

**HOUSEHOLD FOOD ACCESS SECURITY ALONG THE URBAN-RURAL
CONTINUUM IN MOROGORO AND IRINGA, TANZANIA**

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**A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR
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EXTENDED ABSTRACT

The study on which this manuscript is based was done along the urban-rural continuum (urban, peri-urban and rural) in Morogoro and Iringa to assess household food access security. Specifically, the study sought to: (1) assess the prevalence of household food access insecurity along the urban-rural continuum, (2) determine constraints to household food access security, (3) examine coping strategies and resilience to food access insecurity along the continuum, and (4) assess the influence of households' asset ownership on food access security. A cross-sectional research design with a three-stage sampling technique was employed whereby data were collected in 279 households from November 2015 to April 2016. Data were analyzed using Statistical Package for Social Sciences (SPSS). The results showed that food access insecurity was more prevalent among rural households as compared among their counterparts in urban and peri-urban settings ($p \leq 0.001$). Also, findings showed great variations in constraints to food access security, food access insecurity coping strategies and household asset ownership along the continuum. Using a binary logistic regression model, it was found that a household head's education and number of members earning income had a positive relationship with a household's food access security ($p \leq 0.05$), whereas household size ($\beta = -0.408$; $p \leq 0.01$), proportion of consumption expenditure on food ($\beta = -0.151$; $p \leq 0.001$), and reliance on donations ($\beta = -3.770$; $p \leq 0.01$) were inversely related with a household's food access security. It is thus concluded that the prevalence of and constraints to household food access security as well as food access coping strategies and asset ownership vary among households along the continuum. Additionally, as household head's education and number of household members earning income increase a household's food access security improves. On the other hand, large households, higher proportions of consumption expenditure on food and reliance on donations tend to worsen

a household's food access security. It is, therefore, recommended that households should focus more on assets that improve their food access security and control those factors that weaken food access security.

DECLARATION

I, Ubaldus John Tumaini, do hereby declare to the Senate of Sokoine University of Agriculture that this thesis is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

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Date

The above declaration is confirmed by:

Prof. John M. Msuya
(Supervisor)

Date

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LIST OF ABBREVIATIONS AND ACRONYMS

ANOVA	Analysis of Variance
ASDP	Agricultural Sector Development Programme
ASDS	Agricultural Sector Development Strategy
BRN	Big Results Now
CAADP	Comprehensive Africa Agriculture Development Programme
CSSH	College of Social Sciences and Humanities
DDS	Department of Development Studies
DFID	Department for International Development
FAO	Food and Agriculture Organization
GIS	Geographical Information System
HBS	Household Budget Survey
HFIAS	Household Food Insecurity Access Scale
IFAD	International Fund for Agricultural Development
Kcal	Kilocalories
LUNA	Livelihood, Urbanization and Natural Resources in Africa
MDGs	Millennium Development Goals
MFI	Microfinance Institutions
NSGRP	National Strategy for Growth and Reduction of Poverty
OECD	Organization for Economic Cooperation and Development
PSSN	Productive Social Safety Net
SACCOS	Savings and Credit Co-operative Societies
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences

SSA	Sub-Saharan Africa
TACRP	Tanzania Agriculture Climate Resilience Plan
TAFSIP	Tanzania Agriculture and Food Security Investment Plan
TASAF	Tanzania Social Action Fund
THDR	Tanzania Human Development Report
UN	United Nations
UN-HABITAT	United Nations Human Settlements Programme
URT	United Republic of Tanzania
VICOBA	Village Community Banks
WFP	World Food Programme
WFS	World Food Summit

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

The concept of food security appeared for the first time in the global arena of development in the mid-1970s, a period characterized by low grain reserves, escalating prices of oil and agricultural inputs and natural disasters (FAO, 2003). This instigated the food security discourse being introduced at the UN World Food Summit of 1974 with the motive of mobilizing international support and to reach agreements that would ensure that sufficient food is produced accompanied by the stability of supply and prices (FAO, 1996). However, at the beginning of the 1980s it was obvious that making food available in enough quantities alone could not necessarily translate into making people food secure (Maxwell, 1995). As a result, the discourse on food security was modified to incorporate the concern for ensuring actual access to food. This shift was championed by Sen (1981) who argued that people do not usually starve because of an insufficient supply of food at the local, national or international level, but because they have insufficient resources to acquire it. Similar thinking was observed by Bryant (1988) who contended that increasing food production as a response to hunger is limited because a substantial part of the problem is that poor people cannot afford to purchase the food they need. In addition, Maxwell (1996) concurred with this notion and asserted that it is impossible to speak credibly about food security as being a problem of food supply without at least making reference to the importance of access and entitlements.

Despite the realized role of access to food and entitlements, considerably more emphasis is placed on the aggregate availability of food which 'rural development' will supposedly solve (Broca, 2002). The reluctance of actors to take access to food seriously is partly

associated with the high prevalence of household food access insecurity in the world (Crush and Frayne, 2011). Globally, 795 million people (10.9 %) were estimated to be hungry and undernourished in 2014 (FAO *et al.*, 2015). The vast majority of these undernourished people (780 million) live in developing countries whereby sub-Saharan Africa remains the region with the highest prevalence of one in four people chronically hungry (FAO *et al.*, 2015).

In Tanzania, using the national basic needs poverty line of TZS 36 482 per adult per month and the national food poverty line of TZS 26 085 per adult per month, prevalence of basic needs poverty and food poverty were estimated to be 28.2% and 9.7%, respectively, in 2011/12 (URT, 2014). Basic needs poverty implies that a person cannot meet his/her basic consumption needs while an extremely poor individual cannot afford to buy basic foodstuffs to meet the minimum nutritional requirements of 2,200 kilocalories (Kcal) per adult per day. Overall, with the urban-rural divide, rural households are more exposed to food insecurity than urban and peri-urban households (WFP, 2013).

Literature suggests that household food access security is determined by a number of factors including household resource endowments and food prices (Sanusi *et al.*, 2006; Gebre, 2012; Mitiku *et al.*, 2012; Nyikahadzoi *et al.*, 2012), which are allocated across different income and non-income generating activities (Hoddinott, 2012). In addition, Swift (1989) argues that when households are able to generate a surplus over and above their basic food requirements, they can divert the excess resources into different kinds of assets to sustain them in times of crisis. Under these circumstances, food security can be closely linked to a household's resource endowments. This would mean that a household with poor resource endowments faces a higher risk of being food insecure. Although livelihood assets are important determinants of food security, factors such as the size of

the household, availability of household labour, the age and education of the household head, access to credit, the performance of input and output markets, household expenditure, on-farm and off-farm income, livestock assets, and the size of arable land, also have a significant influence on household food access security (Dercon and Krishnan, 2000; Mango *et al.*, 2014).

A study conducted in the city of Addis Ababa, Ethiopia found that household food access is determined by household size, age and education level attained by the household head, asset possession, access to credit service and access to employment (Gebre, 2012). A study by Babatunde *et al.* (2007) among farming households in Kwara State of North-Central Nigeria found that a household's income, ability for own production, education status of household head and household size were important in influencing its food access security. Access to natural resources such as fields, forests, grasslands and water resources has also been reported to be a major determinant of the productive capacity of the food producing households (Mango *et al.*, 2014). This short review shows that multiple, interrelated factors can affect a household's food access security and they also vary from one context to another. According to Barrett *et al.* (2001) and von Braun *et al.* (2005), this implies that policies to address food security should pursue a range of strategies.

Generally, the causes of food access insecurity in Tanzania are nearly similar to those in most other developing countries. The more fundamental causes in Tanzania are the continued lack of economic opportunity to produce adequate amounts of food and the inability to obtain sufficient income to purchase adequate amounts of food needed (WFP, 2013). Specifically, urban households are more likely to cite 'expensive foods' and 'no money' as main drivers of their food shortage whereas rural households most

commonly cite ‘drought and poor rains’ as the cause (URT, 2015). This is because urban households buy most of their foodstuffs while those in rural areas produce most of what they eat. Similar factors apply in Morogoro and Iringa regions where hunger and undernourishment are reported to be still high (Knueppel *et al.*, 2010). According to URT (2014), the proportion of people whose expenditures are below the extreme poverty line in Morogoro and Iringa regions, respectively, were 14% and 10% in 2011/12.

Notwithstanding, it is very clear from the review of the literature that inclusion of the urban-rural continuum in the empirical analyses of household food access security has not been attempted, something that makes this thesis quite unique and important. A detailed understanding of household food access security is critical for informing policy decisions. Therefore, this thesis assessed household food access security along the urban-rural continuum in Morogoro and Iringa, Tanzania. An analysis of household food access security can also show how households’ existing physical and non-physical assets determine their ability to secure food. Also, such information is critical for guiding interventions to curb food access insecurity along the urban-rural continuum.

1.2 Conceptualization of the ‘Urban-Rural Continuum’ Concept

Demographic and economic criteria on which definitions of urban, peri-urban and rural settings are based can vary widely between different nations, making generalizations problematic (Tacoli, 1998). In most cases these definitions are context-specific and are at times based on administrative, morphological or functional indicators depending on the perspective of the respective author or institution (Byfuglien, 1995; Lerner and Eakin, 2011). Besides, ‘urban’ and ‘rural’ definitions are closely bound to historical, political, cultural and administrative considerations, something which has prevented formulation of a global and universal definition (UN, 2013; 2015).

Most countries worldwide base their definition on population size, applying certain population thresholds to distinguish 'urban' from 'rural' areas. These demographic thresholds, however, are artificial, vary drastically and therefore make international comparisons difficult. For example, in the Philippines, urban areas are defined by the National Census as all settlements with a population density of at least 500 persons per square kilometre (Tacoli, 1998). Like in other sub-Saharan Africa, in Benin, the National Institute of Statistics and Economic Analysis considers a town any head town of a district with a population of 10,000 inhabitants or more, and with at least four of the following: post office, tax office, public treasury, bank, running water supplies, electricity, health centre and secondary school (Tacoli, 1998). In some cases, however, definitions differ not only between countries but also within countries. In Tanzania, for example, the Prime Minister's Office, several government ministries and the National Bureau of Statistics have unequal working definitions of the term 'urban', depending on their respective interests (Muzzini and Lindeboom, 2008). This hampers the interpretation of relevant statistics, inter-institutional collaboration, and the formulation of appropriate and coherent policies.

Regarding the peri-urban area, there is still lack of common definition among scholars. However, several attempts have been conducted to narrow down the essential characteristics of the peri-urban. The most obvious way of defining it is to take a location-based approach. According to this approach, distance to the city centre and the adjacent built-up area is seen as the most important variable for its definition (Adam, 2001; Webster and Muller, 2004; Gregory, 2005). Based on this approach, several researchers (Gaile, 1992; Browder *et al.*, 1995; Tacoli, 1998; Rakodi, 1999) have attempted to define peri-urban as a concept that refers to a zone where urban and rural development processes meet, mix and interact on the edge of cities. As Schlesinger (2013) emphasizes, these

processes are strongly interlinked with the respective flows of people (migration), goods (trade), and money (investments). In addition, according to Rakodi (1999), these underlying processes lead to a constant change in the peri-urban areas as cities expand.

The concept of 'rural' is also complex and multidimensional. The existing definitions are formulated with respect to definitions of urban. The definition of rural by the Organization for Economic Cooperation and Development (OECD) is based on the assessment that rural regions have low population densities (and an ageing population) and are located in regions that do not contain major urban centres (missing markets and services) (OECD, 2006). Rural areas are also characterized by a more personal and intimate web of social relationships, extensive land use, and primary economic activity and employment (Scott *et al.*, 2007). In Tanzania rural areas are defined as the geographical areas in which primary production takes place and where populations are found in varying densities (URT, 2001). These areas are characterized by activities related to primary and secondary processing, marketing and services that serve rural and urban populations.

The afore-mentioned literature proves that it is difficult to come up with generalized definitions of the urban, peri-urban and rural areas. However, in the context of this thesis, considering that the focus is on medium-sized towns, travel time from the town centre was chosen as a relative measure as it more adequately reflects the spatial complexities of the urban-rural continuum (Jaquinta and Drescher, 2000; Moustier, 2001; Drechsel *et al.*, 2006). Accordingly, an urban area is defined as an area within a range of up to five travel minutes (by car and in the absence of traffic jam) from the town centre. Peri-urban is the area that takes more than 5 minutes to reach from the town centre but not exceeding 20 minutes and rural area is an area to which travel time is more than 20 minutes from the

town centre. Schlesinger (2013) has applied this approach in other medium-sized towns and worked well. Consequently, urban-rural continuum refers to a spatial location comprising locations regarded as urban, peri-urban and rural.

1.3 Food Security and its Dimensions

Until the 1970s, the term “food security” was assumed as adequacy of food supply at the global and national levels, the view which took into account food production oriented variables and overlooked the multiple forces which come to play to affect access of food (FAO, 1996). Consequently, “food security” gained prominence after the World Food Conference in 1974 and ever since has become households name and attracted so many definitions from various organizations and individual researchers (FAO, 2003). In the 1980s, following the success of the green revolution which helped to increase food production (food availability), it was recognized that food emergencies and even famines were not caused as much by catastrophic shortfalls in food production as by sharp declines in the purchasing power of specific social groups. Following this observation, food security was defined as “access by all people at all times to enough food for an active and healthy life” (World Bank, 1986). This definition was afterwards improved by the World Food Summit (WFS) in November 1996 to include the nutritional value and food preferences whereby food security was defined as “a situation when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life” (FAO, 1996). Based on this definition, four food security dimensions can be identified: food availability; physical, economic and socio-cultural access to food; food utilization; and stability over time.

Food availability is the physical presence of food in the area of concern through all forms of domestic production, commercial imports and food aid (WFP, 2009). Food availability is usually applied at a regional or national level rather than at the household level (Riely *et al.*, 1999). Food availability is determined by production (food produced in the area) trade (food brought into the area through market mechanisms), stocks (food held by traders and in government reserves) and transfers (food supplied by the government and/or aid agencies).

Food access concerns a household's ability to acquire adequate amounts of food, through one or a combination of own home production and stocks, purchases, barter, gifts, borrowing and food aid. Food access consists of three elements, which are physical, economic and socio-cultural. Physical dimension can be illustrated by a situation whereby food is being produced in one part of a country but cannot be delivered to another part suffering from a lack of food due to an inefficient and non-existence transport infrastructure. From the economic viewpoint, food insecurity exists when people cannot afford to buy sufficient food. Socio-cultural dimension arises when food may be physically available and the potential consumer has the money to buy the food but is prevented from doing so for being a member of a particular social group or even gender.

Food utilization refers to households' use of the food to which they have access and individuals' ability to absorb and metabolize the nutrients – the conversion efficiency of the body (WFP, 2009). Among others, food utilization includes the ways in which food is stored, processed and prepared, including the water and cooking fuel used, and hygiene conditions and feeding practices, particularly for individuals with special nutrition needs, such as babies, young children, the elderly, sick people, and pregnant or lactating women.

The availability of and access to food on their own are not enough; people have to be assured of safety and nutritious food which meets their dietary needs.

With regard to stability which is underlined by the phrase “all people, at all times...” integral to the WFS’s definition of food security, this dimension emphasizes the importance to reduce the risk of adverse effects on the other three dimensions: food availability, access or utilization (FAO, 1996). To be food secure, a population, household or an individual must be guaranteed of availability of food, of access to adequate food and of its proper utilization at all times, in other words, in a stable way.

Whereas the main concern of consumers of developed countries is about the effects of the food they eat on their health in terms of their nutritional needs as well as wholesome and tasty, consumers in developing countries including Tanzania are mostly concerned with availability of and access to a nutritious diet throughout the year at relatively low costs (FAO, 2002). This means that household’s food access insecurity remains a major challenge for the country and that policy interventions are needed to address the problem.

1.4 Statement of the Problem

In recent years, Tanzania has undertaken a number of food and agricultural strategies aimed at transforming both small-scale and large-scale agriculture and hence reduce household food access insecurity. Some of these strategies and initiatives include: the United Nations’ Millennium Development Goals (MDGs), which are mainstreamed into the national policy frameworks, including the national development plan, and the Development Vision 2025 aimed at seeing agriculture becoming a semi-industrialized system in which irrigation and modern technology generate production to support manufacturing activities. Also, the country is part of the African Union’s Comprehensive

Africa Agriculture Development Programme (CAADP) and has formulated its investment plan – the Tanzania Agriculture and Food Security Investment Plan (TAFSIP).

In addition, Tanzania is implementing various strategies, including the “Big Results Now” (BRN) initiative, the Tanzania Agriculture Climate Resilience Plan (TACRP), and the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) project. Other programmes and interventions are such as cultivating drought-tolerant food crops, school feeding programmes, training on appropriate methods of storing vegetables, provision of subsidised foods for stabilizing market price, establishment of irrigation schemes and improvement of transportation infrastructure.

Despite the above-mentioned initiatives, household food insecurity level is still high in the country. According to the 2011/12 Household Budget Survey (HBS), more than a quarter (28.2%) of the Tanzanian population fall below the basic needs poverty line and 9.7% falls below the food poverty line (URT, 2014). The prevalence of food poverty changes as one moves from places categorized as urban (8.7%) to rural areas (11.3%). A similar situation applies in Morogoro and Iringa regions which are among the regions with the highest prevalence of extreme food access insecurity. An estimated 14% and 10% of the population in Morogoro and Iringa regions, respectively, could not access sufficient food in 2011/12 (URT, 2014). This necessitates the assessment of household food access security in order to come up with appropriate context-specific recommendations for improving the existing problems. In view of the above arguments, the purpose of the study on which the thesis is based was to gain an in-depth understanding of household food access security along the urban-rural continuum in Morogoro and Iringa, Tanzania.

1.5 Justification for the Study

First, with the exception of urban and peri-urban agriculture, which is considered as the key solution to food security in urban areas (Battersby, 2012), the approach to food access insecurity problem and its solution is primarily rural. Such approach has tended to focus on increasing smallholder agricultural production and strengthening social protection systems (Crush and Frayne, 2011). The existing knowledge in this area assumes that food access insecurity in urban areas can be solved by addressing the problem in the rural settings. This study filled in this gap by proposing context-specific interventions to address food access insecurity in urban, peri-urban and rural locations.

