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FACULTY OF SCIENCE

DEPARTMENT OF ENVIRONMENTAL SCIENCE

**PATTERNS AND PROCESSES OF FOOD SECURITY IN THE
PERI URBAN VILLAGE OF GABANE IN BOTSWANA**

**A Dissertation submitted in Partial fulfillment of the Requirements for the
MSc Degree in Environmental Science**

BY

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APPROVAL

This dissertation has been examined and is approved as meeting the required standards for the partial fulfillment of the requirements for the Master of Science Degree in Environmental Science.

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STATEMENT OF ORIGINALITY

The work contained in this dissertation was carried out by the author at the University of Botswana between August 2013 and August 2017. It is an original work except where due reference is made. It has not been and shall not be submitted for the award of any degree or diploma to any other institution of higher learning.

Author's Signature _____

Date _____

DEDICATION

I dedicate this work to the Almighty God who had been my strong tower, pillar of strength and given me protection throughout my studies. I also dedicate this project to my son who is just a blessing and joy to my life. I dedicate this work to all the sons and daughters of my Father's house (IHL ministry) who tirelessly and persistently prayed for my success.

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LIST OF ABBREVIATIONS

AFSUN: African Food Security Urban Network

FANTA: Food and Nutrition Technical Assistance

HFIAS: Household Food Insecurity Access Scale

HFIAP: Household Food Insecurity Access Prevalence indicator

HDDS: Household Dietary Diversity Scale

MAHFP: Months of Adequate Household Provisioning Indicator

FAO: Food and Agriculture Organization

MDG: Millennium Development Goal

GDP: Gross Domestic Product

SSA: Sub- Saharan Africa

MFDP: Ministry of Finance, Development and Planning

MOA: Ministry of Agriculture

DTRP: Department of Town and Regional planning

SPSS: Statistical Package for Social Sciences

EWTC: Early Warning Technical Committee

ABSTRACT

The aim of this study was to assess the patterns and processes governing food security among the households of Gabane and establish the strategies they adopted to minimize their vulnerability to food insecurity. The study paid particular attention to the food security of that segment of the population that resides in the peri-urban area because of its vulnerability to forces of urbanization (i.e. those whose agricultural land had been appropriated by Government authorities). Therefore, the study set out to identify households vulnerable to food insecurity; examine the level and extent of food security for different households in Gabane; determine the causes of household vulnerability to food insecurity and established the strategies adopted by households to minimize their vulnerability to food insecurity. The study used qualitative and quantitative data sources which comprised of secondary data, key informant interviews and household surveys. The study adopted the AFSUN conceptual framework that demonstrates the multiple factors influencing household food security and focused its attention on the direct drivers of food security.

The study revealed that households whose ploughing lands had been appropriated by Land Board Authorities, the elderly and those who had lower income were vulnerable to food insecurity. Land appropriation affected the food security status of many households negatively. In addition, most households (89%) were food insecure with a few (11%) being food secure. Moreover, there was a statistically significant relationship ($\chi^2 = 30.039$, $P = 0.003$) between income and food security. Also food insecurity tended to increase with household size. One of the causes of household vulnerability identified was land appropriation, which caused households to rely on cash and food purchases. Consequently, the households became vulnerable to high food prices causing them to cut back on their food purchases and consumption. Due to this, households had to rely on less preferred and less expensive food stuff and reduced the number of meals per day. They also had to negotiate for small portion of land to plough, rented off some of their houses and enrolled in Government self-reliance programme (*Ipelegeng*).

The study concludes that as peri-urbanites are being constantly pushed out of their ploughing lands, their food security is being threatened and they are being dispossessed of their means of producing food. Therefore, there is a need to protect the land rights of those dependent on land to ensure their food security.

CHAPTER 1: INTRODUCTION

1.0 Overview

This chapter gives preliminary highlights on food security, states the research problem and outlines the aim and objectives of the study and indicates its scope and choice of study area.

1.1 Background to the Study

In Africa, the concepts of food availability and food security have often been regarded as being synonymous. Unfortunately, this has led to national food policy and programmatic doubts with countries focusing their macroeconomic policies on increasing food production and availability. International organizations, donors and governments have reached an agreement that the solution to food insecurity in Africa lies in huge inputs into smallholder production across the continent (Frayne et al., 2010). Thus far, in many countries, more than enough food is already being produced.

Despite this situation, issues of hunger and malnutrition among the poor, who constitute a significant segment of the population, seem to persist and intensify. Maxwell (1996) explains that it has been impossible since the early 1980s to speak credibly of food security as being a problem of food supply, without at least making reference to the importance of access and entitlement. Sufficient food is available, even in the midst of devastating famine and acute hunger. Rather, food insecurity has been more about inability to access food rather than the absolute amount of food available.

Crush and Frayne (2011) indicated that Sen's vision of scarcity amidst plenty is very relevant to the urban areas of modern Africa. Shelves and baskets in supermarkets in most cities overflow with fresh and processed foodstuffs while on the street poor households are unable to access enough food to feed themselves more than once a day. Despite the fact that food might be varied and abundant in urban areas than in their rural counterparts, there is no uniform access to it.

Barret (2002) conceptualized food security as three main interconnecting concepts; availability, access and consumption. Availability describes the amount of food that is physically present within a particular space and time at the moment and in future; access involves people's ability to obtain the available food; and consumption estimates the nutritional sufficiency of food available and accessed (Barret, 2002). Despite this, Rosegrant

et al., (2005) asserts that food availability is crucial to food security, but it is not the only factor essential for a household to be food secure.

Food security is therefore not, and has never been, an issue of how much food is produced because food production is just only one element of food security. Rather, food security is more often about ability to access food. Other key elements that need to be incorporated include food availability, food accessibility, food reliability, and food quality and food preference (Frayne et al., 2010).

Frayne et al (2010) contend that information on a number of dimensions and determinants of food security in Southern Africa is currently lacking. One of the main unanswered questions is whether the state of food insecurity differs not only among but within human settlements, and why.

1.2 Statement of the Research Problem

Despite Botswana's relative macro- economic prosperity and the success of its social welfare programmes, the country still retains segments of a population who suffer from the interlinked phenomena of persistent poverty and food insecurity (Moseley, 2012).

While research on food security in Botswana has been undertaken since the 1970s, it has tended to focus on the rural areas (Acquah et al, 2013; Lado, 2001;Neudeck et al., 2012).

Recent studies have focused on food security in the city of Gaborone (Acquah et al., 2013; Lane et al., 2012; Cavric and Mosha, 2001). Since the 1980s, the expansion of the Gaborone Planning Area has meant the expropriation of valuable land that was previously used for farming, by earmarking it for development within the context of urban development control codes and standards. This presents a fundamental challenge to food security among the affected peri-urban residents. Very little research has been conducted on what is happening to food security as rural and peri-urban populations are becoming rapidly displaced by urban land-use demands for the scarce farming land. Therefore, little is known about the extent of food insecurity in the peri-urban areas of Botswana. This makes it difficult for development practitioners and policy-makers to measure quantitatively the challenge and to proactively plan to reduce the food gap that exists within and among human settlements.

In order to strategically position urban food security on the general food security policy agenda, and to develop evidence-based policy responses, rigorous and reliable empirical data on the extent and determinants of urban, peri-urban and rural food security is needed.

Legwegoh (2012) expressed that food choice and food consumption experiences within such areas should be of significant importance in urban food insecurity research and practice. Furthermore, there is limited research aimed at understanding food insecurity through an assessment of consumption practices and research has largely focused on food poverty, survival and the need to enhance sustainable agricultural production (Legwegoh, 2012).

This study therefore, intends to shed light on these issues by extending the food security question beyond the urban and rural populations to the peri-urbanites of Botswana who remain under the persistent threat of urban growth.

1.3 Aim of the Study

The aim of the study was to assess the patterns and processes governing food security among the households of Gabane and establish the strategies they adopted to minimize their vulnerability to food insecurity.

1.4 Research Objectives

The study was guided by the following research objectives:

1. To identify households vulnerable to food insecurity
2. To examine the extent and level of food security for different households in Gabane
3. To determine the major causes of household vulnerability to food insecurity
4. To establish the strategies adopted by households to minimize their vulnerability to food insecurity

1.5 Research Questions

- Which types of households, in terms of demographic and socio-economic characteristics are vulnerable to food insecurity?
- Is there any statistical relationship between food security status and the socio-economic characteristics (determinants)?
- What is the food security status for different households in Gabane?
- What are the major causes of household vulnerability to food insecurity?
- Are the causes of household vulnerability to food insecurity uniform across all households in Gabane?

- What sort of strategies do households adopt to minimize their vulnerability to food insecurity?
- Why do the households resort to such strategies?

Table 1.1: Summary Table

RESEARCH OBJECTIVES	RESEARCH QUESTIONS
1. To identify households vulnerable to food insecurity	<ul style="list-style-type: none"> • Which types of households, in terms of demographic and socio-economic characteristics are vulnerable to food insecurity?
2. To examine the extent and level of food insecurity for different households in Gabane	<ul style="list-style-type: none"> • What is the food security status for different households in Gabane? • Is there any statistical relationship between food security status and the socio-economic characteristics?
3. To determine the major causes of household vulnerability to food insecurity	<ul style="list-style-type: none"> • What are the major causes of household vulnerability to food insecurity? • Are the causes of household vulnerability to food insecurity uniform across all households in Gabane?
4. To establish the strategies adopted by households to minimize their vulnerability to food insecurity	<ul style="list-style-type: none"> • What sort of strategies do households adopt to minimize their vulnerability to food insecurity? • Why do the households resort to such strategies?

Source: Author's work, 2015

1.6 Scope of Study and Choice of Study Area

The study focused on household food security for the peri-urban residents of Gabane, specifically limited to the strategies for survival and resiliency to food insecurity by the households, their level or degree of food security and the major causes of household vulnerability to food insecurity. The study was limited to food security; thus nutritional

security will not be considered in this study. This was to ensure that the project is manageable, given the time and resource constraints faced by the researcher.

The study area was selected based on the following:

Gabane is one of the new planning areas of Gaborone and due to its proximity to the city, it is therefore under severe pressure to provide land to accommodate urban land use activities. This is likely to affect the food security of the village negatively.

1.7 Structure of Dissertation

This dissertation is in 6 chapters. The first chapter is introductory and outlines the background, problem statement and objectives. The second chapter presents the description of study area. Chapter 3 provides the literature reviewed, the conceptual framework and the existing knowledge gaps on food security. The fourth chapter presents the research methodology together with the data collection and analysis techniques used in the study. Chapter 5 presents the results and discussion of the results. The last chapter presents the major findings or summary, conclusions and recommendations.

CHAPTER 2: DESCRIPTION OF THE STUDY AREA

2.0 Overview

This Chapter gives a brief discussion and a brief overview of the study area in terms of its location, physical features, demographic profile, and the socioeconomic activities. It also discusses peri-urbanization and its implications for the food security of the residents of Gabane Village.

2.1 Location

The peri-urban settlement of Gabane (figure 2.1) is located within the Kweneng district in the west of the capital city of Gaborone. It is located 15 km west of Gaborone, the capital of Botswana (touristlink, undated). The village of Gabane covers an area of 202.8 square kilometers (KDDP, 2003). This village is originally home to Ba-Malete tribe. Kgosi Mosadi Seboko is the paramount chief and is stationed at Ramotswa, the capital of Balete (touristlink, undated). A relatively smaller proportion of the population belongs to other tribes in Botswana such as Bangwato, Bakgatla, Bakalaka, Bakwena, and others including foreigners mainly from Zimbabwe. The village is headed by a Chief who is assisted by village elders. The Chief reports to the House of Chiefs, which is a legislative branch forming part of the Government in Botswana (Republic of Botswana, 2006).

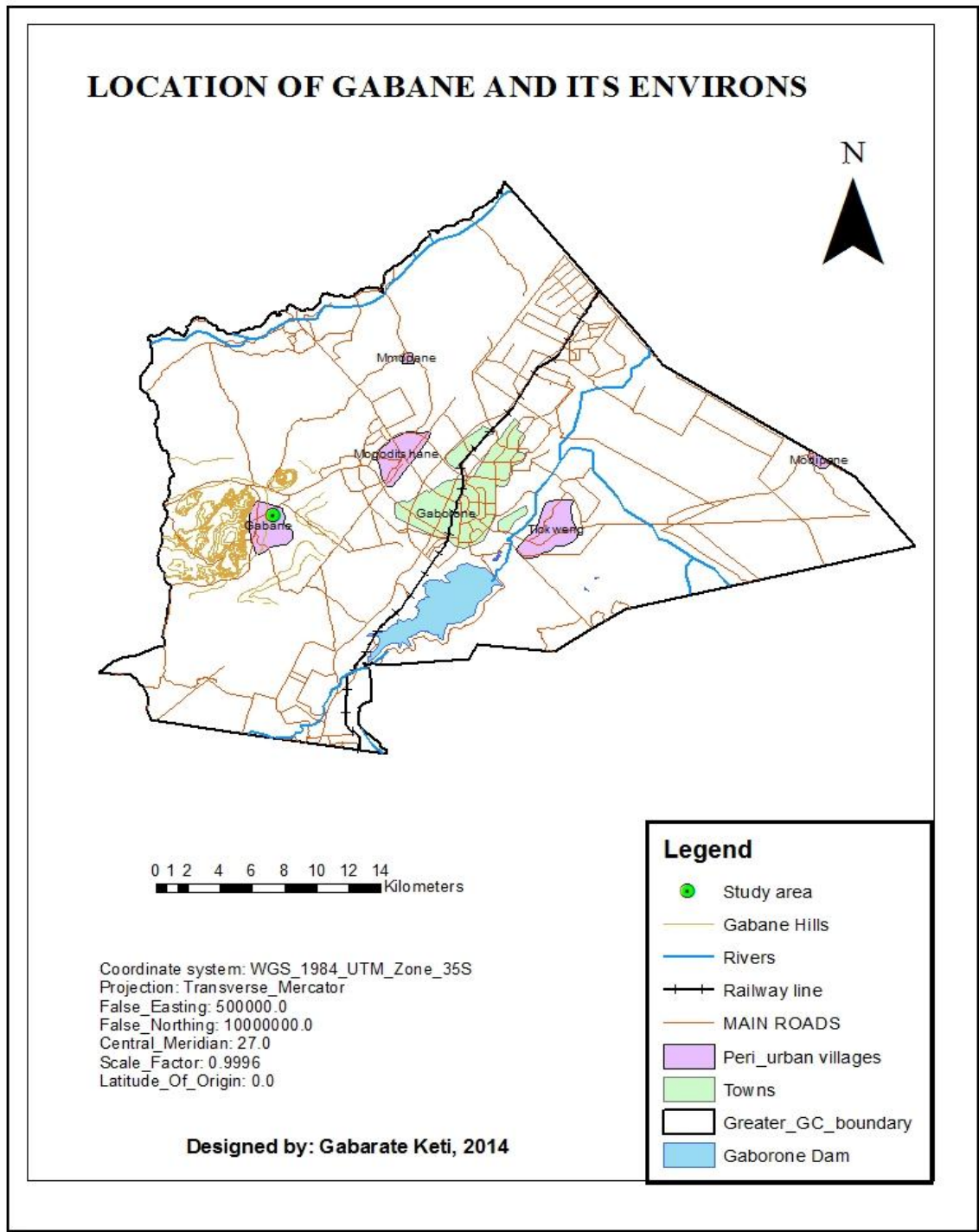


Figure 1.1: Location map for Gabane area, Source: Author's work 2014

Galefele (2001) maintains that Gabane stretches at the foot of a hill from north to south, but on its eastern side and is found between Mogoditshane and Kumakwane villages along the Gaborone-Kanye road. Facing the hill on the main road from Mogoditshane there is a white writing on the rocks which reads 'Gabane Pule' (being the name of the first village chief).The

location of Gabane and its localities of Mmokolodi and Tloaneng accord it a great potential for transformation into a thriving satellite of Gaborone city, absorbing outward growth from former. It possesses the impetus of becoming the main dormitory settlement taking advantage of the saturation of Mogoditshane in the future (Republic of Botswana, 2006).

The people residing in Gabane village belong to the Balete tribe. Due to the accessibility and proximity of Gabane village to Gaborone, the village accommodates people from other tribes and nationalities who find it convenient than in Gaborone. Gabane is classified according to the National Settlement Policy (1998) as a secondary centre, and is administered by the Kweneng District Council (Olesitse, 2010).

2.2 Climate

Gabane is classified as a dry subtropical semi-arid area and is designated as a desert subtype 5d. This climatic condition is characterized by seasonal and highly erratic, unreliable rainfall (Olesitse, 2010). 90% of the rainfall occurs during the summer months from October to April but the annual distribution varies in terms of occurrence and intensity. Gabane's highest temperatures occur during summer months (November, February and March), with mean temperatures being from 20-30 degrees Celsius (Olesitse, 2010).

With Botswana being situated in the Kalahari Desert, drought often affects the agricultural activities in Gabane. The unreliable rainfall affects the rate at which the community can cultivate and harvest its produce. Slower growth and harvesting occur during dry season. Sometimes heavy rains can speed disaster when plants have germinated and plant growth is disturbed by waterlogged soil (Olesitse, 2010).

2.3 Population Trends

According to CSO (2011), Gabane had grown from a settlement with a population of 1963 in 1971 to 2688 in 1981, showing a growth rate of 3.2% during the period. By 1991, the settlement's population had grown to 5975 persons. During the intercensal period 1981-1991, the growth rate was 8.3%. The 2001 census had shown that the population had grown to 10399, revealing a growth rate of 5.7%, while the recent census in 2011 showed a population of 15237 as shown in figure 2.2. According to (touristlink, undated) this population made it the fourth largest settlement in Kweneng. It is now part of the Gaborone agglomeration, home to 421,907 inhabitants as at the 2011 census. The elder population is still very much into agriculture while the younger generations are more urbanized (touristlink, undated).

