at the University of Cape Coast. The research project is an academic exercise in partial fulfilment of the requirements for the award of a doctoral degree. Your participation entails you being interviewed by the principal investigator or a research assistant, and whatever information you provide will be considered as confidential and will be treated as such.

Please also note that your name or identity will not be mentioned in any part of the report. In addition, the information obtained from you will be used for only its proposed purpose. The principal investigator does not anticipate any risks or harm to you with respect to your involvement in this research project. Your voluntary participation is priceless and as such, you may decline to answer any question that you do not wish to respond to, and you can also withdraw from the interview any time that you feel uncomfortable. Your answering of this interview schedule will presuppose that you have given your consent to participate in this research project. Thank you in advance for accepting to be part of this research project. Before we start the conversation, do you have any questions? Please feel free to ask any question during the course of the interaction and I or the research assistant will be glad to respond to them. Thank you once again.

Name of community ……

Date of Interview ……

Introduction

Please, for each question in the various sections indicate the chosen option by ticking the most appropriate answer(s) and fill in (where applicable)

Section 1: Background Characteristics of Respondents

1. Age ……
2. Sex [1] male [2] female
3. What is your highest level of educational attainment? [1] primary [2] middle/JHS [3] secondary/technical [4] vocational [5] tertiary [5] non-formal [6] no formal education

Section 2: Activities that put pressure on agriculture lands

4. Have you noticed that Wa town has been growing over the years? [1] Yes [2] No
5. If yes to Q 1, Indicate the things that you have observed as the things that indicate the growth of Wa town [indicate as many as applicable]

   ……

   ……
6. Does any of the following also indicate the growth of Wa town?

Attribute of growth	Tick [√]
Declining agricultural lands	
Population increase	
Increase economic activities	
Increase in the number of roads	
Increase in schools	
Increase in recreational facilities	
Increase in traffic on the roads	
Others (specify)	

7. Have you notice changes in any of the following in your community (indicate as many as applicable) [1] Education infrastructure [2] Road infrastructure [3] Source of water [4] Presence of electricity [5] Administrative centre [6] commercial activities [7] recreational [9] others (specify) ……..
8. For each issue, indicate whether the changes are reflected in more or less in the following (indicate as many as applicable)

Item	Increase	Decrease	Unchanged
Educational infrastructure			
Road infrastructure			
Water infrastructure			
Presence of electricity			
Administrative centre			
Commercial activities			
Recreational facilities			

9. Have you noticed any changes in your community in terms of growth? [1] yes [2] No
10. If yes, what are some of the changes? Mention them

……

……

……

11. Apart from what you have mentioned above, have you noticed any of the following in your community? (indicate as many as applicable)

Item	Increased	Decreased	Unchanged
Population			
Availability of extra land			
Availability of amenities			
Physical infrastructure			
Access to land			

12. In the past what did you use your land for? (list as many as applicable)

……

……

……

13. What do you currently use you land for? (list as many as applicable)

……

……

……

14. What activities/land uses put pressure on agriculture lands in your community (mention as many as applicable) ……..

……

……

15. Apart from what you have mentioned in item 21, does any of the following also exert pressure on agricultural lands in your community and what are the reasons? (indicate as many as applicable) [1]

Activities	Reason
Food crop farming	
Livestock rearing	
Residential housing	
Commercial	
Recreation	
Hospitality	
Civic	
Industrial/manufacturing	

16. Apart from what you have stated above, does any of the following also contribute to the surge in these activities in your community? *Please tick as many as you know*

Factors accounting for pressure on peri-urban lands	Tick [√]
Population growth/increase	
Migration from neighbouring communities to the town	
Cheap cost of land	
The desire of urban residents for space	
The emergence of the nuclear family system	
availability of social amenities	
availability of infrastructure	
Demand for land for residential housing	

Section 3: Factors that explain agriculture land use change

17. Did you have land for farming and its related activities in the past? [1] yes [2] no

18. (a) If yes, how many acres of land did you have? ……

(b) If no, do you have land now? [1] Yes [2] No

(c) If yes to Q 26, how many acres of land do you still have? ……

19. Indicate the use to which you put the land to in the past (indicate as many as applicable) [1] vacant [2] open space [3] commercial uses [4] farming and residential

20. What made you lose the acres of land you don't have now? (indicate as many as apply)

Reasons for loss of agricultural land	Tick [√]
Sold/Leased	
Given to relative	
Compulsory acquisition	
forceful taken over	
shared among family members	
Others specify	

21. On a scale of 1 to 5 with 1 showing weak agreement and 5 showing strong agreement, indicate how you feel about the statements in the table.