Second, this study aimed at contributing to the attainment of one of the objectives of the Livelihood, Urbanization and Natural Resources in Africa (LUNA) project which partly funded this thesis. The LUNA project assessed the dynamics of food insecurity in households along the urban-rural continuum in Morogoro and Iringa, Tanzania.

Finally, the research is timely because it is in line with a number of national development programmes and strategies aiming at improving food security in households for urban, peri-urban and rural households. Such programmes and strategies include Agricultural Sector Development Programme (ASDP) as a joint implementation tool of the Agricultural Sector Development Strategy (ASDS), the National Strategy for Growth and Reduction of Poverty (NSGRP) II, the Development Vision 2025, *Kilimo Kwanza* initiative, the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) and the Tanzania Agricultural and Food Security Investment Plan (TAFSIP). Moreover, the research was in line with the Millennium Development Goals (MDGs) goal number one which was “to eradicate extreme poverty and hunger”. The MDGs have been revised and are now known as the Sustainable Development Goals (SDGs). Food security is covered

by the SDGs goal number two which is “to end hunger, achieve food security and improve nutrition and promote sustainable agriculture”.

1.6 Objectives

1.6.1 General objective

The general objective of this study was to assess household food access insecurity along the urban-rural continuum in Morogoro and Iringa Regions, Tanzania.

1.6.2 Specific objectives

The specific objectives of this study were:

- i. To assess the prevalence of household food access insecurity along the urban-rural continuum.
- ii. To determine the extent to which constraints to achieving household food access security vary along the urban-rural continuum.
- iii. To examine coping strategies and resilience to food access insecurity along the urban-rural continuum.
- iv. To assess the influence of households’ asset ownership on food access security along the urban-rural continuum.

1.7 Research Questions

The study was guided by the following research questions:

- i. To what extent does the prevalence of household food access insecurity differ along the urban-rural continuum?
- ii. To what extent do the constraints to food access security among urban, peri-urban and rural households differ?

- iii. Do the food insecurity coping strategies employed by households contribute to building and improving their resilience to food access insecurity?
- iv. To what extent does a household's asset ownership contribute to its food access security along the urban-rural continuum?

1.8 Theoretical Framework

While theories and models on hunger and undernourishment are numerous, determining which of them effectively tackles food access security along the urban-rural continuum reflects a challenge due to the complex and context-specific nature of food access security. Considering the importance of access to food as one of the key dimensions of food security in households, this study adopted Sen's Entitlement theory of famine (Sen, 1981) to assess the determinants of household food access security along the urban-rural continuum. However, Multi-layered Social Resilience Framework by Obrist *et al.* (2010) was employed to aid in explaining how households cope with food access insecurity.

1.8.1 Multi-layered Social Resilience Framework

The Multi-layered Social Resilience framework draws on ecological (Carpenter *et al.*, 2001; Folke *et al.*, 2002; Holling 1973), psychological (Luthar 2003, Masten 2001) and socio-anthropological approaches (Bourdieu 1984), as well as DFID's Sustainable Livelihood Framework (DFID, 1999). Resilience is implicit in the Sustainable Livelihood Framework (Obrist *et al.*, 2010), because rather than focusing on barriers to sustainable development, it draws attention on people's capabilities, assets and activities leading to positive outcomes. Adapting the definition of Obrist *et al.* (2010), social resilience is defined as "the capacity of actors to access capitals in order to—not only cope with and adjust to adverse conditions (that is, reactive capacity) but also—search for and create

options (that is, proactive capacity), and thus develop increased competence (that is, positive outcome) in dealing with a threat”.

“Reactive capacities” reflect direct reactions towards a threat that is taking place or has just taken place. On the other hand, “proactive capacities” refer to abilities such as anticipating a threat, changing rules and regulations, creating new options, planning ahead, and recognising danger. According to Giddens (1984), positive adjustment based on a learning process is an essential dimension of resilience, leading to increased competence in dealing with challenging livelihood conditions, notably household food access insecurity in the context of this thesis.

Accordingly, resilience building is determined by two important features. First, access to and ownership of capitals, notably human (skills, knowledge, ability to work and good health), social (networks and connectedness, membership to both formal and informal groups and relationships of trust, reciprocity and exchanges), natural (atmosphere, land, water and wildlife), physical (transport, shelter, and energy), and financial (savings, credit) play an important role in the resilience building process (Bourdieu, 1984; DFID, 1999). Second, resilience is multi-layered, ranging from the individual, household to the community, national and even global level.

The Multi-layered Social Resilience Framework was thought useful in this study by guiding an understanding of how households cope with or adjust to food access insecurity. This is because the framework recognises ownership of assets as prerequisite for resilience building against household food access insecurity. It also recognizes that resilience building is a process involving social networks ranging from individual, household, community, national and international levels. Lastly, this framework provides

researchers and policy-makers with a solution-oriented way of thinking about population at risk, thus reflecting a more mitigation-oriented framework (Obrist *et al.*, 2010; Dongus *et al.*, 2010). This aspect is valuable specifically for chapter 4 of this thesis as it ultimately aims at suggesting policies suitable for enhancing household's resilience to food access insecurity.

1.8.2 Sen's Entitlement theory of famine

Amartya Sen's entitlement theory of famine (Sen, 1981) is hinged on the argument that the problem of food insecurity is not about food supply failure, but rather because people do not have access to enough food (Sen, 1981). In the context of this theory, access to food is determined by the endowment set, the entitlement set and entitlement mapping. The endowment set is defined as a combination of all those resources that are legally owned by a household conforming to established norms and practices. The said resources include both tangible assets, such as land, equipment, animals, and intangibles such as knowledge and skills, or membership to a particular group. The entitlement set is defined as the set of all possible combinations of goods and services that a household can legally obtain by using the resources of its endowment set. These entitlements (or legal ways of acquiring food) are of four types, namely: production-based entitlements (growing food); own-labour entitlements (waged labour and professions); trade-based entitlements (trading artisan products and natural resources such as forestry products); and inheritance and transfer entitlements (from the state, or private gifts and loans). The entitlement mapping is the rate at which the resources of the endowment set can be converted into goods and services included in the entitlement set.

Accordingly, famine is caused not only by food supply failure but by failure of entitlement. A household suffers from failure of food entitlement when its entitlement set

does not contain enough food to enable it to avoid starvation in the absence of non-entitlement transfers, such as charity. Since entitlement set is derived by applying entitlement mapping (also known as E-mapping) on the endowment set, the entitlement failure and thus famine can occur only through some adverse change either in endowment or E-mapping or both. Thus, famine can be caused by either endowment loss, failure of production, exchange failure or transfer failure.

The most valuable contribution of the entitlement approach to famine theorizing is that it shifts the analytical focus away from a fixation on food supplies—the Malthusian logic of “too many people, too little food”—and on to the inability of groups of people to acquire food (Devereux, 2001). Food insecurity affects people who cannot access adequate food (e.g. because of poverty) irrespective of food availability—a famine can occur even if food supplies are adequate and markets are functioning well. This is a crucial insight. An equally important insight is that famine can be caused by “exchange entitlement decline” (adverse shifts in the exchange value of endowments for food, e.g. falling wages or livestock prices and rising food prices) as well as by “direct entitlement decline” (for instance, loss of food crops to unfavourable climatic conditions).

Crucial though the Entitlement approach is, it has its limitations. One major criticism is that it underestimates the importance of supply-side factors. For example, some scholars argue that Sen’s preoccupation with exchange entitlement collapse understates the significance of food availability decline – especially food production failure – as a causal trigger of many famines, especially in Africa (Baulch, 1987; de Waal, 1990; Nolan, 1993). Food supply is an important dimension of food security because even its minor real or expected shortfall can have far-reaching consequences for food security of a

particular group, for example, through a steep rise in food prices, which poor consumers have to pay for their food purchases.

Second, the entitlement approach views famines as economic disasters. However, as Sen himself pointed out, his approach ‘concentrates on rights within the given legal structure in that society, but some transfers are illegal acts, and therefore not accommodated by the entitlement approach nor can they be measured easily’ (Sen, 1981). From recent experience, especially in Africa, the association between violence and famine is so close that no widely-applicable famine theory can disregard the role of violence, and the way that resources like food are illegally acquired by some groups, at the expense of others (de Waal, 1990; Macrae and Zwi, 1994). In Sen’s terms, the violent access of food by one group removes another’s exchange entitlements. Famine may bring important benefits for some, particularly in political emergencies characterised by violence (Jaspars, 2000). Famine among the Dinka of Bahr El Ghazal in Sudan, for instance, was the result of their exploitation because of the wealth (Keen, 1991).

Further to the above, the Entitlement theory has been criticised on two further counts. First, it implies a straightforward sequence of entitlement failure leading to hunger and then to malnutrition, starvation and death. Second, it implies that people’s actions are largely determined by their need to consume food (de Waal, 1990). But research into people’s responses to famine, often referred to as ‘coping strategies’, has shown that their priorities in times of food stress are to preserve productive assets to protect livelihoods, rather than to meet immediate food needs (Corbett, 1988). However, though the entitlement approach has been criticized much, Sen (1981) is commended for bringing together and formalizing old ideas on hunger and poverty in a general framework, and for emphasizing the importance of factors other than aggregate food availability (Sijm, 1997).

In fact, this approach helps to understand why certain people suffer from hunger amid a world of plenty.

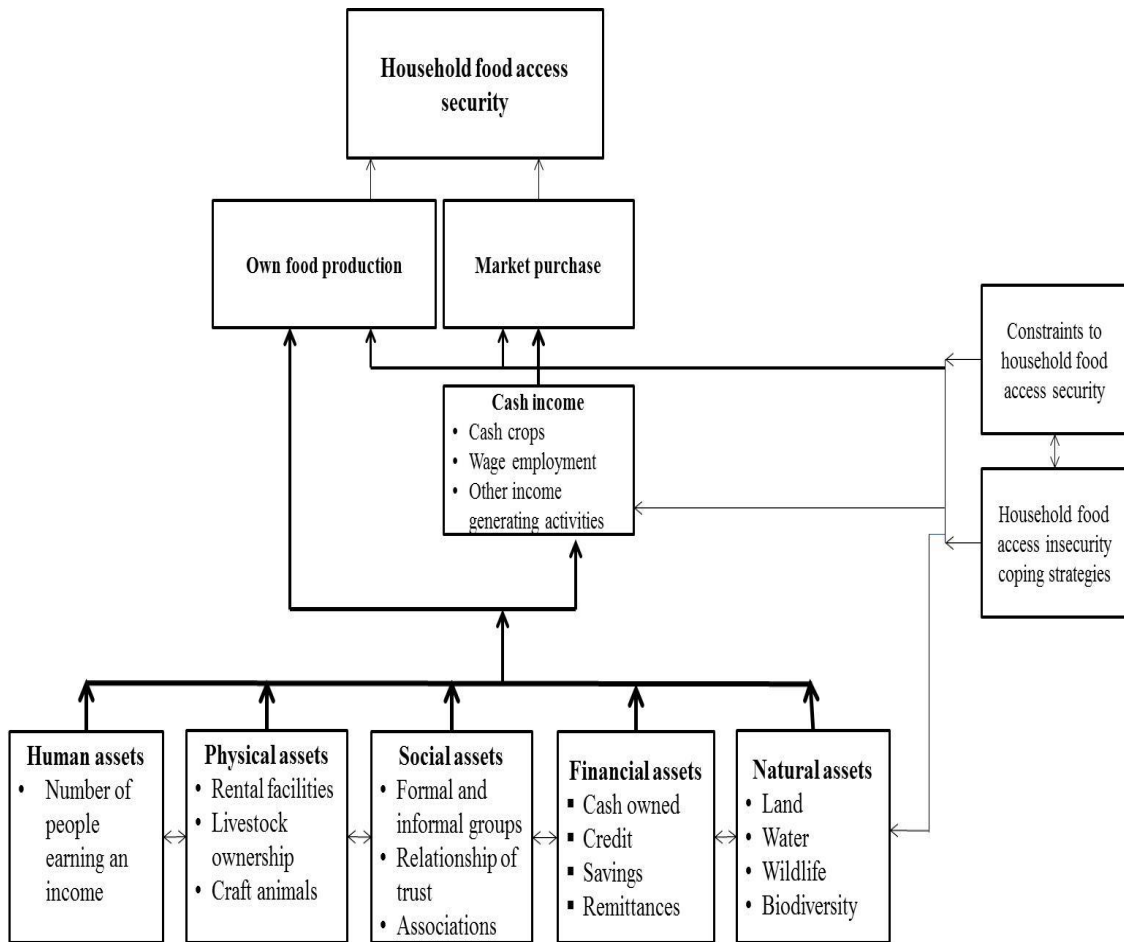
1.9 The Study's Conceptual Framework

The conceptual framework of the thesis is informed by the Entitlement theory of famine by Sen (1981) and the Multi-layered Social Resilience Framework by Obrist *et al.* (2010). Based on the Entitlement theory, households obtain food through: (1) own food production and consumption (including wild food gathering), (2) purchases from the market or (3) in-kind transfers or loan from relatives, members of the community, the government or development partners. In addition, using both the Entitlement and Multi-layered social resilience approaches, a household's ability to access food from these sources is in turn determined by their asset endowment, which defines the set of productive activities they can pursue in meeting their income and food access security objectives. Food access security is also influenced by the food access-related constraints it experiences and the ways in which it copes with food shortages. The detailed relationships among the study variables are shown in Fig. 1.

The dependent variable is household food access security measured by Household Food Insecurity Access Scale (HFIAS). The independent variables are household asset endowments which comprise human, physical, social, financial, and natural assets. Human assets include skills, knowledge ability to labour and good health. Physical assets include material things such as livestock, motorbike, bicycle, and farm size ownership. Social assets encompass membership in formal and informal groups, relationship of trust, and access to wider institutions of society that people draw upon in pursuit of livelihoods. Financial assets entail savings, credit or regular remittances from government, relatives or friends. Natural assets include water, biodiversity, wildlife, and forests. The interaction of

these assets may enable the household to acquire enough food through own food production or generate income to buy food provisions among other household necessities.

Further to the above, a household's food access security is a function of the human, physical, social, financial, and natural assets. Moreover, the ability of a household to access the sufficient food amounts it needs is determined by its asset endowment and by food access-related constraints it experiences and the ability to cope with food shortages and hence improve a household's resilience. Any drastic change in these variables may seriously disrupt production potential or ability to acquire income therefore threatening the food access security of affected households. These shocks not only compromise households' food access security in the short-term but also often lead to the loss of productive assets such as livestock. They also have severe implications for the future productive potential of households and, in turn, their long-term food security.



Source: Adapted from Riely *et al.* (1999)

Figure 1.1: The Study's conceptual framework showing how various factors affect a household's food access security

1.10 Organization of the Thesis

This thesis is organized in six chapters. With exception of chapters one and six, each of the other chapters is organized in a publishable manuscript. Chapter one introduces the context of the study and provides a rationale and the theoretical foundation underpinning this study. Chapter two presents manuscript number one that assesses the prevalence of household food access insecurity along the urban-rural continuum. Chapter three addresses the second specific objective (manuscript number two) which explores the extent to which constraints to achieving household food access security vary in areas categorized as urban, peri-urban and rural. The third manuscript in chapter four examines

coping strategies and resilience to food access insecurity along the urban-rural continuum. Chapter five, which presents the fourth specific objective and manuscript number four, investigates the influence of household's asset ownership on food access security. A summary of the thesis together with conclusions and recommendations are presented in chapter six.

1.11 Study Limitations

Data collection on household food access security relied on specific indicators including measures of household food access insecurity access scale (HFIAS) and ownership of household assets, which depend on the respondent's ability to recall. Generally, recall methods are prone to bias or response errors. Although the questionnaire was translated into Kiswahili at the time of interview, the communication errors brought about by differences in the level of understanding between the enumerators and respondents cannot be ruled out. However, efforts were made to ensure that correct information was collected by a thorough training of enumerators before starting data collection. Also, efforts were made to recruit enumerators who were familiar with the socio-cultural norms of the local people in the study areas.

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CHAPTER TWO

2.0 Prevalence of Households Food Access Insecurity along the Urban-Rural Continuum in Morogoro and Iringa, Tanzania

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2.1 Abstract

The study on which the manuscript is based assessed the prevalence of food access insecurity and identified the socio-economic characteristics of food access insecurity among urban, peri-urban and rural households in Morogoro and Iringa, Tanzania. The study employed a cross-sectional research design whereby a sample of 300 households was selected using a Geographic Information System (GIS)-based simple random sampling procedure. The primary data were collected through interview schedules using the Household Food Insecurity Access Scale (HFIAS) tool. Descriptive analysis was carried out to examine the variation of food access insecurity and socio-economic characteristics among urban, peri-urban and rural households. Ordinal logistic regression model was employed to determine the influence of household's socio-economic

characteristics on food access security. Generally, the results show that food access security was higher among urban households (53.9%) compared to peri-urban (47.3%) and rural households (25.8%) ($p \leq 0.001$). Also, whereas age, education of household head and location of the household were directly associated with food access security, non-employment of the household's head was inversely related with food access security. It is concluded that household food access insecurity is a widespread phenomenon along the continuum although it is more prevalent in rural as compared to urban settings. Thus, it is recommended that appropriate interventions be carried out to improve household food access security mostly in rural areas.

