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Food security and interventions: A glimpse at Windhoek's informal settlements

Hedwig Nelago Black

A Dissertation submitted to the Faculty of Science, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Master of Science



Supervised by: Prof. Mary Scholes

22 May 2018, Johannesburg, South Africa

Declaration

University of the Witwatersrand, Johannesburg

School of Animal, Plant and Environmental Sciences

SENATE PLAGIARISM POLICY

Declaration by student:

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Abstract

Food security is becoming increasingly concerning, especially in light of the rapid growth in the world's population; an issue which is forefront on the global agenda as seen in the newly developed Sustainable Development Goals (SDG's). This is especially evident within African countries where urbanisation is occurring at an alarming rate and urban food insecurity is increasingly becoming a problem. For much too long the urban crisis of food security has remained in the shadow of rural food insecurity; furthermore, the urban poor and vulnerable often carry the highest brunt of food insecurity within urban areas. In the past, much of Namibia's food security interventions focused on the rural poor, but it's been recognised that the urban poor are facing serious challenges in regards to reaching a food secure state. With global and local market prices increasing at an alarming rate, the state of the urban poor's ability to access these markets need to be investigated, in order to facilitate a process that will lead to problem specific interventions. Household Food Insecurity Access surveys were conducted to assess the state of food security in informal settlements of Windhoek; furthermore dietary diversity and month of adequate food in households were also tested for. Results showed that food insecurity is high (more than 80% across all sites) amongst these households, dietary diversity low and coping strategies severe. Physical and financial access of households to markets were analysed, it was found that market access appears to be hindered mainly by lack of finance. Urban interventions were reviewed to give a scope of the current status amongst informal households in the city, which showed that context specific interventions are few and most unsustainable. This confirms the limited attention the urban poor receive with regards to food security and that much can be done to improve the situation if we are to reach the Sustainable Development Goals.

Keywords: urban, food security, markets, food access, interventions.

Acknowledgements

I would first and foremost like to thank my supervisor Prof. Mary Scholes. It was due to her persistence and guidance that I was able to produce this dissertation. Thank you for all the new insight and pushing me beyond my level of knowledge. I would like to thank the NRF for their funding over the past two years; which has allowed me to complete this thesis. I would further like to thank Dr. Danny Simatele and Prof. Coleen Vogel for serving as my committee members and providing very valuable insight into my project.

The biggest thanks go to my mom Adeline Black and my sisters Anneline Black, Kamutuua Black and Verona Black who have sacrificed much to see me through to this point in my life. Your love and encouragement has meant more to me that I can explain. Thank you for never giving up on me and for not letting me give up on myself. Furthermore a big thanks to all my friends and fiancé, Suhin Choudhury, for all the emotional support.

For those that assisted me in the field, Alexander van Neel and Werner Verishao, you guys are the real champs for working long hours in the hot sun and for that you have my utmost gratitude. A big thank you goes to all the councilors' constituency offices that provided me with so much aid during my project. To the Namibian Statistic Agency (NSA), a thank you is in order for their provision of data files used in this project.

Lastly I would like to give a big thank you to my lab members; you have kept the sunshine in this long journey and always offered a shoulder to cry on when things got tough.

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Chapter 1: Introduction

Global food security has taken a forefront position in the global agenda, which is evident in the past Millennium Development Goal (MDG's) targets and the Sustainable Development Goals (SDG's) that replaced the MDG's in early 2016; where both have a large focus on improved food and nutritional security, as well as reduced poverty. Africa in particular is taking great strides in reducing food insecurity on the continent as seen in the African Union's Agenda 2003. The rapid global population growth, especially in Africa, is the fundamental reason why such great focus is being placed on improved food and nutritional security.

This increase of the global population has led to an increase in competition for the world's resources such as land, water and energy; which all influence our ability to produce food (Charles *et al*. 2010). In addition to these factors there is an urgent need to reduce the negative impacts of the food system on the environment. As a result of all these factors (that are often interrelated and complex), food insecurity has become a challenge many nations face around the world, however, food accessibility appears to be a much larger problem than the availability of food itself. It is interesting to note that despite the growth of the human global population over the past few decades, food production (availability) has increased over the last fifty years and this growth in global food production, has seen a reduction in the proportion of people in the world that are hungry (Charles *et al*. 2010), however malnutrition seems to still be a major concern worldwide. Food security is often viewed through two lenses, which is the urban and rural context; where the drivers and associated challenges of food security differ within these contexts.

In sub-Sahara Africa food security has long been focused in rural areas despite the fact that the region is rapidly becoming urbanized, with urban poverty on the rise in most countries (FAO 2015). Food security in urban areas can be easily overlooked due to how it presents itself, as it is often not as clear cut as in rural areas; where food insecurity is often associated with lack of food. Events such as famine and drought often impact food availability in rural areas, which leads to food shortages being experienced at a community level (Maxwell 1999; Battersby 2012); However, it is important to realise that urban food security is not triggered by absolute food shortages (availability), but by household's failures to access available food (Battersby

2012), therefore food insecurity is experienced at household level and can be easily overlooked. Furthermore, existing perceptions of food security being a rural problem may lead to policy makers overlooking the rising problem of food insecurity in urban areas. Food security surveys are often conducted on large scales, such as regional, and these tend to miss the spatial and temporal variability of food insecurity at the household level; it is in these instances that finer grained case studies provide valuable insight to feed into larger scale studies and decision making.

Conceptual framework of the study

Food security in Namibia is an important social and developmental area in the country. The country relies heavily on imports to meet its food demand, as food production within the country is heavily limited by low water availability. The stability of food in the country is thus highly dependent in various external factors such as global food and oil prices. Given the country's high dependency on imports for food, the volatility of international markets, changes in the political and environmental scene of the countries Namibia trades with (such as South Africa), may have adverse impacts on household's ability to access food, and even more so for low income households. Therefore adequate, robust and context specific food interventions play an important role in ensuring food security (Rose 2008).

Much of the food interventions in Namibia since the 90's were focused in rural areas (Nickanor 2013), it is only in recent years that some focus has shifted to urban Namibia, mainly Windhoek. However, despite this shift there is very little work on the complex issues pertaining to food security in Windhoek, and interventions are often translated into the urban context without real consideration of what the underlying issues of food security in these areas are. Two large studies carried out by Ziervogel and Frayne (2011) and Nickanor (2013) highlighted that the pressing issues, regarding food security in Windhoek, lie mainly in the often marginalised urban poor, especially female-headed households. They further found that the availability of food itself seems to be less of a problem, than household's ability to access markets, a trend that has been observed in other southern African countries. Given the propensity for national government to conduct vulnerability assessments on regional scales, unique issues within urban areas may be overlooked. This can result in interventions overlooking the real problems concerning vulnerable groups such as informal households.

For this reason the focus of this study will be two fold, to examine the 1) accessibility aspect of food security in Windhoek's informal settlements and 2) to analyse food interventions in Windhoek. This is in order to better understand the dynamics of food security of vulnerable groups in the urban context, in order to better address the pressing issues faced by the urban poor. Furthermore analysing interventions allows for better understanding of where improvements can be made, as well as shed light on the strength and weakness of current urban food interventions (Fig. **1**).

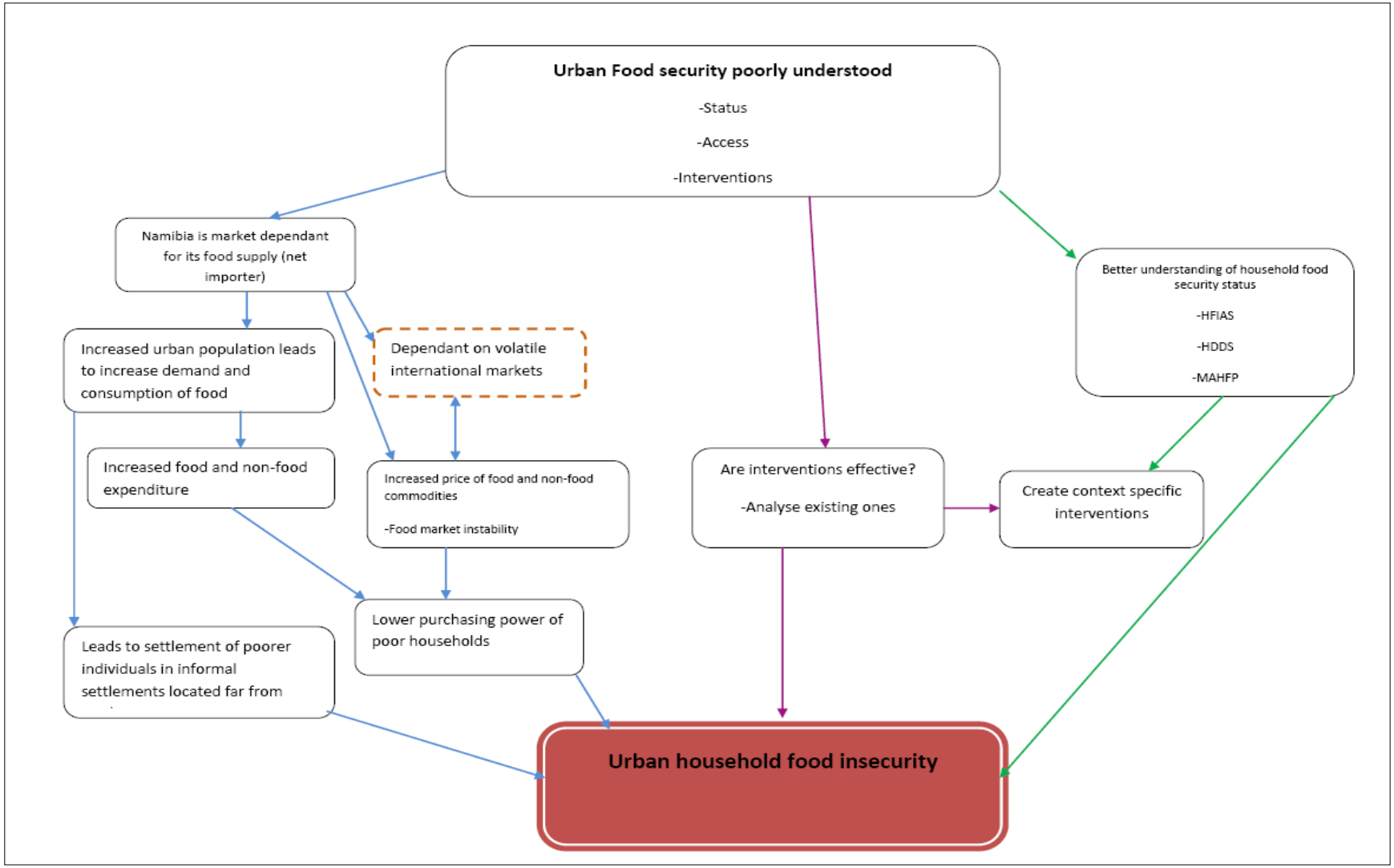


Figure 1. Conceptual framework of the study.

Aims, objectives and key questions

This project aims to assess the state of household food security in selected informal settlements and their access to nutritious food and markets (Objective 1 and 2), as well as to analyse food security interventions in Windhoek (Objective 3). The objectives of the study are:

1) To assess accessibility of informal households to food and the coping mechanisms households employ to deal with possible food shortages.

Key questions:

i. *What is the extent of food security in poorer urban communities and what are the main food types communities have access to?*
ii. *How do households cope with inadequate food in the household?*

2) To assess physical accessibility to formal markets and to investigate the feasibility of informal markets as an alternative to formal markets.

Key questions:

i. *How does distance from markets influence household ability to access food?*
ii. *Do informal markets serve as a feasible financial alternative to formal markets?*

3) To briefly review urban food security interventions of various institutions in Namibia.

Key questions:

i. *What aspects of food security do interventions cover?*
ii. *Are risk management strategies adequate to deal with current and future vulnerabilities of communities?*

Chapter 2: Literature Review

The purpose of this chapter is to provide a theoretical framework for this study. Furthermore this chapter aims to define key definitions and terminology, identify previous studies within the local context and lastly define this research within the broader topic of food security. The chapter is written in the following order: Basic definitions and dimensions for food security, methodologies used within this study framework, followed by a brief overview of food security in general. The review will then define and broaden understanding on urban food security, food security polices, institutions and economic influences on food security. The review also examines interventions and management strategies and will conclude by contextualising food security and interventions in urban Namibia, with a focus on Windhoek.

2.1. Food security

2.1.1. Food security definitions, dimensions and concepts

Food security has had a variation of definitions over the years and these have developed over time to be more inclusive of various factors that make up food security. The most wildly accepted definition of food security is *"when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life"* (World Food Summit, 1996) (ESA 2006: 1).

Four main dimensions (Fig. **1**) are currently recognized in food security (ESA 2006; Pinstrup-Andersen 2009; Quave and Pieroni, 2014) and these are:

1) **Food availability**: This looks at the presence of food in a given place at a given time. It is mainly focused on the "supply" side of the food system. This dimension of food security focuses on food sufficiency and quality, which can be supplied through both domestic production and international trade.

2) **Food access**: Looks firstly at whether consumers have access to existing food supplies and secondly focuses on the adequacy of resources, that household have access to, in order to obtain or gain access to appropriate and nutritious food substances.

3) **Utilization**: Includes the ability of households to make practical and effective use of food, through adequate diet, clean water, sanitation and health (which are all climate sensitive variables). This allows communities to reach a condition of nutritional well-being,

resulting in meeting all physiological needs. This dimension of food security brings into focus the importance of availability and access to non-food stuffs to reach food security.

4) **Stability**: Focuses on the sustainability aspect of food security, with emphasis on access and availability of food at all times, where communities/individuals do not risk losing access to food due to sudden shocks.

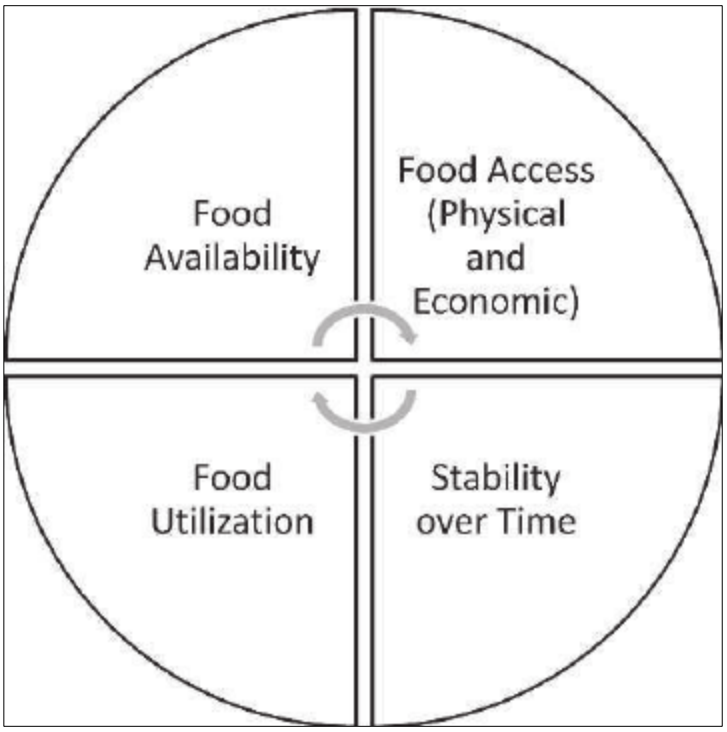


Figure 2. The four commonly accepted dimensions of food security and their inter connectedness to achieve not only national food security, but also on a household level. *Source: Quave and Pieroni (2014).*

The dimensions of food security do not function independently of each other, they often overlap and function at various levels (global, national and all the way down to the household) to achieve food security (Fig. **2**). National food security is important to reach household level food security, however it is important to remember that reaching food security at the national level does not imply household food security, in addition household food security does not equate nutrition security either (Smith *et al*. 2000; Regmi and Meade 2013); Households must be able to have access to food; this can either be physically or by having financial means to access adequate food. Areas where households are unable to access food due to economic disadvantages and

absence of food markets (usually supermarkets) that provide healthy, safe and affordable food, are often considered to be "food deserts" (Battersby and Crush 2014).

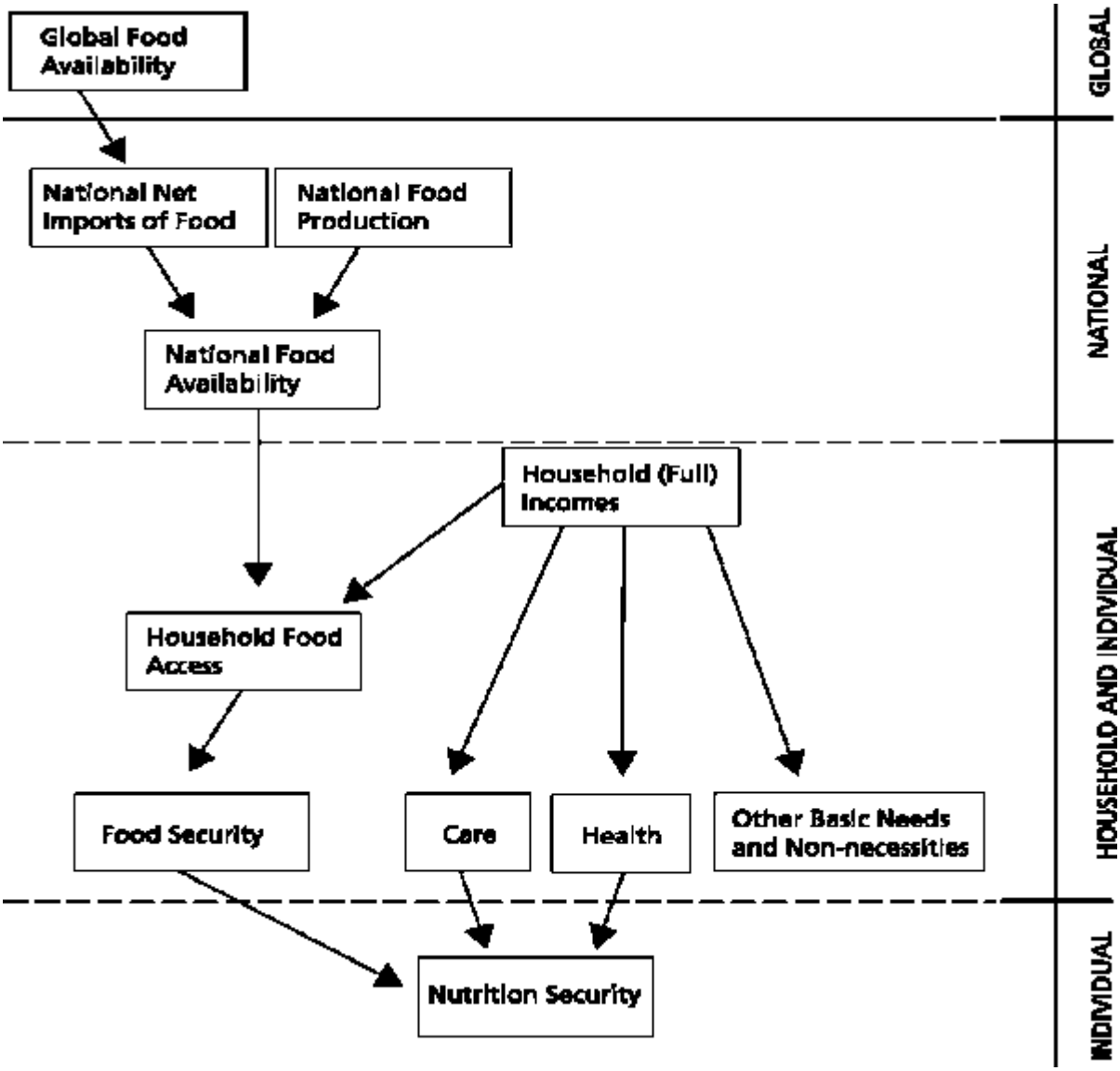


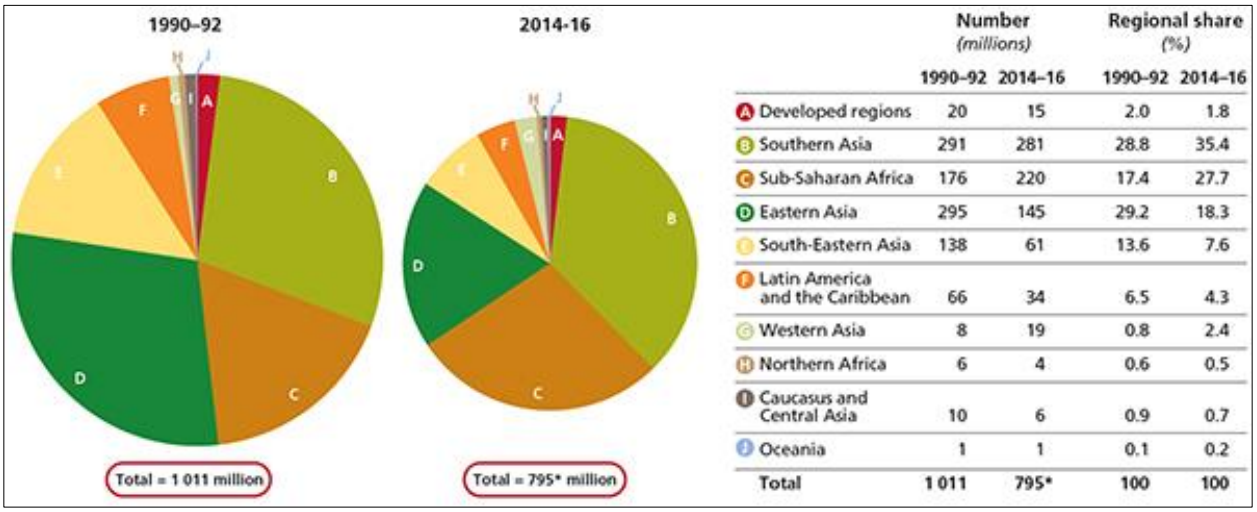
Figure 3. Shows a classical theoretical framework for food security, which looks at how household food access is achieved once national food security is achieved. However national food security does not guarantee household food security as households need necessary resources to gain access to food. *Source: Smith et al.2000.*