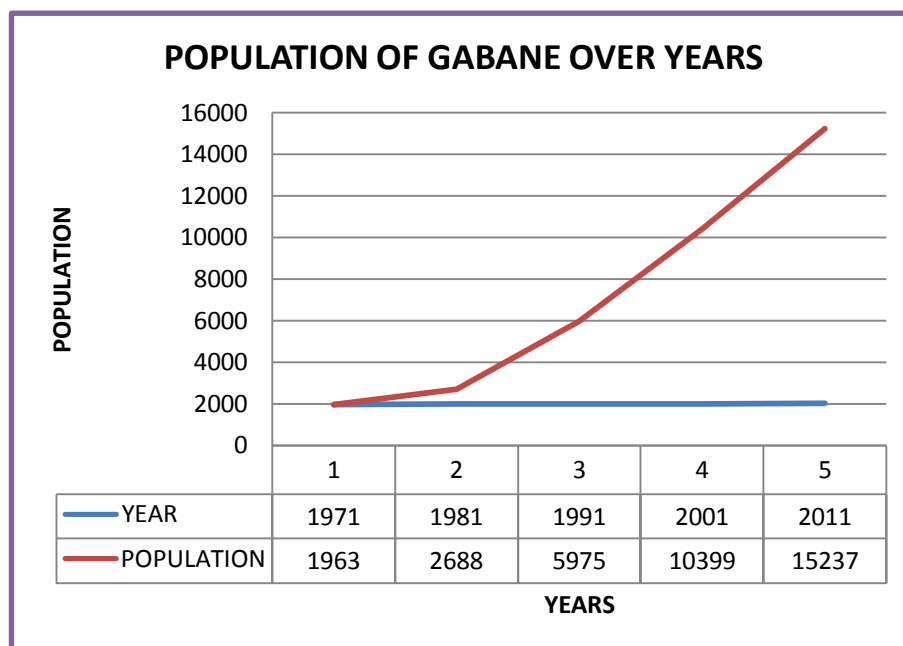


Figure 1.2: Population of Gabane over years, Source: author’s work. 2014
Data source; CSO, 2011

2.4 Services

The principal goal of the Botswana National Health Policy is to provide adequate health care for all Batswana. Gabane village has only one clinic and one health post located in the south-western part of the village. Given the limited health services, some of the villagers visit clinics in Gaborone (which is 15km away) to access specific services (Olesitse, 2010).

One of Botswana’s long term goals (Vision 2016) is education. There are four education policy objectives, namely pre-primary and primary school education, secondary school education, vocational training and special education for the disabled. There are five pre-schools in Gabane privately owned, one privately owned senior school and four government primary schools, two government secondary schools and one Brigade/vocational training school owned by the government (Olesitse, 2010).

Water for the Gabane settlement is supplied by the Water Utilities Corporation that is considered to be a very reliable source. The Kweneng District Council manages the distribution and maintains the water reticulation network as well as purchase of large volumes of water from the Department of Water Affairs by means of a booster station positioned in Mogoditshane (Olesitse, 2010).

Olesitse (2010) highlighted that in 2002, Gabane, experienced an increase in private indoor household water connections and household access to piped water outdoors. Dependence on communal stand pipes decreased as the village developed. A steady supply of water improved household living.

2.5 Economic Activities

According to Olesitse (2010), those who are in full time employment and part-time employment in Gabane are mainly government employees such as teachers, police officers, nurses and other professionals. Employment opportunities are very limited in Gabane with most of population commuting to urban centres to their work places. Part-time employment can be both professional and non-professional which include housekeeping, child care or baby-sitting and gardening.

In Gabane village, food can be purchased from supermarkets (such as the newly built Choppies and shoppers supermarkets in Nkoyaphiri), shops (mostly local general dealers), tuck shops, street vendors and other small businesses initiated by the community to earn a livelihood. Olesitse (2010) points out that the availability of these income generating-activities enables households purchase nutritious foods to improve household food security and thus adequate nutritional intake.

2.6 Peri-urbanization Trends and their Impacts

The proximity of Gabane to the national capital is responsible for the significant land use changes that are occurring at the periphery (Mpofu, 2013). For example, in 1982 there was a predominance of arable land-use and natural land cover. However, over the years there has been an encroachment of urban land use into Gabane village and its environs. By 2013, the arable land-use and biodiversity had been faced with a massive decline and their economic significance became negligible.

According to Mpofu (2013) in the year 1982, most of the land-uses did not exist except for arable land-use, vegetation cover and residential areas. The residential land-use had insignificant spatial coverage. Moreover, most of the urban-related land-uses emerged by the year 1996, and consumed a combined a total of 121 hectares of arable land and the vegetation cover. Subsequently, this area had rapidly increased to 138 hectares in 2006 owing to urbanization pressure from the city of Gaborone. In addition, by the year 2012, planned residential areas, active industries and planned industries had emerged as new urban-related land-uses encroached into arable lands and previously undisturbed biodiversity areas. With

the exponential growth associated with these and other urban-related land-uses, a total land area of 143 hectares in year 2012 had resulted in the decline of the arable land and vegetation cover (Mpofu, 2013).

The new Planning Area of Gaborone encompasses Gabane Village. One significant implication is that urban related land use will be given priority over agricultural and biodiversity related uses.

CHAPTER 3: LITERATURE REVIEW

3.0 Overview

Several studies have been conducted on food security, especially in urban areas. Certain scholars have however concluded that food security is primarily a rural problem. The food security situation in peri-urban areas remains obscured. Apart from defining the study's key terms, this Chapter provides a discussion of different relevant literature on food security and insecurity, its dimensions and its influencing factors with the aim of identifying important knowledge gaps that deserve further research investigation.

3.1 Operational Definitions of Key Terms

Food and Agricultural Organisation (2002) defines *food security* as a situation whereby all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. In simple terms, it refers to the availability of food and one's access to it.

Food insecurity: a situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life (FAO, 2010).

Livelihood: 'comprises the capabilities, assets (resources, claims and access) and activities required for means of earning a living; a livelihood is sustainable when it can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide opportunities for the next generation and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term' (Chambers and Conway, 1992:6).

Household: refers to 'people living together (co-residence) or sharing the same meals thus cooking from one pot and undertaking joint or coordinated decision making in financial or other social systems' (Morris et al., 2001:4)

Peri urban: these are zones of transition from rural to urban land uses located between the outer limits of urban and regional centres and the rural environment (Peri-urban, 2014).

Vulnerability: refers to degree of exposure to contingencies and stress and difficulty in coping with them (Dilley, 2001).

Time poverty: Bardasi and Woodon (2009:8) defines individuals who are time poor as 'those who work long hours and at the same time belong to households that are poor or would become poor if the individuals were to reduce their working hours up to the time poverty line'.

3.2 The attributes of Household Food Security

Food security is conventionally defined as consisting of an income, an access and utilisation component (McCalla, 1999). According to Ebony Consulting International (ECI) (2002), people cannot be food secure if they lack sufficient income to buy food. Similarly, people cannot be food secure if they do not have access to food (i.e. if the food is not physically available or if there is some physical, social or legal barrier to their access to food). The concept of access encompasses the notion of entitlement to food, such as right to the financial means to purchase food (whether such entitlement refers to the receipt of a government pension, or lies in having one's income protected from theft). Finally according to ECI (2002), people cannot be food secure if they do not correctly use the food to which they have access i.e. if they do not follow a diet that ensures that they enjoy nutritional security. Effective food utilisation depends on the knowledge held by each and every household of food storage and processing techniques, the basic nutritional principles and proper childcare (ECI, 2002).

The key aspects that affect an individual's food consumption (individual food security) as attested by Ruel et al (2010) are household food availability, household behaviors, and the individual's health and nutritional status (mainly through an effect on appetite). In the urban setting, food accessibility is the key to food security. This is credited to the fact that households depend on income for their food security, spend a large amount of households' income on food and have little access to other safeguard options like agriculture or land to ensure food access in times of adversity (Ruel et al. 2010).

According to Cohen and Garret (2010) food security, irrespective of location, depends first on food availability in the markets. Moreover, the ability of the household to access that food depends on their income as well as food prices. In addition, the key factors affecting food availability in urban areas are prices and income, access to home production and access to formal and informal transfers. Furthermore, household behaviors (influenced by cultural factors, taste, choice and knowledge), also influence patterns of food demand and distribution within the household (Cohen and Garret, 2010).

Opara (2013) argued that despite the numerous definitions of food security, three core pillars or determinants have emerged, namely: food availability, access and utilisation. Food availability according to him refers to the physical availability of food through local production, imports, and aid. Furthermore, Opara (2013) came up with some of the factors

that can affect food availability; ranging from production index to good postharvest management, which preserves quality and food safety, to occurrence of reduced losses. Adequate availability of food does not guarantee food security at all levels, from individual to global level (ibid).

In addition, Opara (2013) noted that access to food could either be physical access in the market or economic access at the household level. The ability to spend on or buy food is a good indicator of access to food. As a consequence, physical access to food in the market could also be affected by the lack of good road networks, transport, and postharvest handling and storage facilities. Food utilisation on the other hand denotes the consumption of food in an acceptable quantity and quality that is adequate to meet the nutrient requirements (ibid).

Furthermore, food stability as the fourth determinant of food security denotes that for individuals to be food secure, they must have access to food throughout the year at all times and be protected from losing this access (FAO, 2006). Such loss could result from reductions in availability of food or income shortages coming from rapid and unexpected changes such as economic crisis, climate change and seasonal variations (Tetteh, 2011). The phrase “at all times” in the definition of food security according to Gross et al. (2000), denotes the stability dimension of food security. Moreover, the fourth pillar of stability integrates price stability and securing incomes for vulnerable populations (Gross et al., 2000).

In his analysis of food security in Southern Africa, Kalibwani (2005) argued that, at the national level, food self-sufficiency can be perceived as the ability of a country to meet the collective food needs of her citizens from her domestic resource base. Moreover, Kalibwani (2005) noted that food self-sufficiency suggests that the domestic food production of a country must be sufficient to meet her food demand. Therefore, food self-sufficiency does not address the food security within individual households. According to Mazonde (1999), food self-sufficiency only entails the physical availability or supply of food and not the economic access to it or the consumption levels of households.

On the other hand, Kalibwani (2005) noted that a nation’s food security is realized when it can guarantee both physical and economic access to food for all citizens. Furthermore, food security should address the question of poverty within the households. According to Kalibwani (2005), it is not meaningful to talk about food security as long as households lack means to provide themselves with food; either by growing it or by purchasing it. Some

households may grow food, but due to pressing financial needs, end up sell it (ibid) and become food insecure.

According to a study by the Forum for Food Security in Southern Africa (FFSSA) (2004), on achieving food security in Southern Africa, internal coping structures are critical to the food security of any society, especially in the face of food crises. Moreover, a society which can be said to enjoy food security is not only that which has reached a food standard, but one which has also developed the internal structures that will enable it to endure during times of hardship (Maxwell, 1996).

With reference to Maxwell (1996) particularly in the context of the food crises in Southern Africa, food security emphasizes the importance of having structures in place that allow individuals and groups to withstand inevitable food shocks. It also emphasizes the importance of consumption as a component of food security. Food security, thus, has a number of complex and overlapping issues that include agricultural production, international trade, economic interdependence, national stocking policies, food aid and a range of direct measures to enhance household nutrition and consumption level (ibid).

According to Bajagai (2013), a household is food secure when it has sufficient access to the food necessary for a healthy life for all its members. Such sufficiency may be through quality, quantity, and safety and cultural acceptability; and when it is not at uncalled-for risk of losing such access. Some of the features of a household with low food security according to Bajagai (2013) are;

- ✓ Members of household were concerned that their food would run out before they got money to buy more.
- ✓ The Food they bought didn't last and they didn't have some resources to buy more.
- ✓ They couldn't afford to eat balanced meals but relied on inexpensive non-nutritious food.
- ✓ They had to cut the size of meals and skipped meals because there were not enough resources to buy more food.
- ✓ They had to eat less food than they felt they should because there were not enough resources for more food (ibid).

In their analysis of the academic discourse on food security and insecurity in Europe, Borch and Kjaernes (2016) indicated that little knowledge has been generated on food security.

Furthermore there has been limited research that focused on the food production instead of food access (ibid). In addition, Burchi and De Muro's (2016) study focused on moving from food availability to nutritional capabilities. Through this framework, they stress that this might help divert focus on income, entitlement or livelihood related frameworks and better detect the core causes of food insecurity (ibid). Burchi and De Muro's argument therefore was that food insecurity can be an end result of a lack of education, health or other basic capabilities that form part of people's welfare.

3.3 Determinants of Household Food Insecurity

Most food in rural and peri-urban areas is self-produced but in cases where production is difficult, disposable income becomes a solution to accessing food. Therefore, the purchasing power or disposable income of a household largely determines the amount and quality of food consumed (Mazonde, 1999).

FAO (2012) supported the view that the poor spend most of their income on food, and ultimately food prices rises or a drop in their incomes lessen the quantity and quality of their diets. For example during the 2007/08 global food tragedy when food prices rose, the poor had no choice but to spend more on food or eat less (ibid). More expensive items such as fruits and vegetables were the first to be dropped (FAO, 2012) as these are critical in diet diversity. Usually, healthy diet would cost the poor household nearly all of its income (FAO, 2012).

FAO (2012) further narrates that for the poor to make ends meet; they usually resort to cheaper substitutes, such as starchy staples or jumble of food rich in low cost fats and sugars. Cohen and Garret (2010) add that eating of street foods also tends to increase when food and cooking fuel costs rise. To cope with increasing food prices and income insecurity, Frayne et.al. (2010) report similar results and add that the most frequently used strategy is reducing the quality and quantity of food consumed, including dietary diversity.

In addition to the income related challenges that households face daily in accessing food of sufficient quality and quantity, Sabry came up with the non-income dimensions that can also have considerable impacts on their food security. These include lack of space and time (Sabry, 2009). These findings are confirmed by FAO (2012) who supports that the poor households lack enough cash and the refrigerators needed to store food. Therefore, they are forced to buy smaller quantities of food at a higher per item price (FAO, 2012), rather than buying in bulk during monthly price drops to save their income. Lack of space in the home prevents people

from buying food in larger quantities and cheaper; for example, the urban poor find themselves in overcrowded homesteads with shared bathrooms and obliged to cook in the same room where they sleep (Sabry, 2009).

Recent research also considers the fact that time poverty is increasing for most households (Heltberg et al., 2012 and Horn, 2011). Additionally, working longer hours is a major tactic at times of economic crisis, especially for workers in the informal sector in order to increase the take home income (Tacoli et al., 2013). In addition, Chant (2010) suggested that providing childcare, looking after the sick relatives, travelling to buy food and fuel more frequently and in smaller quantities, and cooking, convert into extremely long working hours for women, usually much longer than men.

As discussed in Chapter 4 on variables, MAHFP defines the household's ability to ensure that food is available above a minimum level all year round. Therefore there is a link between time poverty and food insecurity as availability of time for household food provisioning will be reduced by certain job characteristics. Coleman-Jensen (2009) explained that when time given for household food provisioning goes down, households are forced to spend more money buying foods which are prepared outside home (like fast foods) which sometimes are non nutritious. Consequently this may lead to food insecurity as too much spending may be a burden especially on low income households.

3.4 Global literature on Food Security in Peri-urban Areas

Tetteh (2011) has argued that the rapid and noticeable growth of cities in the developing countries has increased urban poverty and threatened food security. Even so, attempts to address these recent problems are not as sturdy as compared to the acceleration of the problems themselves (ibid). According to Tetteh (2011), this is because efforts to improve and upkeep livelihood initiatives have targeted rural areas since they are assumed to be less fortunate than urban areas. Maxwell et al.(2000) have added that the problems of less fortunate dwellers within and around big cities have become very critical, with issues of sustainable livelihoods and food security at the fore front.

In his study on the peri-urban livelihoods and food security in Ghana, Tetteh (2011) indicated that the recurring expansion of the city of Accra has resulted in the sale and demolition of agricultural lands for residential purposes. According to Tetteh (2011), the challenge to this incidence is that the lands are being sold at an alarming rate and almost no land is bought or

reserved for agricultural purposes. This change in land-use in peri-urban Accra has led to shortage of farming land and had consequently affected food availability within households on the urban fringes of Accra and has threatened the food security of the local communities (ibid).

Moreover, Tetteh (2011) asserted that farming activities have gradually declined within Amasaman and its environs despite several government initiatives to promote the growth of the sector. Additionally, this has been caused by the loss of existing farmlands to sand miners and the growth of estate development for the pressing need of accommodation. In addition, Tetteh (2011) noted that the incomes accumulated from the lease and sale of lands for housing projects are generally higher than for agricultural purposes, and this has led to decline in priority for agriculture over other uses. This has threatened the food security of the households and forced the area to rely on imports.

3.5 Urbanization and Food Security in Sub-Saharan Africa

Food insecurity is a major challenge in urban areas of sub-Saharan Africa. The world's population is now mainly urban, and sub-Saharan African is the most fast urbanizing region (UN-Habitat, 2010). The proportion of the world's poor living in urban areas is increasing, not simply because the poor urbanize faster than the non-poor (Ravallion 2002), but also because the conditions in many urban areas drive many existing and new urban residents into poverty (Mehta, 2000). These demographic and economic shifts raise a number of pressing development issues, of which food insecurity is one. Food security challenges for Southern Africa's urban residents are also heightened by the effects of the 2007-08 global financial crisis, and rapid price increases in imported and locally produced foods (Cohen and Garrett, 2010; Ruel et al., 2010).

The first Millennium Development Goal (MDG) aimed to halve the proportion of people affected by hunger and malnutrition by 2015, but in Southern Africa, this target has not likely been achieved (Nickanor, 2013). In addition, food insecurity has been rising instead of decreasing in Southern Africa, especially for women and children who are most susceptible to decreasing agricultural output (Nickanor, 2013).

World development indicators have shown that in 1988 the total production (GDP) of the region amounted to only US\$ 201 billion (World Bank, 2002). Ehui (2006) further highlighted that poverty is higher in most African countries than elsewhere in the developing world, with about 40% of the population of Sub Saharan Africans living on less than one

dollar a day. Those most at risk to poverty live in rural areas and in most cases large households that are headed by women (Ehui, 2006).

In Southern Africa, a region with world's highest rates of urbanization, the fundamental problem is not only food availability, but accessibility (UNHABITAT, 2010). Nickanor (2013) on her analysis of food insecurity among women in Southern Africa highlighted that the main source of food insecurity in most cities is lack of access, rather than availability. Moreover, urban dwellers have to pay for food in addition to housing, energy, transportation, education, health care and personal items, thus constraining the ability of an individual or household to purchase adequate food supplies. Similarly, poor women in urban areas often lack access to financial resources to purchase basic necessities, including food, which is needed to improve overall survival rates in line with MDG targets (Nickanor, 2013).

Frayne et al., (2010) noted that recent African Food Security Urban Network (AFSUN) research suggests that there is chronic food insecurity in the urban centres of Southern Africa, where 77 percent of poor households were found to be food insecure. The AFSUN survey further shows that female headed households were 37 percent among the food insecure category as compared to male headed households with 12 percent, nuclear headed (31 percent) and extended households (20 percent).

Nickanor (2013) presents evidence which shows that as Southern Africa is rapidly urbanizing due to migratory patterns and natural population growth, a high proportion of existing and newfound urban dwellers will be vulnerable to food insecurity. Moreover, with the rapidly growing cities of the region already characterized by high levels of poverty, unemployment and people living in informal settlements, access to basic services, income generation and food security are already major policy challenges facing governments in the region (Nickanor, 2013).

Pieterse (2011) explains that food insecurity, especially in terms of access to healthy diets, has featured as one of the multiple developmental concerns related to the negative experience of urbanization in Sub-Saharan Africa. There is a general concern that urbanization has frequently not been complemented by economic growth. In addition, rapid urbanization is the cause of multiple developmental and environmental problems, both in situ and in urban peripheries. The focus of this study is on food security for a settlement that lies on the shadow and sphere of influence of a rapidly growing urban settlement in sub-Saharan Africa.