Factors	On the scale of 1 to 5 with 1 showing weak agreement and 5 indicating strong agreement how you feel about the following statements	
(a)	The availability of extra land influences my willingness to sell land	[1] [2] [3] [4] [5]
(b)	Availability of buyers influences my willingness to sell land	[1] [2] [3] [4] [5]
(c)	The income category of settlers influences my willingness to sell land	[1] [2] [3] [4] [5]
(d)	The need for money to fight land	[1] [2] [3] [4] [5]

	litigation influences my willingness to sell land	
(e)	An increase in crop yield influences my willingness to sell land	[1] [2] [3] [4] [5]
(f)	A decrease in crop yield influences my willingness to sell land	[1] [2] [3] [4] [5]
(g)	The sale of land increases crop yield	[1] [2] [3] [4] [5]
(g)	The sale of land decreases crop yield	[1] [2] [3] [4] [5]
(h)	The proximity of land to urban centre influences my willingness to sell land	[1] [2] [3] [4] [5]
(i)	The accessibility of land to economic activities influences my willingness to sell land	[1] [2] [3] [4] [5]
(j)	The availability of social amenities influences my willingness to sell land	[1] [2] [3] [4] [5]
(k)	The demand for land influences my willingness to sell land	[1] [2] [3] [4] [5]
(l)	The availability of infrastructure influences my willingness to sell land	[1] [2] [3] [4] [5]
(m)	Profitability of agriculture influences my willingness to sell land	[1] [2] [3] [4] [5]
(n)	Expected economic incentives influence my willingness to sell land	[1] [2] [3] [4] [5]

Section 4: Effects of agriculture land use change on traditional livelihood strategies

22. Have the current land uses affected land for agriculture? [1] Yes [2] No

23. If yes, in what ways have the current land uses affected agriculture land in your community? (Choose as many as applicable) [1]

Converting farmlands into residential use [2] Converting farmlands into commercial use [3] Converting farmlands into recreational use [4] sand winning [5] others (specify) ……

24. Indicate the major crops you cultivated and number of bags/tubers in the past.

Type of crop	Quantity
Maize	
Millet	
Rice	
Groundnuts	
Yam	

Note: for maize, groundnuts, Guinea corn, beans & millet (indicate no. of bags); for yam indicate number tubers

25. Indicate the major crops you cultivate and number of bags/tubers now

Type of crop	Quantity
Maize	
Millet	
Rice	
Groundnuts	
Yam	

Note: for maize, groundnuts, millet & rice (indicate no. of bags); for yam indicate number tubers.

26. Did you have livestock or poultry in the past? [1] Yes [2] No
27. If yes, indicate the types of livestock and poultry you had in the past (indicate as many as applicable) [1] sheep [2] goat [3] cattle [4] chicken/fowl [5] pig [6] guinea fowl

28. Please indicate the number of livestock and poultry you had in the past.

Livestock/poultry	Number
Sheep	
Goat	
Cattle	
Chicken/fowl	
Pig	

29. Do you have livestock now? [1] Yes [2] No

30. If no to Q 37, why? Explain ……

31. If yes, please indicate the number of livestock and poultry you have now.

Livestock/poultry	Number
Sheep	
Goat	
Cattle	
Chicken/fowl	
Pig	

32. Has your livestock and poultry production been affected by current land uses? [1] Yes [2] No

33. If yes explain ……

……

……

34. If no, explain ……

……

……

35. Did you receive remittances/cash from family members in the past? [1] Yes [2] No

36. If yes, how often did you receive remittances/cash from family members [1] once in a quarter [2] twice in a year [3] four times in a year [4] every month
37. Indicate the how much income you earned from agriculture and related activities in the past ……
38. How much do you earn from your current agriculture activities? ……

……

Section 5: Emerging livelihood strategies

39. Indicate the main non-agricultural livelihood activities you engaged in the past? (indicate as many as apply)

……

……

……

40. Indicate the main livelihood activities you undertook in the past

No.	Livelihood activity	Income
1		
2		
3		
4		
5		

41. What non-agricultural livelihood activities do you and other household members engage in? Indicate as many as there are……