The concept of food security is a complex one and requires the recognition of multiple factors at various stages across both time and space. Multiple factors exist that influence global, national and household's food security; these are often complex and interrelated in many ways (Mwaniki

2006; Wheeler and von Braun, 2013). Factors include the economic, political and social environment, which is often a major driver in the level of food security communities and households experience. Furthermore, factors such as war, social unrest, gender inequality, poor education, macroeconomic imbalance, poor human resource base and climatic factors such as natural disasters all influence food security (Mwaniki 2006; Hendrix and Brinkman, 2013).

2.1.2. A global outlook

The number of undernourished people in the world is currently estimated to be 795 million. Despite this number being high there has been a decrease (from 23.3% to 12.9%) in the number of undernourished individuals in the world since 1990 (Fig. **3**). It is interesting to note that this decline has been more pronounced in certain developing regions of the world such northern Africa and central Asia, despite the increase in population in these regions; which may indicate that effective efforts are being made to reduce hunger in these areas (FAO 2015).



	Number (millions)		Regional share (%)	
	1990–92	2014–16	1990–92	2014–16
A Developed regions	20	15	2.0	1.8
B Southern Asia	291	281	28.8	35.4
C Sub-Saharan Africa	176	220	17.4	27.7
D Eastern Asia	295	145	29.2	18.3
E South-Eastern Asia	138	61	13.6	7.6
F Latin America and the Caribbean	66	34	6.5	4.3
G Western Asia	8	19	0.8	2.4
H Northern Africa	6	4	0.6	0.5
I Caucasus and Central Asia	10	6	0.9	0.7
J Oceania	1	1	0.1	0.2
Total	1 011	795*	100	100

Figure 4. Shows how the distribution of hunger has changed for the period of 1990-1992 and 2014-2016. The values for the 2014-2016 periods are based on regional estimates. Both the number of undernourished individuals and regional share are displayed. Southern Asia and Sub- Sahara Africa have the highest share of undernourished individuals in the world. *Source: FAO (2015).*

In September 2000, 189 countries became signatories to the Millennium Development Goals (MDG), set out by the United Nations. The primary focus was to eradicate extreme poverty of all forms by the year 2015 (UN 2015); The MDG's had eight goals of which the first stated "To reduce hunger, malnutrition and food insecurity by half by 2015" (DeCock *et al*. 2013; UN

2015). The monitoring period for the MDG's came to an end in 2015 and of the 129 developing countries that participated in it only 72 (56%) managed to reach the MDG1 goal which focused on food security (FAO 2015) (Fig. **4**). The countries that did not manage to reach the MDG1 goal, were often identified as being in a state of political and social instability, which led to increased vulnerability and food insecurity in the affected populations (FAO 2015).

The MDG's have since been replaced by the Sustainable Development Goals (SDG), which were officially implemented on the 1 January 2016 (DESA 2016). The recently adopted SDG's focus on zero hunger and an end to poverty which falls within the 17 goals developed; which illustrates the global need to still tackle these issues in our societies.

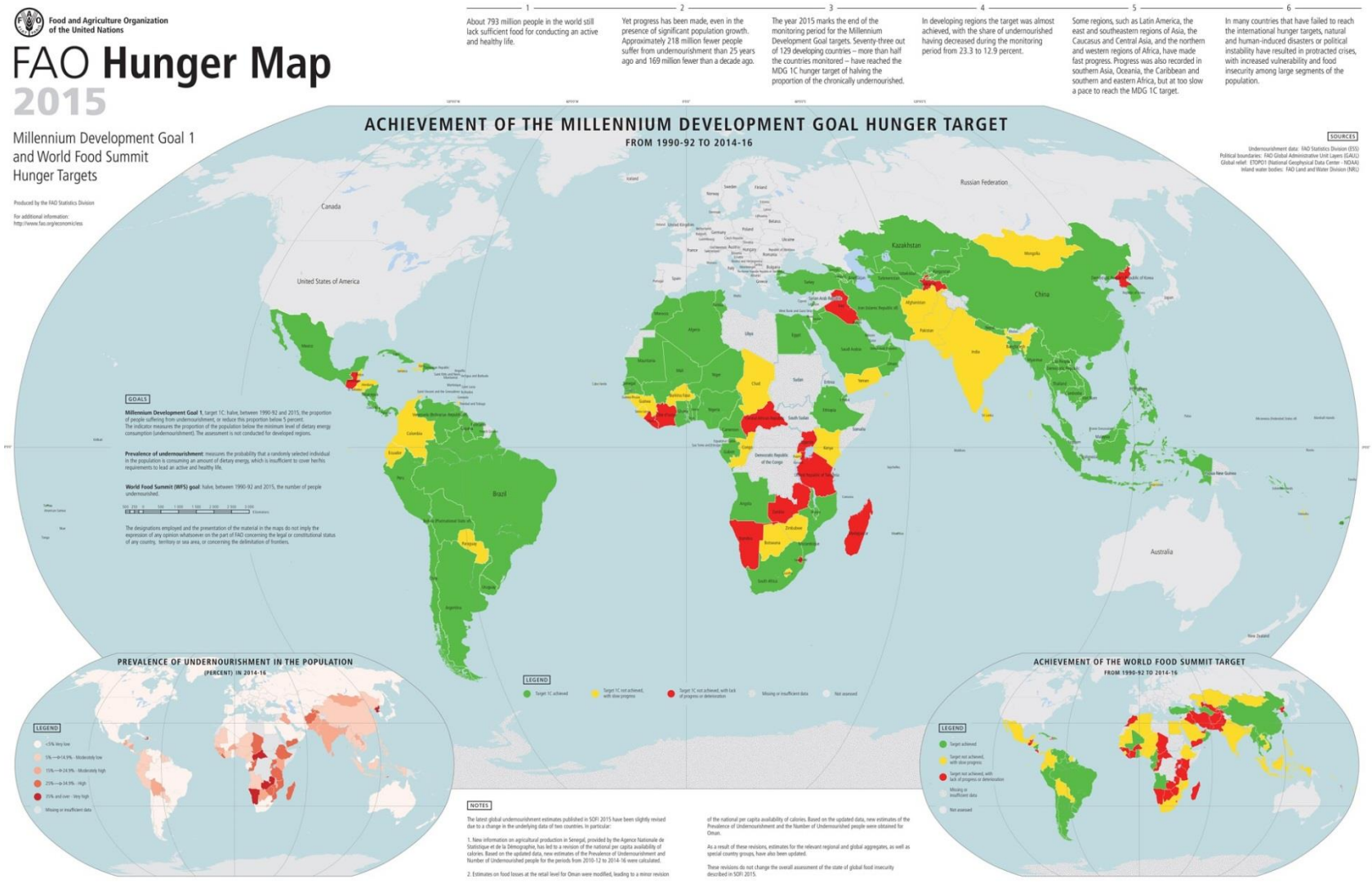


Figure 5. Map showing countries that have achieved the millennium development goals for the 2014-2016 periods. Green: target achieved, yellow: achieved with slow progress, red: not achieved with lack of progress and white: not assessed. *Source: FAO (2015).*

2.1.3. Regional context (Africa)

Although achieving food security is a global challenge, Africa is particularly hard hit by food insecurity, both at national and household levels (ESA 2006). The inability of households and individuals to gain access to food, due to poverty, is a major driver for food insecure households in Africa. In 2012, the estimated number of people suffering from hunger in sub-Sahara was 239 million and the 2015 report of FAO estimated that 23% of the population in the region are classified as undernourished (FAO 2015).

Sub- Sahara Africa is often considered the most vulnerable part of the continent in terms of food security, due to its heavy reliance on agriculture (which is highly sensitive to weather and climate variability) to meet its food needs (Kotir 2011). Furthermore, the continents' low adaptive capacity, poor information, poor service delivery governance issues, corruption and slow technological change further increase that vulnerability (Kotir 2011).

In Africa women and children are hit the hardest by food insecurity; however the situation is even worse for girls in their teens as they historically receive less food than male counterparts within households (Sasson 2012). Vulnerability in many African countries, such as Botswana, Mauritius, Berundi, Namibia, etc., stems widely from the fact that many countries within the continent rely heavily on imports (whose prices increase and are volatile) (Fig. 5) to meet their food security needs (Ng and Ataman 2008; Rakotoarisoa *et al*. 2011). It therefore comes as no surprise that the continent is moving towards a green revolution, with the aim of eradicating hunger and raising food security status within the continent (Altman *et al*. 2009; Sasson 2012). However, physical accessibility to food is not the only concern the continent faces; with over one in seven people in the world that currently do not have access to sufficient protein and energy from their diet, therefore, obtaining nutritious food, adds another dimension to the challenge of food accessibility for the continent (Charles *et al.*, 2010; FAO 2015).

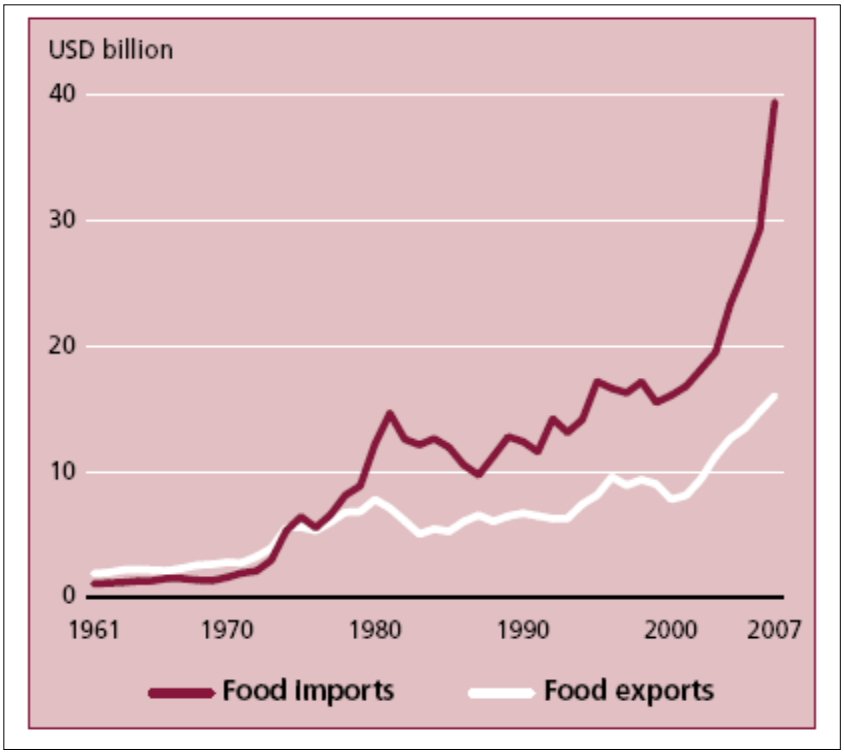


Figure 6. Africa's import and export trends over the past 46 years. *Source: FAOSTAT 2011.*

2.1.4. Influence of changing climate on food security

Global climate change has become a challenge to achieving food security due to meeting the increasing demand for food under variable and changing climates (Ziervogel and Frayne 2011). Despite the number of adaptation strategies and mitigation policies currently being implemented, anthropogenic Green House Gas (GHG) emissions continue to increase (IPCC 2014). There is an important need to understand the effects of climate change to global and national food systems. The Representative Concentration Pathways (RCP's), adopted by the IPCC in 2014, are greenhouse gas concentration trajectories used in climate modelling and research. Four scenarios (RCP2.6, RCP4.5, RCP6, and RCP8.5) were adopted with the aim to project different climate change futures, where RCP8.5 represents the worst case scenario, where emissions rise continually throughout the 21st century (Kirtman *et al*. 2014). These RCP's provide valuable insight on how food security may be affected under these four scenarios, e.g. under the RCP8.5 scenario with no adaptation, areas like sub-Sahara Africa are predicted to have high levels of food insecurity by the year 2050 (Fig. **6**).

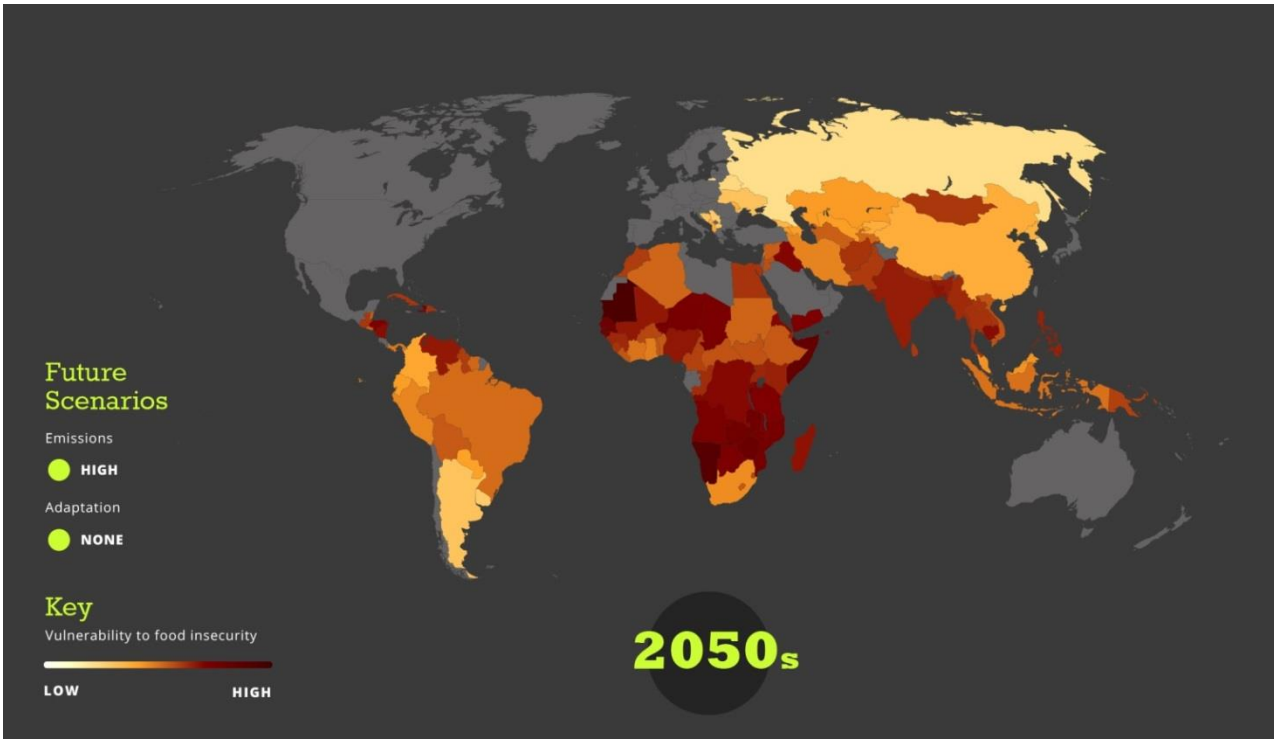


Figure 7. Food insecurity prediction under RCP 8.5 and "no adaptation" scenarios (where no adaptation refers to sensitivity and adaptive capacity index of present day). Sub-Sahara Africa will be the hardest hit under this scenario, becoming highly vulnerable to food insecurity. Namibia falls within the worst case scenario in terms of food security under RCP 8.5. Grey areas on the map represent no data for those areas. *Source: United Kingdom Meteorological services (2017)*

Climate change will have both direct and indirect impacts on food systems, where direct impacts include changes such as an increase or decrease in crop yields, which has a direct influence on the food system, while indirect influences include decreased national revenue for poorer countries affected by droughts, which in turn reduces the ability to purchase food produce on international markets (Tibaijuka 2004; Brown and Funk 2008). Furthermore predicted changes such as increased temperature (beyond 1-3°C) (Fig. **7**) and declining precipitation over semi-arid regions is expected to lead to the reduction of crop yield (IPCC 2007). This will be especially devastating to the food system, as primary crops such as rice, wheat and corn are most likely to decrease, which could lead to a global food security crisis (Fig. **8** crop yields) (IPCC 2007; Brown and Funk 2008). Furthermore predicted increases in the prevalence of pest and disease of crops and livestock, due to climate change, may lead to substantial loss in agricultural productivity (Tirado *et al*. 2010; HLPE 2012). Changes in temperature and precipitation are not

the only factors that may lead to adverse impacts on the food system; increase temperatures of the world's oceans and acidification, as well changes in the frequency and intensity of acute weather events may all lead to reduced crop and livestock yields. Although much of these impacts may lead to yield reductions, it is not limited to that, as negative impacts can arise at several stages of the food chain, which in turn reduces food security (Tirado *et al*. 2010; IPCC 2014). Adverse changes in crops and livestock yields, due to climate change, will be hard felt on especially food insecure regions that rely largely on local and subsistence agriculture to meet their dietary needs (Brown and Funk 2008). It is however important to note that not all climatic changes will have negative effects on food systems, predicted increase in temperature (1-3°C) for mid and high latitude regions may lead to increase crop yields (IPCC 2007)

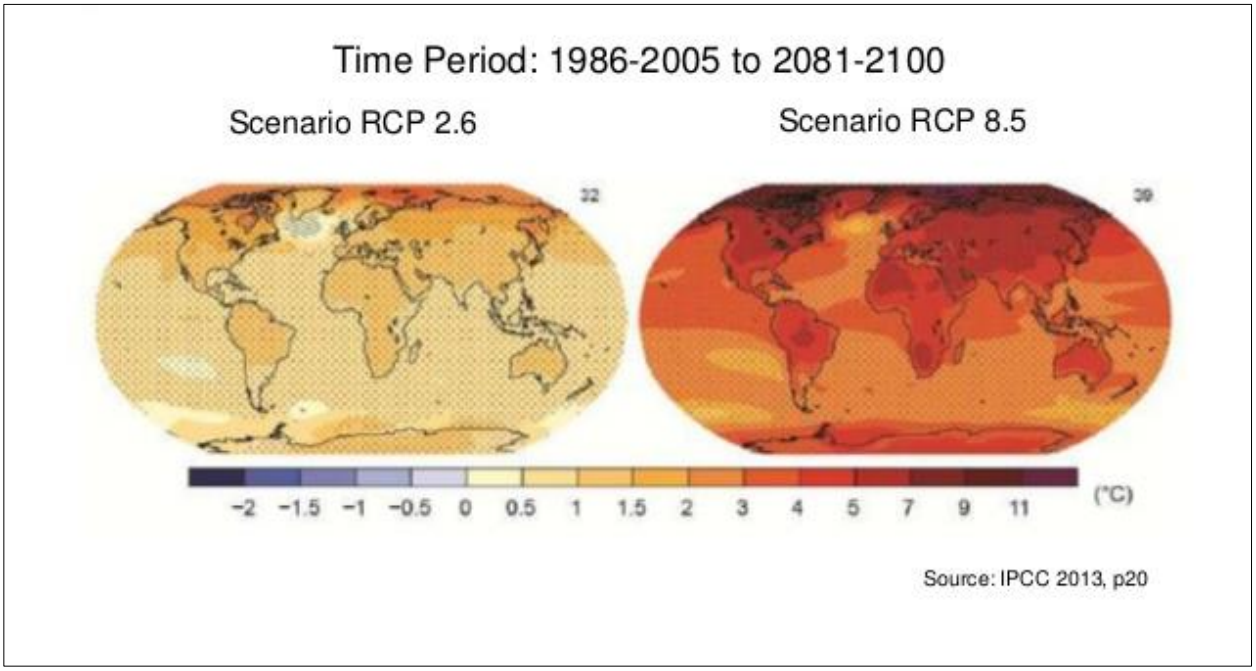


Figure 8. Forecasted changes in the average surface temperature for the time period from 1986 to 2100 under the RCP2.6 and RCP 8.5 scenario's. *Source: IPCC 2013*.