Botswana, like many other African nations, is experiencing rapid urbanization and related challenges to urban development, productivity and sustainability (Hovorka, 2005). Most of Batswana living in urban centres mostly depend on commercially produced and imported food items. Furthermore, Hovorka (2005) indicated that crop and livestock processing and marketing in urban and peri urban areas offer an opportunity for household survival in the midst of underprivileged communities as well as entrepreneurial opportunities for urban dwellers.

According to Crush, Hovorka, &Tevera, (2010), agriculture has been perceived as along-lasting indigenous tradition in many African countries, but has usually been considered an activity practiced by rural dwellers. Moreover, peri urban agriculture is frequently recommended as a way of addressing growing vulnerability and poverty, persistent food insecurity and declining livelihood opportunities. In addition, one of the benefits of this kind of agriculture is that it increases the food security of the poor, there is local production of food; thus making it readily available and at lower prices, and it also improves the nutritional value of the family diet (Crush, Hovorka, &Tevera, 2010).

In addition, Rezai, Shamsudin & Mohamed (2016) reveal that urban agriculture addresses food security as it provides the urban dwellers with access to adequately nutritious, safe, acceptable and cost-effective food. Furthermore, their study explored the effectiveness of this form of agriculture in providing food security among urban dwellers and reducing a large share of their food bills. Their study had shown a positive statistical association between obtaining a sufficient quality of food and adequate diet through engagement in this form of agriculture.

Poulsen et al. (2015) assessed the impact of urban agriculture on dietary diversity and concluded that depending on the kind of farming system, urban agriculture offers a huge access to specific foods for different households. Also, urban agriculture can be a main source of household income, even though actual earnings may be low. Furthermore, UA can ease women's contribution to household food availability in the midst of other household responsibilities, and can provide extra benefits such as economic and social advancement (Poulsen, 2015). Studies have been conducted to assess factors that characterise rural and urban food security. However, the status of food security in the light of rapid horizontal urban expansion in the peri-urban areas of Botswana remains relatively poorly understood.

One of the major challenges faced by peri-urban agriculture is the spill over and rapid expansion of urban functions into the peri-urban human settlements, thus causing the residents to abandon farming (Crush and Frayne, 2010). It is important to note that rapid urbanization is not usually associated with increased earnings and better standards of living in the SADC region as it is in some other developing regions (ibid). Moreover, urban food security has been seen as an emerging issue of concern. Thus far, little is known about the extent of food insecurity mostly in peri-urban areas, making it difficult for relevant authorities to measure the challenge in order to strategically see how to reduce the food gap that exists in urban areas and their surrounding areas (Crush and Frayne, 2010).

A study by Chatterjee et al. (2016) had shown that urban centers usually depend on their immediate surroundings for agricultural produced foods. As these cities apparently combine or join into their peripheral areas, agricultural lands are being changed into urban environments to meet the increasing demand for residential land. According to Chatterjee et al (2016), this negatively impacts the local food supply (due to loss of local food production), resulting in an increasing reliance on the national and global food supply through imports.

Economic growth and urbanization are inextricably linked. Urban economic growth often implies the conversion of rural land to urban uses, including residential, commercial, and industrial uses as regional economies transition from agrarian to urban-based economies (Davis, 2004). This process occurs in urban areas of developing countries as well as in exurban or peri-urban areas, undergoing structural economic changes. As urban areas expand, property rights and food security at the rural-urban fringe have come under threat in Southern and Eastern Africa over the past century (Wily, 2000). Contemporary urbanisation in Botswana has translated into the spatial expansion of towns and cities (Areola, Gwebu and Sebege, 2014). This study looks at how this affects food security, at the rural-urban fringe of Gaborone, the largest city in Botswana.

According to Wily (2000) customary African tenure has been regarded as a paradigm from which modern society should depart. Sebege and Gwebu (2013) argued that the general expectation has been that through market forces, and through the assistance of programmes of tenure conversion, common land rights and organizations which sustain them will in due course vanish. In actual fact, customary land owners in peri-urban areas occupy and use their lands as tenants of State and State agencies, with their land being directly at risk of reallocation (Wily, 2000). Sebege and Gwebu (2013) have highlighted that the local land

rights of peri-urban residents have faded away to that of permissive tenancy. Additionally, Dasgupta and Heal (1979) have however warned that such land conversions, although hallowed at the altars of efficiency, could have disastrous distributional consequences by disenfranchising entire classes of people from social and economic entitlement. This will likely apply to the food security of residents of peri-urban settlements (Dasgupta and Heal, 1979; Nkwae, 2006).

Reference is increasingly being made to legal pluralism, a situation in which two or more legal land tenure systems co-exist at the urban fringe, each with its own basis of legitimacy and validity (Von Benda-Beckmann, 2002). Moreover, there is not just one legal system that applies to neither peri-urban land claims nor a simple division between customary and statutory rules, but rather overlapping legal and normative frameworks at work. These statutory ambiguities threaten food security systems at the peri-urban areas. In addition, Crush and Frayne (2010) points out that all these uncertainties make it difficult for development practitioners and policy makers to quantify the challenge and to proactively plan to reduce the food gap that exists in urban areas and their surroundings. Thus the need for a proper analysis of the patterns and processes that govern food security at the urban fringe.

3.6 Food Security in Botswana

Moepeng (2003) has asserted that the type of food insecurity found in Botswana is the transient food insecurity. This type of food insecurity is caused mainly by high rates of crop failure and lack of employment (Moepeng, 2003). Moreover, the main objective of Botswana's food security policy was to ensure stability in food supply and improve household access to food by reducing incidents of poverty (Moepeng, 2003). Sen (1999) observed that peace, social equality and transparent participatory processes are very important elements in order to achieve food security. Moepeng (2003) maintained that this has formed the basis for Botswana's approach to overcome some of the challenges.

Moepeng (2003) maintained that Botswana experienced a declining population growth rate of about 7% between 1971 and 2001. Mellor (1988) estimated that the poor spends between 50 and 80% of their income on food. According to Moepeng (2003), food prices are a major factor threatening food security in Botswana. In this case (EWTC, 2002) claims that Botswana cannot influence food prices through production due to the fact arable agriculture is constrained by low and erratic rainfall, endemic droughts. MOA (2002) adds the uncertain and scattered water resources for irrigation. Moepeng (2003) concludes that stable food

prices and a stable macroeconomic performance have contributed significantly to food security.

3.6.0 Agricultural Initiatives in Botswana

Agriculture has been identified as one of the sectors that can drive economic diversification and growth as well as food security at all levels. From independence until 1991, government's main objective in agriculture was to promote self-sufficiency in food production. Other objectives that guided agricultural development were: provision of adequate and secure livelihood for those engaged in agriculture; increased agricultural output; conservation of agricultural land resources and meeting employment demands of a growing labour force (Tselaesele, 2007). Below is an outline of government initiatives aimed at achieving self-sufficiency in food production:

3.6.1 The Pupil Farmer – Master Farmer Scheme

According to Tladi and Tselaesele (2010:6), the scheme was introduced before Botswana gained independence. The scheme inspired arable farmers to improve growing of crops and breeding of animals in order to improve their livelihoods (BCA Consult, 2012). Under this scheme, one extension agent worked with 15-25 farmers and for one to be qualified as a pupil farmer, a farmer had to own a plough, draught oxen, have cleared the bush and de-stumped his or her field (Tladi and Tselaesele, 2010:6). After all, the scheme lacked coordination and there was inadequate supervision of extension staff, lacked equipment and poor transportation disabled agents to work effectively (Tladi and Tselaesele, 2010:6).

3.6.2 Arable Lands Development Program (ALDEP)

The Arable Lands Development Programme was introduced in 1979 up to the year 1985. The programme was mainly aimed at raising the production of food grains by small farmers for the country to be food self-sufficient and make the economy less dependent on imported food and raise revenues and income distribution (BCA Consult, 2012).

ALDEP Phase II and III were introduced successively. The second and third phases of ALDEP emphasised on strengthening of extension services, technology transfer and adoption, training and supporting previous and current beneficiaries of the programme to utilise the acquired packages (Ministry of Agriculture, 2006).

The evaluation of ALDEP revealed that its existence did not significantly improve the performance of arable agriculture. At the same time, the cost of delivering ALDEP was estimated to be twice the import parity value of cereals (Ministry of Agriculture, 2002).

3.6.3 Accelerated Rain-fed Arable Programme (ARAP)

In 1985 ARAP was introduced which targeted arable farmers. The programme assisted arable farmers to de-stump up to ten hectares of arable land, provision of farm inputs such as seed and fertilizer, ploughing and planting subsidy (Tsie, 1996).

The new agricultural policy was introduced in 1991 and it advocated food security at household and national level (Ministry of Finance and Development Planning, 2003). Given Botswana's agro-ecological environment and available resources, there was a need to shift from food self-sufficiency to food security as food self sufficiency was seen as unattainable and unsustainable.

The Accelerated Rain-fed Arable Programme (ARAP) was a drought relief measure that introduced subsidies on farm inputs and operations. The programme introduced an incentive for land clearing in to increase the size of arable lands. The target beneficiaries were farmers who did not qualify under ALDEP but who had the potential to produce more (BCA Consult, 2012).

3.6.4 The national Master Plan for Arable Agriculture and Dairy Development (NAMPAADD)

The National Master Plan for Arable Agriculture and Dairy Development (NAMPAADD) was introduced in 2002. The specific objective of NAMPAADD was to improve the performance of the sector and ensure the sustainable use of the country's natural resources. The master plan identified rainfed crop production, irrigated agriculture (mainly horticulture) and dairy farming (BCA Consult, 2012).

NAMPAADD intended to improve the performance of the agricultural sector, by commercializing and modernizing it through the introduction of improved technologies and efficient use and management of land and water resources.

3.6.5 The Integrated Support Programme for Arable Agriculture Development

The ISPAAD programme was introduced in 2008 to address challenges in the arable sub-sector, of poor technology adoption by farmers and low productivity of the sub-sector. The programme was later extended to include support for horticultural development in 2010. Thus, ISPAAD has two sets of objectives:

The objectives of rain-fed arable agriculture support as noted by the BCA Consult (2012) report include:

- To increase grain production,
- To promote food security at the household and national levels,
- To commercialize agriculture through mechanization,
- To facilitate access to farm inputs and credit, and
- To improve extension outreach.

The objectives of the horticulture development programme are:

- To increase production level of horticultural products,
- To create employment opportunities,
- To diversify agricultural production base,
- To provide essential farm inputs and selected equipment, and
- To improve competitiveness of the horticultural industry.

An evaluation of the programmes that preceded ISPAAD indicates that they did not achieve their intended objectives. The Ministry of Agriculture (1991) & Borhaug (1992), argued that ALDEP may not have succeeded in total fulfilment of its objective and that both ALDEP and ARAP were not very promising in terms of general poverty alleviation in the rural areas.

According to BCA Consult (2012), farmers or their representatives, Extension Workers and Village leaders indicated that the existence of government programmes that compete with ISPAAD for already scarce farm labour such as Ipelegeng programme and destitute programs (where food hand-outs are distributed to able bodied people), make it difficult for this objective to be realized. The ISPAAD records show that there has been an increase in the number of beneficiaries over the years since the programme was introduced. At the same time, there has also been an increase in hectares plough/planted. The increase in the number of beneficiaries and the hectares plough/planted has not translated into an increase in total grain production.

Grain productivity per farm has not improved despite the provision of critical inputs through ISPAAD. The low productivity levels are an indicator that the majority of the beneficiaries are not yet able to produce adequate grain to satisfy household requirements. In total, this failure to satisfy household grain requirement translates into failure to meet national grain requirement from domestic production. This failure to meet national requirement from domestic production is exhibited in the rising imports of cereals, which account for 90% of

total cereals utilized in Botswana annually. Thus, ISPAAD has not achieved the objective of promoting food security at household and national level (BCA Consult, 2012).

3.7 Existing Knowledge Gaps on Food Security

Peri-urbanization has impacted negatively on the natural environment, the lifestyles and livelihoods of residents. Up to date most research on food security has focused on either rural or urban areas (Stevens, 1978; Cathie and Hermann, 1988; Asefa, 1988; Cathie and Dick, 1987; Belbase and Morgan 1994; Lado, 2001; Neudeck et al 2012; Acquah et al, 2013; Legwegoh and Hovorka, 2013). Notwithstanding that, peri urban areas have a great capacity to produce food and other agricultural products because they occupy relatively good farming land. Very limited research has been conducted on peri-urban food security, there has been limited research on the subject (Olesitse, 2010). Few studies in Botswana have focused directly on food security (Moepeng, 2003). Most have focused on cash income as a main determinant to food sufficiency (the amount and quality of food consumed), yet some households still depend on their produce for their living.

This study paid particular attention to the food security of that segment of the population that resides in the peri-urban environment because of its vulnerability to forces of urbanization. Several studies have attempted to explain the general landuse/cover change around selected urban centres in Botswana in the perspectives of the bow wave analogy, the stimulus response perspective and rent bid curve model to explain process underlying land use changes (Areola, Gwebu and Sebege, 2014; Sebege and Gwebu, 2013; Mpofo, 2013). The study therefore looked into such issues as to what happens to agricultural land displacement in relation to the level or degree of food security in this area. The geographical focus on this issue will bring out new knowledge on the severity of food insecurity for further policy guidance in this area. It was therefore the intention of this study to investigate and attempt to provide plausible answers on food security among the peri-urbanites.

Therefore the study is significant because of the following reasons:

1. The geographical focus on this issue brings out new knowledge on the severity of food insecurity for further policy guidance complementing information from recent studies by Sebege and Gwebu, (2013), Nkambwe (2003), Nkambwe and Totolo (2005) indicating how volatile and conflict-ridden this area is, in terms of threats to the livelihoods of its residents

2. It generates knowledge on the patterns and processes affecting food security in peri urban areas
3. It addresses Botswana's national MDG 1 that aims at eradicating poverty and hunger

3.8 Theoretical basis towards Food Security

Food security theory is credited to the works of Amartya Sen (1981) on poverty and famines; an essay on entitlement and deprivation. Dilley and Boudreau (2001) argued that Sen(1981) challenged the common belief that lack of food availability and supply was the key cause of famines; as a substitute, he postulated lack of access as the key to understanding food insecurity and poverty. Moreover, Dilley and Boudreau (2001) had shown that Sen's (1981) work represented a clear shift in focus from natural to societal causes of famine. Additionally, Amartya Sen (1981) have noted that scarcity is a consequence of distribution as absolute supply; the phenomenon of people starving amidst plenty is not unknown, even up to today. The problem in such circumstances has more to do with effective demand than supply. That is, having no money people cannot afford to buy food at any price (Gleditsch, 1996).

3.8.1 Vulnerability Indices in Food Insecurity

Dilley & Boudreau (2001) highlighted that in explaining food security, vulnerability is usually described in relation to a consequence such as hunger, food insecurity or famine. Furthermore, this prevents making use of the concept for the more specific task of evaluating the vulnerability of a population to precisely-identified events or shocks that could lead to these consequences (Dilley and Boudreau, 2001).

Capaldo et al. (2010) accentuated that vulnerability analysis provides a quantitative estimate of the probability that a given household will lose access to sufficient food in the near future. Similar to HFIAP indicator by FANTA project, a model of vulnerability to food insecurity allows households to be classified into 4 categories of food insecurity, which are: chronically food insecure, transitory food insecure, permanently food secure and transitory food secure (Capaldo et al., 2010). The concept of vulnerability serves to identify characteristics of population groups that make them more or less vulnerable to experiencing damage when exposed to particular hazards or shocks (Dilley and Boudreau, 2001). In addition, vulnerability is explained by how it relates to hazards rather than directly in relation to the outcomes themselves (Dilley and Boudreau, 2001).

A conceptual framework on vulnerability to future food insecurity by Lovendal and Knowles (2005) views vulnerability as the result of a recursive process. This means that at every point

in time households' food security status is affected by their past status and affects their future status. Capaldo et al., (2010) further explain that between the present and the future, a number of previously unknown factors manifest themselves and determine the future food security status. This is influenced by households' risk management abilities. Both the current food security status and the expectation of the future status determine the overall household food security situation over a period of time.

3.9 Conceptualization of Food Security

Over the past five years, the Urban Food Security Network (AFSUN) has conducted various studies in over a dozen Southern African cities in an attempt to delineate and account for household food security. The studies have used a uniform conceptual framework and measurement instruments to facilitate international comparisons. The framework demonstrates the multiple factors which influence household food security (Figure 3.1).

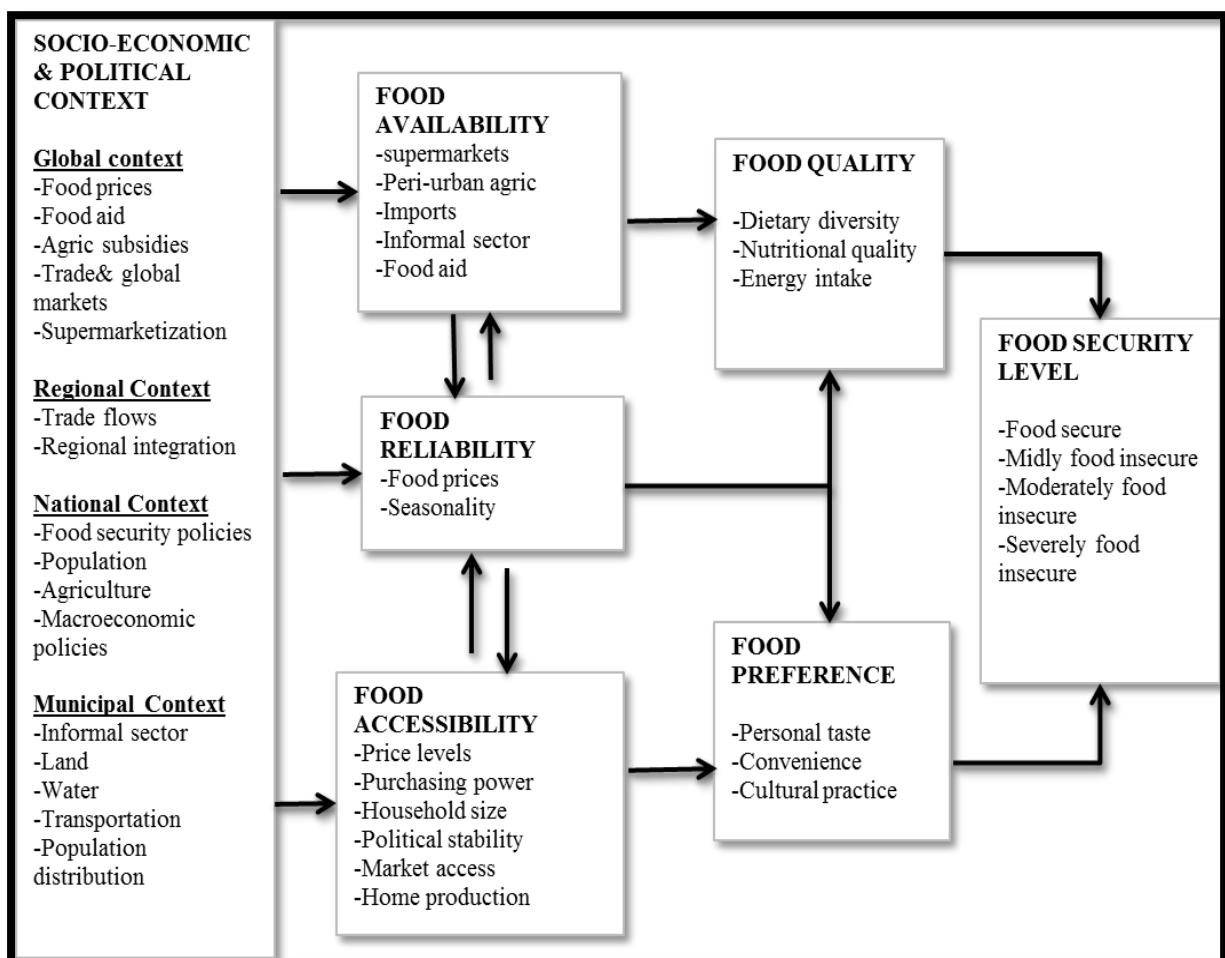


Figure 2.1: Background and direct factors of food security
Source: Edited from AFSUN 2010

The multiple factors that influence household food security are explained at the socio-economic and political context. Crush and Frayne (2010) adds that the level of food security in any particular area cannot be described outside of its global, regional, national and local or municipal context. Crush and Frayne (2010) maintain that while these factors are well beyond the control of individual households, they intensely affect their food security. These factors at all levels or contexts affect the food availability, food reliability and food accessibility (dimensions for food security) for different households.