Key words: *Household food access insecurity, Urban-rural continuum, Socio-economic characteristics, Morogoro and Iringa, Tanzania.*

2.2 Introduction

Globally, an estimated 795 million people experienced food insecurity in 2014 (FAO *et al.*, 2015). Food insecurity is defined as a state of 'limited or uncertain ability to acquire acceptable foods in socially acceptable ways' (Crush and Frayne, 2011). This means that just over one in every nine people in the world are currently unable to consume enough food to conduct an active and healthy life. The vast majority of the hungry people live in developing countries, where an estimated 780 million, or 12.9% of people, were chronically underfed during the same time. Nonetheless, the prevalence of undernourishment in these regions has dropped by 44.4 percent since 1990-92. Despite the notable progress, large differences remain across regions, including Southern Asia, Eastern Asia, South-Eastern Asia, Africa and Latin America. According to FAO *et al.* (2015), Sub-Saharan Africa (SSA) remains the region with the highest prevalence with one in four people chronically food insecure.

Regarding Tanzania, basic needs poverty declined from 34.4% to 28.2% between 2007 and 2011/12, and food poverty declined from 11.7% to 9.7% (URT, 2014). These poverty figures were estimated using, respectively, the national basic needs poverty line of TZS 36,482 per adult per month and the national food poverty line of TZS 26,085 per adult per month. Basic needs poverty implies that a person cannot meet his/her basic consumption needs while an extremely poor individual cannot afford to buy basic foodstuffs to meet the minimum nutritional requirements of 2,200 kilocalories (Kcal) per adult per day. Despite this significant progress, extreme poverty is particularly pervasive in rural areas, whereby 1.9 million people as compared to 0.75 million people in urban areas are estimated to be living in extreme poverty (URT, 2014).

The estimates of the proportion of people whose expenditures are below the extreme poverty line in Morogoro and Iringa regions, respectively, were 14 percent and 10 percent in 2011/12 (URT, 2014). Accordingly, it has been revealed that chances of a household being extremely poor are associated with its demographic structure and its socio-economic characteristics (URT, 2014). For example, large households, lower level of education of household head coupled with being economically inactive, and dependence entirely on a natural resource based livelihood such as farming tend to be food insecure. On the other hand, households tend to be food secure when they are part of the formal sector or has a member who receives wages, salaries, or earns an income from business (WFP, 2013).

Urban food insecurity in Africa is emerging as an important development agenda (Crush and Frayne, 2011). This is challenging the long standing thinking that food insecurity is primarily a rural problem requiring a massive increase in smallholder production (AU, 2006; World Bank, 2008). The key argument is that in a continent

undergoing rapid urbanization, the issue of urban food security has been neglected by governments, international agencies, donors, NGOs and researchers. It is from this seemingly opposing development thinking that the current study was undertaken to assess prevalence of household food access insecurity along the urban-rural continuum with inclusion of intermediary stage i.e. peri-urban. Equally, the influence of socio-economic characteristics on household food access security was also sought. The approach of taking the continuum was considered important since it allows for comparison of related variables within similar socio-cultural backgrounds. This has avoided the possibility of selecting subjects from different population backgrounds.

2.3 Urban-Rural Continuum in Morogoro and Iringa

Both Morogoro and Iringa towns are surrounded by vast arable land and are linked with wide road networks. The two towns have experienced rapid growth in both population size as well as area coverage in the last decade (URT, 2013). Much of the surrounding rural areas have been converted into peri-urban conditions and there is high inter linkage of livelihood activities among the people living in these settings (i.e. urban, peri-urban and rural) (Tacoli, 2003). Therefore, the two areas provided excellent study sites for assessing food access security the urban-rural continuum.

Given the complexity of food security, especially in the urban settings, the study findings will be of great aid to the policy makers and other practitioners in designing context-specific strategies for improving food accessibility in the increasing urbanization conditions facing the Tanzanian society and the whole of SSA.

2.4 Defining the Urban-Rural Continuum

The urban-rural continuum (or the merging of town, suburb and country) is a term used in recognition of the fact that generally there is rarely, either physically or socially, a sharp division, or a clearly marked boundary between the three, with one part of the population wholly urban, the other wholly peri-urban and the rest rural (Simon *et al.*, 2006; White *et al.*, 2008). Based on the continuum conceptualization, urban, peri-urban and rural cannot be seen simply as dichotomous entities. They are interlinked and yet distinct from each other. This study aimed to investigate whether this applies to the issues related to household food access as well.

Generally, the demographic and economic criteria on which definitions of urban, peri-urban and rural areas are based can vary widely between different nations, making generalizations problematic (Whitaker, 1983). According to Tacoli (1998), some authors differentiate these areas based on population size and density. Others base their definitions on the availability of services such as post office, tax office, public treasury, banking, running water supplies, electricity, and health and education facilities. However, the combination of criteria applied can vary greatly. Even the population thresholds used can be different. For example, in many African nations, it is 5000 inhabitants, while for most Latin American and European nations it can be as low as 2000 or 2500, or even just a few hundred inhabitants (Tacoli, 1998). In the context of this research, the working definitions of urban, peri-urban and rural areas were established based on relevant reviewed literature (Moustier, 2001; Erenstein *et al.*, 2004; Drechsel *et al.*, 2006). The work of Iaquina and Drescher (2000) strongly helped in the distinction of the urban, peri-urban and rural areas based on theoretical length of travel time (by car) from the town center. Accordingly, urban area is an area within a range of up to five travel minutes from the town center, peri-urban covers an area between 5 and 20 minutes from the town center

and rural area is an area which travel time is more than 20 minutes from the town center. This approach has been applied by Schlesinger (2013) in other medium-sized towns in Africa and has worked well.

2.5 Socio-economic Characteristics of Households and Food Security

Food security, in general, is a complex phenomenon that manifests itself in numerous physical conditions resulting from multiple causes. Food security has four dimensions namely: food availability or supply, food accessibility, food stability and food utilization. Each of these dimensions can be measured by a set of specific indicators at individual, household, and national levels. This research focused on the food accessibility dimension at the household level. This is because according to FAO *et al.* (2015), the main concern in the Sub-Sahara African countries, Tanzania inclusive, is poor food access.

The socio-economic characteristics of individual households have been identified to be among the basic factors influencing the food security status of households (Sanusi *et al.*, 2006). A study in Addis Ababa city found that the socio-economic characteristics that influence household food insecurity status include household size, age and education level of household head, asset possession, access to credit service and access to employment (Gebre, 2012). A study by Babatunde *et al.* (2007) among farming households in Kwara State of North-Central Nigeria found that household income, ability for own production, education status of household head and household size were important in influencing their food access security. Literature (Leyna *et al.*, 2008; Knueppel *et al.*, 2010) has shown factors such as age, marital status, education, occupation, and religion to be important in influencing food security in rural settings of Tanzania. What is very clear from the review of the above studies is that inclusion of the urban-rural continuum in the empirical analyses of factors that influence household food

access has not been attempted, something that makes this study quite unique and important.

2.6 Methodology

2.6.1 Description of the study area

The survey was conducted in Morogoro Municipality, which covered the urban and peri-urban while the rural part extended to two surrounding districts of Morogoro and Mvomero. Morogoro Municipality lies at the base of the Uluguru Mountains and is a center of agriculture in the region. The Municipality is at an altitude of about 500 – 600 meters above sea level and has a bimodal climate with rain falling between November and May including a relatively dry period in January and February. Morogoro Municipality serves as a hub for two major roads and railway networks to the country's hinterlands (southern highlands, central and western parts of the country) to metropolis Dar es Salaam something which facilitates movement of goods and services. Over half of cash income in the study sites is obtained by agriculture and livestock husbandry; and the remainder is obtained from non-farm sources such as wage income, self-employment and remittances (Ellis and Mdoe, 2003).

On the other hand, Iringa Municipality covered the urban and peri-urban part while the rural area extended to two surrounding districts of Iringa and Kilolo. Iringa Municipality is situated between latitudes 7°46' to 7°77'S and longitudes 35°41' to 37°69'E, with an area of about 35 743 km². The area experiences a rainy season between November and May with an annual precipitation ranging between 500 – 1 500 mm. the main economic activity carried out in Iringa Municipality and the surrounding districts include agriculture, livestock husbandry and forestry. According to the recent 2012 Population Census, Iringa Municipality had a population of 256 348, with an average household size

of 4.2 (URT, 2014). Both Morogoro and Iringa Municipalities are facing rapid influx of new residents causing major urban challenges in managing social and economic changes, whereby growing poverty is of particular importance (UN-HABITAT, 2009).

2.6.2 Research design and sampling procedure

A cross-sectional research design was employed whereby data were collected once from sampled households. Households were randomly selected through a multi-stage cluster sampling design. The first stage involved a purposive selection of two sites, namely Morogoro and Iringa Municipalities. These Municipalities were selected based on several criteria. These criteria included high population growth rates and therefore a certain spatial dynamic in and around the towns, a population of 100,000 – 500,000 and because the livelihoods of its inhabitants is influenced by agriculture to some great extent. In stage two, three districts in both sites were purposively sampled to form the urban-rural continuum. Grid cells were then created on maps of the study sites using Geographical Information System (GIS) whereby random sampling was employed to select 10 grid cells each in urban, peri-urban, and rural settings. Further, the GIS-based random sampling was used to select five households in each grid cell. Accordingly, the sample size in each site was 150 households meaning that 50 households were, respectively, sampled in urban, peri-urban and rural settings. A Geographical Information System is a computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface. GIS can help individuals and organizations to understand spatial patterns and relationships. This approach was desired because it avoids human selection biases of locations and households. The sample size was pre-determined by the Livelihood Urbanization and Natural Resources in Africa (LUNA) project, which supported this study by establishing that a sample size of 150 households in each of the

two study areas was sufficient for reasonable analysis, using experience from previous projects (Schlesinger, 2013).

2.6.3 Data collection

Primary data were collected through interview schedules using a structured questionnaire (Appendix 1) whereby both quantitative and qualitative information were sought. The questionnaire included standardized Household Food Insecurity Access Scale (HFIAS) questions consisting of a list of 9 specific questions about accessibility to food in the household during the previous 30 days (Coates *et al.*, 2007). The standard procedure for scoring was used: zero was recorded if the event described by the question had never occurred, 1 point if it had occurred 1 or 2 times during the previous 30 days (rarely), 2 points if it had occurred 3 – 10 times (sometimes), and 3 if it had occurred 10 times (often). For each household, the HFIAS score corresponded to the sum of these points and could range from 0 (food access secure) to 27 (severely access insecure) (Coates *et al.*, 2007). Study respondents were preferably the spouse in charge of food provisioning and cooking in the household or the head of household.

The Household Food Insecurity Access Prevalence (HFIAP) status indicator was used to categorize the interviewed households into four levels of household food access insecurity namely: food secure, mildly insecure, moderately insecure or severely food insecure. Households were categorized as increasingly food access insecure as they responded affirmatively to more severe conditions or experience those conditions more frequently (Table 2.1) (Coates *et al.*, 2007).

Before the questionnaire was administered to a respondent, verbal consent was sought after the local government official had introduced the researcher. Each participant was

made aware that participation was entirely voluntary and that he/she could withdraw at any time if uncomfortable.

Table 2.1: Categories of food access insecurity

Household food insecurity access category	Conditions
Food security	If [(Q1a=0 or Q1a=1) and Q2=0 and Q3=0 and Q4=0 and Q5=0 and Q6=0 and Q7=0 and Q8=0 and Q9=0]
Mildly food insecure access	If [(Q1a=2 or Q1a=3 or Q2a=1 or Q2a=2 or Q2a=3 or Q3a=1 or Q4a=1) and Q5=0 and Q6=0 and Q7=0 and Q8=0 and Q9=0]
Moderately food insecure access	If [(Q3a=2 or Q3a=3 or Q4a=2 or Q4a=3 or Q5a=1 or Q5a=2 or Q6a=1 or Q6a=2) and Q7=0 and Q8=0 and Q9=0]
Severely food insecure access	If [Q5a=3 or Q6a=3 or Q7a=1 or Q7a=2 or Q7a=3 or Q8a=1 or Q8a=2 or Q8a=3 or Q9a=1 or Q9a=2 or Q9a=3]

Source: Adapted from Coates *et al.* (2007)

2.6.4 Data analysis

Data processing involved editing, coding, and entering data by using the Statistical Package for Social Sciences (SPSS) software. Data were generated and presented via frequencies, percentages, means, and standard deviations. Ordinal logistic regression model was used to examine the influence of household socio-economic characteristics on food access security. The dependent variable (Y) was the four HFIAP outcomes, that is, food secure, mildly, moderately, or severely food access insecure. The independent variables included age, sex, education level and main economic activity of the head of household. Others were household size and the location of household (whether the household was located in the urban, peri-urban or rural setting). Ordinal logistic regression model was considered to be the most appropriate for this research because the dependent variable was a ranked one with ordered categories. In addition, the model was

employed because it estimates the net effects of a set of explanatory variables on the dependent variable (Morgan and Teachman, 1988). The ordinal logistic regression model took the following form:

$$P(y) = \frac{e^{\alpha + \beta_1 x_1 + \dots + \beta_k x_k}}{1 + e^{\alpha + \beta_1 x_1 + \dots + \beta_k x_k}} \dots\dots\dots (1)$$

Where $P(y)$ = the probability of the success alternative occurring, e = the natural log, α = the intercept of the equation, β_1 to β_k = coefficients of the predictor variables, and x_1 to x_k = predictor variables entered in the ordinal regression model.

Specifically in this study:

$P(y)$ = the probability of a household being food secure, α = the intercept of the equation, $\beta_1 \dots \beta_k$ = regression coefficients, x_1 = age of household head (in years), x_2 = sex of household head (1=male and 0=female), x_3 = highest education grade attained by household head (number of years of schooling), x_4 = main economic activity of household head (0=none, 1=farming activity, 2=non-farming activities), x_5 = household size (number of people who sleep under the same roof and take meals together at least four days in a week), and x_6 = location of household (2=urban, 1=peri-urban, 0=rural).

2.7 Results and Discussion

Out of the 300 sampled households, only 279 households completed the data collection procedure. Of these households, 132 (or 47.3%) were in Morogoro study site while the remaining households were in Iringa site. Moreover, in Morogoro, 31.1% of the households were situated in urban area compared to 33.3% and 35.6% in peri-urban and rural areas, respectively. On the other hand, 32.7% of the households in Iringa were located in urban settings compared to 33.3% and 34% in peri-urban and rural settings

respectively. Overall, 26% of the households in urban areas were headed by a female as compared to 14% and 22.7% in peri-urban and rural settings, respectively. Generally, the distribution of respondents was equal among the three locations of interests i.e. urban, peri-urban and rural.

2.7.1 Household Demographic Characteristics

Characteristics of household's heads are presented in Table 2.2. The mean age of the household's heads in urban areas was 40.51 ± 12.18 years as compared to 42.12 ± 12.31 and 42.50 ± 12.76 years in peri-urban and rural areas, respectively. Analysis using one way ANOVA test, proved that the mean age of the head of household from the three spatial entities of the continuum were not statistically different ($p > 0.05$). The mean years of schooling for the heads of households in urban areas was 9.19 ± 3.56 as compared to, respectively, 8.63 ± 3.93 and 5.79 ± 3.34 in peri-urban and rural settings. The majority of household's heads in rural areas have not completed seven years of primary school education as compared to their counterparts in urban and peri-urban areas who have gone to post-primary school education ($p \leq 0.001$).¹ One explanation is that in most cases parents in rural areas do not put much emphasis in education as compared to those in urban settings. A report by URT (2014) affirms that the number of unschooled people in Tanzania is higher in rural areas as compared to the urban areas. Also, Table 2.2 shows that the surveyed households had an average of five members per household along the urban-rural continuum. Generally, household size is an important variable which determines the state of household food security and is expected to be inversely related with household food access security whereby an increase in household size implies more

¹ According to the Tanzanian education system, a person spends the first seven years of formal education, which is considered as primary school. Then follows the next four years of ordinary level secondary school and two years of advanced level secondary school (also known as high school), before a person goes to University or other tertiary level education.

people to be fed from the limited resources (Garrett and Ruel, 1999; Beyene and Muche, 2010).

Table 2.2: Distribution of respondents by mean age, education, and household size along the continuum (n = 279)

Variable	Mean (and Standard Deviation)			P-Value
	Urban (n=89)	Peri-urban (n=93)	Rural (n=97)	
Age (Years)	40.42(±12.18)	42.01(±12.31)	42.5(±12.76)	0.517
Years of schooling	9.26(±3.58)	8.84(±4.16)	5.79(±3.33)	0.000*
Household size (persons)	4.72(±2.15)	5.09(±2.12)	5.13(±2.19)	0.365

* indicates the mean difference is statistically significant at $p \leq 0.001$ level.

2.7.2 Main economic occupations

Table 2.3 shows that quite a huge proportion (86.6%) of the household's heads in urban areas were involved in non-farming activities as compared to 75.3% and only 22.7% in peri-urban and rural areas, respectively. On the other hand, rural household's heads were more involved in farming activities (77.3%) compared to 20.9% and 6.7% in peri-urban and urban settings respectively ($p \leq 0.001$). Although, these findings are consistent with the findings of a survey conducted in Tanzania Mainland (URT, 2014), this proportion is somewhat lower than the national statistics. This implies that the number of rural households shifting from farming to non-farming activities is probably increasing.

Table 2.3: Percentage distribution of household's heads based on main economic occupations (n = 279)

Main economic occupation	Urban (n=89)	Peri-urban (n=93)	Rural (n=97)	P - Value
Farming activities	6.7	20.4	77.3	0.001
Non-farming activities	86.6	75.3	22.7	
Unemployed	5.6	4.3	0	

2.7.3 Household food access along the urban-rural continuum

Using the categorical measure of household food access insecurity along the urban-rural continuum, there was a statistically significant relationship ($p \leq 0.001$) between spatial location of the household and its food access security status (Table 2.4). In that respect, household food access insecurity was more prevalent in rural households whereby almost three-quarters (74.2%) had at least a form of food access insecurity as compared to less than half (46%) and about a half (52.7%) of the urban and peri-urban households respectively. In other words, urban and peri-urban households are more food access secure as compared to rural households. Generally, urban households have higher living standards as they have superior endowments in terms of family size and composition, education, assets, and access to services and employment opportunities as compared to rural households (World Bank, 2015). These results are consistent with the findings of a survey conducted in Tanzania Mainland (URT, 2014).