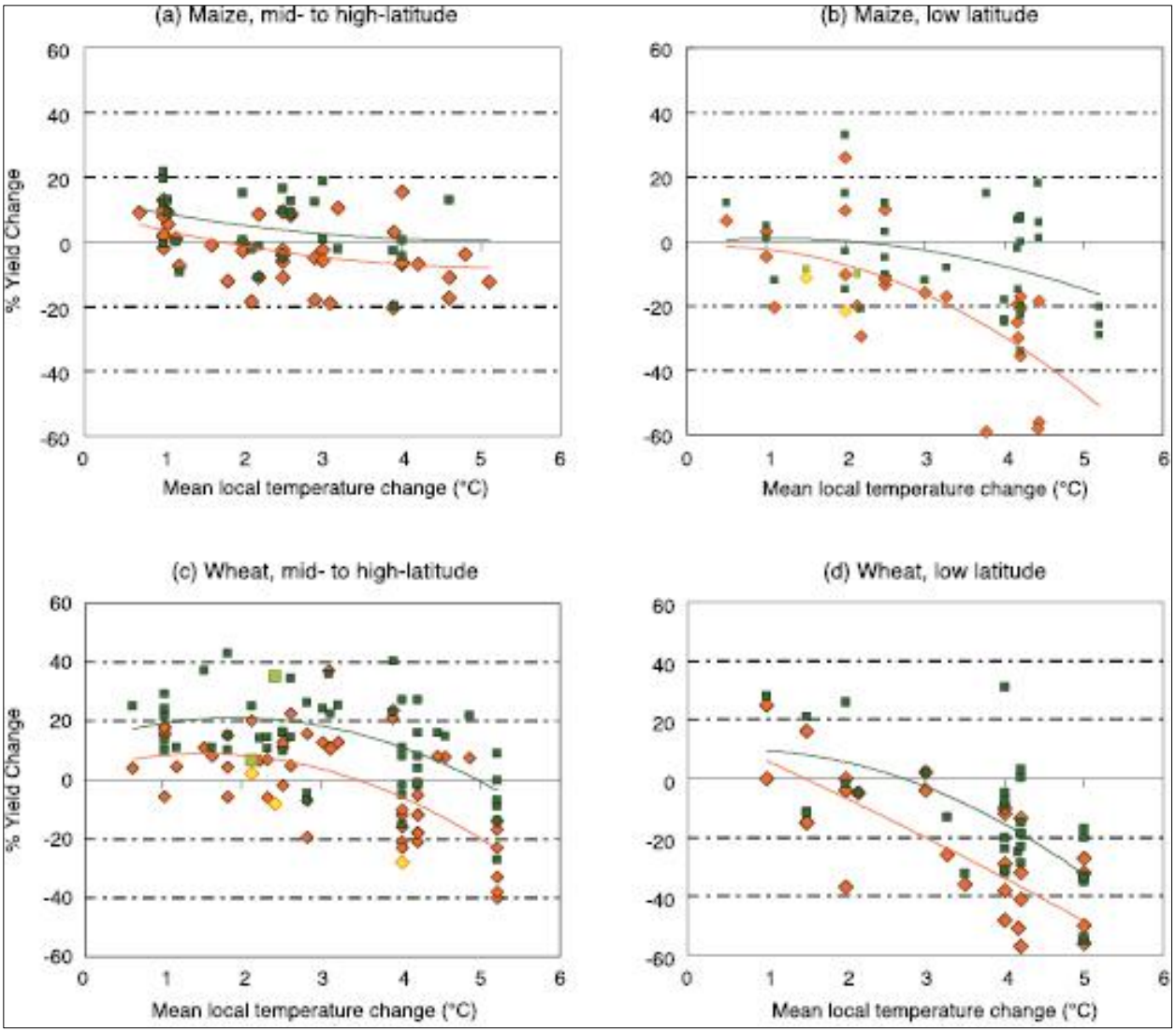


Figure 9. Maize and wheat yield sensitivity to climate change. Orange dots represent instances without adaptation and green dots with adaptation. Lighter coloured dots in (b) and (c) represent yield scenarios for rain-fed crops under predicted decreased precipitation. *Source: IPCC 2007*.

In 2007, the Intergovernmental Panel on Climate Change (IPCC) identified Africa as one of the most vulnerable continents to climate change and climate vulnerability; this is due to various stressors that exist at various levels and the continents overall low capacity to adapt to changes and related impacts (IPCC 2007). Current and predicted climate trajectory poses a problem for the continent to reach food security (Fig. **9**); an additional challenge to decision makers on food security matters on an already vulnerable continent.

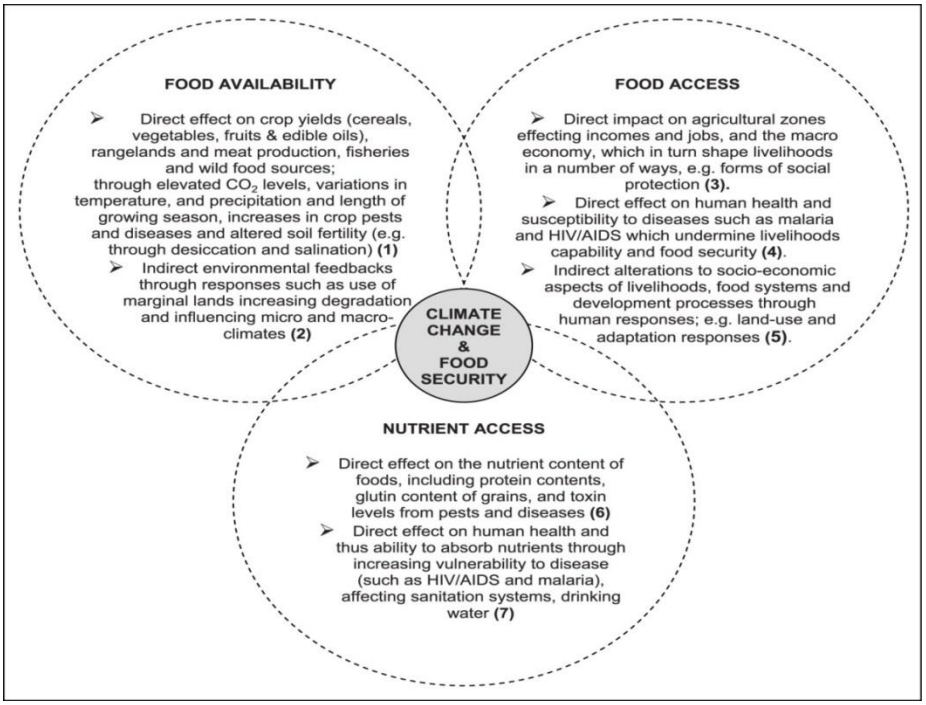


Figure 10. Impacts of climate change on food security in Africa. *Source: IPCC AR4-WG2 report (2007).*

The continent is projected to warm, where the sub-tropics are expected to become drier with a decrease in annual rainfall, the exception being eastern Africa (IPCC 2007). Already existing environmental issues like deforestation, land degradation and failing water supplies exerts immense pressure on decision makers to address food security issues (Brown *et al.* 2007; Ziervogel and Frayne 2011). Integrated thinking with regards to environmental and social issues, allows for decision makers to effectively monitor and communicate, social and environmental challenges and risks.

2.1.5. Vulnerability and risk management

Systems are susceptible to the adverse effects of climate change, where these systems can be physical, biological as well as societal. This susceptibility is referred to as being vulnerable, but it not only encompasses susceptibility to adverse effects, but also the degree of coping, adaptive capacity and sensitivity of the system (Fig. **10**) (IPCC 2007).

Food security is often most prevalent in vulnerable groups. In order to address the issues related to vulnerable groups as well as develop strategies that targets them, it is important to understand the characteristics of vulnerable groups in a society or community as well as identify sources of

risks to their entitlements (Thomson and Metz 1997). This allows for vulnerability identification within a group or community and secondly traces their vulnerability over time (Thompson and Metz 1997). Poor communities are often described as being vulnerable to the negative effects (such as food price increase, food shortages or natural disasters), due to their low adaptive capacity. Furthermore, these groups are often concentrated in high risk areas and are usually found to be highly reliant on climate-sensitive resources such as local food and water supplies (IPCC 2007; Cannon and Müller-Mahn 2010). Other vulnerable groups include the young, elderly, sick and marginalised groups. The combination of lack of resources for adaptation and other stressors such as disease and economic turbulence often makes it difficult for vulnerable groups to cope and adapt to adverse changes, furthermore already pre-existing conditions of vulnerability increases the exposure of these communities to negative changes (Hahn *et al*. 2009; HLPE 2012). It is thus important to deal with and manage vulnerability in order to achieve food security.

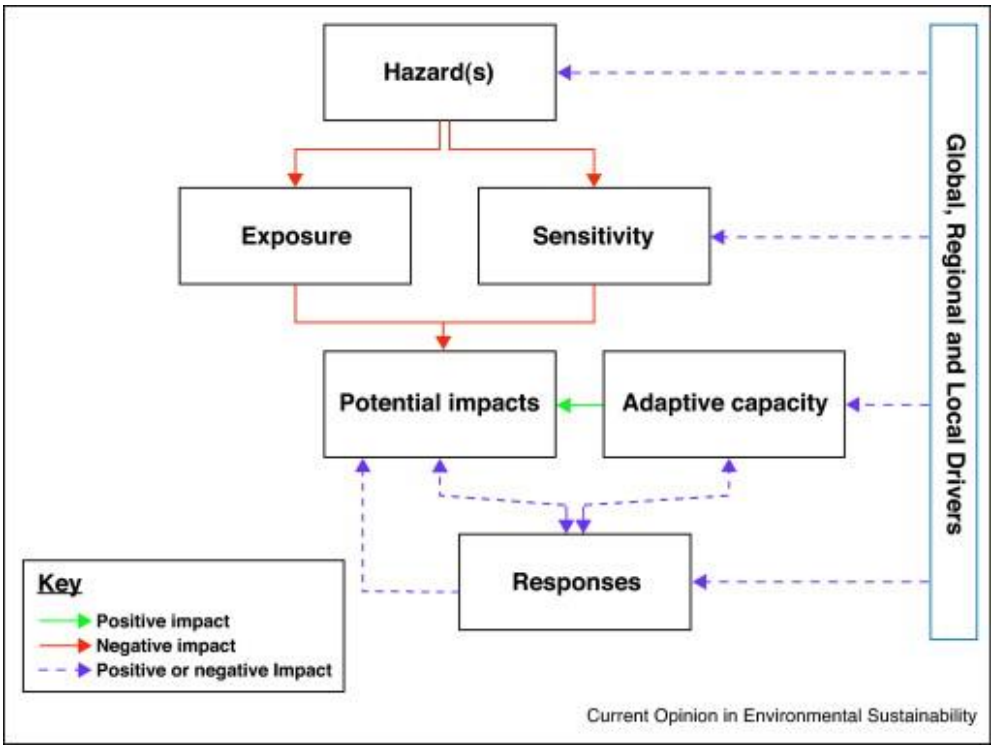


Figure 11. A theoretical framework of vulnerability to global change. The framework looks at multilevel drivers and their interaction with various dimensions of vulnerability. *Source: Lankao and Qin 2011*.

Disaster management aims to reduce risks of communities to current and future hazards. This management not only focuses on risk reduction, but also aims to understand the linkage of risk to livelihoods in order to create effective risk management strategies (Van Aalst *et al.* 2008). The physical, political, social and economic environment in which communities and households' lives determines their level of risk to particular events (Rose 2008; Kazuko and Junko 2014). In order to reduce the risk of communities to threats, strategies often focus on strengthening a household's ability to (Rose 2008; Aldunce *et al*. 2015): 1) prevent a shock; 2) lessen the effect of the shock; and 3) cope with the problem as it occurs.

2.3. Urban food security

Urban centres globally, play an important role as they house a large number of the world's population, furthermore urban areas are important economic, political and development hubs (Lankao and Qin 2011; Jiang and O'Neill 2015). Urban centres have increased at a rapid rate since the start of the century (Table. **1**), this is where the world's population have been migrating to, in order to look for better living and economic prospects. This high influx of the global population into urban areas has resulted in several socio-economic problems increasing in prevalence such as poverty, food insecurity and unemployment; this is especially evident in developing countries (Bedore 2010).

Table 1. Projected percentage urbanisation for various regions of the world, for the time period 1995−2025 (% urban).

	1995	2000	2005	2010	2015	2020	2025
North America	77.3	79.1	80.7	82.1	83.4	84.6	85.7
Europe	71.0	71.4	71.9	72.6	73.5	74.8	76.2
Latin America	73.0	75.3	77.5	79.4	80.9	82.3	83.5
Asia	34.4	37.1	39.7	42.5	45.3	48.1	51.2
Africa	34.1	35.9	37.9	39.9	42.2	44.6	47.2
World	44.7	46.6	48.6	50.6	52.7	54.9	57.2

Source: UN-Habitat 2008

Urban food systems rely on various characteristics of a city, such as natural resources, infrastructure, housing and the historical factors, to name a few (Moragues *et al*. 2013). These

characteristics determine the strength and nature of food systems, which in turn determines the food security status of urban households (Moragues *et al*. 2013).

In recent years there has been an increasing concern over food insecurity in urban households, with specific concern for poor communities, where households are often characterized by social exclusion and deprivation (Bedore 2010). The issue of urban food security is often neglected and particularly so in much of Africa, despite the fact that it is rapidly urbanizing (Battersby 2011; Crush and Frayne 2011; Morgan 2014). Urban food security requires a much more integrated approach to solve in comparison to rural food insecurity, which is often addressed by increasing farmers produce and creating market access. The severity and extent of food security in urban areas is often overshadowed by other problems such as unemployment, poor infrastructure, poor health, and socio-political unrest (Crush and Frayne 2011). However the 2007/2008 food price inflation, where wheat products nearly doubled and rice tripled in price, illuminated the pressing issue of urban food security (Gilbert and Morgan 2010).

In many African countries rural communities are considered the most food insecure, but this is quickly changing due to a surge in rural-urban migration over the last few years (Tibaijuka 2004; Ziervogel and Frayne, 2011). Urban dwellers depend largely on the availability of food in markets and the access of households to these foods (determined by their household income, food prices and location of markets), to reach food security (Cohen and Garrett, 2009). Urban food insecurity in southern Africa is often overlooked and described as an invisible crisis; it is only in recent years that focus has shifted to the status of food security in urban communities (Pendleton *et al.*, 2012).

2.4. Economic forces and market influence

2.4.1. Global economy

There has been an increased concern over the access of affordable food to the worlds' hungry and poor, due to increase in global food prices over the last decade (Benson *et al*. 2013). National governments are often faced with the challenge of dealing with their citizens, especially vulnerable groups, in the face of increasing global food prices and subsequent food security issues that arise.

Developing and developed countries have different responses to global food price changes due to several factors such as differences in governance, institutional capacity, economies and social demographics (Cudjoe *et al*. 2010; Swinnen and Squicciarini 2012). Low global food prices are often advantageous for producers in developed countries, due to advanced technologies that decrease labour costs and agricultural subsidies by governments. However producers in developing countries are often adversely affected by such changes, as they often have high production costs and are further hindered by poor infrastructure and competitive international markets, making it nearly impossible for them to compete (Swinnen and Squicciarini 2012). High global food prices however, do provide an opportunity for developing countries to strengthen the contribution of national farmers to the economic growth of the country (Benson *et al*. 2013).

The food crisis of 2008 brought to light several complexities of increasing food prices in poor communities' esp. in developing countries (Benson *et al*. 2013). The increasing prices brought about an advantage for producers and they could make a large profit from food production; however consumers suffered the brunt of these price hikes. Despite these negative effects, the impact of increasing food prices during that period may not have had such a huge negative effect on households as reported at the time. The study carried out by Verpoorten *et al*. (2012) found that despite increases in food prices, very little increase was found in household's food insecurity status; this was attributed to various factors, but most importantly that growth in these countries Growth Domestic Products (GDP) may have created an off set in increasing global food prices (Verpoorten *et al*. 2012).

2.4.2. Market influences

The global and local food market has significant linkages to food security (Dirba and Renke 2007). Price instability is often identified as a major impediment to food security, especially in southern Africa (Jayne *et al*. 2002; Jayne *et al*. 2006). Producers' incentives are influenced by the global food commodity prices and this holds true even for smallholder farmers, even though almost 80% of their produce are sold at local markets (Rocha 2006; Barron *et al*. 2013). In southern Africa, attempts were made to shift from controlled food marketing systems, to a duel system where both the private sector and government operate in the food market; this was done in the hope of leading to more stable food prices that households can access (Kherallah *et al*.

2002; Jayne *et al*., 2006). However, despite these proposed changes, in some developing countries, government still controls food prices of domestic food producers, in response to increasing global food prices, this may lead food producers to be more reluctant to increase their production in the following seasons (Benson *et al*. 2013). This eventually results in negative effects for both consumers and producers, as consumers are often faced with increasing food prices and producers have limitation placed on the prices of their goods sold on the market.