Supermarkets, peri-urban agriculture, the informal sector (like kiosks) affect the availability of food, and also determine the quality of food consumed by different households. On the other hand, food prices, drought, and seasonality affect the reliability of food and ultimately determine both food quality and food preference for different households. In addition to this, the price levels, purchasing power, market access, household size etc., affect food accessibility (mainly regarded as the main dimension for food security) and determines the different households' food preference. All these factors or determinants (food availability, reliability, accessibility, quality and preference) affect the level of food security for different levels.

The three primary components of food security which are availability, access and utilisation differ in urban and rural contexts and across urban socio-economic groups (Crush & Frayne, 2010). These primary components defined and characterized this study, as illustrated in Figure 3.2.

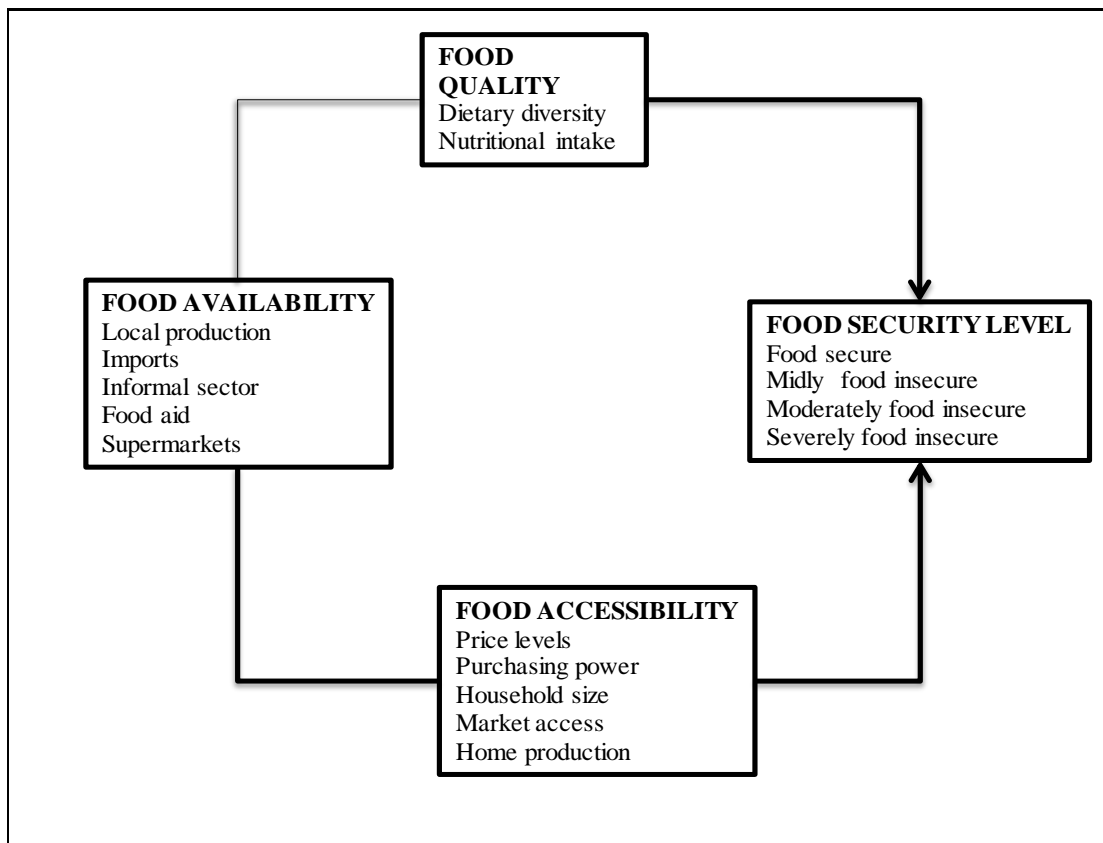


Figure 2.2: Direct factors in levels of food security.
 Source: Author 2014 edited from AFSUN 2010

The main argument is that the food security level of a household is determined by food quality, food availability and accessibility as shown in the figure above. For households to be food secure food should be readily available, accessible by all and it should be of good quality.

CHAPTER 4: RESEARCH METHODOLOGY

4.0 Overview

This chapter describes the methods and instruments that were used to collect data for this study. This chapter also presents how the findings of the study were presented and analyzed that is, how data addressing specific research questions were collected and analyzed according to research objectives.

4.1 Study site-Gabane

In an effort to improve the knowledge base about urban food security in Southern Africa, the African Food Security Urban Network (AFSUN) undertook a baseline urban food security study in eleven cities in nine countries in Southern Africa, including Gaborone in late 2008 and early 2009 (Frayne et al., 2010). Unlike the previous research, this study specifically looked at the patterns and processes that affect household food security in Gabane village, a peri urban area of Gaborone.

4.2 Social Survey Sampling Procedures

Sampling is mainly done to statistically represent a population (Babbie, 2004). The study targeted the households who have been displaced by peri-urbanisation. Households constituted the primary units of analysis. However, for completion their response was complemented by those obtained from the key informants such as selected community leaders. A combination of responses from this diversity of individuals was intended to minimize bias and ensure both the validity and reliability of the final results from the study.

For the social survey, purposive sampling was adopted. Unlike random studies, which deliberately include a diverse cross section of ages, backgrounds and cultures, the idea behind purposive sampling is to concentrate on people with particular characteristics who will better be able to assist with the relevant research (Enki village, 2015). Additionally, the main goal of purposive sampling is to focus on particular characteristics of a population that are of interest, which will best enable one to answer their research questions (Laerd-dissertation, 2012). For this study, the researcher focussed on the people whose ploughing lands or fields were appropriated by the land board in order to assess their food security situation. The researcher sought a list of those potential respondents from the Mogoditshane Sub-Land Board and with the assistance from the Gabane Kgotla by the chief and his assistants, managed to locate the respondents. The sample size therefore depended on the available list of people which the researcher got from the land board but due to lack of recording, there

were few listed individuals. From the targeted list, a total of 35 people whose lands were appropriated by the Land board were interviewed.

4.2.1 Questionnaires

A semi-structured questionnaire was designed and used to collect primary data for the social survey. Questionnaires were administered by the researcher which consisted of both open ended and close ended questions. This instrument was used because it is believed to collect truthful information in order to classify people, their circumstances and behaviour. Face to face interviews were used to administer the questionnaire to draw information about the causes of household vulnerability to food insecurity, the strategies adopted by households to minimize their vulnerability to food insecurity and the households' demographic and socio-economic information. The questionnaire was used to effect the Household Food Insecurity Access Scale (HFIAS), Household Dietary Diversity Scale (HDDS) and Month of adequate Household Food Provisioning Indicator (MAHFP) standard questions adopted from FANTA project. (See appendix B)

4.2.1.1 The Variables

Although a universally accepted definition of food security has been made (FAO), the measurement of this concept has remained problematic. It is therefore in that context that this study has adopted four international cross-cultural scales developed by the Food and Nutritional Technical Assistance Project (FANTA). Each scale identifies a separate component of food security which, when combined with results from other scale provides a valid and reliable metric of food security. Apart from studies conducted elsewhere, seventeen separate studies have been conducted in the Southern African sub-region, by the African Food Security Urban Network (AFSUN). Results from these have attested to both the validity and reliability of the research results from these scales. The scale was complemented with closed and open-ended questionnaires and interview schedules.

The study seeks to explain four dependent variables, developed by (FANTA) that define food security. Data for these indicators are relatively easier to collect and tabulate. The independent variables consist of the socio-demographic and economic factors contained in the closed questionnaire. These independent variables include the household type, household size, income, employment, education, sources of food, loss of agricultural land and among others food prices. The dependent variables consist of the levels of food security as discussed below:

4.2.1.2 Household Food Insecurity Access Scale (HFIAS)

According to the United Nations System Standing Committee on Nutrition (undated), the HFIAS is an instrument used to evaluate or estimate whether households have experienced difficulties in accessing food in the previous 30 days. The instrument consists of nine questions that ask about changes households made in their diet due to limited resources to obtain food (ibid). It gauges the severity of food insecurity in the previous 30 days as reported by the households themselves not as individuals. The higher the HFIAS score, the lower the socio-economic status of households.

United Nations System Standing Committee on Nutrition (undated) reported that HFIAS is modified or obtained from a 9 item questionnaire. The respondent is the person in charge of food preparation, or the head of households and answers on behalf of all household members (United Nations System Standing Committee on Nutrition, undated). For each question, the respondent has 4 possible responses depending on the frequency of occurrence of the experience (ibid). The level of food security is set up based on a score and further classified using different categories of food.

$$\mathbf{HFIAS} = \text{SUM} (1a, 2a, 3a, 4a, 5a, 6a, 7a, 8a, 9a)$$

$$\mathbf{Average\ HFIAS} = \frac{\text{sum of HFIAS}}{\text{Total Number of House holds}}$$

The strengths of the HFIAS are that;

- It is the only tool that measures directly the household's experience of food insecurity, unlike other measures such as food availability or anthropometry;
- It is also much quicker and easier to administer;
- It is easy both to administer and interpret;
- The survey takes only about 10 minutes to administer;
- The survey is also not very offensive as participants are not asked to undress.

Limitations of the HFIAS:

- In places where food assistance is frequently distributed, respondent bias may be common; that is, households might over report food insecurity with the hope of receiving any form of assistance;
- The instrument should not be an aid of identifying those who need assistance;

- HFIAS also cannot tell you if there are certain members of the household that are more vulnerable than others, since it reports the level of food insecurity for the whole household not individual members;
- The HFIAS does not tell you why households are food insecure unless they report the cause.

In spite of the numerous limitations of the HFIAS, the fact that it is the only tool that measures directly the household's experience of food insecurity makes it superior and to maintain the study's integrity, the HFIAS will be complemented by HDDS and MAHFP scales.

4.2.1.3 Household Food Insecurity Access Prevalence Indicator (HFIAP)

According to Coates et al (2007), HFIAP is an instrument which groups the food security statuses. The HFIAP tool uses the HFIAS summation score to categorise households into four levels of household food security. These categories are: food secure, mildly food insecure, moderately food insecure and severely food insecure (Acquah et al., 2013). HFIAP gives practical information on what this tool means by allowing a researcher to distinguish between 'food secure' and 'food insecure' households (ibid).

According to Coates et al (2007), the HFIAP indicator uses the responses to the HFIAS questions. It categorises households into four groups: 1) food secure, 2) mildly food insecure, 3) moderately food insecure and 4) severely food insecure. A food secure household experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely. A mildly food insecure (access) household worries about not having enough food sometimes or often, and/or is unable to eat preferred foods, and/or eats a more monotonous diet than desired and/or some foods considered undesirable, but only rarely. Nevertheless, it does not reduce on quantity nor experience any of the three most severe conditions (such as running out of food, going to bed hungry, or going a whole day and night without eating).

Furthermore, Coates et al (2007) state that a moderately food insecure household sacrificed quality more frequently by eating a monotonous diet or undesirable foods sometimes or often, and/or has started to cut back on quantity by reducing the size of meals or number of meals, rarely or sometimes. However, a moderately food insecure household does not experience any of the three most severe conditions.

A severely food insecure household has graduated to reducing on meal size or number of meals often, and/or experiences any of the three most severe, even as infrequently as rarely. In other words, any household that experienced one of these three conditions, even once in the last four weeks (30 days) is considered severely food insecure.

4.2.1.4 Household Dietary Diversity Scale (HDDS)

Dietary diversity refers to how many food groups are consumed within the household in the previous twenty four hours (Legwegoh and Hovorka, 2013). The maximum number, based on the FAO classification of food groups for Africa, is 12. An increase in the average number of different food groups consumed provides a quantifiable measure of improved household food access (Swindale and Bilinsky, 2006). To better reflect a quality diet, the number of different food groups consumed is calculated, rather than the number of different foods consumed (Swindale and Bilinsky, 2006).

The Household Dietary Diversity Score determines the number of different food stuffs or food groups consumed over a given reference period (Legwegoh and Hovorka, 2013). Furthermore, information on dietary diversity should be used as a crucial element to inform food security analysis. HDDS has been validated in different countries as a proxy measure of household per capita energy intake and a tool for monitoring household economic access to food, dietary patterns and the consumption of specific foods (Kennedy, 2010).

A major limitation to the HDDS tool is that it lacks a universal cut off point for defining varying levels of food security because disparities in dietary patterns and food systems across regions may influence the clarifications of dietary scores (Kennedy, 2010). The HDDS does not expose the context- specific causes of consumption deterioration (Legwegoh and Hovorka, 2013). It is in that the FAO and FANTA endorses that the HDDS tool should not be used as a stand-alone tool instead, HDDS should be a make up for other food related evidence to obtain an all-inclusive representation of the food security situation in a community (Legwegoh and Hovorka, 2013). In this study, the HDDS will be complemented with HFIAS to measure the level of food security for different households in Gabane.

$$HDDS = \text{Sum (A, B, C, D, E, F, G, H, I, J, K, L)}$$

$$\text{Average HDDS} = \frac{\text{Sum HDDS}}{\text{Total Number of house holds}}$$

4.2.1.5 Months of Adequate Household Food Provisioning Indicator (MAHFP)

The MAHFP indicator captures changes in the household's ability to ensure that food is available above a minimum level the year round. Households are asked to identify in which months (during the past 12 months) they did not have access to sufficient food to meet their household needs (Swindale & Bilinsky, 2010). The intention is to find if there is a statistically significant relationship between food security status and months of adequate provisioning.

$$\text{MAHFP} = 12 - \text{Sum (A +B +C +D +E +F +G +H +I +J +K +L)}$$

$$\text{Average MAHFP} = \frac{\text{Sum (MAHFP)}}{\text{Total number of house holds}}$$

4.2.2 Key Informant Interviews

Key informant interviews are used or intended to extract information that cannot be easily attained either from existing data or direct observation. The selection of the key informants was based on purposive sampling and using the snowballing techniques. The key informant interviews were structured questions and conducted both face to face and by telephone, where the interviewee was completely held up. Key informant interviews were conducted with the representatives from:

- ✓ Ministry of Agriculture (agricultural extension officer): these were relevant to provide appropriate information on agricultural changes that has taken place in Gabane. To further explain how these changes has affected crop production which ultimately affects food security of Gabane residents
- ✓ Kweneng land board official: to provide valuable information about land use and land use changes that have occurred in Gabane. This was to obtain information on the amount of land appropriated and names of people whose land were appropriated.
- ✓ Member of Parliament for Gabane area: believed to have more knowledge about what is going on in the area therefore have a better understanding of the place and changes

that have taken place in the village. Provided general knowledge on issues of land appropriation in the area and how residents are affected.

4.3 Secondary Data Sources

Secondary data sources were used to complement the primary data sources used in this study and provide a baseline for the study. Documents related to the topic and study area were used and were obtained from the University of Botswana library, Ministry of Agriculture, Kweneng land Board and other relevant organisations. The secondary data sources aided the researcher in understanding the main factors affecting food security and the land use changes that have affected the agricultural lands of Gabane residents that negatively affect their food security status. This aided in comparing and contrasting against other studies on food security done in Botswana (for example the AFSUN study).

Table 4.1 provides a summary of the research which includes the research and research questions. The study variables were identified and their indicators. The table further shows the data collection and analysis techniques used by the study to address each objective.

Table 4.1: Operationalization of Variables

Objectives/ questions	Study variables	Variable indicators	Data collection instruments	Data analysis techniques
<p>Objective 1: To identify the vulnerable households to food insecurity.</p> <p>-Which types of households, in terms of demographic and socio-economic characteristics are vulnerable to food insecurity?</p>	<p>Vulnerability</p> <p>-Demographic and socio economic factors</p>	<p>In terms of demographic and socio-economic characteristics:</p> <ul style="list-style-type: none"> ✓ Gender ✓ Household type ✓ Age ✓ Household size ✓ Educational level ✓ Income ✓ Length of stay 	<ul style="list-style-type: none"> ✓ Questionnaire (households) ✓ Key informant Interviews 	<p>-Graphs and charts</p> <p>- Tables</p>
<p>Objective 2: To examine the extent and level of food security for different households in Gabane</p> <p>- What is the food security status for different households in Gabane?</p> <p>- Is there any statistical relationship between and food insecurity and the socio-economic characteristics?</p>	<p>Level of food insecurity</p>	<ul style="list-style-type: none"> ✓ Independent variables: ✓ - Socio economic variables (above) ✓ ✓ Dependent variable: level of food security ✓ HFIAP score ✓ - Food secure ✓ - Mildly food secure ✓ - Moderately food insecure ✓ - Severely food insecure ✓ 	<ul style="list-style-type: none"> ✓ Questionnaire 	<p>- Cross tabulations from SPSS</p> <p>-Content/ thematic analysis</p> <p>- Chi square</p> <p>-Tables</p>

<p>Objective 3: To determine the major causes of household vulnerability to food insecurity.</p> <p>- What are the major causes of household vulnerability to food insecurity?</p> <p>- Are the causes of household vulnerability to food insecurity uniform across all households in Gabane?</p>	<p>Causes</p> <p>Land use changes</p>	<ul style="list-style-type: none"> ✓ Food prices ✓ Lack of Income ✓ Loss of agricultural land ✓ Old age ✓ Large household sizes 	<ul style="list-style-type: none"> ✓ Questionnaire ✓ Key informant Interviews (Kweneng land board, DTRP, Community leaders, MOA) ✓ Secondary data 	<p>-Content/ thematic analysis</p>
<p>Objective 4: To establish the strategies adopted by households to minimize their vulnerability to food insecurity.</p> <p>- What sort of strategies do households adopt to minimize their vulnerability to food insecurity?</p> <p>- Why do the households resort to such strategies?</p>	<p>Survival strategies</p>	<ul style="list-style-type: none"> ✓ Borrowing food/ money ✓ Limiting portion size ✓ Skipping meals ✓ Eating less preferred food ✓ 	<ul style="list-style-type: none"> ✓ Questionnaire (Likert scale) ✓ Key informant Interviews (Community leaders, MOA) ✓ Secondary data 	<p>Content/ thematic analysis</p>

4.4 Data Processing and Analysis

Both qualitative and quantitative data had to be organized into a format that is easy to work with before analyzing.