Table 2.4: Percent distribution of households according to their household food insecurity access category along the continuum (n = 279)

Categories of food access security	Urban (n=89)	Peri-urban (n=93)	Rural (n=97)	P-Value
Food secure	53.9	47.3	25.8	0.001
Mildly food-insecure	11.2	17.2	12.4	
Moderately food-insecure	19.1	23.7	34.0	
Severely food-insecure	15.7	11.8	27.8	

2.7.4 Household socio-economic features and food access security

To determine the influence of a household's socio-economic characteristic on the status of its food access, an ordinal logistic regression was employed whereby β -coefficients (positive or negative) were computed to obtain the directions of the predictor variables' impact, as shown in Table 2.5. According to the above analysis, five variables were observed to be statistically significant, indicating that the variables contributed to the

possibility of the households being food access secure. The overall model fit was statistically significant ($X^2 = 44.461$, $p = 0.000$), implying that the model was able to predict a household's food access security. A non-significant p-value of Goodness of Fit ($X^2 = 760.885$, $p = 0.634$) shows that the model fits well with the data, which is the case with this study.

Table 2.5: Influence of socio-economic characteristics variables on household food access security (n = 279)

Variable	B	SE	Wald	df	Sig.	95% C.I for EXP(B)	
						Lower Bound	Upper Bound
Age of household's head	0.021	0.010	4.664	1	0.031*	0.002	0.041
Education of household's head	0.488	0.156	9.846	1	0.002**	0.183	0.793
Household size	0.020	0.055	0.127	1	0.721	-0.089	0.128
Male headed household	0.155	0.279	0.309	1	0.578	-0.392	0.702
Non-employed	-1.707	0.650	6.895	1	0.009**	-2.980	-0.433
Urban setting	0.904	0.303	8.924	1	0.003**	0.311	1.498
Peri-urban setting	0.734	0.294	6.244	1	0.012*	0.158	1.310

** and * indicate statistical significance at $p \leq 0.01$ and $p \leq 0.05$ levels respectively

Age of household head showed a positive and significant association ($p \leq 0.05$) on a household's food access security. This means that as a household head's age increases there is a tendency to have more access to food, and vice versa. This is consistent with other studies by Leyna *et al.* (2008) and Knueppel *et al.* (2010), respectively, in Kilimanjaro and Iringa, Tanzania. It is also consistent with other studies conducted elsewhere in the world (Radimer *et al.*, 1992; Kendall *et al.*, 1995; Studdert *et al.*, 2001; Nnkwe and Yegammia, 2002). Generally, higher age could be attributed to wealth accumulation which is important to improving household food access security.

Education level attained by the household head showed a positive significant effect ($p \leq 0.01$) on a household's food access security. The possible explanation is that a household's head education largely contributes on working efficiency, competency, diversity of incomes, adoption of technologies and generally earning higher incomes than illiterate ones. These results are in conformity with studies conducted by Tingay *et al.* (2003), Hadley and Patil (2006), Hadley *et al.* (2007) and Leyna *et al.* (2008), which reported similar links between education attainment and household's food security. The finding is also consistent with the results of the study conducted by Knueppel *et al.* (2010) in Tanzania and Sanusi *et al.* (2006) in Nigeria. In their study, Sanusi *et al.* (2006) reported that households of secondary school teachers were more food secure than those of the teachers teaching in primary schools. The reason for this is clear, the former are more educated and receive higher pay than the latter.

In addition to the above, the logistic regression results showed that a household's head being not employed was negatively related ($\beta = -1.707$) to a household's food access security. The observation conforms to findings of many studies conducted in developed and developing countries. For example, a study conducted in the slum areas of Bangkok found that households with unemployed household heads were at a greater risk of being food insecure. Similarly, other studies (Sanusi *et al.*, 2006; Leyna *et al.*, 2008; Knueppel *et al.*, 2010; Mende *et al.*, 2015) have come up with similar results.

2.8 Conclusions and Recommendations

This study assessed the prevalence of household food access insecurity along the urban-rural continuum in Morogoro and Iringa, Tanzania. Equally, the study determined the relationship between a household's socio-economic characteristics and its food access security. Based on the findings it can be concluded that household food access insecurity

is a widespread phenomenon along the continuum. However, the proportion of households that are moderately and severely food access insecure is higher among rural households compared to those in the peri-urban and urban areas. Similarly, food access security was found to be higher in urban households as compared to the peri-urban and rural households. In addition, based on the findings of the ordinal regression model, it can be concluded that a household's food access security improves as a household head's age and level of education increase. Moreover, households located in areas regarded as urban and peri-urban are more likely to be food access secure than those situated in rural areas. Similarly, as expected, a household whose head has no employment is likely to experience food access insecurity and vice versa.

Based on the study findings and conclusions it can be recommended that efforts are required to reduce food access insecurity of rural households. It is also recommended that young household heads need to be supported to diversify their sources of income so as to improve food access security of their households. It is further recommended that more education in form of adult education could be provided to less educated household heads to enable them improve their household chances of being food access secure. As food access security among urban households could be linked with improved service provision in urban settings, infrastructure and services such as roads, electricity, and industries should be improved in rural areas so as to open more opportunities for rural households. As expected, household head being not employed was negatively related with food access security. Therefore, it is recommended that more employment opportunities be created and the existing ones be strengthened to supplement what households currently have. Access to jobs helps households to diversify their incomes which in turn improve access to food.

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CHAPTER THREE

3.0 Comparative Analysis of Constraints to Food Security among Urban, Peri-Urban, and Rural Households in Morogoro and Iringa, Tanzania

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3.1 Abstract

Achieving food access security continues to be a challenge in Tanzania. In order to formulate effective policies for reaching this goal, a thorough understanding of the location and constraints to food access security is needed. The study on which the manuscript is based assessed the extent to which these constraints varied along the urban-rural continuum in Morogoro and Iringa, Tanzania. Also, the study assessed the influence of these constraints on households' food access security. A cross-sectional research design was employed whereby 279 households were randomly selected using a multi-stage sampling procedure. A structured questionnaire was used to collect primary data, which were analysed both descriptively and inferentially. The study results reveal great variations in constraints to household food access security along the continuum. In addition, there was a negative significant relationship between household food access

security and variables such as low income ($\beta = -1.358$; $p \leq 0.001$), drought ($\beta = -1.026$; $p \leq 0.01$), limited market access ($\beta = -0.960$; $p \leq 0.05$), and soil infertility ($\beta = -0.950$; $p \leq 0.05$). It is concluded that constraints to household food access security vary significantly along the continuum. Moreover, household food access security is essentially affected by low income, drought, limited market access, and soil infertility. Therefore, coordinated efforts from all sectors of the economy are needed to overcome these constraints and hence improve household food access security.

Key words: *household, food access security, constraints, urban-rural continuum*

3.2 Introduction

A household's food access security is achieved when a household has the opportunity to obtain food with certainty in terms of quantity, quality, safety and in culturally acceptable ways, whether through home production, commercial purchase, or transfers (FAO, 2006). Generally, between 2012 and 2014, access to food improved fast and significantly in countries that had experienced rapid overall economic progress, notably in Eastern and South-Eastern Asia (FAO *et al.*, 2015). Access also improved in countries with adequate safety nets and other forms of social protection in Southern Asia and Latin America. By contrast, countries in sub-Saharan Africa are still experiencing difficulties in achieving sufficient levels of food security. This is also the region with the highest prevalence of undernourishment, with almost one in every four or 220 million hungry people in 2012-14 (FAO *et al.*, 2015). A similar situation applies to Tanzania whereby the average national food insecurity stood at 9.7% in 2011/12 (URT, 2014).

Many studies (Godfray *et al.*, 2010; Premanandh, 2011; Crush *et al.*, 2011; WFP, 2013; Friel *et al.*, 2014; Khan *et al.*, 2014; URT, 2015) have reported different constraints to achieving household food access security worldwide. The more serious fundamental

constraints in developing countries including Tanzania have been found to involve a heterogeneous mix of issues. These include chronic poverty which results from inadequate employment and lack of income generating activities (Dessus *et al.*, 2008; URT, 2015), and continuing population and consumption growth (Godfray *et al.*, 2010). Others include reduced yield of crops due to low productivity of land, labour and other production inputs, and unfriendly climatic conditions (Jones and Thornton, 2003; Fischer *et al.*, 2005; FAO, 2008; Parris, 2008; Khan *et al.*, 2014). Others have included food losses due to rodents, pests and diseases, and poor infrastructure such as poor harvesting, transport and storage facilities (Grolleaud, 2002; Premanandh, 2011; URT, 2015). In addition, the impact of trade liberalisation, unsuitable cropping systems, and lack of access to reliable markets have resulted in household food insecurity (FAO, 1997; Donovan and Massingue, 2007; World Bank, 2008; Oriola, 2009).

From the review of the above literature it is clear that little is known about the spatial variation of constraints to achieving household food access security and its relationship along the urban-rural continuum². Information on spatial variation of constraints to household food access security can be very useful in understanding the dynamics involved and help in proper resource allocation when it comes to intervention targeting (Maxwell *et al.*, 2008). Hence, this study assessed the extent to which constraints to achieving household food access security vary along the urban-rural continuum. Equally, the study assessed the influence of these constraints on household food access security. The findings of this study will assist governments and development partners at both national and local levels to design and implement context-specific policies and programmes to improve household food access security.

² In this manuscript, urban-rural continuum is conceptualized as a spatial location covering areas considered as urban, peri-urban and rural.

3.3 Methodology

3.3.1 Study area

The survey was conducted in Morogoro and Iringa Municipalities and the surrounding peri-urban and rural areas in November/December 2015 and February/March 2016. Morogoro Municipality covered the urban and peri-urban areas while the rural part extended to the two surrounding districts of Morogoro and Mvomero. On the other hand, Iringa Municipality was included with two surrounding districts of Iringa and Kilolo. According to projections from the 2012 Population Census, Morogoro Municipality had a population of 315 866 while Iringa Municipality had a population of 256 348 in 2012. Like in many urban areas in Tanzania, rural–urban migration is one of the most critical issues in these Municipalities. According to Lawi (2013), population growth in small and medium-sized towns such as Morogoro and Iringa results in socio-economic problems notably unemployment, poor provision of social services, including health services, and inadequate clean water, poor sanitation, and high rates of household food access insecurity.

3.3.2 Research design and sampling procedure

The study on which the manuscript is based used a cross-sectional research design whereby data were collected once from 279 sampled households. The sampling unit for this study was a household situated along the urban-rural continuum. A multi-stage sampling procedure was adopted in the selection of the households. The first stage involved a purposive selection of two study sites, namely Morogoro and Iringa Municipalities. This was followed by a purposive sampling of four rural districts in both sites to form the urban-rural continuum. Grid cells were then created on maps of the study sites using the Geographical Information System (GIS). Thereafter, a random sampling method was employed to select 10 grid cells each from the urban, peri-urban, and rural

settings. Five households were randomly selected from each grid cell making a total of 300 households out of which 279 participated in this study. The sample size was determined based on experience from previous similar studies by Schlesinger (2013) and Chagomoka *et al.* (2016). The GIS random sampling approach was more appropriate as it avoids human selection biases of locations and households (Kondo *et al.*, 2014).

3.3.3 Data collection

A structured questionnaire (Appendix 1) was used to collect primary data. The questionnaire included standardized Household Food Insecurity Access Scale (HFIAS) questions consisting of a list of 9 specific questions about accessibility to food in the household during previous 30 days (Coates *et al.*, 2007). Also, information on the main source of food for the household and perceived key constraints to achieving food access security for the household were captured by the questionnaire. Four options were provided, and a respondent was asked to select only one option which he/she considered to be the main source of food for the household. These options were: (1) own food production, (2) purchase from market, (3) donations from relatives, community and government or non-governmental organizations (NGOs), and (4) collection from open places (e.g. uncultivated vegetables and fruits, edible insects and mushrooms). Regarding key constraints to achieving food access security, a list of the constraints was provided and a respondent was guided to tick all the constraints that were applicable to his/her household. The respondent was preferably the spouse in charge of food provisioning and cooking in the household or the head of household. Data was collected between November and December 2015 in Iringa and between February and March 2016 in Morogoro. Generally, the period between November and March is a time of reduced food availability as the food stocks from the previous harvest have been depleted, and consequently many households experience food shortages.

3.3.4 Data analysis

Descriptive statistics including frequencies, percentages, means, standard deviations and cross-tabulations were conducted to establish the status of food access security among the surveyed households including the main source of food for the household and constraints to achieving food access security. Household food access security status was determined by totalling HFIAS scores for each surveyed household. The HFIAS scores could range from zero (food access secure) to 27 (maximum food access insecure) (Coates *et al.*, 2007). A household was considered to be food access secure if its total HFIAS score was less or equal to 11. On the other hand, a household with a total score of more than 11 was regarded as food access insecure (FAO, 2011). Differences in proportions of the main source of food and the constraints were assessed by using chi-square analysis, whereby a p value of ≤ 0.05 was considered significant.

The dependent variable - food access security status - was in the form of a dummy variable that took the value of one denoting food access secure and 0 indicating food access insecure. Household food access security status was estimated as a function of several independent variables as presented in Table 3.1. The binary logistic regression model of the relationship between household food access security status and its explanatory variables is specified as follows:

$$P(Y = 1|X_1 - X_n) = 1/(1 + e^{-(\alpha + \sum\beta_i X_i)}) \dots\dots\dots (1)$$

where P is the conditional probability that household i is food access secure, Y = household food access security status, α = constant term, β_i = coefficient for i^{th} independent variable X , with i varying from 1 to n . The significance of the coefficients β_i was tested with the Wald test, which is obtained by comparing the maximum likelihood estimate of every β_i with its estimated standard error (Hosmer and Lemeshow, 1989; van Den Eeckhaut *et al.*, 2006). By inspecting the sign of a dependent variable's coefficient

estimate, the effect of that variable on the probability of a household being food access secure was determined.

Table 3.1: Description of variables used in the Binary logistic regression model
(n = 279)

Variable	Definition
Dependent variable	
Food access security status (Y)	1 if household is food access secure, 0 otherwise
Independent variables	
Low income (X ₁)	1 if household reported food access insecurity to be caused by low income to buy provisions, 0 otherwise
Limited market access (X ₂)	1 if household reported food access insecurity to be caused by poor market access, 0 otherwise
Rising food prices (X ₃)	1 if household reported food access insecurity to be caused by rising food prices, 0 otherwise
Shortage of farm labour (X ₄)	1 if household reported food access insecurity to be caused by shortage of farm labour, 0 otherwise
Lack of access to farm inputs (X ₅)	1 if household reported food access insecurity to be caused by inadequate and lack of access to agricultural inputs, 0 otherwise
Drought (X ₆)	1 if household reported food access insecurity to be caused by drought, 0 otherwise
Expenditure on non-food items (X ₇)	1 if household reported food access insecurity to be caused by expenditure on non-food items, 0 otherwise
Soil infertility (X ₈)	1 if household reported food access insecurity to be caused by soil infertility, 0 otherwise

3.4 Results and Discussion

3.4.1 Source of food for households

Table 3.2 shows that overall 91% of the surveyed households in urban area sourced most of their food from the market compared to, respectively, under two-thirds (60.3%) and over a quarter (28.9%) of peri-urban and rural households. Likewise, over two-thirds

(70.1%) of rural households derived their food from own food production compared to about a third (33.3%) and a few (9%) of the peri-urban and urban households respectively. The contribution of donations from relatives and friends was negligible in all the three spatial locations. These findings are consistent with a study by the WFP (2013) in Tanzania which found that urban households buy most of their foodstuffs while those in rural areas produce most of what they eat. Generally, an over-reliance on any one food source can adversely affect a household's food access security during times of food shocks. Households that produce much of what they eat will be more vulnerable if there is a drought or major pest damage while households that buy much of their food from the market will be more vulnerable to income and food price shocks.

Table 3.2: Reported main source of food for households along the continuum (in percentages) (n = 279)

Source of food for household	Urban (n=89)	Peri-urban (n=93)	Rural (n=97)
Own food production	9.0	33.7	70.1
Market purchase	91.0	60.3	28.9
Donations	0.0	0.0	1.0

Chi-Square value = 82.250; p-value \leq 0.001

3.4.2 Constraints to household food access security along the urban-rural continuum

Overall, there was a significant relationship between constraints to achieving household food access security and spatial location of the household along the urban-rural continuum. Table 3.3 shows that a household's food access security in the urban settings had a greater incidence of being constrained by low income than those in the peri-urban and rural settings ($p \leq 0.01$). Likewise, food access in urban and peri-urban households

had greater incidence of being affected by rising food prices and expenditure on non-food items (both at $p \leq 0.001$) as compared to rural households.

On the other hand, food access security in rural households was reported to be affected more by inadequate and lack of agricultural inputs, drought and soil infertility ($p \leq 0.001$). Constraints such as limited market access and shortage of farm labour affected food access security more in peri-urban and rural households as compared to urban households. The possible explanation is that urban dwellers in many cities and towns of developing countries buy much of what they eat and rural dwellers depend more on own food production (Maxwell *et al.*, 2000; Ruel and Garrett, 2004; Dessus *et al.*, 2008; URT, 2015), something which shakes their food access security when household income and food prices change. Also, it could be due to less developed infrastructure and services such as roads, transportation system and communication, which affect food access security mostly in rural and peri-urban areas. These results are in conformity with studies by Maxwell *et al.* (2000), Ruel and Garrett (2004), Crush and Frayne (2011) and Tacoli *et al.* (2013), which have also reported similar results in both urban and rural settings.