Food price risks and instability is not the same for all countries; in southern Africa the poor are most exposed to risks as a large proportion of people in this region rely on white maize as their main staple (Byerlee *et al*. 2006; Cudjoe *et al*. 2010). Therefore changes, such as increasing food prices, in the global and local market for such produce will influence the purchasing power of consumers, which may lead to adverse effects. Furthermore, vulnerable households such as those that have low-incomes or that suffer from chronic food insecurity are much more vulnerable to food price shocks (Altman *et al*. 2009). However it is important to note that the extent of these effects may be buffered in urban households, due to the diversification of diets that is often seen in urban areas (Byerlee *et al*. 2006). This allows for some form of flexibility, but ultimately poor households do suffer disproportionally from food price hikes (Jayne *et al*. 2006; Verpoorten *et al*. 2012).

Prices of market are not the only factor that plays a role in urban households' access to food. Distance to markets for households is an important factor to take into consideration when trying to understand market influence on household food security (Laraia *et al*. 2004; Battersby and Crush 2014; Rahkovsky and Snyder 2015). It has been found that households that have several food markets within close proximity tend to have higher food and nutrition security. Furthermore, lower-income houses have been found to improve on their food intake when more food markets are within closer proximity to households, as opposed to those that have to travel longer distances to obtain food (Rose and Richards 2004; Larson and Story 2009).

2.5. Food security policies and institutions

Institutions play an important role in the ability of humans to produce and purchase food (Barron *et al*. 2013). When looking at food systems and policies, adequate knowledge is crucial for policy makers in order for them to gauge the effect of adverse events that will negatively affect

food systems and prices; this allows for better policy development and improvements on existing ones (Benson *et al*. 2013).

Institutions and policies are often dynamic in nature, due to responses to changes in the systems in which they function (Young 2010). Changes are often made to existing laws and policies to adapt and improve functionality and effectiveness of a system (Fig. **11**) (Young 2010; Auld *et al*. 2014). There are many institutions that directly and indirectly affect food systems at global, national and local levels. These institutions are not limited to social institutions, due to the dynamic nature of food systems and the various influences that affects it beyond social ones. Due to food systems requiring the input of various stakeholders, both vertically and horizontally, constraints may arise in the effectiveness of the system, if communication lines and cooperation between institutions and stakeholders are lacking and/or are poor (Altman *et al*. 2009). Furthermore a sense of flexibility needs to be present in institutions that deal with food system policies, if institutional rigidity is to be avoided (Young 2010).

Governments' institutions play an important role in food systems and food security, because national policies often determine key priority areas and implementing strategies for a country (Fig. **11**). However international and regional institutions roles cannot be overlooked, as they often provide important guidelines and programmes to deal, not only with global food issues, but national issues as well. Novel and innovative solutions often arise by the collection of various nations under international and regional organisations to address the world's hunger issues; under international treaties and agreements incentives are often introduced to ensure the success of the global agendas (Dai 2007)

It is important to realise that policies are not only government based, but encompasses both society and the state; this concept of policies going beyond the state is important as society−led policy often acts as either a supplement or precursor to state−led policy (Auld *et al*. 2014). The types and effectiveness of policies often determine how well food security issues are addressed at various levels in a country as well as how resources are managed (Barron *et al*. 2013). In addition, coherent and streamlined planning within various institutions that deal with food related issues in a country allows for proper development and execution of food security initiatives (FSC 2012). However in many countries government institutions are often plagued by corruption and mismanagement of government funds and resources, which leads to poor

execution of policies, which in turn affects vulnerable communities the most (Gupta and Abed 2002; Asongu 2013).

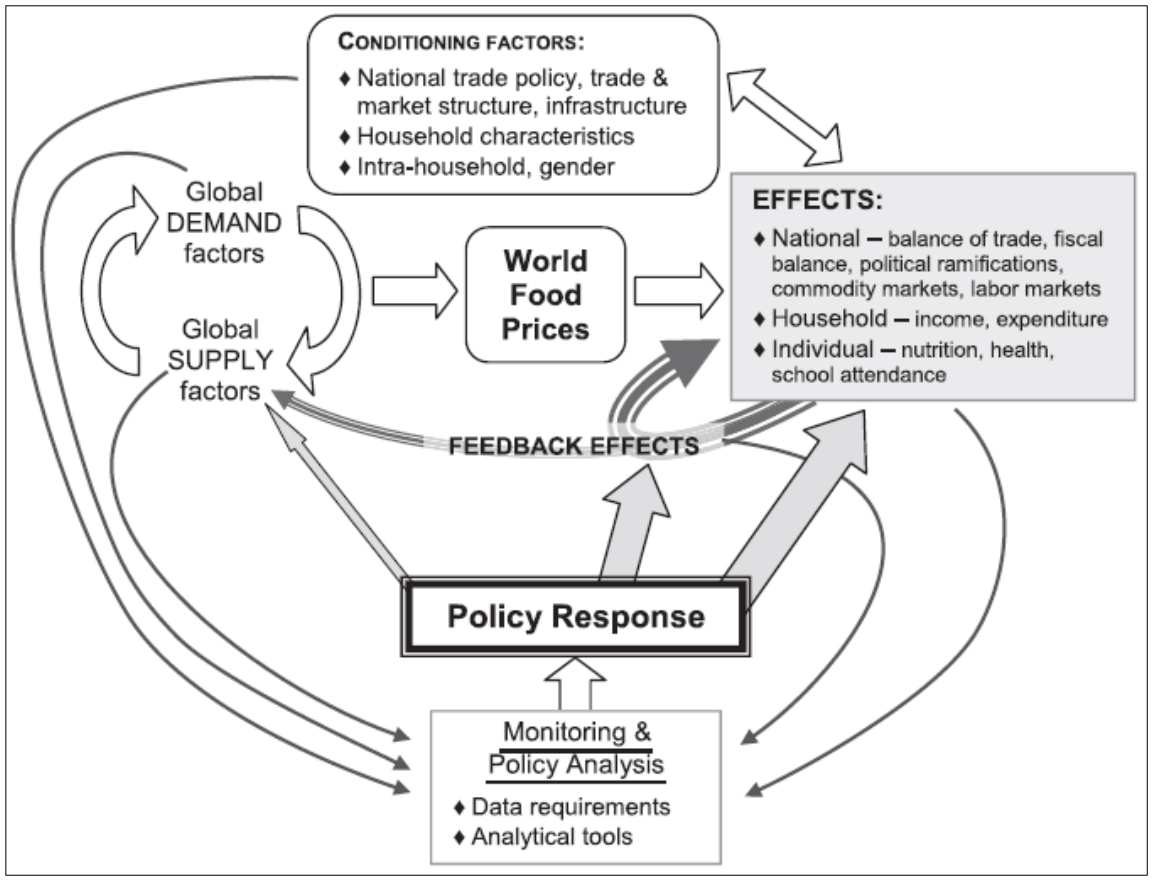


Figure 12. The relationship between policy and policy analysis in relation to higher global food prices. *Source: Benson et al. 2013.*

2.6. Interventions

Due to the complexity and various factors that influence food security, countries employ various interventions to combat food insecurity. These interventions often aim to increase food production, employment and income distribution, increase human capital and distribution of food stuffs (Satterthwaite *et al.* 2007; Rose 2008). However, these factors are often poorly understood which may lead to poor identification of appropriate policies and programme development, to increase economic and social access of poor households in order to increase their food security status (Altman *et al.* 2009). Furthermore, knowledge gaps and institutional barriers hinder the ability of policy makers to identify appropriate interventions as well as to successfully translate existing policies into programmes that can be implemented (Altman *et al.* 2009).

Interventions such as food stamps and subsidizing food production have become widespread in many western countries which prove to be successful, but they often fail to be as effective when implemented within developing countries; This may be due to a combination of differences in the systems, duration of interventions and sufficiency of resources, of which developing countries often lack (Mwaniki 2006). However, the concept of urban agriculture proves to be an effective method in combating household food insecurity within African cities and shows much promise (Dima *et al*. 2002; De Bon *et al*. 2010; Thom and Conradie 2012); However, it should be noted that water limitations in many cities can hinder the extent to which urban agriculture can aid in combating food insecurity, especially in arid countries such as Namibia.

2.7. Food security in Namibia

The situational analysis on the state of food insecurity of urban cities in Southern Africa, carried out by the African Food Security Urban Network (AFSUN), has identified Namibia as a country that suffers from high levels of urban food insecurity at household level (Pendleton *et al.*, 2012). Much work has been done in Namibia to address the issue of food insecurity; however these interventions are mostly focused in the rural north of the country where subsistence crop and livestock farming is practiced, with less focus in urban communities (Nickanor 2011)

Namibia is an upper middle income country with a population of approximately 2.5 million people (Pendleton *et al.*, 2012; NSA 2011a). The country is situated on the Atlantic coast of Southern Africa and its climate is heavily influenced by the cold Benguela current and the tropic of Capricorn (MET 2014). The country is considered the driest country south of the Sahara, where the mean annual rainfall ranges from 25 mm to 700 mm annually (Fig. 12) (LAC 2009; UNFCCC 2011; MET 2014). Most of the rainfall occurs over the summer months (Nov-April) and is erratic; in addition only 8% of the country's land mass receives more than 500 mm of rainfall annually (LAC 2009; UNFCCC 2011). Water is a scarce commodity and droughts are common, the lack of water is a key limitation to the development of the country (UNFCCC 2011; Kusangaya *et al*. 2013; MAWF 2015). All perennial rivers are located at the borders of the country and require international cooperation for successful management (MET 2014). The arid central regions (including Windhoek), utilize ground water and ephemeral rivers to meet the water demand, these sources support over 50% of the country's population across 80% of the country's territory (LAC 2009; MET 2014). The heavy reliance of the country on underground

water sources poses a significant threat to household livelihoods, due to the limited amount of rain and high evapo-traspiration rate in the country, which limits the rate at which underground water supplies get replenish (UNFCCC 2011).

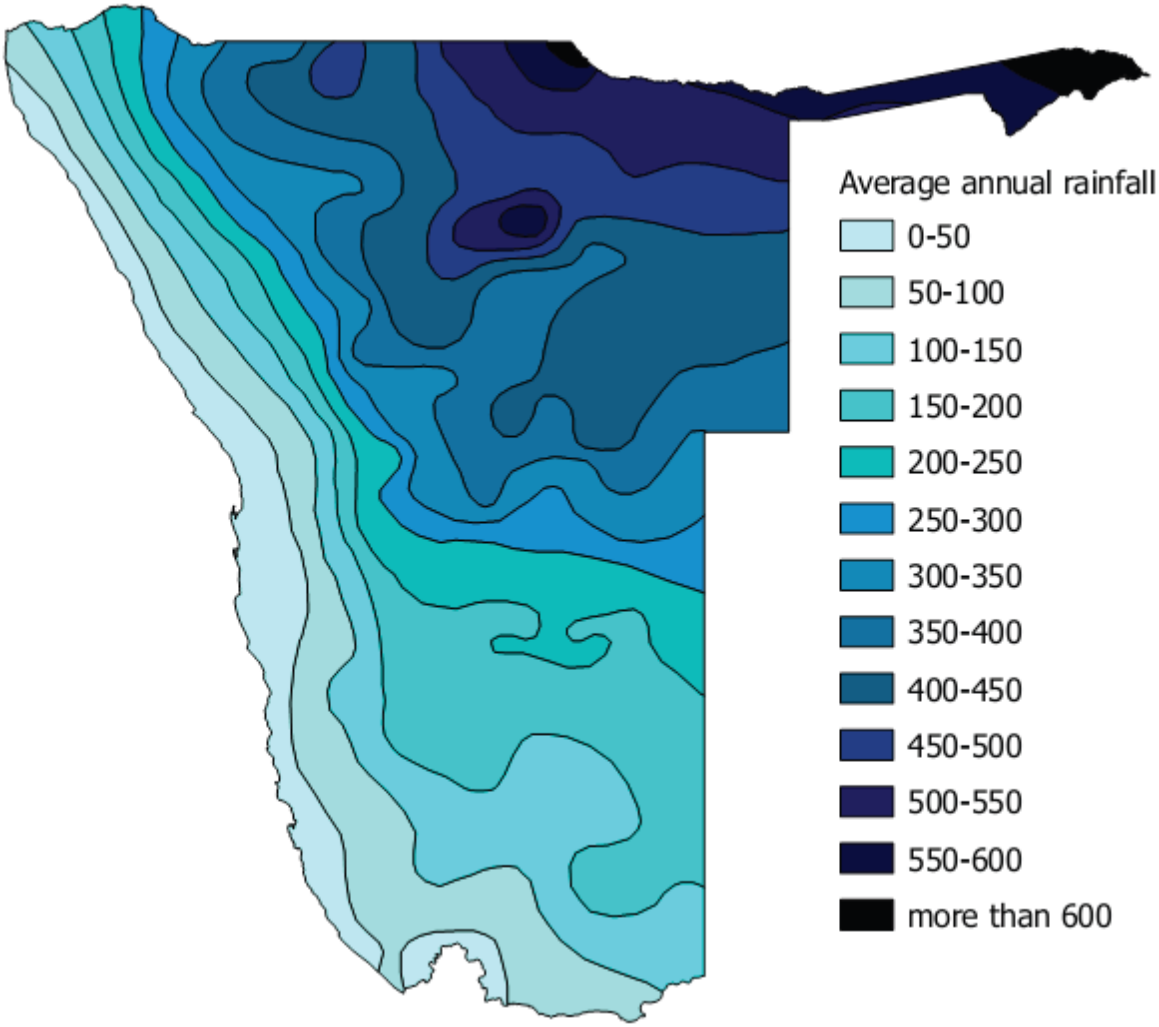


Figure 13. Annual average rainfall for various parts of Namibia. *Source: MET 2014.*

Despite the natural scarcity of water in the country, population growth and economic development further makes naturally occurring surface water supplies inadequate and prone to pollution (LAC 2009). Namibia is predicted to become hotter, with fewer colder days and increases in extreme weather events; furthermore a later onset of rainfall is expected in the northern and central regions of the country resulting in shorter growing seasons (UNFCCC 2011). The current and projected climatic conditions all have an impact on the food security and vulnerability of communities. Direct adverse climatic impacts (such as droughts and floods) on

food security include loss of crops, livestock and limited water availability, where the rural poor are often the hardest hit. However there are also indirect impacts such as adverse economic impacts (e.g. increase in food prices and production), which often impact urban communities the most.

Namibia depends largely on food imports to meet its food requirements, as the country does not produce sufficient food to satisfy local demand (Whitehouse 2004). The major foods imported are cereals (maize and wheat), pulses, vegetable oil and dry skimmed milk. Changes in the global market and in particular South Africa has had a major influence on food prices in the country, in the last year alone Namibia has experienced an increasing trend in the inflation rate of most goods (NSA 2016). March 2016 had experienced the highest annual (6.5%) and monthly inflation (0.8%) rate since January 2013 (NSA 2016). Food products had the second highest rate of inflation for consumer goods, a trend that will exert much pressure on poor and vulnerable communities.

The first National Development Plan (NDP 1) of Namibia drafted in 1995 and the Water and Sanitation Policy of 1993 aimed to move Namibia to self-sufficiency to free the country from dependency on foreign markets and achieve national food security (MAWF 1997). However the difficulty is that water scarcity may be a serious limitation towards that goal as much of the land in the country is arid to semi-arid and largely unsuitable for irrigated crop farming. Furthermore predicted climate changes may further hinder the goal to reach food self-sufficiency in the country. As a result of these possible limitations, policies and interventions need to be adjusted for the realities the country may face with regards to food security.

2.7.1 Food security interventions

The Office of the Prime Minister (OPM) is the main governmental body that deals with food security interventions and they operate through various line ministries such as the Ministry of Water and Agriculture (MWAF) and the Ministry of Health and Social Services. However in 2014 after the election of the country's 3rd president the Ministry of Poverty Eradication and social services was established, where one of their tasks is to deal with the pressing food issues in the country. The addition of a government body tasked with alleviating poverty is a much needed step for the country. The OPM deals with food issues in the country through the Disaster risk management policy of 2012 (GRN 2012: 5). Under this policy risk reduction was defined as

" *the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, application of measures including environmental management, land-use and urban planning, protection of critical facilities, application of science and technology, partnership and networking, and financial instruments, early warning systems including forecasting, dissemination of warnings, preparedness measures and reaction capacities*". It is thus the mandate of the OPM is not only to develop early warning systems for disasters that may affect food security in the country, but to also develop appropriate responses, such as food relief programmes for affected regions.

In 2011 Namibia joined the Scaling Up Nutrition (SUN) project under the Namibian Alliance for Improved Nutrition (NAFIN). It is a multi-stakeholder platform that is housed under the OPM and includes ten ministries, civil society organisations, academic institutes, and the private sector and UN agencies. Under this programmes several projects have been launched such as the Scaling Up Nutrition Country and Implementation Plan (SUNCIP) and the Child Survival Strategy (CSS) in 2012 in order to combat malnutrition, in especially women and children (MoHSS 2013). However, in 2015 the Harambe prosperity plan was introduced with the aim to drastically reduce poverty in the country, as well as to reach food security for the urban poor.

Several programmes and projects are also carried out by NGO's, UN agencies and religious organisations throughout the country. The Namibian Redcross food security intervention, developed in 2011, aimed to address the issue of food availability, access and malnutrition in the country. Several projects were carried out under this intervention aided by the Ministry of Water and Agriculture, Meatco, volunteers and community members. Agricultural and gardening projects were set up in several regions including the Khomas region. Under this project informal households in Windhoek were targeted and households were assisted to grow backyard gardens in order to supplement their diets (Redcross 2011).

2.7.2. Windhoek

Windhoek is located in the central area of Namibia within the Khomas Hochland Plateau. It lies approximately 1800 m above sea level in a broad valley. The south, east and western parts of the city are bound by the Auas Mountains (Mapani 2005). The city receives about 360 mm of

rainfall annually and experiences high evaporation rates (3400 mm annually), one of many factors that result in a high demand for water in the region (du Pisani 2006).

The city is the dominant economic and political centre of Namibia and receives a large number of migrants annually. The urban population has increased from 235 500 in 2001 to 325 858 in 2011 with an annual growth rate of 5%, where over 40% of the inhabitants are migrants from other regions (NSA 2011b). The urban growth rate is higher than the average national growth rate (2.2% per annum), indicating the high influx of people into the city, despite prevailing food, infrastructural and economic challenges in the city.

This influx of individuals into the city has resulted in an increase of the urban poor, as many of these migrants are frequently unable to find jobs (Pendleton et al., 2012). Migrants are mostly settling in informal settlements, with no access to utilities such as water and sanitation. Households in informal settlement communities are often food insecure due to little financial and physical accessibility to food markets (Nickanor 2013). Furthermore vulnerability of households to environmental, political and economic changes in informal areas are increased due to little income security, poor or no service delivery, reduced access to social service and poor housing conditions (Frayne 2004). These communities are often not resilient enough to withstand shocks, due to lack of assets, furthermore adaptive capacity is often low and often limited to the short term (Frayne 2004).

In order to build resilience and combat hunger and poverty in these communities, the state of household food (in) security needs to be assessed, in order for government policy makers and city management structures to develop adequate and robust management strategies, adaptation plans and safety nets. Furthermore understanding at what level food interventions operate will help identify the strength of these interventions, and possible gaps that may exist in current and future interventions.

Chapter 3: Material and methods

3.1. Study site

Windhoek is one of the fastest growing cities in southern Africa and is home to 36% of the country's urban population (NPC 2012). The city is divided into various constituencies (Fig. **13**)

that are governed by local authorities; a counselor for each constituency is elected by the people during the regional elections. Councilors are responsible for the development and service delivery to their constituents (GRN 1992).