4.4.1 Quantitative Data Analysis

Quantitative data was processed by the SPSS software. Descriptive statistics were obtained for data obtained from the FANTA scales. Socio-demographic and economic data were cross-tabulated with the FANTA scale (HFIAP) variable to explain variations across households. Correlations were made to quantify and analyse quantitative data. These correlations were used to determine which groups are vulnerable to food insecurity, how much people spent on food items and other quantifiable variables. Cross-tabulations were used to establish relationships between variables on socio-demographic characteristics and distinguish between food secure and insecure households.

4.4.2 Qualitative Data Analysis

Qualitative data from open ended household questionnaires and interview schedules were collated, around research questions, into themes in order to provide interpretive meaning to results obtained from the SPSS output. In analyzing qualitative data, data had to be reduced, organized and meaningfully reconfigured. Content analysis was used to analyse qualitative data where basic themes were extracted from the responses. Themes arising from respondents' and key informants' opinions, practices and perspectives about strategies for survival and resiliency to food insecurity; the causes or factors influencing household food insecurity and other factors were extracted and analyzed.

4.5 Reliability

Doing research had been perceived as a challenging task that involves analysis of data in a more subjective manner that opens the research to a lot of criticisms. Issues of reliability and validity hence become more important in the study if it is to be regarded as credible. Reliability refers to consistency of research findings. Not only will the results of this study be reliable but the methods and procedures followed in the field during data collection will have to be reliable enough to guarantee the integrity of the study (Kvale 1996). For this study, the purposively sampled respondents were identified and were interviewed in a secure safe place. The questions were explained clearly so that they give out detailed information to ensure

reliable results. Additionally, the researcher did all the interviews in order to explain the questions in detail and getting in-depth information. All these guaranteed the integrity of the study and reliability of the results. To achieve credibility, this study incorporated the flexibility of methodology as this helped overcome some of the difficulties faced by the study (for example small sample size).

3.7 Validity

According to Kitchin and Tate (2001), validity concerns the soundness, legitimacy and relevance of a research theory and its investigation.

The complementary use of qualitative and quantitative methods provides a greater range of insights and perspectives and permits a greater triangulation (the confirmation of findings by different methods) of findings, which improved the overall quality of the study and the validity of results. The use of multiple data methods also improved the quality of the results of each of the components themselves, and made the study of greater use to the constituencies to which it was intended to be addressed. The overall idea of this study therefore was to gather data with minimal exaggeration and bias. In addition, the scales used enabled the researcher to quantify the level of food security for different households.

3.8 Limitations of study

One of the limitations the study faced was that it was difficult to find more respondents as there was no proper documentation by the authorities. Upon getting a few recorded list of respondents, it was difficult to locate the respondents as there were no contacts. Also, some respondents were not willing to give information and they were expecting financial rewards. Even though the sample was small, it was statistically representative as qualitative data were used to compensate for this deficiency.

4.8 Research Ethics

The concept of voluntary participation and informed consent is an integral part of this research. Information obtained from participants was kept private except for the Member of Parliament who consented that his information be published. The research permit (Appendix E) was obtained from the Ministry of Agriculture and the researcher visited the Gabane village. The purpose of this study was presented to the village chief, the headmen of the

village and other community leaders who were called for the meeting by the chief. The Chief consented that the study conducted in the village and advised that the researcher use the Gabane-Mmankgodi constituency office to interview the respondents. He also informed the headmen to summon the respondents who were on the list (as there were no contacts) to the office for interview as the headmen were familiar with the respondents.

Participants in this study were informed prior to interviewing that the purpose of the research was purely for academic purposes and that the findings from the research will be disseminated in the development field. Consent to participate was obtained through written consent form. Participants were also informed on the use of questionnaires with no names to protect their identity, thus assuring confidentiality. The key informants were assured that the results of the study will be sent to them after completion of the study.

CHAPTER 5: RESULTS AND DISCUSSION

5.0 Overview

This Chapter presents a detailed discussion of the research findings in relation to the research objectives. The demographic and socioeconomic characteristics of households are presented. Then the food security status of the different households is outlined before an assessment of their livelihood strategies to cope with vulnerability to food insecurity.

5.1 Demographic and Socioeconomic Characteristics of Households

A sample of 35 households whose lands were appropriated by the Land Board were surveyed based on their age, gender, marital status, educational level, household size, length of stay and household structure. The aim was to determine how these characteristics relate to the households' food security status.

5.1.1 Age and Gender

From the interview, (n=35) 40% of the respondents were males and 60% were females, as displayed in Table 5.1. Generally, these people are unemployed and they had previously owned the ploughing fields that were appropriated by the Land Board.

Table 5.1: Gender of Respondents

Gender	Frequency	Percent
Male	14	40
Female	21	60
Total	35	100

Source: Author's Fieldwork, 2015

Most of the respondents (63%) were over 50 years of age and were unemployed as shown in figure 5.1. This implies that most fell within the unproductive dependent age cohort, as they were not engaged in any economic activity that would generate much income to support them.

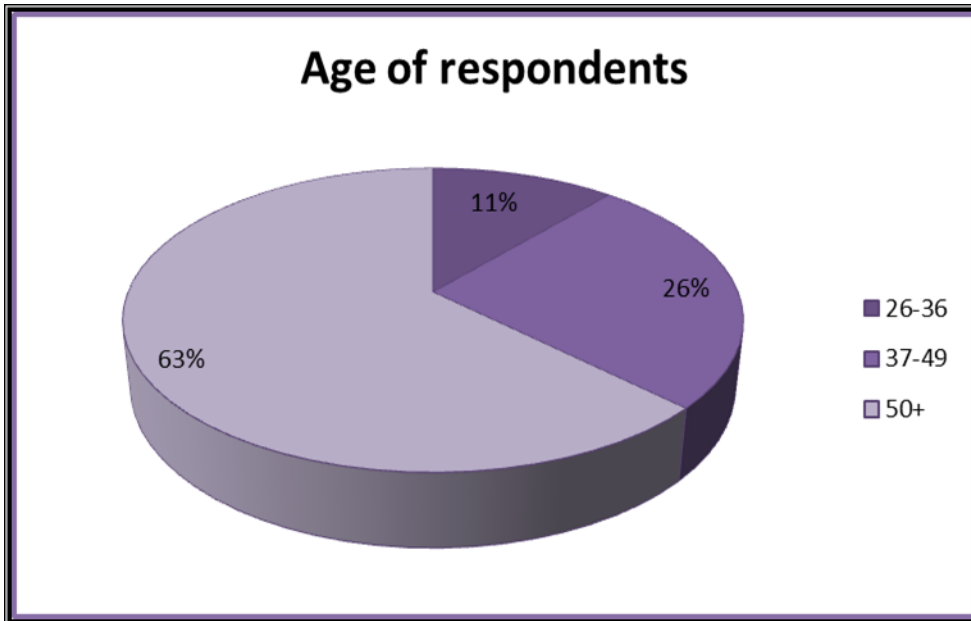


Figure 5.1: Age of Respondents

Source: Author's Fieldwork, 2015

Therefore, these elderly people are highly vulnerable to food insecurity as they are incapable of undertaking any alternative economic activities. This could be critical to household food security as demonstrated by Tetteh (2011). In addition, Tetteh (2011) showed that age becomes an important factor since it determines whether the respondents will be engaging in an economic activity or not. Only 26% of respondents were of ages 37-49 years and 11% were within 26-36 years of age, translating to 37% being economically active.

5.1.2 Duration of Residence

Over 90% (n=35) of the respondents had been in the area for over 30 years. Most of the respondents, (at 60%) had lived in Gabane for more than 50 years, while less than 3% of the respondents had lived in Gabane for at least 20 years as depicted in Table 5.2. This shows the relative stability of the respondents' stay in the area.

Table 5.2: Duration of Residence in Gabane

Years of Stay	Frequency	Percent
11-20	1	2.9
21-30	1	2.9
31-40	8	22.9
41-50	4	11.4
50+	21	60.0
Total	35	100.0

Source: Author's Fieldwork, 2015

5.1.3 Household Size and Household Structure

Findings indicate that the household size of the respondents varied between 1 and 15. Table 5.3 indicates that 11.4% had 1-5 members, 48.6% had 6-10 members, whereas 40% had a household size of 11-15.

Table 5.3: Household Size

Household size	Frequency	Percent
1-5	4	11.4
6-10	17	48.6
11-15	14	40.0
Total	35	100.0

Source: Author's Fieldwork, 2015

According to CSO 2011, the average household size for urban and rural areas was 4 persons. For the purpose of the study, a household with 6 or more members is regarded as a larger family. These results in Table 5.3 above reveal that the household sizes were relatively higher, for example more than 80% of the households had more than six members. Therefore an increase in the number of people might mean more numbers to feed. In the case of this study where there are lack of resources (in this case land) to produce food, there is more demand for food with limited food produced locally. This might pose a threat to household food security for the respondents.

The results in Figure 5.2 indicate that 17% of respondents were living in nuclear families whilst 83% were extended families. Nuclear families usually have fewer members and may not worry that their households would not have enough food for the whole month as there are

few people to feed unlike the extended families. The extended family structure denotes a possibility of high food consumption and as for the HFIAS, this might mean that the household may worry that their food would not last for the whole month and therefore have nothing to eat during that month.

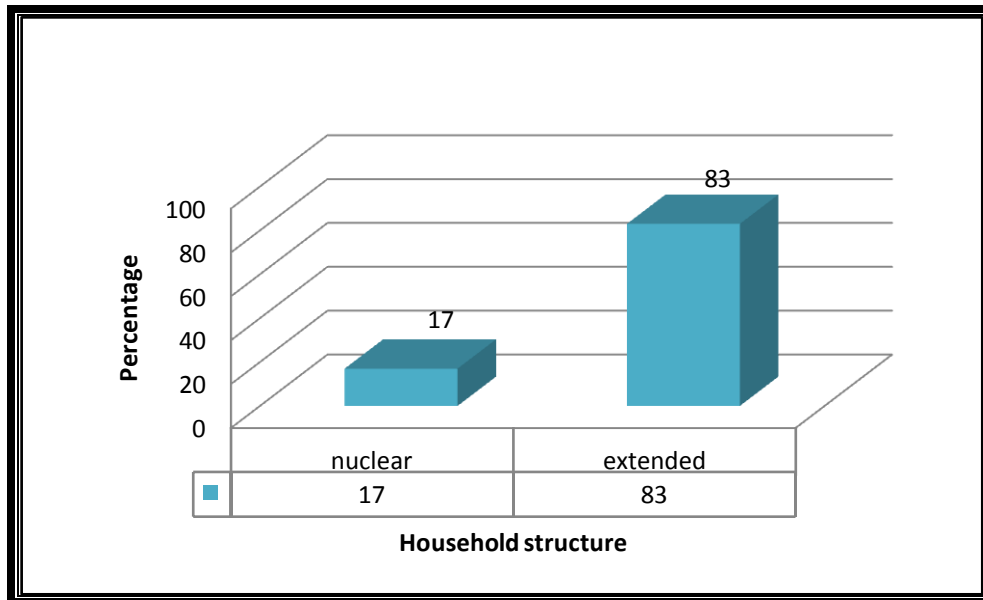


Figure 5.2: Household Structure

Source: Author’s Fieldwork, 2017

5.1.4 Highest Educational Attainment

The results of this study revealed that 49% of the respondents had not received any formal education. Only 14% of respondents went up tertiary, 17% and 11% had gone up to Junior and secondary level with only 17% going up to primary level (Figure 5.3). Education empowers individuals to compete for employment in the job market. It also equips individuals with capital to pursue agriculture more successfully. This relatively low education level might be worrisome as the formal educational level has been positively linked to food security (Tetteh 2011; Oluwatayo 2008).

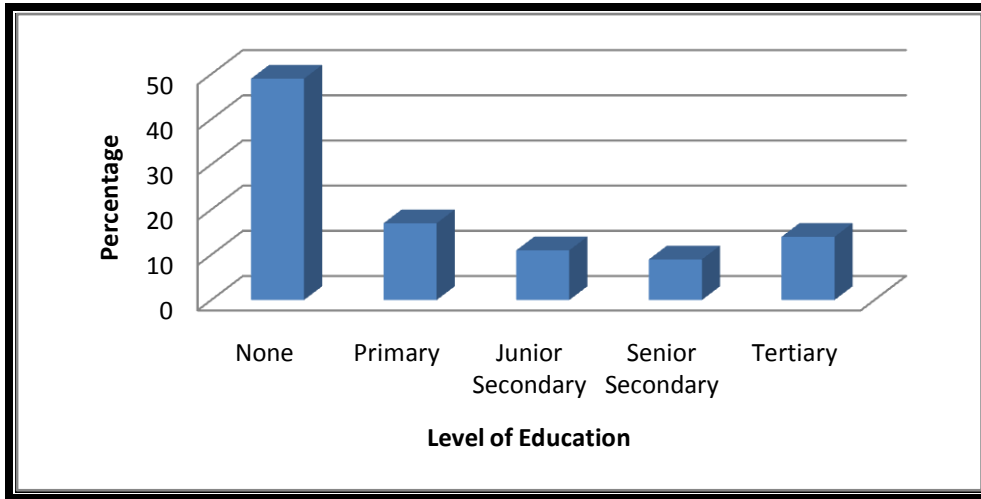


Figure 5.3: Highest Educational Attainment

Source: Author's Fieldwork, 2015

5.1.5: Occupational Status of Respondents

The study had shown that 51% of the respondents were unemployed, 20% were government employees working under various ministries, 14% were self-employed owning tuck shops, 6% were retired and other 6% were headmen who indicated that they received a little amount for the work they do and 3% were working in private companies. Most of those who were unemployed were the elderly who received their old age pensions and explained that the income was insufficient to buy enough food for the whole household to sustain them for the whole month (Figure 5.4). The relatively low percentage of the respondents who depended on regular formal employment indicates the extent of high vulnerability of the respondents to food insecurity. This is so because other income sources (retiree pensions, self employment, headmen allowances) are unsustainable. For example the headmen reported receiving their allowances late and also the street vendors depended upon the sale of their products, as the sales were fluctuating. The dispossession of households' agricultural land only worsens the situation for the unemployed households.

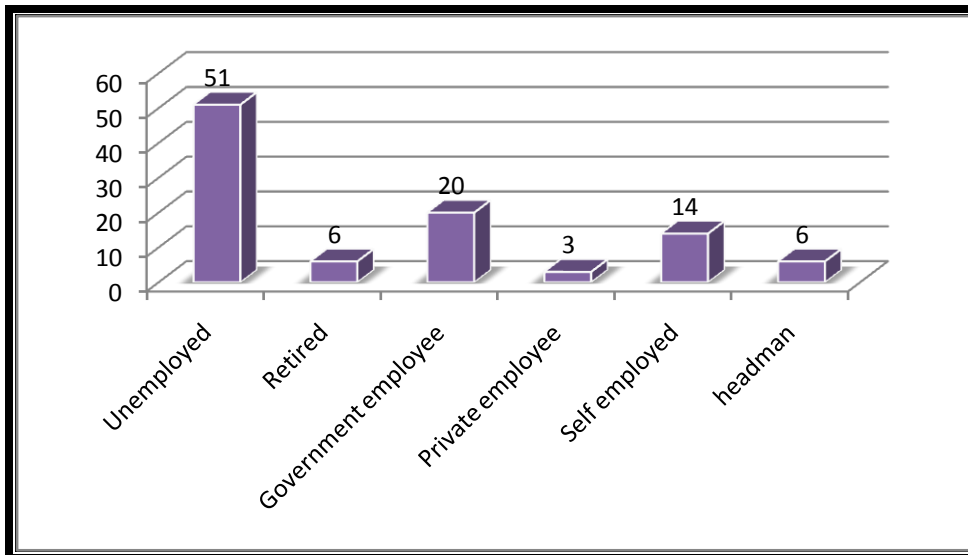


Figure 5.4: Respondents' Occupation

Source: Author's Fieldwork, 2015

5.2 Food security situation

The measures of the household food security situation have been defined in the methodology Chapter. These are the Household Insecurity Access Scale (HFIAS): Household Food Insecurity Access Prevalence (HFIAP) indicator: Household Dietary Diversity Scale (HDDS): and the Month of Adequate Household Food Provisioning indicator (MAHFP).

This section reports the results of household food security and the factors that determine food security. The households are categorised into groups to measure their food security status using the Household Food Insecurity Access Prevalence (HFIAP) indicator. In addition, the ability of households to access food and whether there have been any changes in the households' ability to ensure the adequate availability of food and its quality were analyzed using the Household Dietary Diversity Scale (HDDS) and Months of Adequate Household Food Provisioning (MAHFP) Indicator.

5.2.1 Level of Food Security

The HFIAP indicator categorizes households into 4 groups: 1) food secure, 2) mildly food insecure, 3) moderately food insecure and 4) severely food insecure. The study shows that a high proportion, at 89%, of the households experienced food insecurity with few households being food secure, at 11%. The results are shown in Figure 5.5 below.

As for this study, most households who fell in the mildly food insecure category worried about not having enough food sometimes or often, were unable to eat preferred foods and ate a limited variety of foods (that is, monotonous diet) but only rarely (once or twice in a month). As for the moderately food insecure group, most of the households reduced the size and number of the meals per day but rarely or sometimes (about 3-10 times in a month) and sacrificed food quality very often by eating undesirable and a limited variety of foods. Nevertheless, none of these households experienced the 3 most severe conditions (such as running out of food, going to bed hungry or going the whole day and night without eating). The severely food insecure households identified in this study resorted often to reducing the size or number of meals daily and experienced 2 severe conditions (such as running out of food or going to bed hungry. These findings are similar to the findings by Coates et al (2007) (as discussed in chapter 4).