……

……

42. Why do you engage in these activities? Explain ……..

……

……

43. Do you still engage in agricultural activities? [1] Yes [2] No

44. If yes to Q 67, why? Explain ……

45. If no to Q 67 why? Explain ……

……

46. If yes to Q63, what specific agricultural livelihood activities do you still engage in? (indicate as many as apply)

Agriculture activity	Tick
Food crop production	
Livestock rearing	
Poultry /chicken keeping	

47. What farming arrangement did you adopt for food crop production in the past? [1] Extensive farming [2] Diversification [3] Intensification

48. Why did you use the method chosen in Q 66? Explain ……

……

……

49. What method did you adopt in rearing your livestock in the past? [1] intensive system [2] extensive system [3] free-range system [4] semi intensive

50. Why did you use the method chosen in Q 70? Explain ……

……

……

……

51. What system did you adopt in rearing your poultry in the past? [1] intensive system [2] extensive system [3] free-range system [4] semi intensive

52. Why did you use the method chosen in Q72? Explain ……

……

……

53. What is the current farming arrangement you have adopt for food crop production? [1] diversification [2] intensification

54. Why do you use the chosen method in Q77? Explain ……

……

……

55. What method do you currently adopt in rearing your livestock? [1] intensive system [2] extensive system [3] free-range system [4] semi intensive

56. Why do you use the method chosen in Q79? Explain ……

……

57. What system do you currently adopt in rearing your poultry now? [1] intensive system [2] extensive system [3] free-range system [4] others

58. Why do you use the method chosen in Q 81? Explain ……

……

59. Indicate the main livelihood activities engaged in by your household. Rank them in order of importance (1 as the most important)

No.	Livelihood activity	
1		
2		
3		
4		
5		
7		

60. What informed the choice of the activities stated above (tick as many as applicable) [1] education [2] technical training [3] ability to raise funds [4] presence of opportunities [5] physical ability [6] ownership of asserts [7] wage [8] Job experience [9] Age [10] Sex [11] others specified ……

61. How much do you earn annually from your current livelihood activities you undertake? **……**

62. Do you obtain income from any other source apart from the livelihood activities you currently engage in? [1] yes [2] no

63. If yes, indicate the source of the income [1] family/children [2] LEAP [3] remittance [4] land/house rent [5] gift [6] Pension

APPENDIX B

INTERVIEW/GD GUIDE FOR COMMUNITY LEVEL KEY INFORMANTS

(Traditional Rulers/elders, assembly person & community gatekeepers)

My name is IBRAHIM ABU ABDULAI and a Ph.D. student at the University of Cape Coast. I am undertaking my Ph.D. research on the topic: ***Agriculture land use change and emerging patterns of livelihoods in peri-urban areas of Wa.*** As a key stakeholder(s) in the community I thought it is prudent to interview you so that you can share with me your experiences and opinions about the subject matter of the research. I would like to ask you some questions about your experiences in relation to activities that consume agricultural lands, why landowners sell their farmlands, the effects of the land conversion on livelihoods and the new livelihood strategies that are pursued by peri-urban households in this community. The data you will provide will contribute to the production of a Ph.D. thesis in partial fulfillment of the requirements for the award of a doctoral degree by the University of Cape Coast.

Let me assure you that your name or identity will not be mentioned in any part of the report. In addition, the information obtained from you will be used for only its proposed purpose. Your voluntary participation is priceless and as such, you may decline to answer any question that you do not wish to respond, and you can withdraw from the interview at any time that you feel uncomfortable. Your answering of this will presuppose that you have given your consent to participate in this research project. The interview should take about 1 ½ hour. Are willing to respond to some questions at this time? Thank you in advance for accepting to be part of this research project. Please let me know if at any point you want me to turn off the recorder or keep something you said off the record. I will only take notes of our conversation. Before we begin the interview, do you have any questions? If any questions arise at any point in the course of the interview, feel free to ask them. I would be more than ready to answer your questions.

Let me begin by asking you some questions about the activities that exert pressure on agricultural lands in your community.

Section A: Activities that put pressure on land

1. Do you think that your community has witnessed growth over the years?
2. What changes have you noticed in your community over the years with regards to land use? Explain
3. What activities/land use put pressure on your agriculture lands in your community? please explain
4. What were the uses of land in your community in the past years? Please explain
5. What do you currently use the land for?
6. Indicate the reason(s) that account for the current land uses you mentioned above. Please explain

Section Two: Factors that explain agriculture land use change

7. Indicate major land uses in your community in the past. Please explain for each use mentioned
8. Please indicate the reasons for which local landowners sell their agriculture lands. Please explain

   Probe for the need for funds to fight chieftaincy litigation
   Probe for the need for funds to fight land litigation
   Probe for the need for money to maintain skin
   Probe for the availability of buyers etc.