The majority of informal settlements in the city are located in Katutura, the largest township in the city and the remaining settlements are located in Khomasdal. Katutura is divided into six constituencies, which are Tobias Hainyeko, Katutura Central, Katutura East, Soweto, Samora Machel and Moses Garoëb. The majority of informal settlements found within Katutura fall within Tobias Hainyeko (population 45 800), Samora Machel (49 700) and Moses Garoëb (45 500) constituencies, where several neighbourhoods are located within these constituencies (NSA 2011c; Pendleton *et al.* 2012; Nickanor 2013). Khomasdal north (43 400) constituency, which is located in Khomasdal, is home to one of the most recent and rapidly growing informal settlements known as 7/8ste Laan.

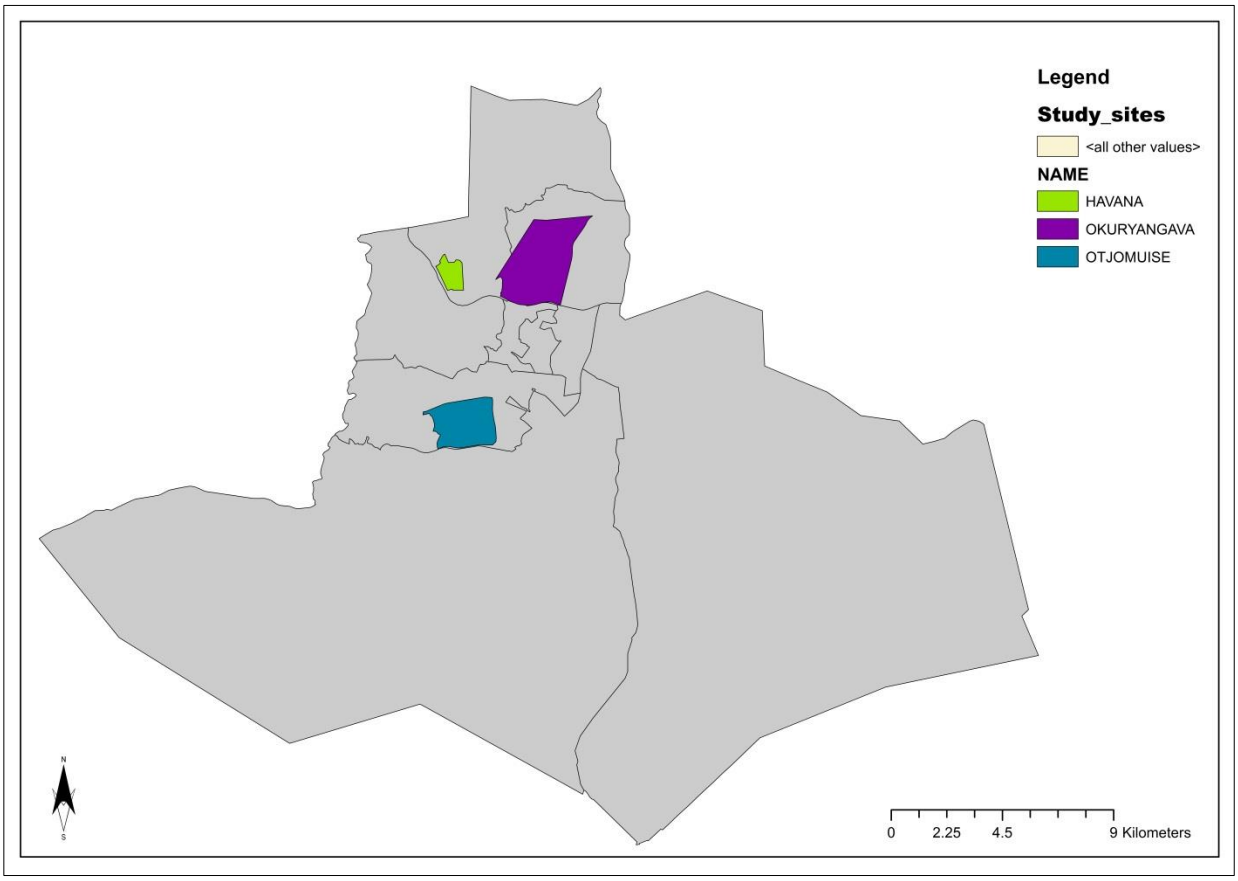


Figure 14. Study sites (7/8ste Laan, Havana and Okahandja Park) located within the boundaries of Windhoek, Namibia. Data obtained from the Namibian Statistics Agency (NSA).

3.2. Sampling design

The project surveys were conducted at three major informal settlements (located across three constituencies) (Fig. **13**) in and around Windhoek, which are 7/8ste Laan (Khomasdal North), Hakahana (Moses Garoëb constituency) and Okahandja Park (Tobias Hainyeko). Each of these falls within three distinct constituencies in Katutura and Khomasdal North. Only three settlements were selected as time constrains did not allow for all settlements in the city to be surveyed. These settlements were selected based on permission granted by council's office willing to assist with the survey process. Forty households were surveyed form 7/8ste Laan, 39 from Havana and 37 from Okahandja Park. Numbers of households were selected based on willingness of households to participate as well as the area that allowed for safe access to

communities. Surveyed households were selected using the snowball sampling technique. Initially community development council (CDC) members (provided by the council office) within the community, aided the first five selection of houses after which members from interviewed households would suggest areas and households that may be willing to partake in the surveys (Sadler *et al.* 2010). All research tools and consent forms can be found in Appendix A.

Objective 1) To assess accessibility of informal households to food and the coping mechanisms households employ to deal with possible food shortages.

All participants in the study were asked to fill in a consent form (or give verbal consent in instances when an interviewee could not write) to confirm their willingness to participate in the study; furthermore all participants were informed about the nature of the project. Demographic information was collected from all interviewed households. Three food security indicators (See below: HFIAS, HDDS, and MAHFP) (Swindale and Bilinsky 2006; Coates *et al*. 2007; Bilinsky and Swindale 2010) were used to assess the accessibility and nutrient diversity of food in informal urban settlements. The share of income on household expenditure was used to determine how much of household income is allocated to food expenses. Type of coping strategies and the frequencies at which they were used was assessed using the questionnaire developed for the Coping Strategy Index (Maxwell *et al*. 2003).

The Household Food Insecurity and Access Scale (HFIAS)

HFIAS is the continuous measurement of food insecurity through measuring accessibility of food stuffs in households over a time period of four weeks (a month). The scale gave an indication of how food insecure households were, where a high score indicated high levels of food insecurity and lower scores indicated little to no food insecurity (food secure). The scale captured the household's experience on food insecurity through capturing information on feelings of uncertainty, perception of sufficient/insufficient quantities and quality of food. Food reductions and the consequences of insufficient food quantities were also recorded.

The data were collected using a questionnaire that consists of nine questions which measures the occurrence of food (in) security and nine subsequent questions that measure the frequency of occurrence. Frequencies of occurrence questions were asked as follow up questions to the occurrence questions and were only asked when respondents gave affirmative answers to occurrence questions.

All questions in the questionnaire were used to calculate the HFIAS. A HFIA score variable was first calculated by summing the frequency of occurrence score for each household. A household could have a maximum of 27 points (all nine answers had a frequency of often, which received the code 3) and a minimum of zero (answers for the occurrence was zero, therefore frequency of occurrence would be zero). After the calculation of the HFIAS score variable, the indicator value was calculated using the sum of all HFIAS score variables. The formula used was:

$$HFIAS\ indicator\ value = \frac{Sum\ of\ HFIAS\ score\ in\ the\ sample}{Total\ households\ in\ sample}$$

Household Food Insecurity Access Prevalence (HFIAP)

The HFIAP was determined from the questions used. The HIAP indicator revealed the level or prevalence of household insecurity. Four categories or status exist which is food secure, mild, moderate and severely food insecure households. Frequency of occurrence for all nine questions in the HFIAS questionnaire was used to determine the HFIAP category table. The HFIAP category table was used to determine household's level of food insecurity. The nine questions and their associated frequency of occurrence determined the household's food (in) security status.

The Household Dietary Diversity Score (HDDS)

This score measured the number of different food groups households consumed over a 24 hour period. The information was only recorded over 24 hours (working back from the time of day the interview was conducted), as individuals often find it difficult to recall very specific details, such as exact foods consumed, over longer periods of time (More than 24 hours) (Swindale and Bilinsky, 2006). A closed-ended interview that contains most common food types within the major food groups was used. Local names and food products were added to the list, to ensure that food groups were not under represented. Twelve major food groups were used in the calculation of HDDS, which were:

Cereals	Fruits
Roots and Tubers	Meat, poultry and offal
Vegetables	Eggs

Fish and seafood	Oils/fats
Pulses, legumes, nuts	Sugar/honey
Milk and milk products	Miscellaneous

The miscellaneous category included goods such as coffee, tea, alcohol, condimums and all other food stuff that did not fall within the other eleven categories outlined above. Water consumption was not recorded for any analysis in this study.

Months of Adequate Household Food Provisioning (MAHFP)

A close-ended interview was used to record the months in which households perceived whether or not they had enough food to eat for all members within the household. Sources of acquiring food included buying, growing and/or borrowing. Significant and popular events were linked to every month to help respondents recall information, for example December was associated with Christmas, etc. This process was done for all months, for easy recollection. The first month listed was October as it was the month in which the interviews were conducted, after which all other months were traced back from that point.

Share of Food on total household expenditure

The share of food on total expenditure aimed to calculate the percentage of income (from all sources) in the household that was used to acquire food in a month. Alcoholic and non-alcoholic beverages (excluding tap water) were also included in the definition of food stuffs of the household. The percentage was taken as a relative amount, rather than an exact amount to avoid missing data due to interviewee's reluctance to foreclose their exact income amount and expenses. Furthermore recalling exact amounts spent on food may have proved to be challenging. A closed-ended interview was used to obtain information on household's expenditure on food, asking them to choose an expense category (half, more than half or less than half of their income) that best matched their spending. Share of food on total expenditure is not a direct measure of food insecurity; however it did give insight into the poverty status of households, as those that spend a larger percentage of their income on food are commonly known to be poor households (De Cock *et al.* 2013).

Coping Strategy

The index was calculated by conducting an interview that consisted of a series of twelve closed-ended questions that assessed how households coped with food shortages over a short period (30 days). Only the type of strategies and the frequency at which these strategies occur were calculated and used for the purpose of this objective. Questions were structured in such a way as to capture short term coping strategies of households. The four main strategies that the questionnaire covered were:

1. Change in diet, where households move from preferred foods to less preferred foods.
2. An attempt to increase their food supplies using short term strategies such as cash loans and borrowing food/cash.
3. Reduction in the number of people in the household.
4. Rationing available food in the house, by either cutting down on the portions of food, the number of meals that has been eaten in a day or skipping meals the entire day.

Objective 2) To assess physical accessibility to formal markets and to see the feasibility of informal markets as an alternative to formal markets.

2.1) Market identification

A spatial dataset of markets (grocery stores and mini-markets) was created by collecting physical addresses of 52 full-serviced markets in Windhoek using the local directory and by requesting information from the Namibian Statistical Agency (NSA). The numbers of markets were chosen based on the number of full addresses online and in the directory available for analysis. These addresses were geo-encoded using geo-encoding add-on software in Google sheets called "Awesome Tables" to convert the physical addresses to GPS co-ordinates (Laragia *et al*. 2004; Jiao *et al.* 2012; Breyer and Voss-Andrea 2013). These co-ordinates were then inserted into ArcMap to create a shape file for the markets. Only markets that had a minimum of ten fresh produce items available were included in the analysis, stores that did not sell fresh produce were excluded from the analysis as not only access to food is being analysed but the proximity of markets that contain nutritious food (Laraia *et al*. 2004).

2.2) Physical accessibility

In order to determine if households within each study site could physically access markets, all markets that fell within a 1.61 km of the extensions in which each informal area was located

were selected using ArcGis. This distance was used, as previous studies considered any area where markets are a distance beyond 1.61 km from where communities reside, as a food desert (Laraia *et al*. 2004).

Shape files for the constituencies and extensions of Windhoek were obtained from the Namibian Statistic Agency (NSA). Constituencies and extensions, in which the three informal settlements (study sites) were located, were selected. A new layer called "study sites" was created from this selection. The market shape file, created from physical addresses collected, was combined with supermarket data obtained from the NSA to create a new layer called "all markets". The "all market" shape file was overlaid over the study site shape file; thereafter a selection by location was made to determine the markets that fell within 1.61km proximity of the study sites. A new layer was created called "markets" and the "all market" shape file was removed. The final map consisted of the study site and market layers, which showed which markets are within a distance considered accessible to study site households.

Extensions areas (which are similar to neighbourhoods) in constituencies were used instead of the actual boundaries of the settlements as there was no data available on the boundaries of informal settlements. This value as in previous studies on classifying areas that are considered food deserts use 1.61 km as a well serviced area and anything further away becomes a food desert (Jiao *et al.* 2012; Breyer and Voss- Andreae 2013).

2.3) Informal market prices

Informal market prices were collected from each study site for items that were found on the HDDS food categories. A total of nine informal market food prices were collected for 7/8ste Laan, of which five were "Kukka" shops, the local term for small informal markets, and the other five consisted of street markets that sold fresh produce. However, only the data of four "Kukka" shops could be used, as the data for the fifth shop was collected incorrectly; making the total shops analysed eight. Havana had a total of ten informal shop's food prices collected, where five were "Kukka" shops and five streets markets. Okahandja Park had the lowest number of informal market food prices collected as there were simply not enough of them to collect from and several market owners did not want to participate in the study. Therefore only a total of three markets food prices were obtained for this study site, whereby two were "Kukka" shops and one

street market. Items priced for each shop varied due to the type of stock sold, however some items, such as bread and sugar, were present in all shops.

The difference between informal and formal food markets for the price of a basket of food and what the basket consisted of on average were compared, in order to assess the differences in the availability of major food groups between formal and informal food markets as well as the price difference for these baskets. National food prices were obtained for a basket of food that contains food items that can be found in the HDDS categories (average of 18 items). This was done in order to assess the adequacy of local food markets as an alternative source to obtain (possibly) cheaper and physically easily accessible food, as these are often in closer proximity to households.

Objective 3) To briefly review urban food security interventions of various institutions in, Namibia.

3.1) Document selection

Intervention documents related to food security, poverty alleviation, early warning systems, social programmes and micro financing were collected from government, UN agencies, NGO's, civil and religious organisations website databases. In instances where documents were not available online, hard or soft copies were requested from the relative organisations and /or companies.

3.2) Document review

Project management strategy and policy documents of government, municipal, NGO, large markets and major church organisations were reviewed to assess which food security dimension these interventions targeted (ESA 2006), as well as what kind of risk management category they fall under. Key words such as poverty, food security, education, micro-finance, urban interventions, low income and underprivileged were used to assess whether documents met the criteria for interventions in the urban context.

Types of interventions ("projects") were identified from project/policy documents and annual reports which were categorised under four components that increases food security of households based on the categories developed by Rose (2008), which were: i) Food production; ii)

Employment and income; iii) Human capital and; iv) Food based distribution. An additional category was added, which looked at projects/programmes that aimed to strengthen vi) institutional capacity. The three risk management categories that were used based on Roses (2008), work were: i) Prevention; ii) Mitigation and; iii) Coping.

3.3. Data Analysis

Objective 1) To assess accessibility of informal households to nutritious food and the coping mechanisms households employ to deal with possible food shortages.

Descriptive statistics (percentages, means and standard deviation) for the socio-economic factors as well as the food security indices were produced. Differences between levels of household food insecurity between the three communities were tested using ANOVA, where data were normally distributed and Kruskal−Wallis, where data was not normally distributed.

Pearson's Chi-squared test of independence was carried out to test for relationships between the three food security indices (HFIAS, HDDS and MAHFP) and socio−economic factors (gender, number of. members per household, employment, income range, and share of income on expenditure), for all three study sites. Narrative data analysis was used to describe trends and observations made by survey households with regards to household food security.

Objective 2) To assess physical accessibility to formal markets and to see the feasibility of informal markets as an alternative to formal markets.

Descriptive statistics (mean and standard deviation) were used to analyse informal market (Kukka shops and street markets) prices across all three study sites. ArcMap was used to overlay market shape files with extension boundaries of the study sites and to select markets that occurred within the 1.61 km range of study sites. Narrative data analyses were used to describe both market vendors and buyers perception on food prices and supplier (in the case of vendors).

Objective 3) To briefly review urban food security interventions of various institutions in, Namibia.

Descriptive statistics (percentages) were used to describe trends in types of interventions in Windhoek by various institutions. The data was then summarized for a better understanding.

Chapter 4: Results

The results section is laid out in the following order: Firstly socio-economic survey results comprising gender data, average members per household, employment, education, income ranges and share of income on expenditure are reported. These results are then followed by survey results for the three household food security indicators namely; the Household Food Insecurity Score (HFIAS), Household Dietary Diversity Score (HDDS) and lastly the Months of Adequate Household Food Provisioning (MAHFP). The next section of the results include the distance analysis for markets in relation to the study sites, followed by survey results of market price and results on prices for formal markets for food baskets and finally perceptions of buyers/sellers on food prices and food sourcing. The last section consists of urban interventions reviews; additionally this section includes survey results of perceptions of households with regards to interventions in their areas.

Objective 1: To assess accessibility of informal households to food and the coping mechanisms households employ to deal with possible food shortages.

Gender profile

The gender profile for 7/8ste Laan and Havana are skewed towards female respondents, however little difference is observed between male and female respondents for Okahandja Park, where male respondents made up just over 40%of surveyed households (Fig. **14**). However this data may be a result of more women being at home more frequently and thus more likely to be interviewed upon visitation. Despite the majority of respondents being female, they were often not the head of their households. For the purpose of this study, the "household head" was based on who was considered to be the breadwinner. For all three sites surveyed females made up the least percentage of households heads.