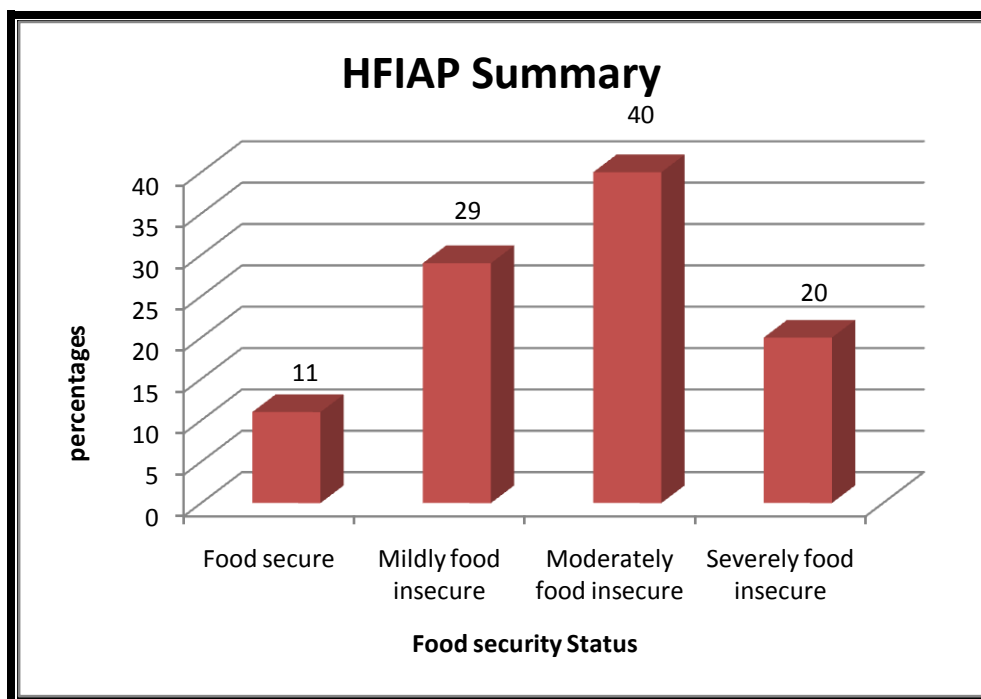


Figure 5.5: Level of food security for different households

Source: Author's Fieldwork, 2015

Recent African Food Security Urban Network (AFSUN) research has suggested that there is chronic food insecurity in the urban centres of Southern Africa, where 77 percent of poor households were found to be food insecure (Frayne et al., 2010). Similarly, the AFSUN survey in Gaborone by Acquah et.al (2013) indicated that a total of 12% of the population were food secure and 88% were food insecure. Therefore, there is evidence that urban and

peri-urban food security is at threat as the households depend on food purchases with more basic necessities to take care for, in so doing affecting their food access and consumption.

5.2.2 Level of Food Security and Size of Household

The study revealed that out of the total households (n=35), only 11.4% were food secure and 88.6% accounting for the mildly, moderately and severely food insecure households. Furthermore, the study showed that households with 1-5 members were 25% food secure and 50% severely food insecure. Households with 6-10 members were 11.8% food secure, 35.3% were mildly and moderately food insecure respectively and only 17.6% severely food insecure as compared to the latter category. Table 5.4 shows the distribution of household food security status by size of household.

Table 5.4: Household Food Security Status by Household Size

Size of household	Level of food security (%)				Total (%)
	Food secure	Mildly food insecure	Moderately food insecure	Severely food insecure	
1-5	25	25	0.0	50	100
6-10	11.8	35.3	35.3	17.6	100
11-15	7.1	21.4	57.1	14.3	100
Total	11.4	28.6	40	20	100

Source: Author's Fieldwork, 2015

The Chi-square test on the effect of household size on level of food security was carried out and it indicated that there was no statistically significant association ($\chi^2 = 6.206$, $P = 0.400$). Therefore, based on the test, household size did not have much influence on the level of food security. The Phi coefficient value of 0.421 suggests that there is a weak positive association between household size and level of food security. This is so because one would expect low incidences of food insecurity in households with at least 5 or fewer members as there are few people to feed than a household with more members. Similarly, Frayne et al. (2010) study revealed that there were more food insecure households in the 1-5 household size category than other categories. Therefore, the conclusion by Frayne et al. (2010) was that, the relationship between household size and food insecurity is not statistically significant, suggesting that household size is not a good predictor of a household's food security status.

The findings of this study are in contrast to the literature reviewed which indicated that household size has a negative influence on household food security. This meant that food security decreases with increase in household size, for example: households with 6 to more members tend to record high incidents of food insecurity (Oluwatayo, 2008). As for this study, an increase in household size did not have much influence as shown in table 5.4 above with some households with 1-5 members experiencing severe food insecurity statuses than those with more members. The main explanation to those households who experienced severe food insecurity status according to the HFIAP indicator might be due to the fact that they indicated that in the past 4 weeks prior to interview, they oftenly ate smaller meal than they felt they needed, ate fewer meals in day and also there were no food of any kind to eat due to limited resources. Some households thought that the food they bought will last the whole month, but it was not the case. This explanation might be true for most of the variables which will follow below.

5.2.3 Level of Food Security and Household Structure

The distribution of household food security by household structure reveals that the nuclear family structures were more food insecure than the extended family structures. The findings in figure 5.5 indicates that even though the nuclear structures were more food secure, they were mildly and severely food insecure than the extended family structures. The extended family structures were moderately food insecure (48.35) than the nuclear structures. The explanation to these occurrences is similar to the 5.2.2 (on household size) above.

Similarly, Ndobu (2013) noted that females are most likely to take care of their extended families. They usually sacrifice their food intake to feed other members of their household when threatened by food insecurity. Moreover they are most likely to be single parents than their male counterparts.

Table 5.5: Household Food Security Status by Household Structure

Household structure	Level of food insecurity				Total
	Food secure	Mildly food insecure	Moderately food insecure	Severely food insecure	
Nuclear	33.3	33.3	0	33.3	100
Extended	6.9	27.6	48.3	17.2	100
Total	11.4	28.6	40	20	100

Source: Author's Fieldwork, 2017

A Chi-square test was conducted to establish if there was any statistical significance between household structure and level of food security and the study revealed that there was no significance ($\chi^2= 6.638$, $P= 0.084$). The Phi coefficient value of 0.435 suggests that there is a weak positive association between household structure and level of food security. Likewise, Frayne et al.'s (2010) study showed a surprisingly weak statistical relationship between household type and food security status.

5.2.4 Level of Food Security and Education Level

The levels of food security and education level were cross tabulated. The results are shown in Table 5.6 which revealed that the respondents who did not receive any formal education were more associated with household food insecurity followed by those with low education level compared to other groups.

Table 5.6: Household Food Security Status by Educational Level

Highest Education level	Level of food security (%)				Total (%)
	Food secure	Mildly food insecure	Moderately food insecure	Severely food insecure	
None	0.0	17.6	52.9	29.4	100
Primary	16.7	33.3	33.3	16.7	100
Junior Secondary	0.0	25	75	0.0	100
Senior Secondary	33.3	66.7	0.0	0.0	100
Tertiary	40	40	0.0	20	100
Total	11.4	28.6	40	20	100

Source: Author's Fieldwork, 2015

The results in figure 5.6 indicate that among the respondents who went up to tertiary level, some were food secure (40%) while others (60%) were considered food insecure. From the study, the explanation to this was that households who were food secure were the more economically active members who contributed to food purchase, thus meaning there was enough food for the household. To find out if there was any statistical significance between education attainment and level of food security, the Chi-test was conducted. The test revealed that the relationship was not significant ($\chi^2=17.293$, $P= 0.139$). The Phi coefficient value of 0.703 suggests that there is a strong positive association between educational level and level of food security. Contrary to this, Frayne et al. (2010) found that the relationship between education and food security status was statistically significant.

As figure 5.6 indicates, the explanation to those who were food insecure was that only the person with high education level was economically active and had to provide for the whole family. Findings also show that although some people had acquired tertiary education, they were not employed. Even though some studies, for example Ndobu (2013) and Oluwatayo (2008) have reported that educational attainment has positive effects on food security, if graduates are jobless this might trigger their food security status and that of other members in the household. However, despite this, generally no or low education level contributes to food insecurity because education enhances chances of better job opportunities. For this study, educational attainment has no positive effects on food security and the explanation to this might be the fact that households might worry that their food would run off before the end of the month before they could buy for the following month. Also the explanation in section 5.2.2 on household size may be appropriate.

5.2.5 Level of Food Security and Income

Most respondents earned between P200 (US \$18.44) and P500 (US \$46.09). This was mainly from government pension scheme for the elderly. Most of those who earned below P500 were mostly the elderly people who depended on pensions while those who were considered food secure were involved in some formal kinds of jobs. Ndobu (2013), confirms that household income is regarded as the most critical determinant of household food security status in urban areas.

Food security was cross tabulated against income for the previous month prior to the study. The results shown in Table 5.7 indicated that those who earned lower incomes were more food insecure than other income groups. Table 5.7 shows that none of those who earned between P50 (US \$4.61) and P750 (US \$69.14) were food secure. This is because when the income is distributed according to utilities, what is left was not enough to buy quality food. Therefore, there was a need for diversification of income generating initiatives. Respondents who earned P1500 (US \$140.44) and more were 42.9% food secure and 14.3% food insecure. This shows that land appropriation impacted negatively on the households as they had become totally dependent on food purchases even if they earned much better. Therefore, low income households are more likely to suffer from food insecurity as compared to middle income and wealthier households. For the purpose of this study, low income refers to any amount less than P500 which cannot buy the normal or basic food basket (which includes vegetables, sorghum, maize meal, meat, salt, sugar, flour, milk and cooking oil).

Table 5.7: Household Food Security by Income

Income last month	Level of food insecurity (%)				Total (%)
	Food secure	Mildly food insecure	Moderately food insecure	Severely food insecure	
P50-P200	0.0	100.0	0.0	0.0	100.0
P201-P500	0.0	15.8	57.9	26.3	100.0
P501-P750	0.0	0.0	100.0	0.0	100.0
P751-P1500	33.3	0.0	33.3	33.3	100.0
P1500+	42.9	42.9	0.0	14.3	100.0
Total	11.4	28.6	40.0	20.0	100.0

Source: Author's Fieldwork, 2015

A Chi-test performed showed that there was a statistical significance between household income and level of food security ($\chi^2 = 30.039$, $P = 0.003$). The Phi coefficient value of 0.926 suggests that there is a strong positive association between household income and level of food security. Frayne et al. (2010) also found that the level of income and the food security status of the household are positively correlated. This is because their findings showed that households with the lowest incomes experienced the greatest levels of food insecurity while most of those found within the highest income category were food secure. Frayne et al. (2010) noted that food security increases with a rise in household income across all types of households.

5.2.6 Household Dietary Diversity Score (HDDS)

Dietary diversity refers to how many food groups or types were consumed within the household in the previous 24hrs. An increase in the average number of different food groups consumed provides a quantifiable measure of improved household food access (Swindale and Bilinsky, 2006). Olesitse (2012) mentioned that for a household to be considered as food secure, a household dietary diversity score of 4 is required for adequate nutrition. Additionally, a cutoff score below 4 indicates a diet of poor quality and household insecurity. Food access is therefore linked to dietary diversity because the availability and accessibility of adequate food will assist one to vary their diet (Olesitse, 2012).

This study established that most of the households, at 57.2% ($n=35$), fell in the lower range of below 4 and about 40% fell within middle ranges (5-7) with only 3% in the high range of 8. Table 5.8 shows a median HDDS score of 4 out of 12 (mean HDDS of 4.49) for the

households surveyed. The figures in Table 5.8 show a relatively low dietary diversity which indicates that the nutritional status and food accessibility of these households is low.

Table 5.8: Average HDDS by Household

HDDS	Frequency	Percent
3	10	28.6
4	10	28.6
5	7	20.0
6	5	14.3
7	2	5.7
8	1	2.9
Total	35	100.0
Mean HDDS		4.49
Median HDDS		4.00
Standard deviation		1.36

Source: Author's Fieldwork, 2015

The study found that the majority of households had consumed cereals (100%), dark green vegetables (83%), milk (77%) and flesh meat (51%) as shown in Figure 5.6. This implied low food security as there was lack of diversity in food consumption thus revealing monotonous meals. Comparatively, Acquah et.al (2013) indicated a median HDDS score for the Gaborone households to be 7 out of 12 though the analysis revealed a relatively low dietary diversity.

This study found that there was relatively high consumption of cereals, dark vegetables and meat. This implied improved food security for some households. This was also echoed by Acquah et al. (2013). The main explanation by Acquah et al. (2013) was that the consumption was attributed to the traditional Botswana staple meal of maize meal, vegetable relish and beef.

This study found out that other vegetables (naturally occurring indigenous vegetables like *rothwe* (Cleome gynandra) and *thepe* (Amaranthus thumbegi) and other fruits (naturally occurring wild indigenous fruits) were least consumed. The explanation according to the respondents was that during the time of interview (June-July 2015), most of them (naturally occurring products) were out of season. Some revealed that due to the fact that their fields, where they used to fetch some of these vegetables, had been appropriated by the Land Board, they had none in their homes. Some members indicated that they could not spend their money

on buying these vegetables and fruits as they are naturally occurring and their income was limited to buying the essential basic commodities (like maize meal and sorghum).

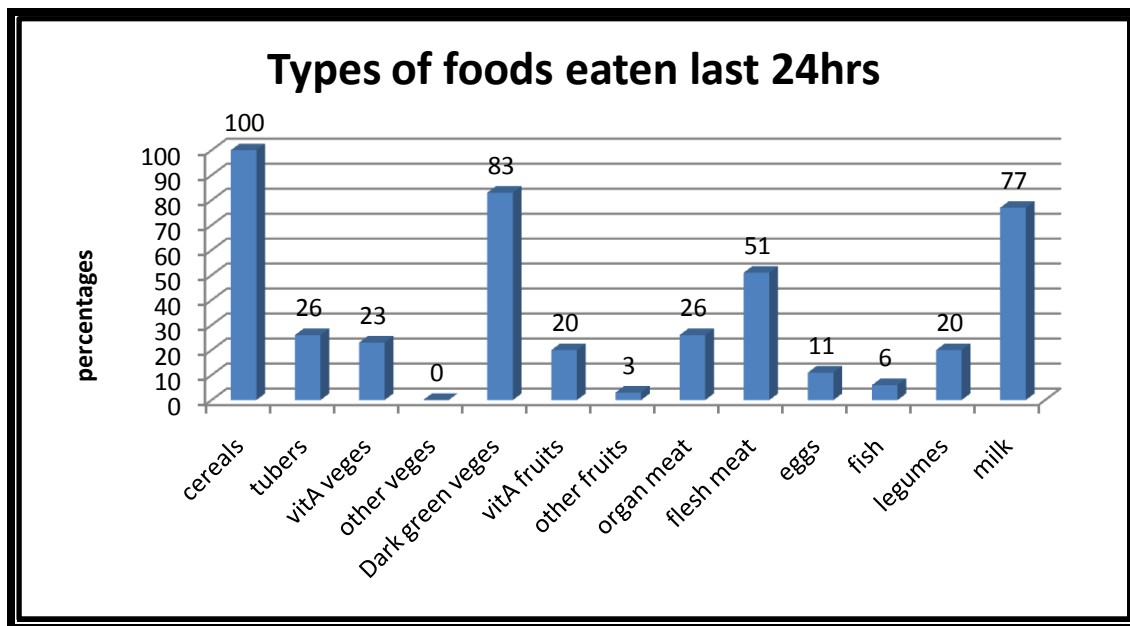


Figure 5.6: Types of food consumed in the previous 24 hours
 Source: Author's Fieldwork, 2015

5.2.7 Months of Adequate Household Food Provisioning (MAHFP)

The findings in figure 5.7 indicate that January was the most prominent month for inadequate food provisioning (90%) while December (at 16%) was the least month for insufficient food provisioning followed by March (19%). Based on the above accounts, it can be concluded that most households experience food shortages in January and have large quantity in December mostly during the festive season.

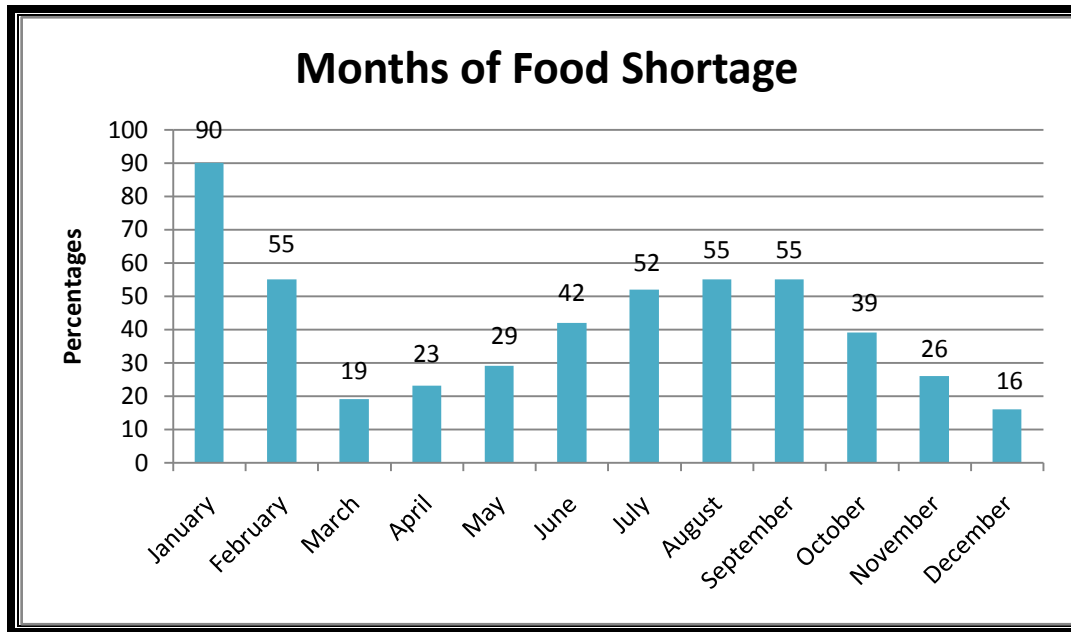


Figure 5.7: Months of Insufficient Provisioning

Source: Author's Fieldwork, 2015

Most respondents reported that January was the most difficult month for them as they would have used up a lot of money during the festive season and are faced with challenges to buy school uniforms for their children in the new year. Most households (n=100%) reported that they made an effort to buy the basic foods (like maize meal, sugar, sorghum meal, salt cooking oil) so that they did not spend the whole day hungry. This was because they no longer had any harvest from their fields to help them as a relish and sell some of their produce to buy extra food. Some reported they had inadequate food provision from January to December.