9. Does agriculture have a future in your community? Please explain

Section three: **Effects of agriculture land use change on traditional livelihoods**

10. What were the main livelihood activities pursued by households in the past? Please explain
11. What are the effects of current land uses on livelihood assets in your community? Please explain

    Probe for effects on land and other natural resources (streams, wetlands, nature reserves etc.)
    Probe for effects on community relations
    Probe for effects on income (farm income, savings, credit, etc.)
    Probe for effects on physical assets (equipment, livestock, poultry, housing, etc.)

Probe for effects on human assets (education, health, skills, knowledge etc)

12. Indicate the effects of current land uses on family structure
13. Indicate the effects of current land uses on social vices
14. What are the effects of agricultural land use change in your community? Explain

    Probe for a reduction in farmlands
    Probe for the double sale of land
    Probe for frequent land disputes

Section four: Emerging patterns of livelihoods

15. What were the main livelihood activities undertaken by households in your community in the past? Please explain/describe the activities
16. What are the current main livelihood activities undertaken by households in your community? Explain/describe
17. Please indicate the things people consider before undertaking a choice of a livelihood activity of an individual or a household in your community

    Probe for education/technical skills/training as factors

    Probe for physical ability as a factor

    Probe for the ability to raise funds as a factor

    Probe for wages, age, etc. as factors

    Probe for job experience as a factor

    Probe for ownership of assets as a factor
18. How will you compare the livelihood activities in the past and the current livelihood activities?

    Probe for income earned

    Probe for the investment required

    Probe for sustainability etc
19. How will you rate the livelihood activities mentioned above as compared to farming? Please explain.

APPENDIX C

INTERVIEW GUIDE FOR OFFICIALS OF PHYSICAL PLANNING DEPARTMENT

My name is Ibrahim Abu Abdulai and a Ph.D. student at the University of Cape Coast. I am undertaking my research project on the topic; ***Agriculture land use change and emerging patterns of livelihoods in peri-urban areas of Wa***. As an agency of government which is involved in the physical planning of settlements, I thought it would be a good idea to seek your views about the subject matter of the research. I would like to ask you some questions about your outfit's experiences in relation to the growth of Wa, the physical plans you have or otherwise, and whether or not the plans have incorporated measures to secure agricultural lands in peri-urban communities. The data you will provide will contribute to the production of a Ph.D. thesis in partial fulfillment of the requirements for the award of a doctoral degree and whatever information you provide will be considered as confidential and will be treated as such.

Let me assure you that your name or identity clue will not be mentioned in any part of the report and the information obtained from you will be used for only its proposed purpose. Your voluntary participation is priceless and as such, you may decline to answer any question that you do not wish to respond, and you can withdraw from the interview at any time that you feel uncomfortable. Your answering of this interview schedule will presuppose that you have given your consent to participate in this research project. The interview should take about 1 hour. Could you respond to some questions now? Thank you in advance for accepting to be part of this research project. I will only take notes of our conversation and record at the same time and if at any point during the conversation you want me to turn off the recorder or take off something you said, please let me know. Before we begin the interview, do you have any questions? If any questions arise at any point during the conversation, you can feel free to ask them. I will more than willing to answer your questions.

Let me begin by asking you some questions about the growth of Wa and encroachment on peri-urban land.

Section A: Activities that put pressure on agricultural land in peri-urban areas

1. Have you noticed any changes with regards to the growth of Wa town? Please explain
2. To what extent has the growth of Wa town encroached on peri-urban agriculture lands?
3. Does the PPD have any plan (s) indicating the location of physical development activities in Wa? Please explain
4. To what extent does the plan (s) protect farmlands in and around Wa? Explain
5. What activities exert pressure on agricultural lands in peri-urban communities around Wa?

Section B: Factors that explain agricultural land use change in peri-urban areas

6. What are the factors that explain why local landowners are selling their lands to be used for non-agricultural purposes?