Table 3.3: Constraints to achieving food access security in households along the continuum (n = 279)

Constraint	Affirmative responses (%)			P-Value
	Urban (n=89)	Peri-urban (n=93)	Rural (n=97)	
Low income	67.4	43.5	52.6	0.005
Rising food prices	59.6	50	13.3	0.000
Limited market access	7.9	21.7	16.3	0.034
Shortage of farm labour	0.0	5.4	2.8	0.028
Lack of access to agricultural inputs	6.7	7.6	23.7	0.000

Drought	7.9	19.8	54.6	0.000
Soil infertility	7.9	13	30.6	0.000
Expenditure on non-food items	23.9	28.6	3.1	0.000

3.4.3 Factors influencing household food access security

The binary logistic regression results in Table 3.4 show the factors influencing household food access security status. Four variables among the eight were observed to be statistically significant. The overall model fit was statistically significant ($\chi^2 = 40.724$, $p \leq 0.000$ with $df = 8$) implying that the model was able to predict a household's food access security status. The Wald values demonstrated the relative contribution of individual variables to the odds probability of the household being food access secure. The regression model estimates factors that are significantly associated with a household's increased odds of having food access security.

The results in Table 3.4 show an inversely significant relationship ($\beta = -1.358$; $p \leq 0.001$) between low income and a household's food access security suggesting that low income reduces chances of a household to have food access security. Studies (Maxwell *et al.*, 2000; Ruel and Garrett, 2004; Crush and Frayne, 2011; Tacoli *et al.*, 2013 and Cochrane and D'Souza, 2015) conducted in Tanzania and elsewhere in the world have also reported an inversely significant relationship between lack of income and food access security in many poor households. Generally, lack of income prevents households not only from buying enough food for its members but also from being able to produce adequate food for the entire period of the year. Consequently, this leads to increased food insecurity in the households.

Table 3.4: Binary logistic regression results of factors affecting household food access security status (n = 279)

Variable	B	S.E.	Wald	Df	Sig. level	Exp(B)	95.0% C.I. for EXP(B)	
							Lower	Upper
Low income	-1.358	0.318	18.188	1.000	0.000***	0.257	0.138	0.480
Lack of access to farm inputs	-0.547	0.493	1.231	1.000	0.267	0.579	0.220	1.520
Drought	-1.026	0.404	6.444	1.000	0.011**	0.358	0.162	0.791
Rising food prices	0.323	0.310	1.084	1.000	0.298	1.381	0.752	2.537
Limited market access	-0.960	0.442	4.717	1.000	0.030**	0.383	0.161	0.911
Shortage of farm labour	-1.499	1.091	1.888	1.000	0.169	0.223	0.026	1.895
Soil infertility	-0.950	0.480	3.912	1.000	0.048**	0.387	0.151	0.991
Expenditure on non-food items	-0.692	0.403	2.953	1.000	0.086	0.500	0.227	1.102
Constant	0.343	0.343	1.002	1.000	0.317	1.410		

Overall model fit ($\chi^2 = 40.724$, $p \leq 0.000$ with $df = 8$); *** and * indicate levels of significance at $p \leq 0.001$, $p \leq 0.05$ respectively.

Drought was found to have a negative significant relationship ($\beta = -1.026$; $p \leq 0.05$) with a household's food access security. This implies that drought increases the chances of food access insecurity particularly in households which rely entirely on rain-fed subsistence farming. Inadequate rain undermines farm yields, reducing household food availability, and agricultural income derived from crop sales (Burke *et al.*, 2006). In addition, poor harvests threaten households' food access status to varying degrees according to the extent that a household depends on agriculture for its food and income. Drought is also likely to trigger rise in food prices due to shortage of food in markets (Eriksen *et al.*, 2005; Friel *et al.*, 2014). As a consequence both peri-urban and urban households who rely on markets for their food access can also be affected. These results compare well with the findings by several studies on drought and food security in developing countries (Devereux and Tiba, 2007; Schmidhuber and Tubiello, 2007).

Limited market access coefficient also exerted a negative and statistical significant effect ($\beta = -0.960$) on the dependent variable. It was observed that infrastructure and services such as roads and transportation network were less developed in many parts of the study sites. Poor infrastructure delays information transfer between producers and markets and increases the cost of transporting produce and inputs (such as fertilizers). Studies by Wrigley *et al.* (2003) and Guy (2004) have also found that location isolation which relates to poor road quality and long distances to markets and other basic social facilities is one of major causes of household food access insecurity in many parts of developing countries. Poor infrastructure leads to high cost of transportation which in turn is reflected in high prices of food in deficit areas and therefore affecting access to food by low income rural as well as urban and peri-urban households.

Soil infertility too showed a negative and significant association ($\beta = -0.950$; $p \leq 0.05$) with a household's food access security status. Generally, the main source of food for households particularly those in rural areas is own food production. Therefore, declining soil fertility means not only less food is grown but also production of cash crops and income are endangered consequently resulting into household food access insecurity. The finding is in conformity with a study by Swai *et al.* (2015) which attested that declining soil fertility is an influential factor contributing to household food insecurity in the central semi-arid regions of Tanzania. Moreover, studies by Sanchez (2002), FAO (2004), and Henao and Baanante (2006) have also reported that depletion of soil fertility is a major biophysical cause of low per capita food production, a factor directly related to food access insecurity.

3.5 Conclusions and Recommendations

The study on which this manuscript is based assessed the extent to which constraints to household food access security varied along the urban-rural continuum in Morogoro and Iringa, Tanzania. Equally, the study assessed the influence of these constraints on households' food access security. Based on the findings it is concluded that food access security among urban and peri-urban households is greatly constrained by low income, higher food prices, and expenditure on non-food items. On the other hand, household food access security in rural settings is mainly affected by limited market access, shortage of farm labour, lack of access to agricultural inputs, drought, and soil infertility. Using binary logistic regression model, constraints such as low income, drought, limited market access, and soil infertility had an inversely significant effect on household food access insecurity along the continuum.

Since constraints to households' food access security vary greatly along the urban-rural continuum, interventions to improve food access security should adequately address these variations. As low income affects household food access security, programmes aimed at boosting household's income should be promoted along the continuum. Specifically, more employment opportunities should be created and the existing ones be strengthened to supplement what households currently have. Farmers should be supported to grow drought-tolerant crop varieties such as cassava, pearl millet, cowpea, groundnuts and sorghum. Affordable irrigation farming should be promoted whenever possible which may include water-use-efficient techniques such as simple and affordable drip-irrigation. The effect of limited market on household food access security confirms the need to improve infrastructure and communication services such as roads, and transportation system to ease movement of agricultural inputs and produce. The effect of soil infertility implies that agricultural extension services should integrate the use of sufficient quantities

of manure or fertilizers to replenish the soils. Affordable soil fertility replenishment approaches, which use resources naturally available in the community, should be developed and farmers should be encouraged to apply them in their fields.

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CHAPTER FOUR

4.0 Coping Strategies and Resilience to Food Insecurity along the Urban-Rural Continuum of Morogoro and Iringa, Tanzania

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4.1 Abstract

Food access insecurity is a worrying challenge worldwide with sub-Saharan Africa including Tanzania being the most affected. Although factors that influence household food access security and ways of coping with such factors have been examined, little has been reported on how these coping strategies vary along the urban-rural continuum especially in medium-sized towns. The study on which this manuscript is based assessed whether food access insecurity strategies employed by households are similar along the urban-rural continuum. In addition, the study assessed whether the above-mentioned strategies contribute to building and improving households' resilience to food access insecurity. The study employed a cross-sectional research design whereby a sample of 279 households was drawn using a multi-stage sampling procedure. Primary data was the key source of information for the study and was collected using a structured

questionnaire. Data were analysed mainly descriptively. Chi-square test (X^2) was performed to assess the relationship between each employed coping strategy and the spatial location of the household. Additionally, the Multi-layered social resilience framework was employed to determine whether these strategies contribute to improving household's resilience to food access insecurity. Results show that the surveyed households use a number of coping strategies, most of which vary significantly from one spatial entity to another. Results also show that these strategies do not improve households' resilience to food access insecurity as they erode household's own resilience. Thus, it is concluded that food access insecurity coping strategies vary greatly among households along the urban-rural continuum. In addition, the surveyed households employ mainly reactive strategies, which may not be considered as proper in the realm of resilience building. It is hereby recommended that poor households, particularly in those rural areas be supported to diversify their incomes so as to be able to employ resilient building strategies when they experience food shortages.

Keywords: Household food access insecurity, coping strategies, resilience, rural-urban continuum

4.2 Introduction

Before the early 1980s, global challenges of food insecurity were viewed almost exclusively as a rural phenomenon, and most of the international focus was directed on rural farming (Misselhorn, 2004; Hendriks, 2005; Aliber and Hart, 2009; Mat she, 2009; Altman *et al.*, 2010; Crush *et al.*, 2011). Nevertheless, the dramatic growth of cities in the developing world combined with steep increases in food prices that started in 2008 and climate change have not only endangered livelihoods and food security in rural areas but also in peri-urban and urban settings (Zezza and Tasciotti, 2010; Tawodzera *et al.*, 2012). The fact that population in and around African cities is growing faster than the provision

of social services including food (UN-HABITAT, 2014), calls for a critical analysis of potential food insecurity challenges concerning not only urban but also peri-urban and rural dwellers and how these populations would cope with these challenges.

Generally, literature shows that food insecurity is largely a “managed process”, meaning that people are not passive victims but rather are active participants in responding to the risks they face (Radimer *et al.*, 1992; Coates *et al.*, 2007). Studies in several developing countries have documented that households employ a range of coping strategies during times of food insecurity (Liwenga, 2003; Verpoorten, 2009; Floro and Swain, 2013; Kuuire *et al.*, 2013; Agada and Igbokwe, 2014; Amendah *et al.*, 2014; Gebrehiwot and van Der Veen, 2014). However, these strategies vary from one location to another and also over time according to choices, objectives, opportunities and constraints (Siri *et al.*, 2005; Chagomoka *et al.*, 2016). For example, the poorest households in Kilindi, Muleba and Ngorongoro districts in Tanzania, have been reported to resort to severe coping strategies such as stopping children from going to school and temporal migration (URT, 2012). In Rukwa region, households were reported to use reduction of food consumed, borrowing money from relatives, selling labour for food or money to buy food, and gathering wild edible plants (Hadley *et al.*, 2007). Rural households in Iringa and Kilimanjaro regions are known to rely on less preferred and quality foods and eating fewer meals per day during periods of food shortage (Leyna *et al.*, 2007; Knueppel *et al.*, 2010). In the city of Dar es Salaam, borrowing money and taking less preferred foods were the most common food insecurity coping strategies among people living with HIV/AIDS (Semali *et al.*, 2011).

Despite the above-mentioned observations, little is known on how these strategies vary along the urban-rural continuum³ in medium sized towns⁴ in Tanzania. Moreover, there is insufficient literature about whether these strategies really contribute to building and improving households' resilience to food access insecurity. According to Maxwell *et al.* (2008), variation in the food access insecurity coping strategies from one spatial entity to another can serve as a useful indicator for predicting and understanding shortfalls in achieving adequate food, and for allocating resources or tracking the impact of interventions. The study on which the manuscript is based examined the variation of coping strategies to households' food access insecurity along the urban-rural continuum in medium-sized towns. Equally, the contribution of these strategies towards building and improving households' resilience to food access insecurity was investigated.

The study findings are expected to provide researchers and policy-makers with fresh insights into the debate on the extent to which food access insecurity coping strategies vary among households located in places categorised as urban, peri-urban and rural. In addition, an understanding of the implications of these strategies on households' resilience to food shortage can facilitate formulation of more effective and appropriate interventions for strengthening food access security.

4.3 Multi-layered Social Resilience Framework in the Context of this Study

Based on the above section, it is evident that households employ different types of food coping strategies when they do not have enough to eat. As noted above, the most common food coping strategies include eating foods that are less preferred, limiting portion size,

³ Urban-rural continuum, as conceptualized in this study, refers to a spatial location comprised of urban, peri-urban, and rural settings.

⁴ A medium-sized town refers to an urban area with less than 500,000 inhabitants.

reducing number of meals, and skipping eating for a whole day. Others are borrowing money, selling household assets, and working for food or cash. Given the fact that the frequencies of strategies vary from one household to another and also from place to place, an important question is whether these strategies contribute to building household's resilience to food access insecurity.

The underlying theoretical framework of this assessment is the 'Multi-layered Social Resilience' as put forward by Obrist *et al.* (2010). This framework borrows heavily from ecological (Holling, 1973; Folke *et al.*, 2000; Carpenter *et al.*, 2001), psychological (Luthar, 2003; Masten, 2001) and socio-anthropological approaches (Bourdieu, 1984), as well as the sustainable livelihoods framework (DFID, 1999). Adapting the definition by Obrist *et al.* (2010) to the context of this study, resilience is defined as a household's capacity to not only cope with and adjust to a threat ("reactive" capacities), but search for and create options ("proactive" capacities), and thus develop increased competence and hence create pathways for mitigating or even overcoming the threat. Whereas 'reactive capacities' refers to direct reactions towards a threat that is taking place or has just taken place, 'proactive capacities' are understood as abilities such as anticipating threats, changing rules and regulations, creating new options, planning ahead and recognising danger. Therefore, according to Obrist *et al.* (2010), the capacity of a household to access capitals so as to both cope with and actively avoid a threat (e.g. food access insecurity) is known as resilience.

Generally, resilience building is determined by the access to and ownership of capitals, notably human, physical, financial, social and natural capitals. According to DFID (1999), human capitals encompass skills, knowledge, ability to labour and good health. Physical capitals include basic infrastructure and materials (livestock ownership and

rental facilities such as motorbikes and vehicles). Social capitals entail social resources such as membership to formal and informal groups, relationships of trust, and access to wider institutions of society that people draw upon in pursuit of livelihoods. Financial capitals include cash money, savings, supplies of credit or regular remittances and pensions. Natural capitals include aspects such as land, water, wildlife, biodiversity and other environmental resources.

In the context of this study, coping with food access insecurity by employing 'reactive capacities', notably eating less preferred quality food, limiting portion size, reducing number of meals, having a strict budget on food items, working for food or cash, making and selling charcoal, firewood, local beer, and livestock is not regarded as resilience building. On the other hand, the ability to anticipate household's food access insecurity situation and thus employ 'proactive capacities' such as creating addition source of income, growing drought-resistant crops, and buying enough food in bulk when food prices are low is regarded as resilience building.

The Multi-layered Social Resilience Framework was considered appropriate for this study because of several factors. First, it recognizes capitals such as human, physical, social, financial and natural capitals as prerequisite for resilience building. Second, it recognizes that people's resilience depends on the type of threat they face. The risk may be environmental (e.g. landslides), individual (victim of violence), community-based (threat of eviction), related to a life event (serious illness or death of a relative), or a long term threat (continuous food access insecurity). It also recognizes that resilience building is a process involving social networks ranging from individual, household, community, national and international levels. Lastly, this framework provides researchers and policy-makers with a solution-oriented way of thinking about population at risk.

4.4 Research Methodology

4.4.1 Description of the study area

This study was carried out in Morogoro and Iringa Municipalities including two rural districts surrounding each Municipality. The Municipalities covered urban and peri-urban areas while the rural part extended to Morogoro and Mvomero districts in Morogoro; and Iringa and Kilolo districts in Iringa. Morogoro Municipality is a town with a population size of 315 866 (URT, 2014) located in the eastern part of Tanzania about 200 kilometers west of the city of Dar es Salaam, the country's largest commercial center. Morogoro Municipality is bordered to the East and South by Morogoro District and to the North and West by Mvomero District. Iringa Municipality has a population size of 256 348 (URT, 2014) and is situated about 492 kilometers south-west of the City of Dar es Salaam. It is bordered to the North, East and West by the Iringa District and to the South by the Kilolo District.

Morogoro and Iringa municipalities are facing rapid influx of new residents causing major challenges in managing social and economic conditions with growing poverty. Infrastructure and services such as roads and transportation network are less developed in many parts of the study sites something which prevents both producers and consumers from accessing markets easily. Food stores are high following maize harvest in June but often become depleted from December before the next harvest season. The months before harvest, called the 'hungry' or 'lean' season, are often the time period when households experience devastating food insecurity.

4.4.2 Research design and sampling approach

A cross-sectional research design was used whereby data were collected once from sampled households. The targeted population was all households located along the urban-

rural continuum in Morogoro and Iringa. Households were selected through a three-stage cluster sampling procedures. In stage one, purposive sampling technique was employed to select two study sites namely Morogoro and Iringa Municipalities. In stage two, two districts in each site were purposively selected to form the urban-rural continuum. These districts are Morogoro and Mvomero in Morogoro, and Iringa and Kilolo in Iringa. Lastly, a sample of 150 households in each site (i.e. 50 households each, respectively, from urban, peri-urban and rural settings) were selected using the Geographical Information System (GIS). Accordingly, out of a sample of 300 households, 279 households participated in data collection. Experience from previous similar studies by Schlesinger (2013) and Chagomoka *et al.* (2016) established that a sample of 150 households in each of the study sites was sufficient to allow for a meaningful analysis.

4.4.3 Data collection and analysis

Primary data was the key source of information for this study and was collected using a structured questionnaire (Appendix 1) that included both quantitative and qualitative information. Quantitative questions inquired about access to food in the household during the previous 30 days. The Household Food Insecurity Access Scale (HFIAS) tool was used to collect the access component of food security (Coates *et al.*, 2007; Becquey *et al.*, 2010). Qualitative questions investigated the ways in which households cope with food insecurity situations. Respondents, who were preferably the spouses in charge of food provisioning and cooking, were guided to recall all the coping strategies they employed during the times of food shortage. Data was collected between November and December 2015 in Iringa and between February and March 2016 in Morogoro. According to WFP (2013), the two time periods represent peak seasons of food shortage in the respective areas.

At the end of data collection, the information was checked for completeness and consistency before coding into computer using Statistical Package for Social Scientists (SPSS) software. Analysis took the form of descriptive statistics including frequencies, means, standard deviations and cross-tabulations to describe status of food access security, characteristics of sampled households, and the types of food insecurity coping strategies. Descriptive analysis was chosen because of its ability to organize and compare the vast amount of data in a more manageable form. Chi-Square test was performed to determine whether there was any significant relationship between each employed coping strategy and the spatial location of the household at $p \leq 0.05$. The status of food access security was determined by computing the HFIAS score for each sampled household. The minimum HFIAS score is 0 and the maximum score 27. The higher the score, the more food access insecurity the household experiences and vice versa (Coates *et al.*, 2007). A household was considered to be food access secure if its total HFIAS score was less or equal to 11, and food access insecure if its total score was more than 11 (FAO, 2011).