Food stability, as noted by FAO (2006) in chapter 3, means that for individuals to be food secure, they must have access to food throughout the year at all times and be protected from losing this access. In this study, there was no food stability as the households had no access to certain foods at all times due to issues of price instability and the low incomes for the elderly (as the vulnerable group in this study) were not secure.

5.2.8 Sources of Food

When respondents were asked where they normally bought their food, the results indicated that the respondents accessed or bought food from multiple sources. Most households preferred supermarkets (as indicated in table 5.9 below) and this was accessed mostly once a

month where the respondents asserted that they targeted the reduced prices by these outlets during month end. These findings are confirmed by Block and Kouba (2006) who support that supermarkets are perceived as providing a wide range of choices at the most competitive prices and with lower prices than any local stores and fast food restaurants in the area.

In addition, households were asked how frequently they obtain food from these sources. The findings of this study indicates that sources with high frequencies shows their physical access (convenience) and most importantly their economic access(affordability). For example, most households (86%) preferred to buy food once a month when they have enough income and could buy in bulk for the whole month and kiosks (commonly known as dimausu) were mostly used on a weekly basis where the households bought convenience items like salt, milk and fat cakes mostly. This seems to indicate that the more frequently the households accessed a source, the more food they got thus improving their food security status. Moreover, physical access to healthy food becomes significant in ensuring one’s food security status. Therefore food sources become important to gauge or measure one’s food security depending on affordability.

Table 5.9: Sources of Food

Source of food	5 days a week (%)	Once a week (%)	Once a month (%)	Once in 6 months (%)	Less than once a year (%)	Never (%)
Supermarket	3	11	86	0	0	0
G/dealer	3	26	63	6	0	3
Tuck shop(kiosk)	6	83	11	0	0	0
Street food	6	20	9	17	9	40
Grow it	0	0	0	0	14	86
Remittances	0	0	20	6	0	74
Food provided by others	0	0	3	0	6	91

Source: Author’s Fieldwork, 2015

The study found that groceries were mainly bought from supermarkets (such as in Choppies Gabane, Shoppers in Nkoyaphiri or in Gaborone supermarkets). This was made easy because the taxi and bus fares were affordable and travel schedules convenient between Gabane and Gaborone. No households borrowed food from their neighbors or relatives as the old culture

of sharing no longer existed. Only 14% grew food; few households reported that after their lands were appropriated by the Land Board they borrowed some small portions of the ploughing fields from the neighbouring lands. Some households asserted that Gabane experienced a shortage of water so they could not grow any vegetables in their yards to support backyard vegetable gardens. They usually bought seasonal vegetables from street vendors to use as a relish as an accompaniment to the cereals they had.

5.3 Causes of food Insecurity

The main purpose of this study was to assess the food security situation for Gabane households whose farming lands were appropriated by the Government and Land Board. The causes identified were factors affecting their food access, availability, reliability and quality as discussed and illustrated by the conceptual frameworks depicted in Chapter 3 Figure 3.1 and Figure 3.2.

5.3.1 Land Appropriation and Food Security

Findings of this study indicates that appropriation of the small agricultural farmers' fields was one of the causes of food insecurity among the interviewed Gabane residents. In an interview with the MP for Gabane-Mmankodi area on the changes that had occurred in the agricultural land use in Gabane, he narrated that:

“Agricultural land has been taken from the residents and converted into residential land uses in order to meet the accommodation needs /demand. Other land uses that have consumed the agricultural land use were the commercial and industrial. Moreover, as population grows, there is a need to extend and construct more graveyards; the expansion of Gaborone has also called for a need to expand the infrastructure (for example the national sewerage from Gaborone behind Diremogolo hill in Gabane)” (Mr P. Mokgware, 2016).

Von Braun and Meinzen-Dick (2009) indicated that land is a political issue across the globe, with land use change and land rights issues often leading to violent conflict. Since the state often formally owns the land in most developing countries, the poor run the risk of being pushed off their agricultural land in favour of other more profitable land uses, without consultation or compensation.

Similarly, Harris (2015) noted that land expropriation, dispossession and displacement for the purpose of development often takes place in fringe areas of cities largely affect those occupants who have no authorized land documents and such groups of people are usually squatters. However, when population in the city increases, the demand for land for investment and other purposes also increases with urban boundary expansion, forceful taking of land from surrounding farming community becomes a norm.

Additionally, Harris (2015) presents evidence which shows that urban expansion and land acquisition for investment and development generally results in the conversion of agricultural lands in the fringe areas to non-agricultural uses. Such developments and programs are often associated with positive and negative effects on the farming community in the fringe areas (Harris, 2015).

The results of this study reveal that during the ploughing season of 2013/2014, there was a record of 873.78 tonnes of production for all crops ploughed by people in the village. The production dropped to 81.82 tonnes in the 2014/2015 season. This was a significant drop in hectareage. This is in line with Mpofu's (2013) findings, which indicate that the agricultural landuse was and would continue in future to be an activity that competes and conflicts against farming activities and therefore a threat to peri urban residents'livelihood. Furthermore, he confirmed this by calculating the percentage changes of different land uses using the Geographic Information System. The figures in table 5.10 show that the arable land had decreased by 52% between 2006 and 2012 while the residential landuse has increased from 50ha to 73ha by 46% between those years. The decrease in arable land (from 31ha to 15ha) seems to indicate that there is reduction in local food production which in turn affects the food security status of households negatively.

Table 5.10: Land Use Change between 2006 and 2012

LAND USE	Size in Ha (2006)	Size in Ha (2012)	% Change
Arable land	31 ha	15 ha	-51.6%
Residential	50 ha	73 ha	46%
Fallow land	14 ha	5 ha	-65.1%

Data Source: Mpofu, (2013)

Furthermore, the MP for Gabane – Mankodi area described how the changes that have occurred on the agricultural land use affects the residents:

“The appropriation of these ploughing fields had reduced the agricultural production in terms of food in the local area. Consequently, it had been difficult for households whose lands had been appropriated to acquire alternative lands anywhere else in nearer villages as the normal expectation is that one will get or find land elsewhere. This the MP said was due to a number of reasons. One of the major reasons outlined was that the money which was supposed to compensate for the appropriated land was too little for the residents to buy new fields. Additionally the cost of de-bushing or clearing the land was much higher than before. This scenario permanently reduced the hectarage of the ploughing land as most had been turned to other non-agricultural uses. Moreover, there were standard changes for the compensation of appropriated lands to farmers (for instance, P25, 000 for 10 ha field)”(Mr P. Mokgware, 2016).

Similarly, Harris’s (2015) study on the expropriation, compensation and transitions to new livelihoods in Ethiopia concluded that expropriating farmland deprives rural small-holders of their most important income generating assets and forces them to find new livelihoods. Governments recognize this, and often provide households with compensation, which in some cases takes the form of a lump-sum payment. His main question was to know if these lump-sum payments were sufficient to compensate households for the land that is taken. He further indicated that the size of compensation payment, even if it is not linked to land quality or verifiable investments, affects ex ante investment incentives for farmers.

When asked about the size of their land parcels or ploughing fields before being appropriated, about 49% of respondents (n=35) reported that their lands were between 6-10 hectares and that they used to plant a variety of crops. Furthermore, the average yield for all crops grown for most households was about 1000-2500kg per season. As for the benefits gained from the crops planted, most households reported that they consumed the produce, stored some for future use, distributed some to their friends and relatives; and sold the surplus of their produce to the Botswana Agricultural Marketing Board and to individuals. This they reported was the thing of the past and they no longer enjoyed this.

When commenting on how the changes on the agricultural land use have affected the residents, the MP for Gabane pointed out that:

“The residents lost ploughing (as they used to plough sorghum, maize and the like) and they start buying. This means the residents rely on the purchase of food as this had become costly (due to limited cash and high prices). Moreover, the majority of these are the elderly who are not working and the agricultural production was their source of income. Their lives had been affected a lot and life has become expensive on them” (Mr P. Mokgware, 2016).

Subsequently, the results of this study indicates that as land is appropriated, the households start depending on the Government handouts (mainly *Ipelegeng*/ self reliance programme) and not all of them are hired. The elderly usually compete and depend on these handouts together with their children as some of them are unemployed graduates. Instead of promoting production, they had completely stopped producing due to the declining agricultural production. Some of these farmers complained about low and lack of compensation of their appropriated lands to different authorities (chiefs, ministers and land board officials). Their children were not allocated residential plots from their appropriated fields. This means lack of accommodation for their children, despite the appropriation of their parents' land.

Furthermore, the seriousness of the issue of land appropriation in the area was narrated by the key informant who did put that:

“A certain man owned a horticultural farm in Ledumadumane.. he went out and took a loan from CEDA to start the business. His business did very well and later on he was told to move out of his farm as the city was expanding. His farm was appropriated by the officials and he tried to argue with the Horticultural personnel. He was told to go find another land in the Kweneng district in Takatokwane. He was promised a bigger land than the one he had initially of about 6ha and a better compensation thereafter. He was attracted to a new land of about 20ha over the one he owned before where he used to grow cabbages and tomatoes which he sold to bigger supermarkets such as Spar. He was promised better benefits of high profits and huge yields to the new land; this alone raised his hopes and he did not consider other factors. To the new land, he constructed a borehole and regarding that as a success, the water was salty (not suitable for crops); secondly the place was too sandy and this was unsuitable for crop

production. The project had to collapse due to this and what he intended to produce failed to germinate and the saltiness of the water added to this failure. The gentleman lost and those who used to or would get some produce from him no longer did. Now they started importing from South Africa to Botswana and as for himself, he had lost the income locally as he could not produce anymore''(Mr P. Mokgware, 2016).

5.3.2 Food Prices and Food Security

Food security, regardless of location, depends on food availability and households' ability to access food depends on income as well as food prices (Cohen and Garret, 2010). Tawodzera et al (2016) has asserted that many factors contribute to food access but the rapid food price increases such as those experienced during the extraordinarily high inflation of 2008 in Zimbabwe forced consumers to cut back on purchases, reduce food consumption, sacrifice nutritional value for sustenance and make tradeoffs between food and other basic needs.

Respondents were asked about their experience of food price over the past 6 months or if the households had gone without certain types of food because of food prices. The findings reveal that most respondents (46%) had gone without certain foods due to food price about once a week, with a very few (3%) experiencing that everyday and (3%) never experienced. This seems to indicate that the more the households went for days without certain foods, the more they become food insecure. This is because they had no economic access to certain foods, thus decrease in dietary diversity and quality of food.

The results also indicate that for those respondents who experienced a food price change, the types of food they had gone without frequently were mostly fresh meat, eggs, vitamin A rich vegetables and fruits. Cereals were least because the respondents felt that even though the prices may have been high for cereals, they reported that they would rather sacrifice to buy them as they were the main or staple food for their survival. Respondents reported that besides the increase of food prices, the other problems that prevented them from having enough food to meet their family needs were lack of money and old age.

5.4 Strategies Adopted by Households to Minimize their Vulnerability to Food Insecurity

Narrating on the adjustments made to deal with the changes, as shown in Table 5.11, the households asserted the reliance on cash income, with a few renting out their houses to

diversify their income sources, others worked in the government self-reliance program (*ipelegeng*) while some of the elders reported they had just given up as they were now old. Even though most of the respondents mentioned that they rely on cash income, the money that they had was not sufficient for all the necessities in the household. It is important to note that the sustainability of the strategies mentioned above is low or questionable. For example, the self reliance programme lasts for a few months and the chance that one will be enrolled back to the programme is very low. This therefore means the individual stays home again and starts looking for something else to earn a living and for that period he/ she becomes a dependant. Also it is not a guarantee that the money from rent will be received regularly as sometimes the tenants move out of the house.

Table 5.11: Adjustments adopted after land appropriation

Adjustments	Frequency	Percent
Rely on cash from government (Pension etc.)	16	45.7
Rent houses	9	25.7
Opened a small tuck shop	2	5.7
Work in government self-reliance program (<i>Ipelegeng</i>)	1	2.9
Gave up	2	5.7
Borrowed/rented a piece of land for ploughing	5	14.3
Total	35	100.0

Source: Author's Fieldwork, 2015

Even though some households reported the success of the alternative strategies employed in Table 5.11, some were still worried that their households would not have enough food to sustain them longer (than a month) and this contributed to food insecurity. Most households reported that the adjustments were inadequate as they used to produce diverse food products and had to buy few foods to complement the ones they had.

When asked how the residents sustain their subsistence needs in the face of declining landuse or appropriation of agricultural land, the MP for the area confirmed that:

“most of these people were the old and they depended on the government, relatives and children. There is nothing that the elderly could do as they depended much on the agricultural produce”(Mr P. Mokgware, 2016).

In addition, when asked to what extent the households use strategies other than regular formal employment to make a living, none of the households were dependent on tree crops (such as fruit trees and flowers), crafts, formal credit and begging. The findings of this study had shown that 34% of households rented their houses to those who seek accommodation in order to diversify their income. Additionally, few (29%) depended on livestock rearing, even though the dependence was slight and partial. This is because the number of livestock reared is small and this means that it is impossible to rely upon the sale of livestock. The sustainability of these adopted strategies therefore is weak or become questionable in order to ensure a positive stable food secure status.

The Member of Parliament for the area further noted that:

“despite the effort by the Government to provide programmes that promote agricultural activities/ production to residents (like ISPAAD which gives farmers fertilisers and seeds), these were not effective as those who used to gain from these now loose help from the Government making these programmes ineffective. The MP’s worry was that the government was not helping the farmers in anyhow, but maximised in satisfying accommodation needs”(Mr P. Mokgware, 2016).

The results of this study indicated that most elderly respondents used to store their produce in bulk and sell their produce before their lands were appropriated. Some of the produce sold included for example dried beans for P10 per cup, or dried bean leaves (*Vigna angulata*) at P5/ cup. However, after the appropriation of their arable lands, their household income had decreased significantly and at the time of the study they depended on the monthly elderly pension of about P300 per month. This they said was too little to buy sufficient food and contribute to other household expenses. When asked whether they ever go without food since their lands had been appropriated, most households responded that they never did. This is because the elderly and the children could not sleep without any meal as some elders complained of diabetes which deterred from staying hungry. Therefore, they sacrificed such that they could eat at least once a day. Furthermore, some reduced the number of meals for example, by cooking a main meal once a day. Frayne et al. (2010) indicated that to cope with increasing food prices and income insecurity, the most frequently used strategy was reducing the quality and quantity of food consumed, including dietary diversity.

As to the variety of food consumed by households since the appropriation of their lands, the findings indicate that the variety had changed as they used to eat a variety from their produce, thus contributing to their dietary diversity especially of local foods. There was an emphasis that the foods were much healthier as they contained no colorants and flavors and were good for them, especially the elderly who reported cases of diabetes.

5.5 Chapter Summary and Conclusion

The expansion of the city led to acquisition of agricultural lands in the peri urban area of Gabane which were turned to residential and industrial land uses to meet the pressing demand for such services. Consequently, land appropriation had a great effect on people's livelihoods, especially on the elderly people as they mostly owned the ploughing fields. Most of the households were either mildly (29%), moderately (40%) or severely food insecure (20%) with a few being food secure (11%). This affected the quality of food they consumed as most households consumed monotonous and non-nutritious meals to soothe their hunger. In addition, most households experienced inadequate food provisioning during the year. Food prices, land appropriation, lack of money, old age and large size of households were among the causes of household food insecurity. To respond to these causes, households resorted to reducing the number of meals they consumed per day, buying basic commodities, rented houses, relied on cash from old age pensions, children & relatives and worked in government self-reliance programme (ipelegeng).

This chapter presented a detailed discussion of the research findings based on the research objectives which in broad detail analysed the food security situation for different households, provided the causes for the vulnerability of food security and an assessment of the households' livelihood strategies to cope with vulnerability to food insecurity. It is in the next chapter that the study will provide the conclusions drawn in reference to the conceptual framework guiding this study and furthermore the recommendations.

CHAPTER 6: SUMMARY, CONCLUSIONS & RECOMMENDATIONS

6.0 Overview

This study set out to analyse the patterns and processes contributing to food insecurity among the households of Gabane and establish strategies adopted by households to minimize their vulnerability to food insecurity. This aim was broken down into four specific objectives to guide the study. In order to achieve the aim and objectives of the study, the study used the household questionnaires and key informant interviews. This chapter provides a brief summary of the findings of the study objectives and provides the recommendations based on these findings. It also draws the main conclusions emerging from the results.

6.1 Summary of findings in relation to Research Objectives

The first objective was to identify households vulnerable to food insecurity. The information from the key informant revealed that the appropriation of the arable lands by Government authorities had a negative effect on the residents' food security status. It was also found that elderly people were mostly owning these lands except for cases where they had transferred to the older children taking over them. Consequently, this meant that the population was economically inactive and the dependency ratio was high (63%) (as the elderly reported they survived through an old age pension). Ultimately, households whose lands were appropriated by the Land Board and within them extended family structures, female-headed households, the elderly household heads, those who did not receive formal education and had lower income were found to be vulnerable to food insecurity.

The second objective was to examine the extent and level of food insecurity for different households. On the issue of food security, the study found out that a high proportion (90%) of the households were food insecure. Generally the study revealed that only 11% of the households whose lands were appropriated by Land Board were food secure, 29% were mildly food insecure, 40% moderately food insecure and 20% severely food insecure. Also, respondents who had not received any formal education were more food insecure as none of them were food secure. Those who earned lower incomes were more food insecure than other income groups.

Furthermore, the study established that food insecurity increased with household size; extended family structures were more food insecure as they were only 6.9% food secure than the nuclear family structures. Low income was associated with food insecurity, and there was

a statistically significant relationship between income and food security ($\chi^2 = 30.039$, $P = 0.003$). The study revealed a relatively low dietary diversity, with households consuming monotonous diets (mostly cereals like mealie meal being consumed on a daily basis). Moreover, the study discovered that households experienced inadequate food provisioning during most months of the year and were more food unstable.

Thirdly, the study also sought to determine the major causes of household vulnerability to food insecurity. Appropriation of arable lands by the Government authorities was one of the causes of household vulnerability to food insecurity. Consequently, most respondents had to rely on cash (46%) and food purchases, thus causing vulnerability to high food prices; as households were faced with a challenge of feeding larger families. High food prices contributed to household food insecurity and forced the household members to cut back on their food purchases, reduce their food consumption and sacrificed their dietary/ nutritional value for their sustenance. Old age and lack of money were additionally identified to be the other the causes of household insecurity by some households.

The final objective was to establish the strategies adopted by households to minimize their vulnerability to food insecurity. Due to the appropriation of arable lands, households had to try other alternative strategies to earn a living. Some had negotiated for a small portion of land from their neighbouring villages to plough; others rented out houses as accommodation was a challenge in the city, some opened small businesses (tuckshops or kiosks) and also enrolled in the Government self reliance programme (*Ipelegeng*). Furthermore, the households relied on less preferred and less expensive basic food stuff (like mealie meal, sorghum) and seasonal vegetables (like cabbage, spinach, choumolier). Additionally, households reduced the number of meals they ate in a day.