   Probe for the contribution to demand for land to land use change

   Probe for the contribution of rent

   Probe for the contribution of availability of excess land

   Probe for demand for money to pay school fees, fight litigation, etc.
7. What is the nature and extent of the physical plan of Wa?
8. Does physical development of the peri-urban areas conform to the physical plan of Wa?
9. Has the physical plan of Wa been affected by the uncontrolled urban expansion? Explain

Section C: Effects of agricultural land use change on livelihoods of peri-urban households

10. Does your outfit have physical development plans for the peri-urban communities around Wa?
11. Are there efforts to secure agricultural/farmlands in the peri-urban communities around Wa?
12. To what extent has your outfit ensured orderly development in peri-urban communities around Wa?

Section D: Emerging pattern of livelihoods in peri-urban areas

13. Do you know some of the current livelihood activities peri-urban households engage in to make a living?
14. How will you compare current livelihood activities and agriculture activities they were engaged in the past?

Section E: Institutional challenges in controlling peri-urbanization and agricultural land use change

15. What are the challenges that confront the demarcation of land for the various activities in peri-urban communities?
16. What institutional challenges does your outfit face in the discharge of your mandate in regulating land use in peri-urban communities?
17. What have you done about the challenges mentioned above in the discharge of your mandate?
18. What will you suggest to be done to enhance the execution of your mandate of regulating land use in proximate communities around Wa?

APPENDIX D

INTERVIEW GUIDE FOR OFFICIAL (S) OF LANDS COMMISSION

My name is Ibrahim Abu Abdulai and a Ph.D. student at the University of Cape Coast. I am undertaking my research project on the topic; ***Agriculture land use change and emerging patterns of livelihoods in peri-urban areas of Wa.*** As an agency of government which is involved in the land title registration and related activities, I thought it would be a good idea to interview you so that you can share with me your experiences and opinions about the subject matter of the research. I would like to ask you some questions about your outfit's experiences in relation to the growth of Wa, the land uses, and whether or not you have land use plans as well as the extent to which the plans have incorporated measures to secure agricultural lands in peri-urban communities. The data you will provide will contribute to the production of a Ph.D. thesis in partial fulfillment of the requirements for the award of a doctoral degree and whatever information you provide will be considered as confidential and treated as such.

Let me assure you that your name or identity will not be mentioned in any part of the report and the information obtained from you will be used for only its proposed purpose. Your voluntary participation is priceless and as such, you may decline to answer any question that you do not wish to respond, and you can withdraw from the interview at any time that you feel uncomfortable. Your answering of this interview schedule will presuppose that you have given your consent to participate in this research project. The interview should take about 1 hour. Are you available to respond to the questions now? Thank you in advance for accepting to be part of this exciting project. I will only take notes of our discussion and please let me know if at any point you want me to turn off the recorder or keep something off the record. Do you have any questions before we start? If any questions arise at any point in the course of the conversation, feel free to ask them. I would be glad to answer your questions.

Let me begin by asking you some questions about the activities that contribute to the physical encroachment on peri-urban agricultural lands around Wa.

Section A: Activities that put pressure on agricultural land in peri-urban areas

1. Have you noticed any changes with regards to the growth of Wa town? Please explain
2. To what extent has the growth of Wa town encroached on peri-urban agriculture lands?
3. Does the Lands Commission have any plan (s) indicating the location of physical development activities in the peri-urban communities? Please explain
4. To what extent does the land use plan (s) protect farmlands in the proximate communities

Section B: Factors that explain agricultural land use change in peri-urban areas

5. What are the factors that explain why local landowners are selling their lands to be used for non-agricultural purposes?

   Probe for the contribution demand for land to land use change
   Probe for the contribution of rent
   Probe for the contribution of availability of excess land
   Probe for demand for money to pay school fees, fight litigation, etc.
6. What is the nature and extent of the physical growth of Wa?
7. Does physical development of the peri-urban areas conform to the land use plans in the peri-urban areas?
8. Have the land use plans of Wa been affected by the uncontrolled urban expansion? Explain

Section C: Effects of agricultural land use change on livelihoods of peri-urban households

9. What are the effects of the encroachment on peri-urban lands on the livelihoods of peri-urban communities?
10. How has physical development in the peri-urban communities consistent sound land use?
11. To what extent has your outfit been able to prevent the incidence of physical expansion of Wa encroaches on agricultural lands in peri-urban communities around Wa?
12. Does your outfit ensure that unapproved development in the peri-urban areas is prevented?
13. Do peri-urban areas experience multiple sales of lands?
14. If yes what is the extent or magnitude of the problem?
15. What measures have your outfit put in place to prevent the multiple or illegal land sales in peri-urban areas?
16. What has your outfit done in respect of creating the awareness of peri-urban communities about the need for sustainable land management?