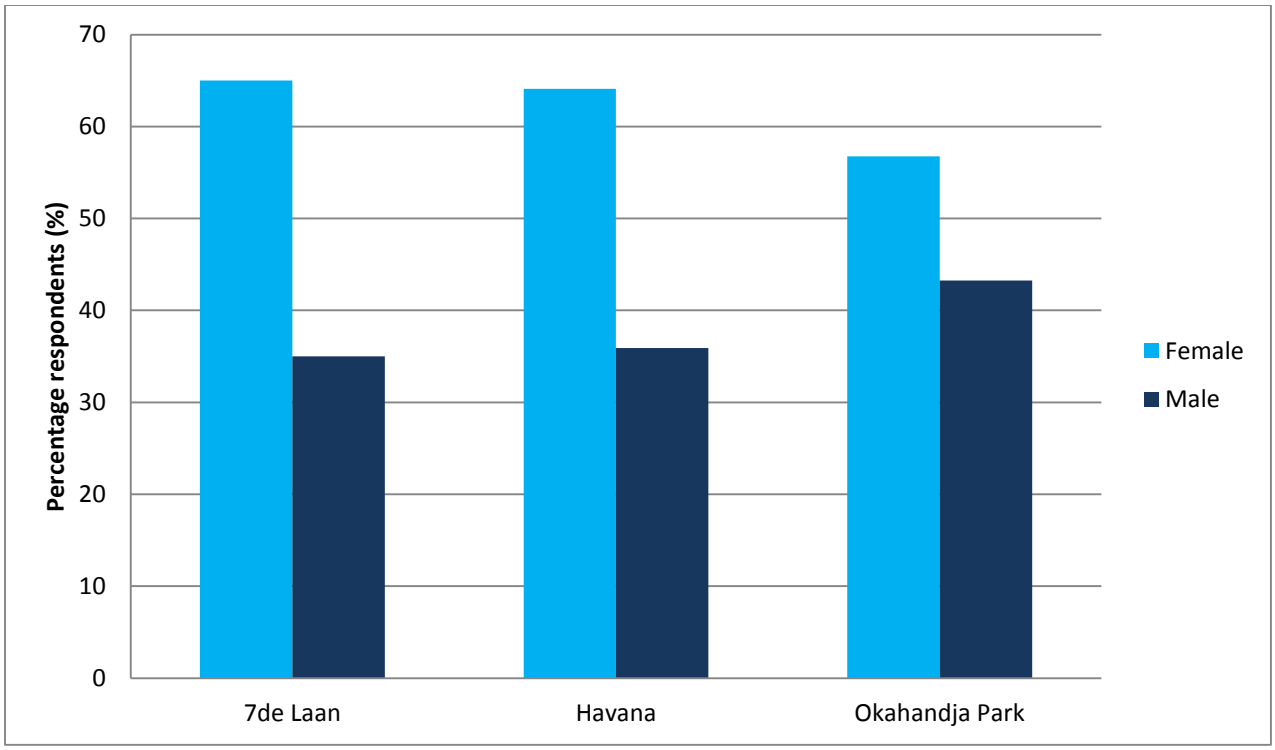


Figure 15. Percentage of male and female respondents in 7/8ste Laan, Havana and Okahandja Park, Windhoek, Namibia. n= 40, 39 and 37

Household size, employment and education

Households for 7/8ste Laan and Havana had lower average occupancy of household members while Okahandja Park had a slightly higher occupancy than the other two sites (Table. **2**). Employment was made up of formal full- and part-time jobs, as well as self-employment. Okahandja Park showed the highest percentage employment across all three sites, while 7/8ste Laan had the lowest percentage employment of households surveyed. Respondents that had a minimum of grade 12 certificate (NSSC) were considered to be educated. Education amongst surveyed households was the highest in Havana and the lowest in Okahandja Park.

Table 2. A comparison of average household size (mean ± SD), percentage employment and education for surveyed households in informal settlements, across the three study sites in Windhoek, Namibia.

	Site		
	7/8st Laan	**Havana**	**Okahandja Park**
Average members per household	4.15 ± 2.09	4.59 ± 2.93	6.14 ± 2.77
Percentage Employment (%)	27.50	28.95	29.73
Percentage Education (NSSC) (%)	27.50	35.14	24.32

Income range and share of income on expenditure

The highest percentage of households for 7/8ste Laan fell within the R1500−2000 per month bracket, while Havana and Okahandja Park had the highest percentage of households that fall within the R 500−1000 per month bracket, thus these two sites had a large percentage of respondents falling in a lower income bracket compared to 7/8ste Laan. As expected, very few households had an income that exceeded R5000 (Fig. **15**).

Half of households in 7/8ste Laan spend more than 50% of their income on food, similarly close to a half of households in Okahandja Park spend 50% of their income on food (Fig. **16**). Okahandja Park had a high number of households that fell within a lower income bracket (R500−1000) as households with less income are expected to spend a larger portion of their income on food, while households with higher incomes are expected to spend a lower share of their income on food expenses. Overall the majority of households, across all three sites, spend more than fifty percent of their income on expenses. This indicates that the vulnerability of these households further increase as this means that they will have very little additional or reserve income to buffer unexpected increases in food prices (Smith and Subandoro 2007).

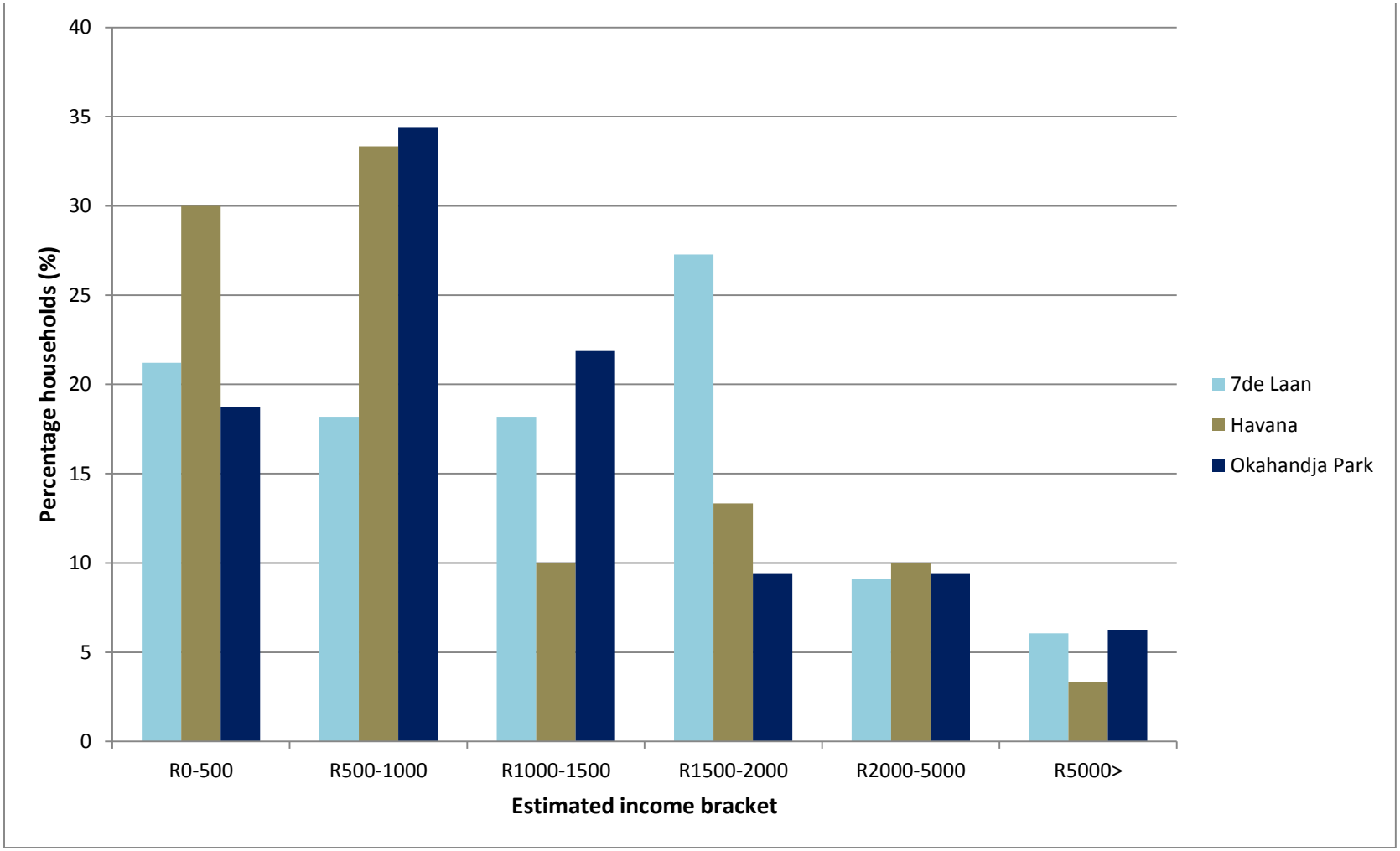


Figure 16. Percentage of households that fall within the designated estimated monthly income brackets for 7/8ste Laan, Havana and Okahandja Park.

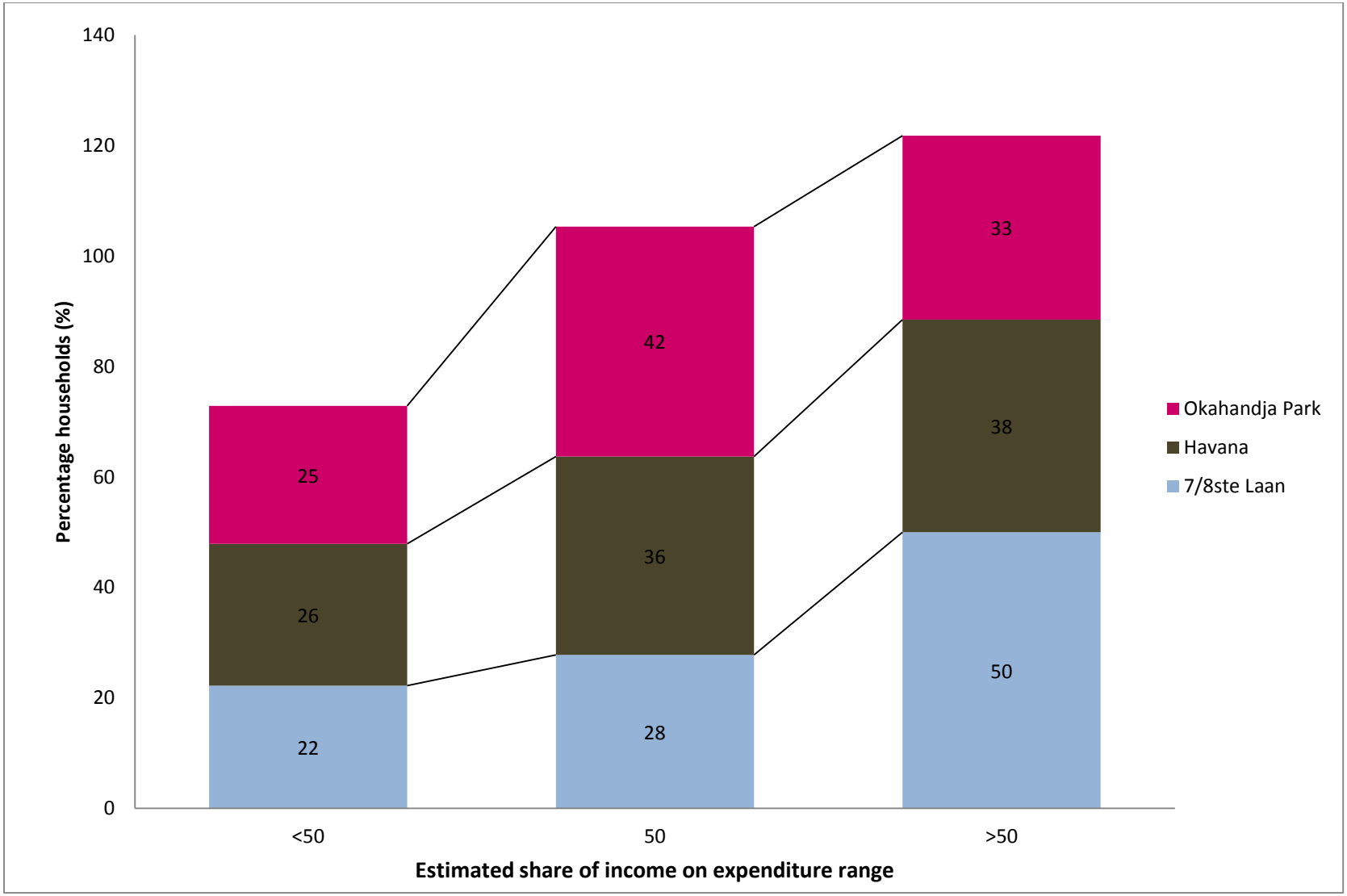


Figure 17. Percentage of households that fall within the three estimated share of income on expenditure categories for 7/8ste Laan, Havana and Okahandja Park.

Comparison of food security indicators across the study sites

Household Food Insecurity Access Score (HFIAS) scores show that surveyed households for 7/8ste Laan, Havana and Okahandja Park are severely food insecure, with 88%, 82% and 74% of households found within this category. No significant difference ($p > 0.6$, $n = 116$, $\alpha = 0.05$) was observed between the means of HFIAS scores between the three sites. This indicates that food insecurity levels are similar in these settlements despite their different locations.

Households showed some diversity in dietary intake over a 24 hour period; where all households, across all three sites, ate on average more than half of the 12 food categories. No significant difference ($p > 0.94$, $n = 116$, $\alpha = 0.05$) between sites were observed for the mean values in dietary diversity. Cereals, which consisted mostly of maize meal, were the food group most consumed by all households across all three sites, while sugars were the second highest consumed food group for households in Havana and Okahandja Park (Fig. **16)**. This indicates that a large number of households have a diet that consist largely of starch and sugar. Pulses, legumes and nuts were the least consumed food group across all three sites, followed by eggs (Fig. **17**). Which may indicate low protein intake amongst households, however meat products were consumed by most households over a 24 hour period. Miscellaneous category also had a high consumption by households across all three sites; however (Fig. **17**), tea and coffee were the most commonly reported items for this category, adding very little nutritional value to household's diets.

Looking at the months that households self-reported adequacy of food, January was showed to be the month in which most households reported adequate food in Havana and Okahandja Park, while February and March were the months in which most households from 7/8ste Laan reported having adequate food (Fig. **18**). Households may report having more food in the months of January to February due to receiving food over the December holidays from relatives living outside of the city, as reported by some households during the surveys. A low percentage of households across all sites felt that they had adequate food for every month of the year, from a total of 116 households surveyed. This emphasizes the lack of food present in households and that the level of food insecurity is severe. A significant difference ($H_{2, 116}$=41, 85, $P< 8.17 \times 10^{-10}$) was observed between the Months of Adequate Household Food Provisioning (MAHFP) for 7/8ste Laan and Havana, as well as between 7/8ste Laan and Okahandja Park, however no

difference was observed between Havana and Okahandja Park, indicating that site difference of monthly food adequacy does exist, this may be due to differences in resource availability and access.

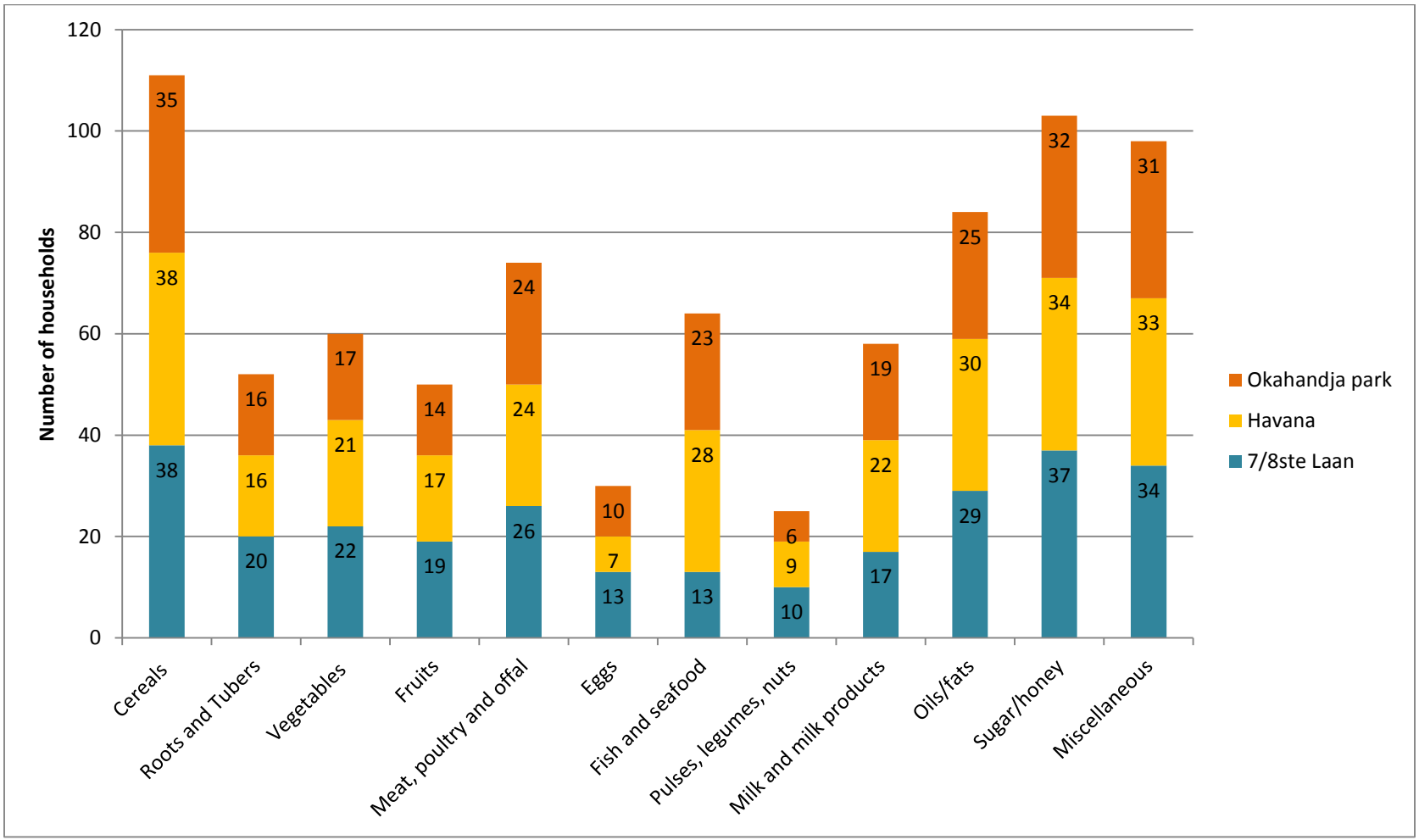


Figure 18. Summary of the 12 major food groups, outlined by FAO, consumed by households over a twenty four hour period during October 2016 in 7/8ste Laan, Havana and Okahandja Park, where n=40, 39 and 37 respectively.

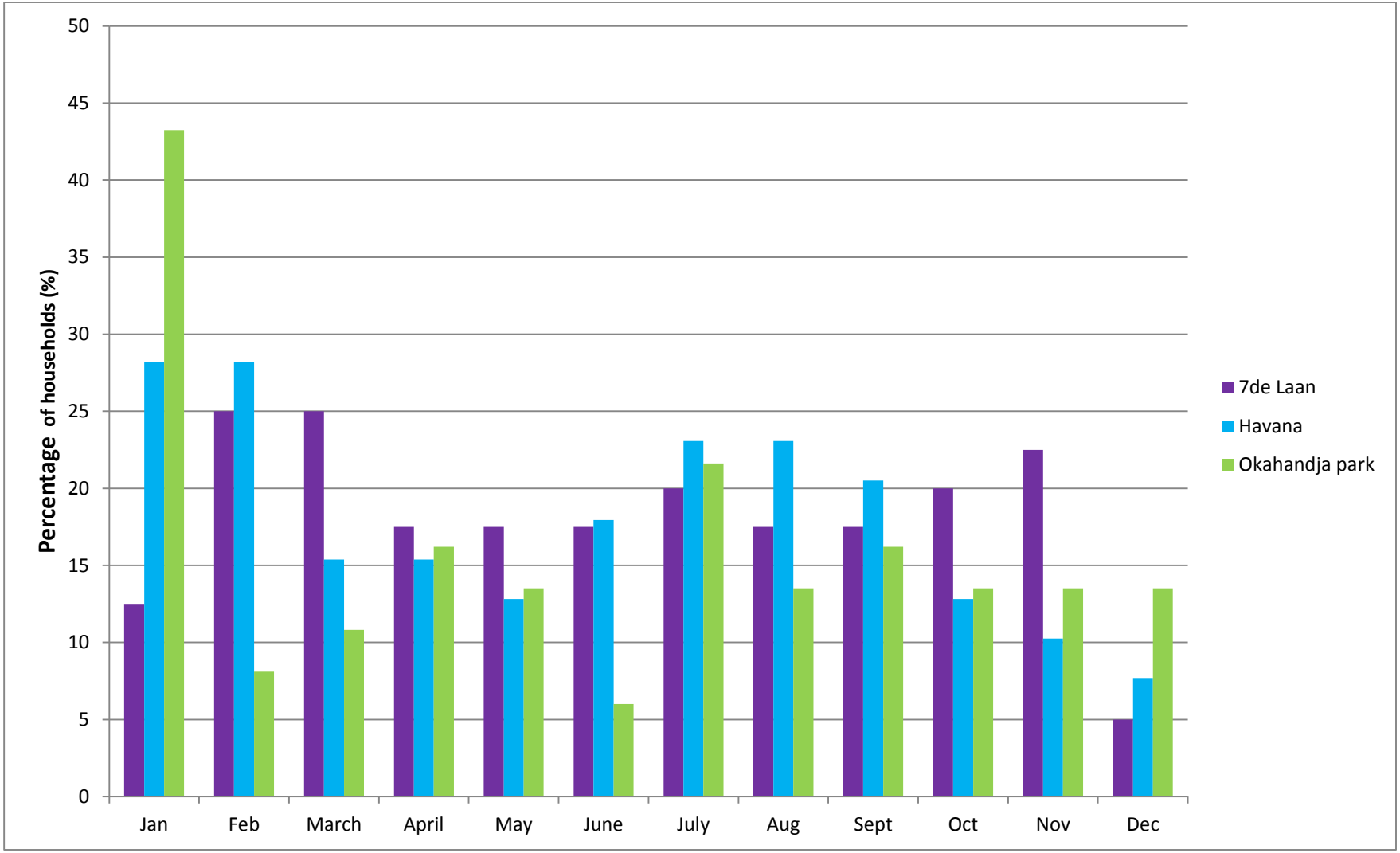


Figure 19. Months in which households experienced adequate food provisioning.