Table 6.1 Summary of key findings per research question

Objective 1: To identify households vulnerable to food insecurity	
Key research questions	Findings
<ul style="list-style-type: none"> Which types of households, in terms of demographic and socio-economic characteristics are vulnerable to food insecurity? 	The elderly people, households whose lands have been appropriated by the Government authorities, Extended family structures, those who had not received any formal education and those who had lower incomes.
Objective 2: To examine the extent and level of food insecurity for different households in Gabane	
<ul style="list-style-type: none"> What is the food security status for different households in Gabane? 	Food secure: 11%; Mildly food insecure: 29%; moderately food insecure: 40% and severely food insecure: 20%
<ul style="list-style-type: none"> Is there any statistical relationship between food insecurity and the socio-economic characteristics? 	There was no statistical significance between food insecurity and household size ($\chi^2=6.206$, $P=0.400$), household structure ($\chi^2=6.638$, $P=0.084$) and educational level ($\chi^2=17.293$, $P=0.139$) while there was a statistical significance between food insecurity and income ($\chi^2=30.039$, $P=0.003$)
Objective 3: To determine the major causes of household vulnerability to food insecurity	
<ul style="list-style-type: none"> What are the major causes of household vulnerability to food insecurity? 	Land appropriation, food prices, lack of money, old age
<ul style="list-style-type: none"> Are the causes of household vulnerability to food insecurity uniform across all households in Gabane? 	Some causes were uniform across all households (e.g. land appropriation, food prices) while the some causes were not uniform(e.g. old age, lack of money)
Objective 4: To establish the strategies adopted by households to minimize their vulnerability to food insecurity	
<ul style="list-style-type: none"> What sort of strategies do households adopt to minimize their vulnerability to food insecurity? 	Reliance on cash (from pension), renting out houses, working on government self-reliance programmes (Ipelegeng) Non cash strategies: relied on less preferred & less expensive food stuff and also reduced the number of meals they ate in a day
<ul style="list-style-type: none"> Why do the households resort to such strategies? 	Their ploughing lands which they depended upon had been appropriated by the government authorities. They no longer obtained food from their produce and therefore had nothing to eat and resorted to such strategies.

Source: Author's work, 2016

6.2 Conclusions

This study has shown that as the peri-urban population is rapidly displaced by urban land use demands, their food security statuses are being threatened. It is interesting to note that land appropriation affects farmers' food security and dispossess them of their means (land) to produce food as local food production has the potential to improve food security through the direct availability of food in a cost effective way. In this regard, the main aim of this study was to assess the patterns and processes governing food security among the households of Gabane and establish the strategies adopted by households to minimize their vulnerability to food insecurity.

This study has conformed to the AFSUN conceptual framework that demonstrates the multiple factors influencing household food security. This is because the framework argues that the contextual factors (especially national) are well beyond the control or influence of households and thus affect their food security. This is very true for this study in the case of land appropriation by those in authority over land issues; subsequently affect the dimensions of food security (being food availability, reliability, accessibility and quality). One of the most noteworthy issues to consider is the loss of local production of food by the peri-urbanites (through land appropriation) that can effectively drive food availability, access, quality and safety which can assure food security among households.

As revealed by the findings of this study, it is very clear that there is food insecurity among households whose agricultural lands have been appropriated. Considering that the elderly are the most vulnerable (due to age, not employed, dependents and have little income), ploughing is their best livelihood they can adopt as noted from the findings, as it improves their nutritional status (through quality and energy intake), dietary diversity and quantity of food they consume. Therefore the survival strategies that these people adopt to minimize their vulnerability to food insecurity are not sustainable, thus a need for a proper policy and integration in ensuring food security through local production.

6.3 Recommendations for Policy and Practice

This section provides some recommendations on what need to be done in order to ensure food security among the peri-urbanites who are facing persistent land appropriation in the face of urban expansion of the city. This can be achieved by employing the following:

- i. Effective Government legislation on land tenure security: The Government should consider securing and protecting land rights for land dependent individuals or communities to assure or ensure their food security. This will mean individuals having title deeds over their lands thus removing the fear over appropriation of their lands and laws enforced to prevent those selling their plots.
- ii. Allocation of another plot somewhere: In case where there are pressing issues (for example expansion of roads, construction of powerlines, etc.), residents who have passion for ploughing should be given a plot somewhere to continue with their production instead of monetary compensation. The land should be tested for it to be suitable for ploughing.
- iii. Promoting and ensuring dietary diversity: agricultural produce provides bulk and variety in food as households do not have to rely only on food purchase. Also, it provides indigenous locally produced foods which are healthy and nutritious.
- iv. Promoting food availability and stability: likewise agricultural produce adds to local food produce for export and bulk store ensures food availability all year long.
- v. Infilling and densification of existing plots: this could be done on existing plots through mixed and multiple uses of land to regulate the spreading out irregularly of cities into peri urban land. This could help meet the accommodation demand for the ever increasing population.
- vi. Repossession of idle land: several serviced land that remains undeveloped within cities need to be repossessed, reallocated to those in need of land and developed. This could minimize land appropriation on peri urban land.

6.4 Recommendations for Further Research

Further research on food security and land appropriation should focus on;

- i. Investigating on the capital assets of farmers whose lands had been appropriated.
- ii. Assessment of the long term survival strategies of households who had been dispossessed of their ploughing lands.
- iii. A need for assessing the nutritional status using anthropometric measurements (e.g. body mass index) in addition to food security.
- iv. Repeat study with households still owning arable land as a control.

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APPENDIX A: TIMELINE

Activity	2015						2016			
	Mar	Apr	May	Jun-Jul	Jul-Sep	Sep-Dec	Feb	Mar-Aug	Aug-Dec	Dec
Proposal Presentation	■									
Applying for research Permit		■	■	■	■					
Data collection					■	■				
Data Entry						■	■			
Data Analysis							■	■		
Report writing								■	■	
Submission										■

APPENDIX B: SEMI STRUCTURED QUESTIONNAIRE FOR GABANE HOUSEHOLD FOOD SECURITY SURVEY

My name is Gabarate Tshekiso, a Master of Science student from the University of Botswana in the Environmental Science department conducting a study on Food security in the peri-urban area of Gabane. The main objective of the study is to examine the multidimensional factors that results in food insecurity among the peri urban residents and their survival strategies thereof. Your participation in this will be highly anticipated and all the information you provide will be confidential. Participation is voluntary, so please willingly provide necessary information as this study is dependent upon your responses. Thank you for your cooperation in advance!

SECTION A: HOUSEHOLD COMPOSITION

1. Age: a)20-25 b) 26-36 c) 37-45 d) 50 and above
2. Gender: a) Male b) Female
3. Relation to household:_____
4. Marital status:_____
5. Highest Education:_____
6. Occupation: _____
7. Work Status:_____
8. Household size:_____
9. Length of stay:_____
10. Income last month:_____
11. Where was main meal eaten? _____
12. Who in the household normally:
 - Buys food_____
 - Prepares food_____
 - Decides who will get food (allocates)_____
 - Grows food (produces)_____

SECTION B: HOUSEHOLD DATA

1 Which of the following best describes the household structure	Household structure	Code
	a. Female centred	1
	b. Male centred	2
	c. Nuclear	3
	d. Extended	4
	e. Under 18 headed household-female centred	5
	f. Under 18 headed household-male centred	6
	g. Other (specify)	7
2 Household income from all sources (in the last one month)		
Income categories	Amount	code
a. Wage work		1
b. Casual work		2
c. Remittances-money		3
d. Remittances- food		4
e. Income from farm products		5
f. Income from formal business		6
g. Income from informal business		7
h. Income from renting dwelling		8
i. Income from aid 1) food		9
2) cash		10
3) vouchers		11
j. Pension/ disability /other social grants		12
k. Other (specify)		13
3 Household monthly expenses (for the last month)		
Expenses	Amount	Code
a. Food and groceries		1
b. Housing (Rent, mortgage)		2
c. Utilities (water, electricity, telephone)		3
d. Transportation		4
e. Savings		5
f. Fuel (gas, paraffin, fuel wood)		6
g. Medical		7
h. Insurance		8
i. Education (uniforms, books, fees)		9
j. Home based care		10
k. Remittances		11
l. Debt repayment		12
m. Other (specify)		13

4 To what extent do people in your household use strategies other than jobs (regular formal employment) to make a living 1= not at all 2= slightly 3= partly dependent 4= totally dependent	Way to make a living	Code
	a. Field crops	
	b. Garden crops	
	c. Tree crops	
	d. Livestock	
	e. Crafts	
	f. Self employed	
	g. Rent out space	
	h. Formal credit	
	i. Informal credit	
	j. Begging	
	k. Other specify	

Before your lands were appropriated to the City of Gaborone

- a. What was the size of your lands? _____
- b. What crops were you planting?

- c. What were the average yields each season? _____
- d. How did your household benefit from the crop harvests?

- e. What types of adjustments have you made to deal with the changes?

- f. How successful have these adjustments been?

➤ **Did you have access to grazing lands?** _____

- a. How did your household benefit from these lands? _____
- b. How did the appropriation of the lands affect the welfare of your household?

- c. What types of adjustments have you made to deal with the changes?

- d. How successful have these adjustments been?

Since the appropriation of my arable lands:

- my household's income is :the same, has increased, has decreased

- my household now goes without food: not at all, often, very often
- my household eats less food: not at all, often, very often
- the variety of food consumed by my household: has remained the same, has slightly changed, has changed very much

Since the appropriation of my grazing lands:

- my household's income is : the same, has increased, has decreased
- my household goes without food: not at all, often, very often
- my household eats less food: not at all, often, very often
- the variety of food consumed by my household: has remained the same, has slightly changed, has changed very much

1. If you recall; where there months in which you did not have enough food to meet your family's needs? _____

1a. If yes, which were the months you did not have enough food to meet your family's needs?

2. What types of food you ate from your produce that you cannot access or eat now?

SECTION C: FOOD INSECURITY

1. HOUSEHOLD FOOD INSECURITY ACCESS SCALE (for the last four weeks)

NO	QUESTION	RESPONSE OPTION	CODE
1	In the past four weeks, did you worry that your household would not have enough food?	0 = No 1= Yes	.....
1.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)	.....
2	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 1= Yes	.....
2.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)	.....

3	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 1 = Yes	.....
3.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)	.....
4	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 1 = Yes	.....
4.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)	.....
5	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 1 = Yes	.....
5.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)	.....
6	In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	0 = No 1 = Yes	.....
6.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)	.....
7	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 1 = Yes	.....
7.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)	.....
8	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 1 = Yes	.....
8.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)	.....

		the past four weeks)	
9	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 1= Yes	.....
9.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)	.....

2. HOUSEHOLD DIETARY DIVERSITY DATA (types of food ate yesterday)

QUESTIONS	Yes	No
A. Cereals: Bread (magwinya, diphaphatha), rice, biscuits, or any other foods made from millet, sorghum (bogobejamabele/ting, jwalerotse, lefatana) maize (kabu, mageu, phaletshe)?	1	2
B. White tubers & roots: potatoes, sweet potatoes or any other foods made from roots or tubers (digwere)?	1	2
C. Vitamin A rich vegetables: pumpkin, carrots (lerotse, makatane)	1	2
D. Any fruits?	1	2
E. Any beef, pork, lamb, goat, rabbit wild game, chicken, duck, or other birds, liver, kidney, heart, or other organ meats?	1	2
F. Any eggs?	1	2
G. Any fresh or dried fish or shellfish?	1	2
H. Any foods made from beans, peas, lentils, or nuts?	1	2
I. Any cheese, yogurt, milk or other milk products?	1	2
J. Any foods made with oil, fat, or butter?	1	2
K. Any sugar or honey?	1	2
L. Any other foods, such as condiments, coffee, tea?	1	2

3. MONTHS OF ADEQUATE HOUSEHOLD FOOD PROVISIONING

Now I would like to ask you about your household's food supply during different months of the year. When responding to these questions, please think back over the last 12 months, from now to the same time last year.

QUESTIONS	Yes	No
1. Were there months, in the past 12 months, in which you did not have enough food to meet your family's needs?	1	2

2. If yes, which were the months in the past 12 months during which you did not have enough food to meet your family's needs?		
A. January	1	2
B. February	1	2
C. March	1	2
D. April	1	2
E. May	1	2
F. June	1	2
G. July	1	2
H. August	1	2
I. September	1	2
J. October	1	2
K. November	1	2
L. December	1	2

4. EXPERIENCE OF FOOD PRICE CHANGE

1a. Over the past the 6 months, have you or your household gone without certain types of food because of the price of food (it is unaffordable)?	Frequency of going without food	Code
	Never	1
	About once a month	2
	About once a week	3
	More than once a week	4
	Everyday	5
	Don't know	6

1b. if ever, which food types did you or your household gone without? (Refer to list in question 2 on HDDS)

Besides the increase in food price, what other problems prevented you in the past 6 months from having enough food to meet your family's needs?

Where do you normally obtain your food?

3b. how often do you normally obtain your food from these sources?

Source of food	Code	Frequency of food obtained from this source					
		5days a week	Once a week	Once a month	Once in 6 moths	Less than once a year	Never
Supermarket	1						
General dealer	2						
Tuck-shop	3						
Street food	4						
Grow it	5						
Remittances	6						
Food provided by others	7						
Borrow food	8						
Other, specify	9						

Thank you very much for your time you devoted answering this questionnaire, the information is valuable. Stay blessed.

APPENDIX C: INTERVIEW GUIDE FOR KEY INFORMANTS

1. What are the changes that have occurred in the agricultural land use in Gabane village over time?
2. How has these changes affected the residents, particularly their food security?
3. How are the residents coping with the declining or loss of their agriculture land in order to sustain their food needs?
4. Is there enough production or trading in Gabane that can sustain the whole residents?
5. What other strategies are in place to promote agricultural activities in Gabane village?
- How effective are they?

APPENDIX D: INFORMED CONSENT FORM FOR HOUSEHOLDS AND KEY INFORMANTS

Name of Principal Investigator: Gabarate Tshekiso

Name of Organization: University of Botswana

Name of Sponsor: self

Name of Project and Version: 2015:An analytical study of patterns and processes of food security in the peri urban village of Gabane in Botswana

PART I: INFORMATION SHEET:

Introduction

My name is Gabarate Tshekiso. I am a Master of Science student in Environmental Science at the University of Botswana. I am doing research on the patterns and processes of food security in the peri urban village of Gabane. I am going to give you information and invite you to be part of this research.

This consent form may contain words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask them from me or another researcher.

Purpose of the research

Type of Research Intervention

The research will incorporate your participation in a face to face interview based on key informant interview. The interview will take about fifteen to twenty minutes.

Participant Selection

You are being invited in this research because your perceptions and experiences on food security can contribute to the understanding and knowledge of how the strategies adopted can improve food security & accessibility and alleviate urban poverty. Your input will also provide information on policy instruments that are in place to support the survival or sustainability of urban and peri urban agriculture.

Voluntary Participation

Your contribution in this research is entirely voluntary. I would be elated if you are able to participate. It is your choice whether to participate or not. If you choose not to participate in the study you will not be forced nor intimidated to do so.

Procedures

The research requests you to help us learn more about the opportunities or prospects and challenges facing urban and peri urban agriculture in Botswana; policy implications surrounding urban and peri urban agriculture and the contribution of urban and peri urban agriculture towards the MDG's and Botswana's vision 2016.

Duration

The research takes place over 30 days or 1 month in total. During that time, we will visit you once for interviewing you and each interview will last for about 20minutes.

Risks

There will be no risks nor dangers involved for participating in this research, but time will be spent in answering questions.

Reimbursements

There will be no incentive awarded to you for taking part in the research.

Confidentiality

Information obtained from you will not be shared with anyone and your name will not be published, but only a number will appear. Only members who are involved in this project (project supervisors) will know your particulars. Hence the information obtained from you will be kept private.

Sharing the Results

Nothing that you tell us today will be shared with anybody outside the research team, and nothing will be attributed to you by name. Following approval of the results by supervisors, the results will be published so that other interested people may learn from the research.

Right to Refuse or Withdraw

You are encouraged to participate in this research because your input will be valuable in achieving the objectives of the study. However if you are not willing to partake in the study you will not be forced to do so. You may also choose which information to disclose and you may stop the interview at any time you wish. If you are willing to review your remarks at the end of the interview and modify them you will be permitted.

Who to Contact

If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact any of the following:

- 1) Gabarate Tshkiso, University of Botswana, Notwane Road Plot 4775, Village, 3554519 & Fax: 3552908; gabarateketi@yahoo.com
- 2) Prof T D Gwebu, University of Botswana, Notwane road plot 4775, village, 3552519 & Fax: 3552908; gwebutd@mopipi.ub.bw
- 3) Prof E N Toteng, University of Botswana, Notwane road plot 4775, village, 3552104 & Fax 3552908; totengen@mopipi.ub.bw

The project proposal and data instruments have been reviewed and approved by the Departmental Board of Environmental science. The board is a national level committee whose task is to ensure that the project meets its objectives and research participants in the evaluation are protected from harm.

PART II: CERTIFICATE OF CONSENT

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Print Name of Participant _____

Settlement (Village/Town etc.) _____

Ward (Kgotla etc) _____

ID No _____

Cell number _____

Signature of Participant _____

If illiterate

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Print name of witness _____

Thumb print of participant

Signature of witness _____



Date _____

Day/month/year

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that the following will be done:

1. The objectives of the study
2. That their participation is voluntary
3. That their personal details will be kept confidential

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability.

I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this ICF (Informed Consent Form) has been provided to the participant.

Print Name of Researcher/person taking the consent_____

Signature of Researcher /person taking the consent_____

Date _____

Day/month/year

APPENDIX E: RESEARCH PERMIT

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MINISTRY OF AGRICULT

PAGE 01/01

Telephone: (+267) 3689211
Fax No: (+267) 3903154
Internet: www.moa.gov.bw
Email:
REF: A34/6 XV (2)



Republic Of Botswana

Ministry of Agriculture
Private Bag 003
Gaborone
Botswana

13th July 2015

Dr. M. Kusale
Assistant Director,
Officer of Research and Development
Private Bag 00708
GABORONE

Dear Sir/Madam

APPLICATION FOR A RESEARCH PERMIT:
MS GABARATE KETI

Reference is made to your letter ref: UBR/RES/IRB/GRAD/172 dated 18th June 2015 on the above subject matter.

Your request for permission to carryout research on "**Patterns and Processes of Food Insecurity in the Peri Urban Village of Gabane in Botswana**" is hereby approved.

You are advised to share your research report with the Ministry and have it deposited at Ministry of Agriculture Library.

Thank you.

Yours faithfully

E. K. Baipoledi
FOR/PERMANENT SECRETARY



OUR VISION: Attain national food security and global competitiveness in agricultural products
OUR MISSION: To improve agricultural productivity through technology development and transfer, diversification and commercialization, in order to promote food security in partnership with our stakeholders.