Section D: Emerging pattern of livelihoods in peri-urban areas

17. What are some of the livelihood activities peri-urban households engage in to make a living due to the loss of their agricultural lands?
18. How will you compare current livelihood activities and agriculture activities they were engaged in the past?

Section E: Institutional challenges in controlling peri-urbanization and agricultural land use change

19. What are the challenges that confront the demarcation of land for the various activities in peri-urban communities?
20. What institutional challenges does your outfit face in the discharge of your mandate in regulating land use in peri-urban communities?
21. What have you done about the challenges mentioned above in the discharge of your mandate?
22. What will you suggest to be done to enhance the execution of your mandate of regulating land use in proximate communities around Wa?

APPENDIX E

INTERVIEW GUIDE FOR OFFICIALS OF DEPARTMENT OF AGRICULTURE

My name is Ibrahim Abu Abdulai and a Ph.D. student at the University of Cape Coast. I am undertaking my research project on the topic**; *Agriculture land use change and emerging patterns of livelihoods in peri-urban areas of Wa*.** As an agency of government that is involved in the agriculture, I thought it would be a good idea to interview you so that you can share with me your experiences and opinions about the subject matter of the research. I would like to ask you some questions about your outfit's experiences in relation to the growth of Wa, the state of agriculture in peri-urban communities, and the measures put in place to secure agricultural lands in peri-urban communities, and the reasons for the sale of agricultural lands among others. The data you will provide will contribute to the production of a Ph.D. thesis in partial fulfillment of the requirements for the award of a doctoral degree.

Let me pledge that your name or identity will not be mentioned in any part of the report and the information that will be obtained from you will be used for only its proposed purpose. Your voluntary participation is priceless and as such, you may decline to answer any question that you do not wish to respond, and you can withdraw from the interview at any time that you feel uncomfortable. Your answering of this interview schedule will presuppose that you have given your consent to participate in this research project. Our interview today will last approximately one hour during which I will be asking you about your outfit with regards to peri-urban development, agriculture land use, agriculture production, threats of physical expansion on agriculture in peri-urban areas. Are you willing you to answer the questions now? Thank you in advance for accepting to be part of this research project. I will only take notes of our conversation and if at any point you want me to turn off the recorder or keep something you said off the record you can draw my attention to it. Do you have any questions before we start the conversation? If any questions arise at any point, feel free to ask, I would be happy to answer your questions.

Let me begin by asking you some questions about you views about growth of Wa over the years and encroachment on peri-urban agricultural lands in peri-urban areas.

Section A: Activities that exert pressure on agricultural lands

1. Has Wa town experience physical expansion over the last few years? Please explain
2. To what extent has the growth of Wa town encroached on peri-urban agriculture lands?
3. What are the activities that put pressure on agricultural lands in peri-urban areas of Wa?
4. What is the situation of agriculture production in the peri-urban communities around Wa?
5. How has the encroachment on peri-urban agriculture lands affected agriculture production in peri-urban communities?
6. Does your outfit have a plan (s) to protect agriculture lands in proximate communities around Wa town?
7. Has your outfit have any engagement with local landowners on the need to secure lands for agriculture production in peri-urban communities?
8. Has your outfit engaged the municipal assembly on agricultural land loss in peri-urban communities?

Section B: Factors explaining agricultural land use change

9. Why do local landowners in the peri-urban communities sell their farmlands to be used for other non-agricultural purposes?

10. In what ways has your outfit made any attempt to create awareness about the need to preserved agricultural lands in peri-urban communities?
11. In what ways has your outfit made efforts to inform peri-urban communities about the potentials of peri-urban agriculture?
12. How has your outfit engaged peri-urban communities about the importance of peri-urban agriculture?

Section C: Effects of agricultural land use change on livelihoods of peri-urban households

13. Has physical expansion of Wa affected agricultural production in the peri-urban communities?
14. What is the implication of agricultural land loss on food security in the peri-urban communities?
15. What is the effect of agricultural land use change on food security in the municipality as a whole?

Section D: Emerging patterns of livelihoods in the peri-urban communities around Wa

16. Does agriculture still pay a role in the livelihood portfolio of peri-urban households?
17. What other livelihood activities do peri-urban households undertake due to declining farmlands?