4.5 Findings and Discussion

4.5.1 Food access insecurity coping strategies along the urban-rural continuum

Using Chi-square test (X^2), it was noted that the surveyed households use a number of coping strategies most of which vary significantly from one spatial entity to another (Table 4.1). The proportion of households consuming foods which they did not prefer due to lack of resources was relatively higher in rural settings compared to urban and peri-urban areas ($p \leq 0.001$). Similarly, more rural households were consuming fewer meals per day as a way of coping with food access insecurity compared to urban and peri-urban households ($p \leq 0.01$). One explanation is that on average the surveyed rural households rely heavily on rain-fed subsistence farming, something which lowers their

food security status especially when there is crop failure. Studies (Hadley *et al.*, 2007; Regassa, 2011; Gupta *et al.*, 2015; Chagomoka *et al.*, 2016) have reported similar results. Since these strategies are likely to have negative effects on the nutritional status of household members, it implies that rural households are less resilient to food shortage as compared to the urban and peri-urban households.

Table 4.1: Percentage of households undertaking various household food insecurity coping strategies along the urban-rural continuum

Food insecurity coping strategy	n	Urban	Peri-urban	Rural	P – Value
Relying on less preferred foods	181	23.2	32.0	44.8	0.000***
Eating a limited variety of foods	95	31.6	26.3	48.5	0.113
Eating fewer meals per day	68	20.6	30.9	48.5	0.003**
Work for food or money	46	15.2	21.7	63.0	0.000***
Undertake income-generating activities	81	27.2	27.2	45.7	0.049*
Buying food in bulky	6	66.7	33.3	0.0	0.108
Having a strict budget for food	41	41.5	48.8	9.8	0.001**
Selling livestock	8	0.0	25.0	75.0	0.036*

Note ***, ** and *, respectively, indicate statistical significance at $p \leq 0.001$, $p \leq 0.01$ and $p \leq 0.05$ levels.

It was noted that nearly two thirds (63%) of the surveyed households in rural areas work for food or money to buy food compared to slightly less than a quarter (21.7%) of peri-urban and a few (15.2%) of urban households ($p \leq 0.001$). Whereas most rural household members sell their labour in agricultural related activities such as farming in other people's plots, their counterparts in urban and peri-urban areas engage mostly in non-agricultural activities such as providing skilled and unskilled labour in construction sites. These activities are highly labour-intensive with very little pay something which makes these labourers less resilient to food shortage among other necessities. These results are in conformity with those of the study by Liwenga (2003) which found that poor households sell their labour in order to get money to buy food.

Also, Chagomoka *et al.* (2016) reported that poor women in poor rural households in the northern region of Ghana sometimes work as crop harvesting labourers to get money to buy food for their households.

Nearly half (45.7%) of the surveyed rural households reported to have engaged in income-generating as compared to about a quarter (27.2%) of urban and peri-urban households as a way of coping with food access insecurity ($p \leq 0.05$). Most rural households confirmed being involved in making and selling charcoal, firewood and brewing local beer from maize and millet to generate income to buy food and other necessities. One explanation is that the livelihoods of most poor rural households depend on natural resources for both their income and food. Thus, it is a common practice to resort to forest products such as firewood and charcoal making especially during times of hardship. Similarly, selling of local beer is more practiced in rural areas simply because its main ingredients, notably maize and millet cereals, are easily accessible especially during harvesting season. On the other hand, most of urban and peri-urban households, particularly women and youth, reported engagement in small-scale gardening and food vending. The main reason is that urban and peri-urban households source much of their food through the market something which facilitate the growth of such businesses.

The main implication of the above findings is that rural households are likely to be less resilient to food shortage due to their engagement in such unsustainable activities. Likewise, the resilience of urban and peri-urban household members is at stake as more and more of such open spaces and road reserves are likely to be used for construction and other development activities. Studies by Liwenga (2003) and Khatri-Chhetri and Maharjan (2006) have also reported that rural households engage in selling charcoal, firewood and local beer as a way of coping with food shortages. Likewise, Floro and

Swain (2013) noted that women engage in income generating activities such as selling cooked food in order to get money to buy food in times of household food shortages. Similar results have also been reported by Hovorka *et al.* (2009) who assert that women from urban low-income households contribute to food security through activities such as urban farming among others during times of food insecurity.

The results in Table 4.1 further show that many urban households cope with food shortage by having a strict budget on food and non-food items through buying and consuming only necessities compared to peri-urban and rural households ($p \leq 0.01$). The kinds of foods reported as unnecessary and hence reduced or omitted from meals during the difficult moments include fruits, juice, cold drinks (soda), fish, meat and chicken. Unlike peri-urban and rural households, most poor urban households do not have access to wild edible plants and animals, firewood to sell or make charcoal. Therefore, they are forced to rely on strict food budgeting. These results compare well with the findings by several studies on food insecurity coping strategies in urban areas in developing countries (Kraak *et al.*, 1999; Hadley *et al.*, 2007; Maxwell *et al.*, 2008).

Peri-urban and rural households reported to sell livestock, mostly chicken, during times of food shortage as compared to urban households ($p \leq 0.05$). Livestock keeping is mostly practiced in peri-urban and rural areas because such areas offer enough space to raise animals. Livestock keeping can be regarded as resilience building only if it is practiced in such a way that it supports the household to obtain food throughout the crisis. Consequently, households in peri-urban and rural settings are less resilient to food access insecurity as compared to their counterparts in urban settings. Selling livestock was cited as one of the coping strategies in Central Tanzania to buy food (Liwenga, 2003). Elsewhere, the works of Quaye (2008) in Ghana and Yaffa (2013) in the Gambia have

also reported use of livestock as fall-back asset during time of food shortages. The study by Verpoorten (2009) in Rwanda had similar results although it did not explain the extent to which the sale of livestock varied among urban, peri-urban and rural households.

Based on the Multi-layered Social Resilience Framework, all the food coping strategies employed by the surveyed households are mainly reactive; they are direct reactions towards a threat (i.e. food shortage) that is taking place. First, eating less preferred quality food, limiting portion size, reducing number of meals and having a strict budget on food items have negative repercussion on nutritional status of household members notably children, the elderly and the sick by eroding their health. Secondly, working for food or cash denies most household members an opportunity to work on their own fields and hence perpetuating a food insecurity cycle (Ntwenya *et al.*, 2015). Thirdly, making and selling charcoal or firewood, and making of local beers from maize and millet cereals tend to erode household resilience by destroying the environment, putting people's health at risk and depleting food reserves.

A negative resilience implication of these strategies is the fact that households cope with food shortage by eroding their own resilience. Indeed the resilience of these households is at risk because resilience is more than just coping in the sense of minimizing the consequences of an adversity and managing vulnerability to ensure short-term survival (Obrist *et al.*, 2010). In this case coping with a threat by eroding own resilience notably eating less quality food, limiting portion size, reducing number of meals, working for food or cash, trading firewood, charcoal, local beers and food may not be considered as proper in the realm of resilience building process.

4.6 Conclusions and Recommendations

The study on which this manuscript is based examined the variation of coping strategies to households' food access insecurity along the urban-rural continuum in medium-sized towns. Equally, the contribution of these strategies towards building and improving households' resilience to food access insecurity was sought. Based on these objectives and the study findings, it is concluded that food access insecurity coping strategies vary significantly from one spatial entity to another in terms of frequency. The knowledge on how households differ along the urban-rural continuum in coping with food insecurity is useful for geographical targeting and resource allocation in planning interventions. Many rural households cope with food access insecurity by relying on less preferred and quality foods, consuming fewer meals per day, undertaking work for food or money, performing farm and off-farm activities, and selling of fall-back assets compared to urban and peri-urban households who mostly rely on strict food budgets.

Also, based on the Multi-layered Social Resilience Framework, it can be concluded that the surveyed households cope with food access insecurity by using mainly reactive strategies. The negative implication of these strategies is that they erode household's own resilience to food access insecurity. First, fewer and low quality foods coupled with strict budgets could have put households' health at risk. Secondly, spending much time selling labour for cash or food could further perpetuate food insecurity cycle as household members will not have sufficient time to work on their own fields. Thirdly, making and selling charcoal, firewood, and local beer, as well as cultivating and selling foodstuffs in informal places are not resilience building because these activities destroy the environment and deplete food reserve base.

Based on the above conclusions, the following are recommended. Poor households particularly those in rural areas should be supported to, among other things, diversify farming activities with other sustainable and viable non-farming activities so as to increase household's income and eventually improve their food access security. During times of food shortages, households should be sensitized and supported to employ food access insecurity coping strategies which do not erode their resilience.

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CHAPTER FIVE

5.0 Household Assets and Food Security in and around Medium-Sized Towns: Some Insights from Morogoro and Iringa, Tanzania

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5.1 Abstract

The study on which the manuscript is based assessed the extent to which household assets varied in urban, peri-urban and rural areas. In addition, it determined the relationship between ownership of assets in a household and its food access security. A cross-sectional research design was employed, and a three-stage sampling technique was used to draw a sample of 279 households from Morogoro and Iringa. Primary data were collected through interviews using a structured questionnaire. Descriptive analysis was carried out to examine the extent to which household assets varied in urban, peri-urban and rural locations. Econometric analysis was used to assess the influence of household assets on food access security. Descriptively, the results show that ownership of assets varied significantly among households located in places regarded as urban, peri-urban and rural.

In addition, binary logistic regression model results show that a household head's education ($\beta = 0.213$; $p \leq 0.01$) and number of household members earning income ($\beta = 1.115$; $p \leq 0.05$) had a positive and significant effect on a household's food access security. On the other hand, household size ($\beta = -0.408$; $p \leq 0.05$), proportion of consumption expenditure on food ($\beta = -0.151$; $p \leq 0.001$) and dependence on donations ($\beta = -3.770$; $p \leq 0.01$) had a negative effect on a household's food access security. It can be concluded that the household's asset ownership vary greatly in urban, peri-urban and rural areas. Moreover, food access security tends to improve as a household head's education and number of members earning income in a household increase. However, food access security worsens as household size, the proportion of consumption expenditure on food, and reliance on donations increase. Based on the conclusions it can be recommended that households should focus on things that improve their food access security and control those that weaken their food access security.

Keywords: Food access security, household asset ownership, urban, peri-urban and rural areas

5.2 Introduction

The conceptual understanding of food insecurity has gradually evolved since the late 1970s to include not only transitory problems of inadequate supply at national and global levels but also chronic problems of inadequate access at the household level (Maxwell, 1996; Frankenberger *et al.*, 1998; Crush and Frayne, 2011). The limitations of the food supply focus came to light during the food crisis that plagued Africa in the mid-1980s. It became clear that adequate food availability at the national level did not automatically translate into food security at the individual and household levels. After realizing that sufficient food is often available even in the midst of devastating famine and acute hunger, researchers argued that food was not accessible because households lack access to

the necessary resources to acquire food (Sen, 1981; Maxwell, 1996). Nevertheless, the contribution of these resources to food access security varies from one household to another and from location to location depending on the options available, and the household's wealth status (von Braun *et al.*, 1992; Barrett *et al.*, 2001). According to Hoddinott (2012), access to resources such as farm land, active labour, forests, grasslands and water resources is a major determinant of the productive capacity of food-producing households whereas access to income-generating activities is a major determinant of ability of households to purchase food.

Generally, households' income generating and food production possibilities are directly affected by the socio-economic characteristics of such households and their members. For example, studies (Babatunde *et al.*, 2007; Agada and Igbokwe, 2014) conducted among farming rural households in Nigeria affirm that household income, ability for own food production, education status of household head and household size are important assets in influencing a household's food access security status. In Swaziland and Ethiopia, it was reported that age, gender, land and livestock ownership play a central role in determining the food access status of rural households (Beyene and Muche, 2010). Other researchers (von Braun *et al.*, 1993; Frankenberger *et al.*, 1998; Maxwell, 1996; Crush *et al.*, 2011) have noted factors, notably low employment and wages, higher food prices and low incomes to play a central role in determining a household's food access security in urban areas as such households are more dependent on food purchase. In addition, Raimundo *et al.* (2014) reported that low level of schooling and training and absence of social security systems were affecting food access security in urban Maputo, Mozambique. It can, therefore, be generalized that assets and resources can influence a household's food access security in two main ways: first, they enable households to produce own food, and secondly, they can facilitate generation of income to buy food.

The relationship between household assets and the status of food access security in Tanzania share similar features with that of other developing countries as presented above. For example, a study conducted by Ntwenya *et al.* (2015) observed that farmland size, income diversity, and education level were associated with improved household food security in Kilosa district. Similarly, food access security in rural households in Rukwa region is associated with household wealth and extent of social support (Hadley *et al.*, 2007). Despite these observations, little is actually known about the extent to which ownership of household assets vary in places regarded as urban, peri-urban and rural. Also, it is not empirically known which of these resources influence household food access security in such areas, and to what extent. Unlike other approaches that focus on the dichotomy between urban and rural areas, the urban-rural approach aids in formulating appropriate policies that address food access security in areas large enough to include urban, peri-urban and rural areas (Forster and Escudero, 2014). Moreover, information on spatial variation of household food access insecurity can be very useful in understanding its dynamics in various locations and thus help in resource allocation and proper intervention targeting (Maxwell *et al.*, 2008). The study on which this manuscript is based examined the variation of ownership of household assets in urban, peri-urban and rural settings. Also, the influence of these assets on household food access security was sought using Morogoro and Iringa as a case study.

5.3 Conceptualization of Urban, Peri-Urban and Rural Areas

There is no international consensus on how to determine the boundaries of urban areas or identify when a settlement is ‘urban’ (McGranahan and Satterthwaite, 2014). For example, in India, an urban location is defined as all statutory places with a municipality, corporation, minimum population of 5,000, at least 75% of male working population engaged in non-agricultural pursuits, and a population density of at least 400

people per km² (UN-DESA, 2011). In Equatorial Guinea, an urban setting is any locality with 300 dwellings or more or with 1,500 inhabitants or more (Eppler *et al.*, 2015). Muzzini and Lindeboom (2008) note that there are three perspectives on ‘urban’ in Mainland Tanzania: 1) the politico-administrative perspective adopted by the Prime Minister’s Office, Regional Administration and Local Government; 2) the human settlements perspective, embraced by the Ministry of Lands and Human Settlements Development; and 3) the statistical perspective, adopted by the National Bureau of Statistics (NBS). However, both Muzzini and Lindeboom (2008) and Wenban-Smith (2014) have explored the potential for a density-based definition of ‘urban’ in Tanzania (e.g. over 150 persons per km²) but such an approach has not been adopted by Tanzanian authorities.

The concept of ‘peri-urban’ emerged due to limitations in the dichotomy between urban and rural (White *et al.*, 2008). Several attempts have been conducted to narrow down the essential characteristics of the peri-urban concept. The most obvious way of defining it is to take a location-based approach. According to this approach, distance to the city centre as well as adjacent built-up area is seen as the most important variable for its definition (Adam, 2001; Webster and Muller, 2004; Gregory, 2005). It is from this approach that several researchers (Gaile, 1992; Browder *et al.*, 1995; Tacoli, 1998; Rakodi, 1999) have attempted to define peri-urban as a concept that refers to a zone whereby urban and rural development processes meet, mix and interact on the edge of the cities. Small farmers, informal settlers, industrial entrepreneurs and urban middle class commuters may all coexist in the same territory but with different and often competing interests, practices and perceptions (Eppler *et al.*, 2015). However, according to Schlesinger (2013), this simplified approach has been criticised as it does not appreciate the full complexity of the urban morphology.

Just like 'urban' and 'peri-urban', the concept of 'rural' is also complex and multidimensional. One problem lies in capturing the diversity of types of rural areas that exist. These can, for example, range from small settlements on the fringe of large towns and cities to remote villages and from 'green belt' agriculture to areas of extensive arable farming or grazing. Another complication lies in the economic and social changes that take place in rural areas which create interrelationships with urban areas and cultures (Scott *et al.*, 2007). Nevertheless, rural areas are characterized by a more personal and intimate web of social relationships, low population density, extensive land use, and primary economic activity and employment (Scott *et al.*, 2007). In Tanzania rural areas are defined as geographical areas in which primary production takes place and where populations are found in varying densities. These areas are characterized by activities related to primary and secondary processing, marketing and services that serve rural and urban populations (URT, 2001).

In the context of this study, travel time from the town centre was chosen as a relative measure as it more adequately reflects the spatial complexities of the urban-rural continuum (Jaquinta and Drescher, 2000; Moustier, 2001; Erenstein *et al.*, 2004; Drechsel *et al.*, 2006). Accordingly, urban area is defined as an area within a range of up to five travel minutes (by car and in absence of traffic jam) from the town centre. Peri-urban is an area to which travel takes between 5 and 20 minutes from the town centre, and in rural area the travel takes more than 20 minutes from the town centre. Schlesinger (2013) applied this approach in other medium sized towns and worked well. Consequently, urban-rural continuum refers to a spatial location comprising of urban, peri-urban and rural settings.

5.4 Household Food Access Security in the Context of Entitlement Theory of Famine

The study was guided by the Entitlement theory of famine by Sen (1981). Generally, the entitlement theory is based on three conceptual categories, namely, the endowment set, the entitlement set and the entitlement mapping (also known as e-mapping). The endowment set is defined as a combination of all those resources that are legally owned by a household, conforming to established norms and practices. These resources include both tangible assets, such as land, equipment, animals, and intangibles such as knowledge and skills, or membership to a particular group. The entitlement set is defined as a set of all possible combinations of goods and services that a household can legally obtain by using its resources. Usually, the use of the resources to get final goods and services may either be in the form of production, exchange or transfer. The entitlement mapping is the rate at which the resources of the endowment set can be converted into goods and services included in the entitlement set.