Relationship between socio-economic variables and food security indicators

Chi-square test for independence was conducted to test the relationships between social-economic variables (gender, number of members per household, employment, income range, and share of income on expenditure) and the three food security scores (HFIAS, HDDS and MAHFP).

No significant relationship was found between the gender of head of households and HFIAS (χ^2 (3, N = 116) = 2.93, p=0.403) as well as HDDS (χ^2 (2, N = 115) = 1.28, p=0.527) and MHAFP (χ^2 (2, N = 116) = 2.71, p=0.259). This indicated that the gender of the head of household did not have an influence on the level of household food security. Furthermore, the number of members in households did not have a significant relationship with all three food security scores (Table. **3**). Indicating that the number of households' members did not influence the food security levels in this study, which contradicts previous studies (Tantu *et al*. 2017), where it has been found that households' size did influence food security levels, where households with more members had higher incidences of food insecurity. A significant relationship (χ^2 (3, N = 116) = 6.78, **p=0.020**) (χ^2 (3, N = 116) = 7.80, **p=0.034**) was found between employment and HDDS, as well as MAHFP, indicating that employment (in this study) may have an influence on households dietary intakes, as well as monthly access to food. However, it was interesting to note that no significant relationship (χ^2 (3, N = 116) = 5.14, p=0.162) existed between employment and the level of food security (HFIAS), which was surprising as employment has been shown to influence the level of food security of households, as employed household members are expected to have financial access to food. Furthermore, it was interesting to note, that the income range did have a significant relationship (χ^2 (15, N = 95) = 41.74, **p<0.001**) with HFIAS, despite the lack of relationship between employment and HFIAS. This brings into reason that other possible sources of income may be available to households, which are classically not defined by households as "employment". However, what remains consistent is that households with lower income ranges did have higher levels of food insecurity.

Income range and HDDS did have a significant relationship (χ^2 (10, N = 94) = 23.09, **p=0.010**), where households with higher income ranges had higher dietary diversity scores. Given that a positive relationship between employment and HDDS was also found, a possibly exists that finance has an influence on the dietary diversity of households. However, no significant

relationship was found between shares of income on expenditure for all three food security scores (HFIAS, HDDS and MAHFP) (Table. **3**), which was unexpected as households that spend less of their income on food were expected to have higher food insecurity levels. Nevertheless, it is important to take into consideration that low income levels of most households already indicate poverty, thus the expected trend may not present itself within this sample.

Table 3. Relationship of various socio-economic variables with HFIAS, HDDS and MAHFP for households in 7/8ste Laan, Havana and Okahandja Park in Windhoek Namibia. Significant values are presented in bold.

		Significant	n	χ^2 value	d.f.	Asymptotic. Significance (2-sided)
Gender	HFIAS	No	116	2.930	3	p=0.403
	HDDS	No	115	1.280	2	p=0.527
	MAHFP	No	116	2.705	2	p=0.259
Number of members per households	HFIAS	No	116	2.313	9	p=0.985
	HDDS	No	115	4.676	6	p=0.586
	MAHFP	No	116	2.516	6	P=0.867
Employment	HFIAS	No	116	5.135	3	p=0.162
	HDDS	**Yes**	115	**7.797**	2	**p=0.020**
	MAHFP	**Yes**	116	**6.779**	2	**p=0.034**
Income range	HFIAS	**Yes**	95	**41.736**	15	**p<0.001**
	HDDS	**Yes**	94	**23.089**	10	**p=0.010**
	MAHFP	No	95	16.447	10	p=0.088
Share of income on expenditure	HFIAS	No	111	7.662	6	p=0.264
	HDDS	No	110	8.000	4	p=0.092
	MAHFP	No	111	6.393	4	p=0.172

Household coping strategies

Households were surveyed on twelve coping strategies (which falls under four categories) which they employ daily. The results follow below:

The most commonly used type of coping strategy for households was changing their diets during periods when access to food was low. In all three study sites eating less preferred food was the most frequently (everyday) used coping strategy (dietary change), where households in Okahandja Park had the highest frequency for this coping strategy (Fig. **21**). Rationing strategies was the strategy used the second most, after dietary change, by households across all three sites. However this strategy was employed less frequently by the majority of the households across all three sites. Households in 7/8ste Laan and Havana ate fewer times a day more frequently, than households from Okahandja Park that ate smaller amounts of food more frequently as a coping strategy (Fig. **19, 20 & 21**). Nonetheless, both these strategies are categorised as rationing strategies. The least used coping strategy was decreasing the number of members in the household, where begging had the lowest frequency within this category across all three sites. It was also found that very few households (across all three sites) practiced urban agriculture in the form of growing food in the backyards, and those who did were rare and grew limited food as seen during field observations. Overall it appears when coping strategies are used they most often fall under dietary changes and rationing strategies.

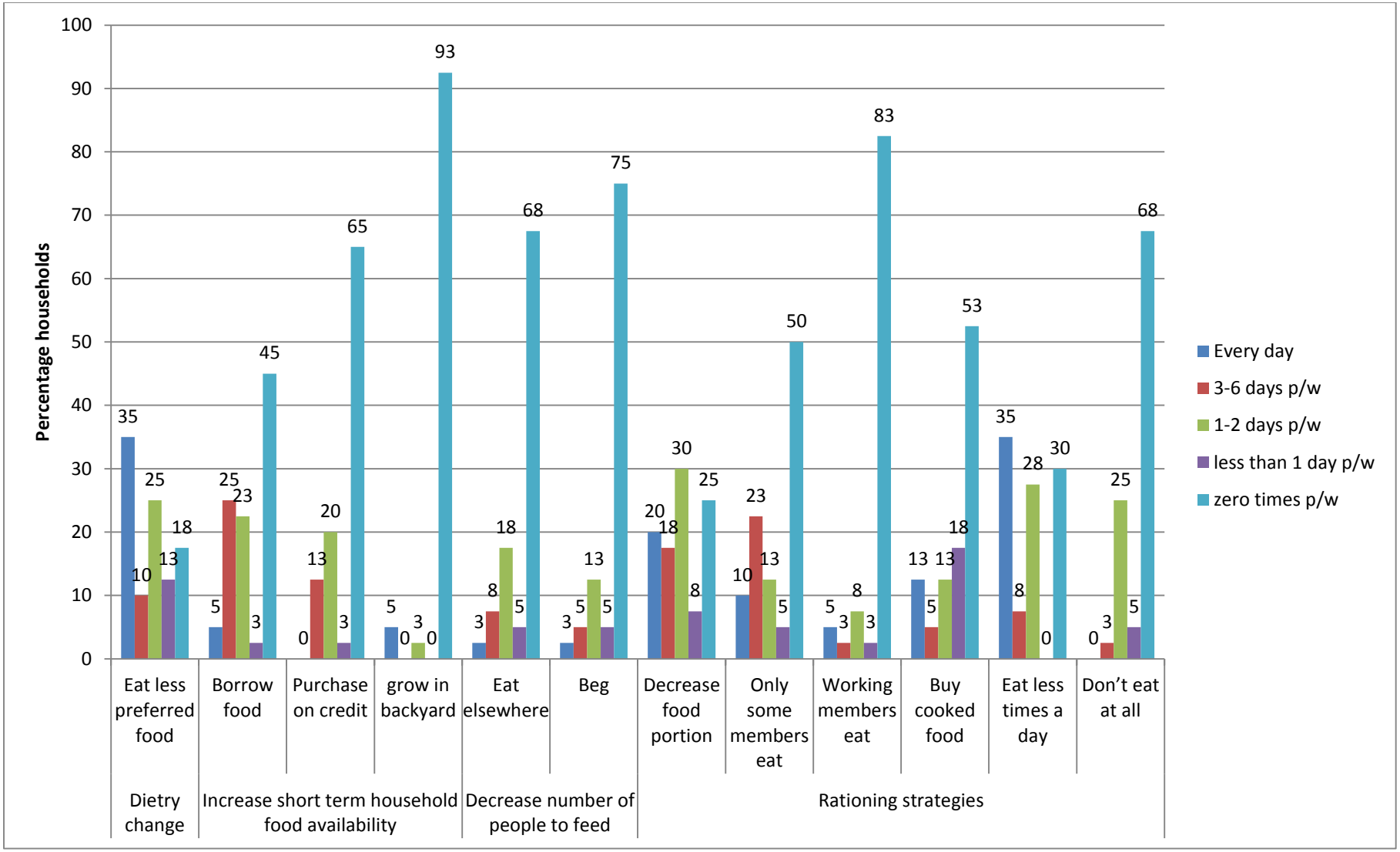


Figure 20. Percentage households that employed different coping strategies in 7/8ste Laan, Windhoek Namibia, where (p/w) represents per week, n= 40

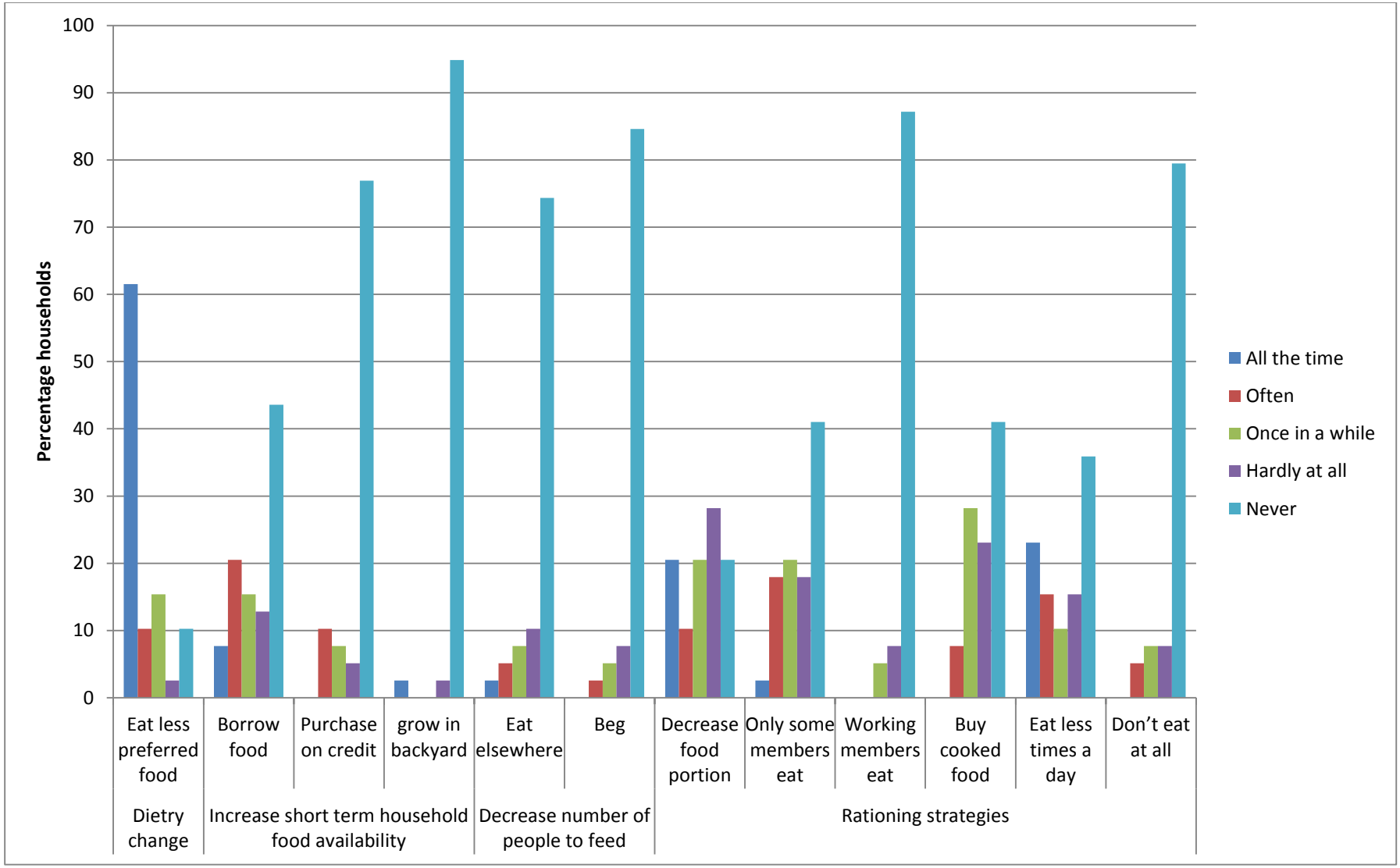


Figure 21. Percentage households that employed different coping strategies in Havana, Windhoek Namibia, where (p/w) represents per week, n=39

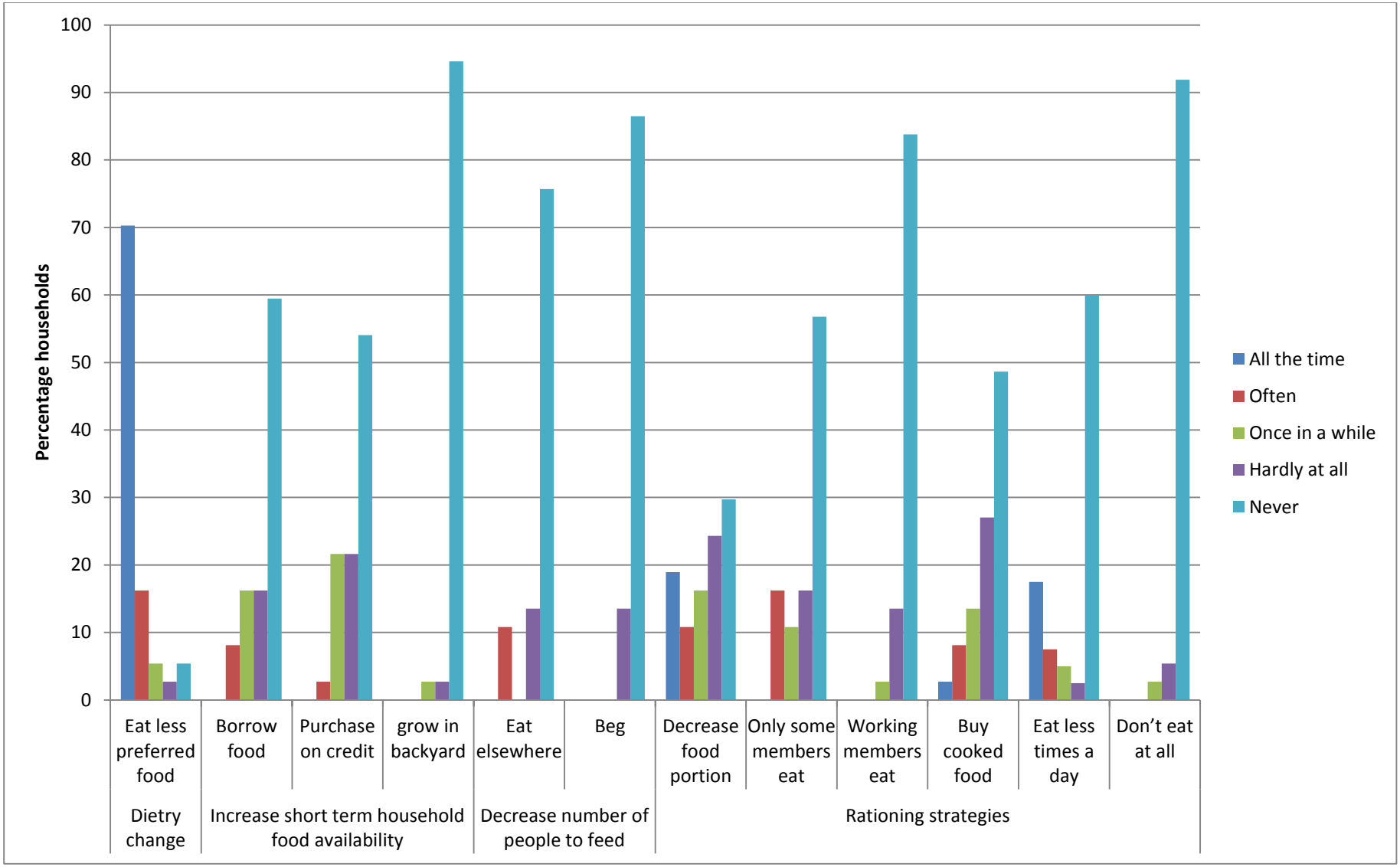


Figure 22. . Percentage households that employed different coping strategies in Okahandja park, Windhoek, Namibia, where (p/w) represents per week, n= 37.

Objective 2: To assess physical accessibility to formal markets and to investigate the feasibility of informal markets as an alternative to formal markets.

Physical accessibility of study households to formal markets

In order for a community not to be classified to live within a food desert, food outlets (markets, supermarkets and Informal markets) has to be found within 1.61 km walking distance of the community (Laraia *et al*. 2004).

Fifty-two formal food markets were recorded for urban Windhoek for the purpose of this study, from these 52 only fifteen where found to be within 1.6 km of the extensions in which the study sites fell (Fig. **22**). Havana extension (where Havana informal settlement is located) had the least number (3) of formal markets that was within 1.6 km of its vicinity, while Okuryangava extension (Okahandja Park) had the highest number (9) of formal markets within 1.6 km of its vicinity. One of the markets did overlap between Havana and Okuryangava extensions. Otjomuise extension (7/8ste Laan) had five formal markets within 1.6 km of its vicinity. The presence of formal markets within the boundaries of the extensions in which the study sites occur indicate that these areas are not classified as food deserts, however it important to note that due to the lack of border data for the actual study sites, distances to these markets may be further for households within the informal settlements than for the rest of the extensions, due to the location of informal settlements on the fringes of the respective extensions; Leading these sites to be possible "food deserts".