Challenges that confront institution in the discharge of its mandate with regards to land management

18. What community-level challenges confront your outfit in an attempt to protect agriculture lands in proximate communities around Wa?
19. What efforts have you put in place to overcome the challenges mentioned above?
20. What are the institutional level challenges that confront your outfit in your attempt to protect farmlands in peri-urban communities?
21. What do you suggest should be done to enable you to discharge your duty to protect peri-urban agricultural lands?

APPENDIX F

GROUP DISCUSSION [GD] GUIDE FOR COMMUNITY LEVEL DISCUSSIONS

Ibrahim Abu Abdulai is my name. I am a Ph.D. student at the University of Cape Coast. My research project focuses on the topic; ***Agriculture land use change and emerging patterns of livelihoods in from peri-urban areas of Wa.*** As residents in this community, I will like to have a conversation with you so that you can share with me your experiences and opinions about the subject matter of the research. Your answering of this will presuppose that you have given your consent to participate in this research. Our conversation today will last about two hours during which I will be asking you about your experiences in relation to activities that consume agricultural lands, why landowners sell their farmlands, the effects of the land conversion on livelihoods and the new livelihood strategies that are pursued by peri-urban households in this community in order to learn more about you're the situation within the community. The data you will provide will contribute to the production of a Ph.D. thesis in partial fulfillment of the requirements for the award of a doctoral degree.

I guarantee that your name or identity will not be mentioned in any part of the report, and the information obtained from you will be used for only the proposed purpose. Your voluntary participation is priceless and as such, you may decline to answer any question that you do not wish to respond, and you can withdraw from the interview at any time that you feel uncomfortable. Are you available to respond to some questions at this time? Thank you in advance for accepting to be part of this research project. I will not only take notes of our conversation but, will also record the discussion. If at any point you want me to turn off the recorder or keep something you said off the record, kindly let me know. Before we begin the interview, do you have any questions? If any questions arise at any point in the course of the interview feel free to ask them. I would be ready to answer your questions.

Let me begin by asking you some questions about the activities that exert pressure on agricultural lands in your community.

Section A: Activities that exert pressure on agricultural lands

1. Has your community witnessed expansion in the last few years? Please explain
2. Have you noticed any changes in the physical built-up of your community?
3. What specific changes have you noticed in the last few years in your community?
4. What are the specific activities that exert pressure on agricultural lands in your community?

Section B: Factors that explain agriculture land use change

1. Indicate major land uses in your community in the past. Please explain for each use mentioned
2. Please indicate the reasons for which local landowners sell their agriculture lands. Please explain
3. What are the effects of agricultural land use change in your community? Explain

   Probe for effects on farmlands
   Probe for effects on the social vices
   Probe for the double sale of land
   Probe for land disputes
4. Does agriculture a future in your community? Please explain

Section C: Effects of agriculture land use change on traditional livelihoods

5. What are the effects of agricultural land use change on livelihood assets in your community? Please explain

   Probe for effects on land and other natural resources (streams, wetlands, nature reserves etc.)
   Probe for effects on community relations
   Probe for effects on income
   Probe for effects on physical assets (equipment, housing, means of transport, etc.)

6. Indicate the effects of current land uses on family structure
7. Please what are the effects of current land uses on social vices

Section D: **Emerging patterns of livelihoods**

8. What were the main livelihood activities households undertaken by members of the community in the past? Please explain/describe the activities
9. What are the main livelihood activities that are currently undertaken by households in the community? Explain/describe
10. Please indicate the things people consider before undertaking a choice of a livelihood activity of an individual or a household in your community

    Probe for physical ability
    Probe for health
    Probe for age
    Probe for assets ownership
    Probe for job experience
    Probe for wage etc.
11. How will you compare the livelihood activities in the past and the current livelihood activities with respect to the income earned?
12. How will you rate the livelihood activities mentioned above and farming? Please explain
13. Please indicate and explain the barriers that inhibit the ability of an individual or household to undertake a particular livelihood activity in your community.