Based on Sen's theory and in the context of this study, household endowment set include human, physical, financial, social and natural assets. According to DFID (1999), human assets include level of education of household head and number of household members contributing income. Physical assets encompass ownership of farmlands, livestock, motorcycles and bicycles. Social assets entail meaningful membership in formal and informal groups, relationship of trust, and access to wider institutions of society that people draw upon in pursuit of livelihoods. Financial assets are financial resources that are available to the household and include savings, credit or regular remittances from government, relatives or friends. Natural assets are physical environment and natural resource stocks that can be controlled by household and used to expand or enhance food access security. Natural assets include water, biodiversity, wildlife, and forests.

Based on the above, it is assumed that a larger asset base will generally translate into greater household livelihood opportunities and stronger food access security, and vice versa. However, since the contribution of each asset to a household's food access security is determined by the main household livelihood strategy, those households which source most of their food through market purchase will have more food access security if they have endowment set that can enable them to generate more income. Likewise, households which derive most of their food from own food production will have better food access security if they possess endowment set that enables them to produce sufficient food. This study assessed the extent to which household assets varied in urban, peri-urban and rural areas. The study also determined the relationship between household asset ownership and its food access security.

The selected household assets included education level attained by household head, household size, number of members contributing or earning an income, equipment owned such as motorbikes and bicycles, number of livestock (cattle, goats/sheep, pigs and chicken), size of cultivated land, ability to get credit, the proportion of consumption expenditure on food, membership to social networks such as Village Community Banks (VICOBA), Savings and Credit Co-operative Societies (SACCOS), donations (cash transfer or food) from relatives and community, and access to food from natural resources such as forest, water bodies, and open spaces.

5.5 Methodology

5.5.1 Description of the study area

The study on which this manuscript is based was conducted in Morogoro and Iringa covering areas regarded as urban, peri-urban and rural. Morogoro site covered Morogoro Municipality and Morogoro and Mvomero districts whereas Iringa site included Iringa

Municipality, and Iringa and Kilolo districts. Agriculture is the main source of food and income in the study sites and employs over 70% of the rural population (WFP, 2013). Like in many areas of the developing world, the welfare of urban households and that of their peri-urban and rural counterparts are strongly interlinked. Urban households also participate in agricultural activities such as growing food, largely for subsistence production, in peri-urban and rural settings. Rural households, on the other hand, participate in income generating activities in the urban and peri-urban areas. In addition to working on their own farms, many surveyed rural households had their members work in a diverse set of activities in urban and peri-urban market places. Such activities included wholesaling and retailing agricultural goods and working as casual labourers in construction sites.

5.5.2 Research design and sampling procedure

This study employed a cross-sectional research design with a three-stage sampling technique. In the first stage, two towns namely Morogoro and Iringa were purposively selected because they comprise medium-sized towns⁵, and also because the main livelihoods of their inhabitants have high interaction between urban, peri-urban and rural areas. Purposive sampling technique was again employed in stage two to select three districts in each region. These districts were selected in such a way to form the urban-rural continuum. Thirdly, grid cells were created on maps of the selected districts using the Geographical Information System (GIS) whereby random sampling technique was employed to select 10 grid cells each in urban, peri-urban and rural settings. The GIS-based sampling technique was used to select five households in each grid cell making 300 households in both sites. Households which could not be located or refused to

⁵ A medium-sized town refers to an urban area with less than 500,000 inhabitants (United Nations, 2013).

take part in the survey were systematically replaced by taking a nearby household. Overall, 279 households completed the questionnaire. This approach was chosen because it avoids human selection biases of locations and households (Kondo *et al.*, 2014). The sample size was determined based on the experience from similar studies conducted by Schlesinger (2013) and Chagomoka *et al.* (2016).

5.5.3 Data collection

Data for this study were collected from November 2015 to April 2016, a time when food supplies are normally low in most of the households in the two study sites. The advantage of collecting data during such a time of the year is to get a clear picture of households' food access security situation during lean seasons especially when applying the Household Food Insecurity Access Scale (HFIAS) approach (Coates *et al.*, 2007; Becquey *et al.*, 2010). However, its disadvantage is that the results may not reflect the food access security situation during peak season when households are harvesting their food crops and therefore having better access.

A structured questionnaire was administered to the sampled households. The questionnaire had three main sets of questions (Appendix 1). The first set included background information about household demographic characteristics while the second part captured information on access to food in the households based on the HFIAS tool. The last set of questions dwelt on a household's asset possession. The questionnaire was pre-tested in Morogoro Municipality before the actual fieldwork commenced.

5.5.4 Data analysis and model estimation

Data processing involved editing, coding, and entering data into the Statistical Package for Social Sciences (SPSS) software. Data were analysed both descriptively and

inferentially. Descriptive analysis included frequencies, means, standard deviations, and cross-tabulations to describe socio-economic characteristics of sampled households and their asset endowments. One way Analysis of Variance (ANOVA) was used to compare means of each selected household asset along the urban-rural continuum. Chi-Square test was performed to determine whether there was any significant relationship ($p \leq 0.05$) between ownership of household assets and spatial location of a household.

Inferential analysis started by totalling the HFIAS scores for each surveyed household whereby the minimum score is usually 0 and the maximum score is 27 (Coates *et al.*, 2007). Accordingly, the higher the score, the more food access insecurity the household experiences and vice versa. a household was considered to be food access secured if its total HFIAS score was less or equal to 11, and food access insecure if its total score was more than 11 (Ballard *et al.*, 2013). Afterwards, binary logistic model was used to estimate the influence of household assets on food access security status. Conventionally, as the dependent variable (food access security status) is dichotomous, Logit or Probit regression model could be used to determine the relationship (Gujarati, 2003). These models are widely applied statistical techniques relating the probability of a dichotomous outcome to a set of explanatory variables that are hypothesized to influence the outcome (Neupane *et al.*, 2002). Although there is no binding reason to prefer either model, many researchers tend to choose the Logit model for its comparative mathematical and interpretational simplicity (Pindyck and Rubinfeld, 1981; Hosmer and Lemeshew, 1989). Therefore, the binary logit model was used to determine the key explanatory factors associated with a household's food access security. In this case, the probability of having food access security (Y), given the presence of the independent variables, can be represented as the conditional probability:

$$P(Y = 1|X_1 - X_n) = 1/(1 + e^{-(\alpha + \sum\beta_i X_i)}) \dots\dots\dots(1)$$

where P is the conditional probability that household i is food access secure, Y = household food access security status, α = constant term, β_i = coefficient for i^{th} independent variable X , with i varying from 1 to n , e = error term. The significance of the coefficients β_i is tested with the Wald test, which is obtained by comparing the maximum likelihood estimate of every β_i with its estimated standard error (Hosmer and Lemeshew, 1989; van Den Eeckhaut *et al.*, 2006). By observing the sign of a dependent variable's coefficient estimate, the effect of that variable on the probability of a household being food secure can be determined.

In the context of this study:

Y = food access security status (1 = household is food access secure, 0 = otherwise), x_1 = age of household head (in years), x_2 = education of household head (actual years of schooling), x_3 = household size (number of people who sleep under the same roof and take meals together for at least four days a week), x_4 = number of members earning an income (total number of household members contributing/earning an income), x_5 = consumption of expenditure on food (percentage of total household's income spent on food (%)), x_6 = livestock ownership (total number cattle, goats, sheep and pigs owned by a household), x_7 = ownership of bicycle (1 = yes, 0 = no), x_8 = ownership of a motorbike (1 = yes, 0 = no), x_9 = have membership to social networks (1 = yes, 0 = no), x_{10} = have access to credit (1 = yes, 0 = no), x_{11} = reliance on donations from friends, relatives or community (1 = yes, 0 = no), and x_{11} = access wild food (1 = yes, 0 = no).

5.6 Findings and Discussion

5.6.1 Household food access insecurity in urban, peri-urban and rural settings

The mean HFIAS score was higher in rural households (11.4±5.38) compared to urban (6.04±4.12) and peri-urban (6.04±4.05) households. Using the categorical measure of food insecurity, the proportion of food secure households was higher in urban areas (35.6%) than in peri-urban (25.5%) and rural settings (19.4%). The above values were significantly different ($p \leq 0.001$). The observation suggests that urban households have more food access security than those in peri-urban and rural areas. These findings reaffirm earlier research findings that food insecurity is less in urban areas than in rural settings of Tanzania (WFP, 2013). According to World Bank (2015), urban households tend to have higher food access security because most of them generally have higher incomes, are part of the formal sector, or have superior asset endowments as compared to their rural counterparts.

5.6.2 Household asset ownership and spatial location of households

The mean years of schooling for household heads were higher in urban areas than in peri-urban and rural areas (Table 5.1). There are several reasons for this; one explanation is that there is inadequate provision of education services in rural areas something which results into low pupil enrolment or more school dropouts. A survey conducted in Mainland Tanzania observed that the number people lacking formal education in Tanzania is higher in rural areas as compared to urban and peri-urban areas (URT, 2014). Household heads with some degree of education are likely to be more efficient in contributing towards household income and thus higher food access security (Sanusi *et al.*, 2006).

Rural households spent on average more than three-quarters (80%) of their income on food as compared to urban and peri-urban households who spent 55% and 64%, respectively (Table 5.1). These differences could be attributed to the fact that the average household size was moderately larger in rural areas (5.13 persons) than in urban areas (4.72 persons). Also, this could be because of higher food prices in rural areas which are caused by higher cost of transporting food to such locations. Higher food prices lead to an increased proportion of consumption expenditure on food. These results are consistent with findings of a study by Cochrane and D'Souza (2015) which observed that poor households in Tanzania, particularly those in rural areas, spend the majority (on average, 75%) of their income on food. Likewise, Garrett and Ersado (2003) have also noted the average consumption expenditure on food to be higher among rural households (over 70%) as compared to urban households (60%) in Maputo city in Mozambique.

The mean number of livestock owned by the surveyed households at the time of the survey was higher in peri-urban and rural households as compared to urban households. Livestock keeping is mostly practised in peri-urban and rural areas because such areas offer enough space to raise animals. A study conducted by Covarrubias *et al.* (2012) in Tanzania also revealed that the proportion of households involved in rearing livestock was higher in rural areas than in urban settings. Livestock can contribute to food security status of households in different ways such as by providing cash income through selling, consumption (meat and/or milk), draught power and manure.

Table 5.1: Descriptive statistics for selected household assets in urban, peri-urban and rural areas (n = 279)

Variables	Urban (n = 89) Mean(SD)	Peri-urban (n = 93) Mean(SD)	Rural (n = 97) Mean(SD)	P-Value
Age of household head (Years)	40(±12.18)	42.(±12.31)	42(±12.76)	0.517
Years of schooling of household head	9.26(±3.58)	8.84(±4.16)	5.79(±3.33)	0.000
Household size (Number)	4.72(±2.15)	5.09(±2.12)	5.13(±2.19)	0.365
Number of members earning an income	1.93(±0.902)	1.93(±0.946)	1.78(±1.088)	0.463
Farm size (Hectares)	0.54(±1.703)	1.09(±1.818)	2.33(±2.622)	0.000
Proportion of consumption expenditure on food (%)	55(±22.73)	64.3(±22.75)	80(±18.23)	0.000
Number of livestock owned	2(±4.985)	6(±8.185)	5(±6.512)	0.000

Descriptive statistics for discrete-related variables⁶ in Table 5.2 show that more peri-urban and rural households owned bicycles than those in urban areas ($p \leq 0.05$). One main explanation is that riding bicycles is the most affordable and prominent mode of transport after walking in rural and peri-urban areas. These results are consistent with the findings of a survey conducted in Tanzania Mainland, whereby ownership of bicycles was higher among rural households (45.7%) compared to those in urban areas (27.7%) (URT, 2014). Bicycles are considered to be a “productive tool” at the most basic level. When bicycles are used for business purposes they add income to the household, which is further used to produce or buy food and other household provisions.

⁶ A discrete variable is a variable that only takes on a certain number of values. In the context of this study, these discrete-related variables take on a value of zero or one. The opposite of a discrete variable is a continuous variable. Continuous variables can take on an infinite number of possibilities and include decimal points.

It was also found that more urban and peri-urban households had membership to social networks such as VICOBA and SACCOS as compared to rural households ($p \leq 0.001$). Similarly, many urban and peri-urban households were reported to have access to credit compared to rural households ($p \leq 0.001$). This was partly expected because institutions offering financial services; notably credit unions, banks, microfinance institutions (MFI) or insurance companies are reluctant to extend their services to rural areas due to poor infrastructure and high cost of operations (Tenaw and Islam, 2009). Consequently, this inhibits entrepreneurial activities in rural areas. Access to financial services is a crucial element that enables a household to make investments and thus improve its food access security.

The proportion of households relying on food or financial donations from relatives or community support was higher in rural households than in urban and peri-urban households ($p \leq 0.01$). This higher proportion in rural areas could be due to the increasing movement of people (both low and high-skilled) from less developed rural areas to more developed urban areas, something which deprive rural households of their active labour power and hence create dependence (Ajaero and Onokala, 2013). Likewise, quite a huge proportion of rural households obtain food from natural resources compared to their counterparts in urban and peri-urban settings ($p \leq 0.001$). Access to natural resources such as fields, forests, grasslands and water resources has been described to be a major determinant of the productive capacity of food-producing households particularly in rural areas as these households can utilize such resources to cultivate their food (Pieters *et al.*, 2013). Other products that can be acquired from natural resources include source of cooking energy, water, medicines and food.

Table 5.2: Percent affirmative descriptive statistics for discrete-related variables in urban, peri-urban and rural settings (n = 279)

Variables	Urban (n =89)	Peri-Urban (n = 93)	Rural (n = 97)	P – Value
Own motorbike	11.2	24.4	15.0	0.051
Own bicycle	31.5	51.1	49.0	0.014
Have membership in social networks	52.8	47.8	21.0	0.000
Have access to credit	42.7	36.7	26.0	0.000
Receive donations	10.1	18.9	29.0	0.005
Obtain food from open-spaces	33.7	43.3	71.0	0.000

***, ** and * indicate significance at $p \leq 0.001$, $p \leq 0.01$, $p \leq 0.05$ levels, respectively

5.6.3 Influence of household assets on food access security

As shown in Table 5.3, results from the binary logistic regression analysis show that a household's asset ownership had a significant influence on its food access security. The overall model fit was statistically significant ($X^2 = 235.124$; $p = 0.000$) implying that the model was able to predict household food access security status. The Wald values demonstrated the relative contribution of individual variables to the odds ratio probability of the household being food access secure. Overall, five out of the 14 variables had a significant influence on the surveyed households' food access security.

Table 5.3: Binary logistic regression results of household assets on food access security status (n = 279)

Explanatory variables	B	S.E.	Wald	p-value	Exp(B)
Age of household head	0.015	0.028	0.274	0.600	0.986
Sex of household head	0.821	0.962	0.728	0.394	2.273
Household head's education	0.213	0.078	7.419	0.006**	1.273
Household size	-0.408	0.158	6.669	0.010*	0.665
Number of members earning an income	1.115	0.444	6.313	0.012*	3.049
Proportion of consumption expenditure on food (%)	-0.151	0.023	41.454	0.000***	0.860
Ownership of motorbike	-0.437	0.901	0.235	0.628	0.646
Ownership bicycle	-0.250	0.612	0.167	0.683	0.779
Number of livestock owned	0.027	0.041	0.452	0.501	1.028
Membership in social networks	-0.130	0.758	0.029	0.864	0.878
Ability to access credit	-1.266	0.834	2.304	0.129	0.282
Farmland owned (ha)	-0.062	0.136	0.208	0.649	0.940
Reliance on donations	-3.770	1.368	7.595	0.006**	0.023
Access to food from open spaces	0.758	0.729	1.081	0.298	2.134
Constant	5.539	2.059	7.235	0.007	254.540

***, ** and * indicate levels of significance at $p \leq 0.001$, $p \leq 0.01$ and $p \leq$ respectively.

Education level attained by the household head showed a positive and significant association with a household's food access security ($p \leq 0.01$). This means that households whose heads had attained higher level of formal education were more likely to have food access security than those with heads with lower levels of formal education. Education is likely to contribute to working efficiency, competency, diversification of income sources, adopting technologies and generally earning higher incomes than illiterate ones (Mukudi, 2003; WFP, 2006; Gebre, 2012). Other studies in Africa (Hadley and Patil, 2006; Sanusi *et al.*, 2006; Hadley *et al.*, 2007; Leyna *et al.*, 2008; and Kneuppel *et al.*, 2010) have also reported that education level attained by the household head was important in determining the household's food access security.

The study findings show an inversely significant relationship between household size and food access security, meaning that the larger the household size, the lower the odds of having food access security. An increase in household's size by one member decreases the household's food access security by 6.65%. This inverse relationship between household size and household food access security has also been observed in other studies (Lanjouw and Ravallion, 1995; Datt and Jolliffe, 2005). The possible explanation is that in a setting where households source most of their food from own food production and market purchase, increasing household size results in increased demand for food particularly if a household lacks enough income. This result reaffirms the findings in literature (Garrett and Ruel 1999; Bigsten *et al.*, 2002; Babatunde *et al.*, 2007; Beyene and Muche 2010; Hadley *et al.*, 2011). According to these studies, larger households especially those composed of non-productive members are more likely to have food access insecurity due to the high burden levied on the active labour.

The logit results (Table 5.3) also show the important role of number of members who earn an income in a household on influencing its food access security ($p \leq 0.05$). This suggests that a household with a large active adult labour is more likely to have food access security than a household with limited availability of people working or earning income. A study by Bigsten *et al.* (2002) observed that those households with proportionally more inactive labour (children under the age of 15 years and older people above 65) seem particularly vulnerable to poverty and hence food insecurity. This underscores the importance of active adult labour in the welfare of households.

The proportion of consumption expenditure on food was inversely related with the possibility of a household having food access security ($p \leq 0.001$). This means that the lower the share of expenditure on food, the higher the level of food access security in a

household and vice versa. Higher proportion of consumption expenditure on food is considered to be one of the most important indicators of low standard of living (WFP, 2013). This is understandable considering the fact that a household spending a greater percentage of its income on food means that it has a smaller percentage left for other goods and services which are also vital for its welfare. These results are somewhat similar to results of a study conducted by Donkoh *et al.* (2014) in Ghana. They are also consistent with observations made in Bangladesh, Guatemala, Malawi, Pakistan, Tajikistan, and Vietnam, where poor rural households were reported to spend a large portion of their income on food than the urban households (FAO, 2011).

Also, as shown in Table 5.3, households that relied on donations whether in form of cash or food were likely to have less food access security than those which did not rely on such donations ($p \leq 0.01$). These findings contradict what was reported by Seidenfeld *et al.* (2014). However, such findings were expected because most of the households who reported to have relied on donations were headed by aged people particularly women who depended almost entirely on remittances from their children or relatives. This may imply that such donations are not sufficient to make these households food access secure.

5.7 Conclusions and Recommendations

Based on the Entitlement theory of famine by Sen (1981), the objective of this study was two-fold. First, it examined the extent to which the ownership of household assets varied in urban, peri-urban and rural areas, and second, it assessed the influence of household asset ownership on its food access security. Generally, two main conclusions are drawn from these findings. First, household's asset ownership varies significantly in urban, peri-urban and rural areas. Secondly, household food access security improves as a household's age and number of household members earning income increase.

On the other hand, food access security worsens as household size, proportion of consumption expenditure on food and reliance on donations increase.

It is, therefore, recommended that households should strive to own assets that will enable them to have higher food access security. Besides, households should control or get rid of the things which impoverish their food access security. Specific recommendations are as follows: first, because the education level of head of household has positive significant influence on food access security, appropriate strategies should be taken to enable young household heads to diversify their sources of income as advancement in age is usually related with wealth accumulation. Secondly, as households with more members earning income are more food access secure than those with fewer members, all unemployed able members should be encouraged to engage in income-generating activities so as to reduce dependence on their active labour. However, government authorities at all levels should design appropriate strategies to support poor households that are mostly composed of aged people and the sick. Additionally, since households who spend higher proportions of their income on food are more food access insecure than those who spend a small share, poor households should be supported to increase their incomes.

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CHAPTER SIX

6.0 Summary, Conclusions and Recommendations

6.1 Summary of Major Results and Conclusions

This study assessed household food access security along the urban-rural continuum in Morogoro and Iringa, Tanzania. The thrust was to provide researchers and policy makers with fresh insights on the debate on the extent to which household food access security varies along the urban-rural continuum (urban, peri-urban and rural) and thus facilitate formulation of context-specific policies and strategies to improve food access security in such locations. This study had four main objectives which mainly aimed to: 1) assess the prevalence of household food access insecurity along the urban-rural continuum, 2) determine constraints to household food access security, 3) examine coping strategies and resilience to food access insecurity along the continuum, and 4) assess the influence of households' asset ownership on food access security. Consequently, four manuscripts have been prepared from the study each of which is based on one objective.

6.1.1 Prevalence of household food access insecurity along the urban-rural continuum

The results of the prevalence of food access insecurity among the surveyed households along the continuum are discussed in chapter two which is based on objective one. Using the categorical measure of household food access insecurity, there was a statistically significant ($p \leq 0.001$) relationship between spatial location of the household and its food access security. In that respect, food access insecurity is more prevalent among rural households as compared to urban and peri-urban households. The results of ordinal logistic regression model revealed that age ($\beta = 0.021$; $p \leq 0.05$), education of household head ($\beta = 0.488$; $p \leq 0.01$), a household being located in urban ($\beta = 0.904$; $p \leq 0.01$) or

peri-urban ($\beta = 0.734$; $p \leq 0.05$) settings had a statistically significant effect on household food access security. On the other hand, households with unemployed heads showed an inversely relationship ($\beta = -1.707$; $p \leq 0.01$) with household food access security.

Based on these findings it is concluded that household food access insecurity is a widespread phenomenon along the urban-rural continuum, although the situation is worse in rural areas than in peri-urban and urban areas. Also, a household's food access security improves as a household head's age and level of education increase. Similarly, households that are located in urban and peri-urban areas are more food access secure than those in rural settings. Moreover, households with unemployed head are more vulnerable to food access security than those with employed heads.

6.1.2 Comparative analysis of constraints to food access security among urban, peri-urban, and rural households

Chapter three is based on the second objective. In this chapter comparative analysis of constraints to food access security among households located in urban, peri-urban and rural was carried out. In addition, this chapter determined the influence of these constraints on household food access security. Using Chi-square test (X^2), the results showed that food access security among urban and peri-urban households was reported to be mainly constrained by low income ($p \leq 0.01$), higher food prices, and expenditure on non-food items ($p \leq 0.001$). On the other hand, food access security among rural households was reported to be essentially affected by limited market access, shortage of farm labour ($p \leq 0.05$), drought, soil infertility, and inadequate or lack of access to agricultural inputs ($p \leq 0.001$). Also, the results of the binary logistic regression revealed low income, drought, limited market access and soil infertility to be inversely related with household food access security.

Based on the above, it can therefore be concluded that there is great variation in constraints to household food access security along the urban-rural continuum. In addition, food access security among the surveyed households is essentially affected by low income, drought, limited market access and soil infertility.

6.1.3 Coping strategies and resilience to food access insecurity along the urban-rural continuum

Chapter four, which is based on objective three, examined the variation of coping strategies to food access insecurity along the urban-rural continuum. Additionally, the contribution of these strategies towards building and improving households' resilience to food access insecurity was examined in the chapter. Overall, results show that the surveyed households used a number of coping strategies most of which varied significantly from one spatial entity to another along the continuum. Generally, a high proportion of rural households relied on less preferred foods, consumed fewer meals per day, undertook work for food or money, performed farm and off-farm income-generating activities, and sold fall-back assets as a way of coping with food access insecurity. Generally, more urban and peri-urban households were reported to cope with food access insecurity by having strict food budgets compared to those in rural households. Using the Multi-layered Social Resilience Framework it was observed that households had managed to utilize their capitals to develop mainly reactive strategies to cope with food access insecurity.

Based on the above, it can therefore be concluded that rural households cope with food access insecurity by essentially consuming less quality and fewer meals, engaging in income-generating activities and by selling fall-back assets. Urban and peri-urban

households, on the other hand, cut budgets on food by only consuming foods considered to be necessary as a way of coping with food access insecurity. Using the Multi-layered Social Resilience Framework, the surveyed households mainly employ reactive strategies to cope with food shortages. However, such strategies may not be considered as proper in the realm of resilience building as they erode households' resilience to food access insecurity.

6.1.4 Households' asset ownership and food security in and around medium-sized towns

Chapter five covered the fourth objective of the thesis. The chapter assessed the extent to which households' asset ownership varied in urban, peri-urban and rural areas. In addition, the chapter examined the influence of household asset ownership on its food access security. Generally, the findings reveal that the mean years of schooling of household's heads were higher among urban households than among peri-urban and rural households ($p \leq 0.01$). On the other hand, the mean farm size, proportion of consumption expenditure on food, and number of livestock owned were higher among rural households than among urban and peri-urban households ($p \leq 0.001$). Also, whereas more peri-urban households reported ownership of bicycles ($p \leq 0.05$) as compared to urban and rural households, many urban ones reported to have membership to social networks, and access to credit ($p \leq 0.001$). Further to the above, more rural households reported reliance on donations ($p \leq 0.01$) and on collecting food from open-spaces ($p \leq 0.01$).

The findings from binary logistic regression model showed education of household head ($\beta = 0.213$; $p \leq 0.01$) and number of members earning income in a household ($\beta = 1.115$; $p \leq 0.05$) to be related with a household's food access security. On the other hand, household size ($\beta = -0.408$; $p \leq 0.05$), proportion of consumption expenditure on food (β

= -0.151; $p \leq 0.001$) and reliance on donations ($\beta = -3.770$; $p \leq 0.01$) were inversely related with a household's food access security.

It can, accordingly, be concluded that households' asset ownership vary significantly among households situated in locations regarded as urban, peri-urban and rural. Also, a household's food access security improves as household head's education and number of members earning income in a household increase. However, a large household size as well as a high proportion of consumption expenditure on food and reliance on donations tends to weaken household food access security.

6.2 Theoretical Reflections

Generally, the theoretical frameworks used to guide this study have proved useful in generation of the afore-mentioned results. Two theoretical frameworks were employed as a lens for assessing the determinants of household food access security along the urban-rural continuum. Whereas the Multi-layered Social Resilience Framework by Obrist *et al.* (2010) was employed to aid discussion on coping strategies and resilience to food insecurity, the Entitlement theory of famine by Sen (1981) facilitated the assessments of the influence of household's asset ownership on food access security.

Specifically, the application of the Multi-layered social resilience framework was useful in understanding the implication of food access insecurity coping strategies in the context of resilience building process. The employment of the concept of 'reactive' and 'proactive' capacities was useful in broadening the analytical approach for determining the implications of households' ability to cope with food access insecurity. Further, an understanding of food access insecurity coping strategies and their influence on

improving household's resilience facilitated recommending specific factors for re-building household's resilience against food access insecurity.

The application of the Entitlement theory of famine was useful in understanding the influence of household's asset ownership on its food access security. Generally, the theory guided the structuring and organization of data collection, analysis and discussion. Moreover, structuring findings and discussion according to household's asset ownership was critical in understanding not only the extent to which ownership of these assets varied among urban, peri-urban and rural households but also the influence of asset ownership on food access security among such households. For example, the theory assumes that food access security is determined by the extent of assets that a household has. The results of this study also showed that a household's asset ownership has a significant impact on a household's food access security.

Given the fact that only five out of the 14 variables had a statistically significant effect on the dependent variable it implies that not all household's assets have a direct effect on its food access security. Some assets have more influence on food access security than others. In this regard, notably education level of household head, number of household members earning an income, having membership to social networks and ability to access credit have a considerable impact on households' food access security relative to ownership of assets such as bicycles, motorbikes, or big farmland. Therefore, the results suggest that households should focus more on assets that can enable them to have higher food access security.

6.3 Recommendations

6.3.1 Prevalence and socio-economic characteristics of household food access insecurity

Addressing the prevalence of household food access insecurity requires context-specific interventions be carried out to improve food access security most especially among poor rural households. Also, as advancement in age is usually associated with wealth accumulation, young household heads should be supported to diversify their sources of income so as to improve food access security in their households. Similarly, as households with educated heads were more food access secured than those with uneducated heads, both formal and informal education should be provided to uneducated household heads. Additionally, improved food access security among urban and peri-urban households is usually associated with access to more improved infrastructure and services such as roads, electricity and other social services. Such services should be extended to rural areas. Lastly, as households with unemployed heads were more vulnerable to food shortage, unemployed people should be assisted to utilize employment opportunities around them.

6.3.2 Constraints to food access security among urban, peri-urban, and rural households

To address constraints to household food access security, interventions to improve food access security should be context-specific and should adequately address these constraints. This should go hand in hand with efforts to improve household's income and stabilize food prices so as to enable poor households to access sufficient food. Farming households should be supported to grow drought-tolerant crops, and affordable irrigation farming should be promoted whenever possible. Infrastructure and communication services such as roads and transportation system should be improved so as to ease

movement of agricultural inputs and produce. Moreover, agricultural extension services should integrate the use of affordable sufficient quantities of organic manure to replenish the soils.

6.3.3 Coping strategies and resilience to food insecurity along the continuum

Since the surveyed households mainly employed reactive food access insecurity strategies which essentially are destructive to their resilience, awareness on the effects of such strategies to people's health should be created among all households along the urban-rural continuum. In addition, as households use reactive strategies basically because of lack of or inadequate income to buy sufficient food, poor households in particular should be supported to diversify their sources of income. Generally, income diversification enables households to overcome food shortages with more sustainable proactive strategies.

6.3.4 Household's asset ownership and food access security

Since not all household assets owned have a direct influence on its food access security, it is therefore recommended that households need to focus on assets that enable them to improve their food access security. Likewise, households should try to control things that weaken their food access security. Specifically, household heads should be equipped with both formal and informal education so as to improve their working efficiency, increase income and hence improve household food access security. Moreover, all abled household members should be sensitized to seek and engage in both formal and informal employment so as to increase their household's income, reduce dependence on others and hence improve food access security. Lastly, appropriate interventions should be undertaken to support those households that are composed of aged people and the sick.

6.4 Areas for Further Research

Generally, this study focused on Morogoro and Iringa regions whereby the main livelihoods of their inhabitants do include agriculture to a great extent. Future similar studies are recommended to look at other regions with different main livelihood strategies using the urban-rural continuum approach. Also, because of financial and time constraints the study on which this work is based only focused on one of the four dimensions of food security, that is, food access security. It is important other studies attempt to assess the variation of other dimensions of food security notably food availability, utilization and stability along the urban-rural continuum.

Finally, this study has not entirely exhausted all relevant aspects of household food access security. Accordingly, further research is needed to assess the gender aspects of household food access security along the urban-rural continuum. Specifically, future studies need to tackle issues around women empowerment and intra-house food access security along the continuum.

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APPENDICES

Appendix 1: Questionnaire Used for Data Collection

Section A: Interviewer's Introduction

Dear Respondent,

I ama PhD student from Sokoine University of Agriculture, Department of Development Studies. Your household has been selected randomly to participate in a research that is on-going in Morogoro and Iringa Municipalities and in two rural districts surrounding each Municipality. These districts are Morogoro and Mvomero in Morogoro region and Iringa and Kilolo in Iringa region. The research that has been sanctioned by all relevant authorities is about Household Food Access Security. The aim of the research is to get views of the residents in the selected areas about food access security situation in their respective households. The findings of the research will be useful for drawing recommendations to the regions on how best to improve the status of household food access security. All the responses you will give about your household and in general will be treated confidentially. Therefore, you are kindly requested to respond to all questions openly and trustfully.

Email address: ujtumaini@yahoo.com

Mobile: +255765611683

SECTION B: HOUSEHOLD BACKGROUND INFORMATION

Date: _____

B1. Where is this household located? Urban Peri-urban Rural

B2. Name of Ward: _____

B3. Village/Street: _____

B4. Household ID and coordinates: eg. TZ_MOR/IR_001): S06.____ E37.____

B5. Alternative household (*in case originally sampled household is not available*) 1st household to the left 2nd household to the left 3rd household to the left

B6. Age of household head (in years): _____

B7. Sex of household head: Male Female

B8. Highest education grade attained of household head (total number of years of schooling):

B9. Main economic occupation of household head

- None
- Owner farmer
- Farm wage labourer
- Salaried job*
- Non-farm wage labourer*
- Own business*
- *please specify: _____

B10. How many people live together with you in this household? (Total number of family members who sleep under the same roof and take meals together at least four days a week): _____

**SECTION C: ASSESSMENT OF HOUSEHOLD FOOD ACCESS INSECURITY
USING THE HOUSEHOLD FOOD INSECURITY ACCESS
SCALE (HFIAS)**

No.	Question	Response options	CODE
Q1.	In the past four weeks, did you worry that your household would not have enough food?	0 = No (skip to Q2) 1=Yes _
Q1.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) _
Q2.	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	0 = No (skip to Q3) 1=Yes _
Q2.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) _
Q3.	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	0 = No (skip to Q4) 1=Yes _
Q3.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) _

Q4.	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	0 = No (skip to Q5) 1 = Yes _
Q4.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) _
Q5.	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	0 = No (skip to Q6) 1 = Yes _
Q5.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) _
Q6.	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	0 = No (skip to Q7) 1 = Yes _
Q6.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) _

Q7.	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	0 = No (skip to Q8) 1 = Yes <input type="checkbox"/>
Q7.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) <input type="checkbox"/>
Q8.	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	0 = No (skip to Q9) 1 = Yes <input type="checkbox"/>
Q8.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) <input type="checkbox"/>
Q9.	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	0 = No (questionnaire is finished) 1 = Yes <input type="checkbox"/>
Q9.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) <input type="checkbox"/>

SECTION D: CONSTRAINTS TO HOUSEHOLD FOOD ACCESS SECURITY

D1. What is the main source of food for your household?

- Own production.
- Purchasing from market.
- Donations.
- Collecting from forest or water sources.

D2. What are the key constraints that your household faces in accessing sufficient food?

(Tick all that apply)

Inadequate income to buy food provisions
Higher food prices
Poor market access
Low crop yield
Limited access to farmland
Shortage of farm labour
Higher farm input prices
Drought
Pests and harmful animals
Soil infertility
Lack of water for domestic use
Lack of farm inputs
Lack of effective pesticides
Other responsibilities such as school fees, etc.
<i>Others. Please mention</i>

D3. What coping strategies does your household use during times of food shortage?

(Mention all the strategies that your household uses when you do not have enough food):

SECTION E: HOUSEHOLD RESOURCES AND ASSETS

E1. How many of the following physical assets do your household own?

Physical assets	Quantity	Approximated current value (TZS)
House		
Car/truck		
Motorbike (<i>bodaboda</i>)		
Bicycle		
Craft animal		
Hand hoe		
Tractor		
Plough		
Cattle/goats		
Chicken		

E2. Are you a member in any formal or informal association such as neighborhood groups, Village Community Bank (VICOBA), Savings and Credit Co-operative Society (SACCOs), etc? Yes No

E3. Does your household obtain financial assistance from friends, relatives, community, or government? Yes No

E4. If your household is doing own food production, how much land do you cultivate?
Number: ____ Unit (1) ha (2) acre (3) square meter

E5. Does your household obtain food from open spaces, forest or water sources?
 Yes No

E6. Does your household normally receive food donations from relatives or friends?
 Yes No

E7. Does your household normally receive food donations from the NGOs or government?
 Yes No

THANK YOU FOR YOUR COOPERATION