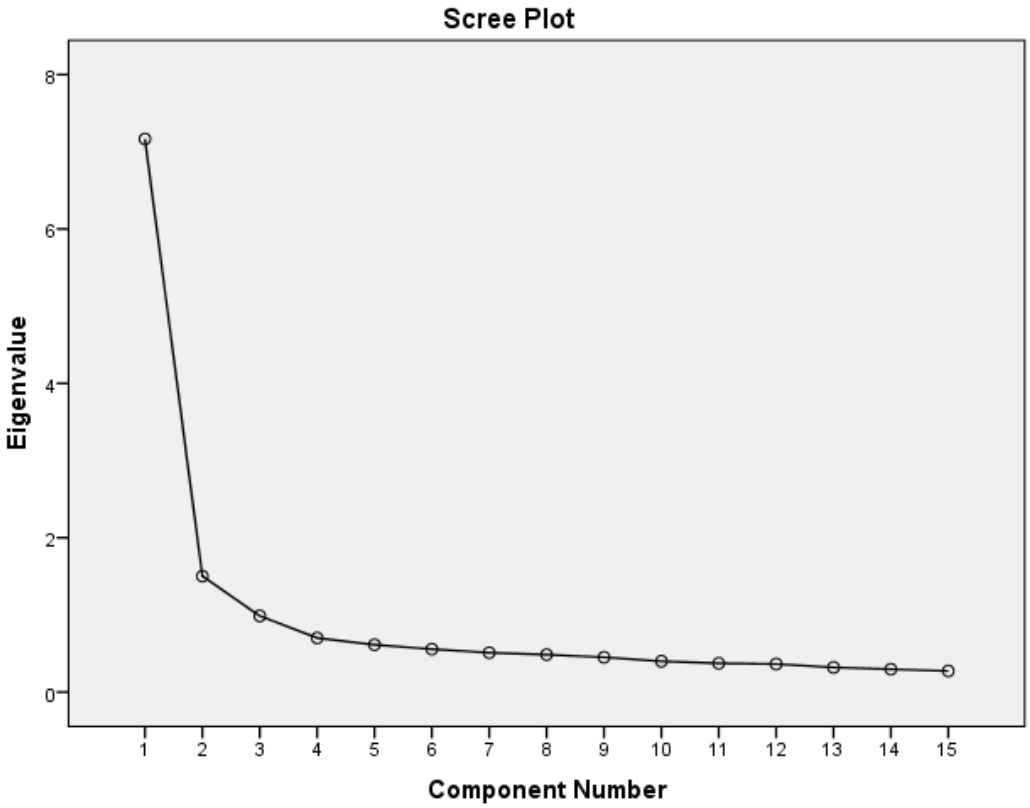
APPENDIX G

OBSERVATION CHECKLIST

1. Things that you have observed as the things that indicate the growth of Wa town
2. Changes in infrastructure in the communities
3. Activities/land uses put pressure on agriculture lands in the communities
4. The current land uses that pose a threat to agriculture land
5. The types of livestock and poultry kept by households
6. Non-agricultural livelihood activities households undertake

APPENDIX H

SCREE PLOT



APPENDIX I
INTRODUCTORY LETTER

UNIVERSITY OF CAPE COAST

INSTITUTIONAL REVIEW BOARD SECRETARIAT

TEL: 0558093143 / 0508878309/ 0244207814
E-MAIL: irb@ucc.edu.gh
OUR REF: UCC/IRB/A/2016/500
YOUR REF:
OMB NO: 0990-0279
IORG #: IORG0009096

C/O Directorate of Research, Innovation and Consultancy

18TH JUNE, 2019

Mr Ibraham Abu Abdulai
School of Development
University of Cape Coast

Dear Mr. Abdulai,

ETHICAL CLEARANCE – ID: (UCCIRB/CHLS/2019/05)

The University of Cape Coast Institutional Review Board (UCCIRB) has granted **Provisional Approval** for the implementation of your research protocol titled **Agricultural Land Use Change and Emerging Patterns of Livelihoods in Per-urban Areas of Wa. This approval** requires that you submit periodic review of the protocol to the Board and a final full review to the UCCIRB on completion of the research. The UCCIRB may observe or cause to be observed procedures and records of the research during and after implementation.

Please note that any modification of the project must be submitted to the UCCIRB for review and approval before its implementation.

You are also required to report all serious adverse events related to this study to the UCCIRB within seven days verbally and fourteen days in writing.

Always quote the protocol identification number in all future correspondence with us in relation to this protocol.

Yours faithfully,

Samuel Asiedu Owusu, PhD
UCCIRB Administrator

ADMINISTRATOR
INSTITUTIONAL REVIEW BOARD
UNIVERSITY OF CAPE COAST
Date: 18/06/19