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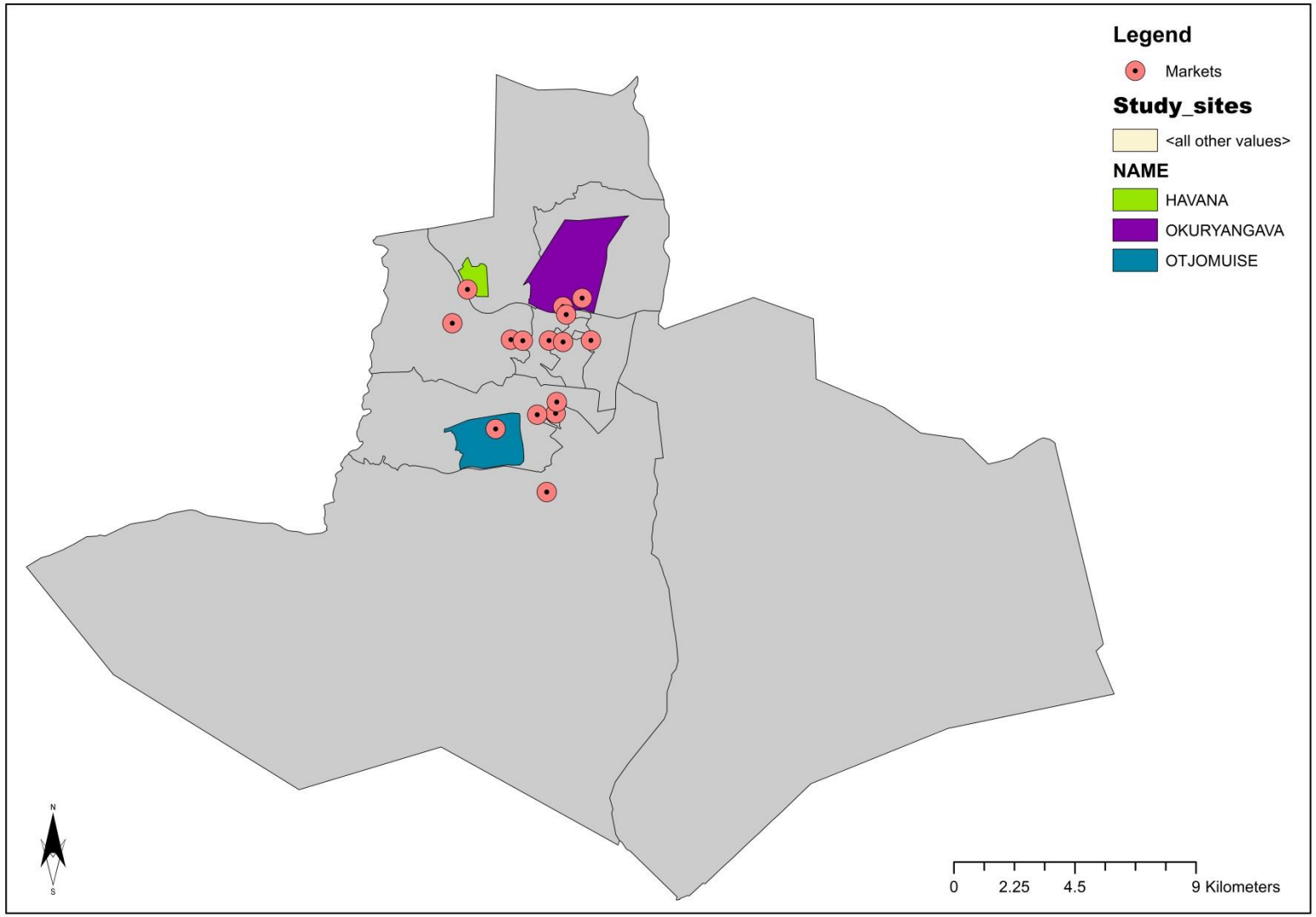

Figure 23. Map of urban Windhoek that shows mini- and super markets that are located within 1.6 km of Otjomuise, Havana and Okuryangava, the extensions in which the three informal settlements (study sites) are found.

Informal market prices and vendor's perceptions on pricing

Two types of informal markets were found within the study sites; namely Kukka shops and street markets. Kukka shops are small "convenient" stores that are normally built out of congregated iron; these are often found to stock non-perishable goods and fresh bread. Street markets are generally set alongside the main roads that enter the settlements. They are either set up underneath a large umbrella or a make shift cover. Fresh fruits and vegetables are sold at these street markets and in some instances loose sweets and potato chips.

The cost for a basket of food items at a Kukka shop was found to be the highest at 7/8ste Laan, followed by Okahandja Park (Table. **4**). The number of items per basket across all study sites ranged from 10−17 items, where 7/8ste Laan had the highest number of food items per baskets in comparison to the other two sites. This may indicate that Kukka shops in 7/8ste has a higher diversity in the food products available for purchase. Havana had the highest average cost for food items for the street markets in comparison to the other two sites; furthermore Havana also had the most fresh produce items available for sale at the street markets (Table. **4**). Number of items present in a food basket for the street markets across all three sites ranged between 7−9 items. The higher number of fresh fruit and vegetable products available at Havana may indicate that there is higher nutrition diversity in this site in comparison to the other two sites, due to easy access to these products in the form of street markets, as households report as often using these shops to purchase daily food products in small quantities.

Vendors from all three sites for both markets and Kukka shops reported during verbal interviews that suppliers are costly and that prices fluctuate often. Despite this, vendors cannot increase their prices too drastically to avoid loss of customers. Prices for street markets are set daily for fresh produce, while Kukka shop vendor's change prices annually or biannually. Prices for fruit and vegetables are influenced by the state of freshness, this is a practice done by all interviewed street market and Kukka shop vendors across all three sites. The prices are higher for fresher products and get less as the quality deteriorates. Fresh produce is sold based on the seasonality of fruit and vegetables. All street market vendors across all three sites have the same supplier for fruit and vegetables; however vendors may have varying prices due to transport costs involved for those located further away from the supplier. The farmer's marker from which all vendors obtain their goods is located within the same constituency (Tobias Hainyeko) as Okahandja Park,

whilst 7/8ste Laan is located the furthest away. Given this proximity of the farmer's market to Okahandja park, it would be expected that prices would be cheaper within this area compared to the remaining two study sites, but it is difficult to make any concrete conclusions as only the prices of one market was obtained.

Table 4. Summary of average prices (mean ± SD), for the year 2017,of a basket of selected food items at informal markets (Kukka shops) and street markets for 7/8ste Laan, Havana and Okahandja Park, Windhoek, Namibia. Average cost is represented in bold. Kukka shops n= 4, 5 and 2 for 7/8ste Laan, Havana and Okahandja Park. Street markets n= 4, 5 and 1 for 7/8ste Laan, Havana and Okahandja Park. Okahandja Park's street market data are for one market only.

	Study sites					
	7/8ste Laan		**Havana**		**Okahandja Park**	
	Basket Cost (R)	**No. of items**	**Basket Cost (R)**	**No. of items**	**Basket Cost (R)**	**No. of items**
Kukka shops	**252.80** ± 91.95	17.25 ± 5.06	**124.6** ± 58.50	10.60 ± 3.97	**135.29** ± 30.82	12.5 ± 2.12
Street markets	**18.34** ± 17.53	5.25 ± 1.89	**33.10** ± 9.24	7± 2	**4.43**	7

National food basket prices (Namibia)

The data presented for this section were collected from the First Capital food price monitor documents, compiled by First Capital Treasury Solution (Pty) Limited, which is an international financial services institute. Basket prices for an average household from five large supermarkets of selected months across three years (2010, 2016 and 2017) are displayed. The months displayed were selected based on the availability of data. There is variation in prices, items and quantity for items used to calculate the average cost.

March 2010 showed the lowest cost for a basket of food for the time periods represented in the table above (Table. **5**), while September had the highest cost with 40 items. It is important that if viewed within context of items per basket, January 2017 would then represent the time period

with the most costly basket for an average household. Within a one year period starting from January 2016 to January 2017, the cost of a basket (both containing the same items) has increased by R123.07. A trend can be noticed as prices start to increase moving from 2010 forward to January 2017, which indicated that the cost of food for Windhoek has been dramatically increasing over the last seven years (Table. **5**).

Table 5. Average cost of a basket of food (mean ± SD) for an average sized family in Windhoek, Namibia, for selected months.

	Windhoek					
	March 2010	**Dec 2016**	**Jan 2016**	**Sept 2016**	**Nov 2016**	**Jan 2017**
Av. Cost per basket (R)	**420.97**± 18.12	**728**±	**969.10**±	**1201.67**±22.82	**1067.04**±48.21	**1092.17**±46.29
No. of items	20	17	17	40	17	17

Adopted from: First Capital Treasury Solution (Pty) Limited reports for the years 2010, 2016 and 2017.

Objective 3: To briefly review urban food security interventions of various institutions in, Namibia.

Intervention analysis

Forty-four project documents related directly or indirectly to food security were collected from government websites from NGO's and corporate companies. These documents were sorted to analyse only those that affected urban food security, which resulted in a total of 21 project documents being reviewed for this section. Projects were categorised to look at food dimensions (availability, access, and utilisation) and management strategies they targeted.

A few projects overlapped between food security dimensions (Fig. **23**), from the 21 projects analysed. There are slightly more projects that overlapped between availability and access than between utilization and availability and utilization and access, where each combination had two projects respectively (Table. **6**). These combinations however do highlight that of the projects analysed, availability of food to households is a dimension that is addressed in interventions. Almost fifty percent of projects analysed covered the utilization aspect of the food dimensions, while the dimension that had the least projects addressed was access. Only one project out of the 21 reviewed fell within all three food security dimensions.

A large portion of projects (Fig. **24**) fell within both the prevention and mitigation risk management categories, while coping did not overlap with any of the other categories (Table. **6**). This indicates that projects aim to adapt to current situations as well as simultaneously mitigate already critical situations. Coping strategies are considered as a short term solution as it does not directly solve the issue at hand but simply aims to cope with adverse effects. However no project exclusively aimed to mitigate risk.

Projects that aimed at increasing human capacity made up almost half of those reviewed, while improving education and/or increasing income made up 24%. These statistics highlight the results found for the most prominent food security dimension being utilization. Food based distribution projects only made up 10% of those reviewed and those that aimed to improve institutional capacity made up 19% of reviewed projects.

Thirteen projects (62%), of the 21 reviewed, are still ongoing, while 19% of reviewed projects only ran during the period of 2010 (Table. **6**). This indicates that projects that only ran for a time

period of one year were very short term. This puts into question the effectiveness of these projects, as food security issues which often require long term interventions. Ongoing projects are a good indication of moving towards sustainability in food security interventions.

Household's perceptions of interventions

Households surveyed from 7/8ste Laan, reported during interviews, that they have not received food parcels from the national food distribution project, while some households from Havana and Okahandja Park reported that they felt that there are discrepancies in how parcels are distributed and that elements of tribalism often comes into play. Some interviewee's from Okahandja Park further reported that community members involved in the distribution of food parcels often took some parcels for resale and /or chose family members and friends over other community members to be recipients of parcels.

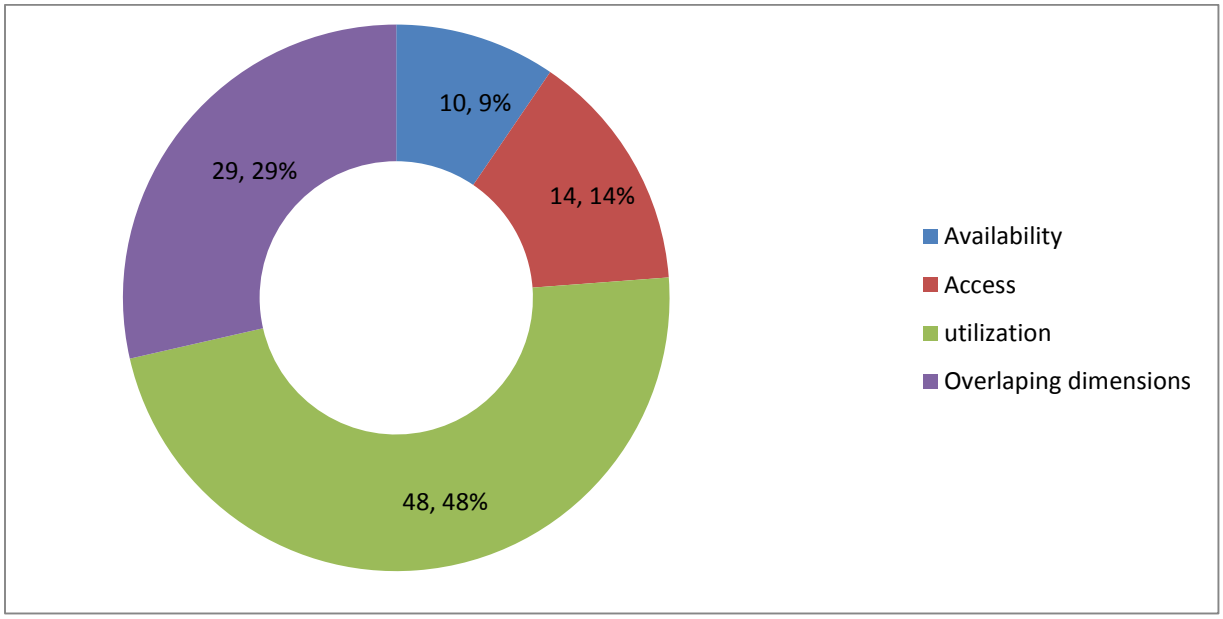

Figure 24. The percentage of projects found under each food dimension, as well as the percentage of projects that overlapped between dimensions, n=21.

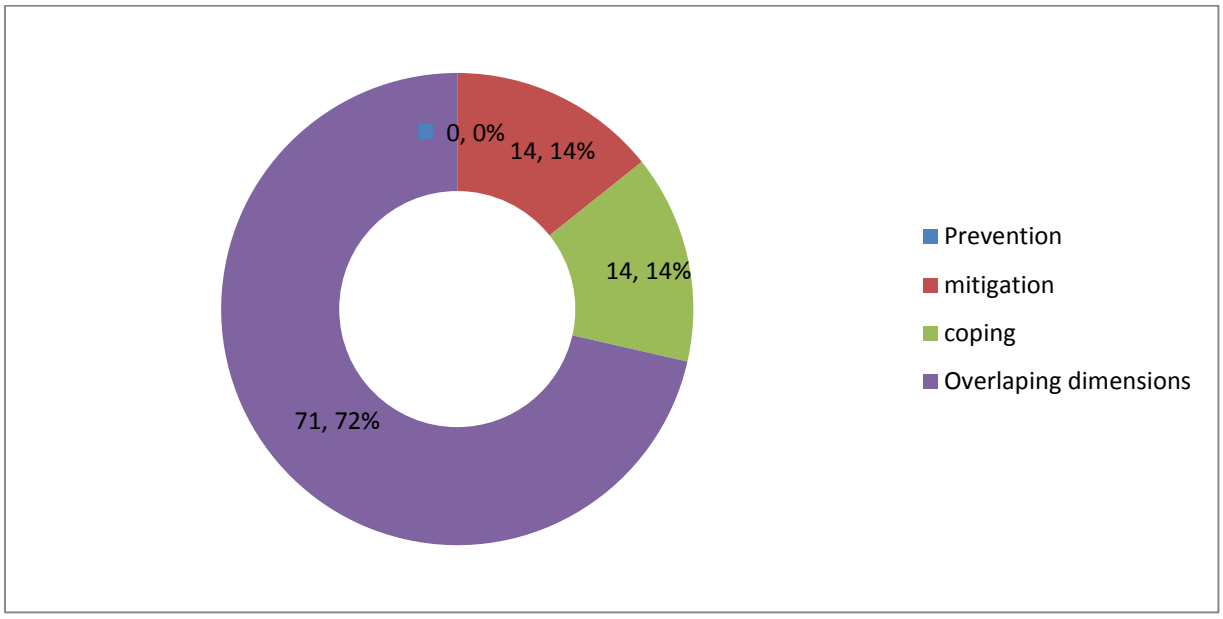

Figure 25. The percentage of projects found under the three risk management categories (prevention, mitigation and coping), as well as the percentage of projects that overlapped between prevention and mitigation, no overlapping was observed for projects that fell under the coping category, n=21.

Table 6. Summary of twenty-one urban interventions reviewed that effect Windhoek and periods over which they occur.

Project	Description	Food security Dimension			Risk management			Programme	Period
		Avail.	Access	utilization	Prevention	mitigation	coping		
Food and nutrition guidelines (nutrition education)	Human Capacity			x	x	x		Food and nutrition guidelines for Namibia	2000
Computer laboratory programme for underprivileged schools				x	x	x		Bank of Namibia	2006-2011
House construction for informal households				x	x	x		Shack dwellers federation of Namibia	2010
Youth expo SME projects				x	x	x		First National Bank	2009
Windhoek High School scholarship: For less privileged children				x	x	x		First National Bank	2009-ongoing
Exchanges: Sharing, Learning by doing				x	x	x		Shack dwellers federation of Namibia	2010
Slum upgrading project				x		x		Shack dwellers federation of Namibia	2010
Food fortification: introduction of standards on food fortification in Namibia to address micronutrient deficiencies in the general population		x			x	x		World Food Programme and NAFIN	2011
Free primary and secondary education				x	x	x		Ministry of Basic Education	2013-current
Fee exemption on Primary health care for low income				x		x		Ministry of health and social services	current

households									
Healthy food regulation	Institutional Capacity	x			x	x		Food safety policy	2014-current
Namibian Alliance for Improved Nutrition (NAFIN)		x	x	x	x	x		Scaling up nutrition	2014-current
Early warning: Food and nutrition Monitoring		x		x	x	x		Vulnerability Assessment Committee and World Food Programme	2015-current
School feeding programme monitoring				x		x		World food programme	Ongoing
Urban school feeding in selected government schools	Food Based Distributions	x	x				x	The Namibian School feeding programme	2012-Current
Distribution of food items to low income households		x	x				x	Harambe prosperity plan	2015-current
Collateral free loans for SME"s (micro credit)	Employment and Income		x		x	x		Small and Medium Enterprises bank	2012-Current
Saving groups for informal settlements			x	x	x	x		Shack dwellers federation of Namibia	2010
Sales promotion and expansion for SME's			x		x	x		Small and Medium Enterprises	ongoing
Building partnerships for SME's			x	x	X	x		Small and Medium Enterprises	ongoing

Chapter 5: Discussion

This chapter will focus on discussing three interrelated concepts to address the key questions set out under each objective. These are (1) the scope and intensity of food security in informal households and differences in these states amongst study sites, (2) market influences on marginalised urban poor and lastly (3) interventions in urban Namibia. The discussion will be laid out to address the findings under each objective, by contextualising the local findings and incorporating it into the larger knowledge base.

The scope and intensity of food insecurity in informal settlements

The study provided valuable insights on broadening the literature on the socio-economic and food security status of the urban poor in Namibia. As anticipated, food insecurity levels where high amongst informal households which are considered to be vulnerable groups, these results are very similar to those found by Pendleton *et al*. (2012) that showed high instances if food insecurity amongst these households (up to 89%). Namibia is making very slow progress towards reaching a state of household food security (Fig. 4), this is not only evident in the failure to reach MDG targets, but is also further emphasised from the results in this study. The question that thus arises is why Namibia is making such slow progress towards poverty eradication? The 2015 world hunger report by FAO stated that countries who showed little progress towards reaching its MDG's goals on poverty reduction (for the period of 2014-2016) was due to political and social instability (Fig. 3); Namibia was found to be amongst those countries that did not only not achieve the MDG 1 targets, but is making very little progress towards reaching that goals. Despite Namibia's political stability, social inequality in the country is extremely high and this is evident in the country's national statistical reports over the last decade that indicate a high Gini coefficient (0.597), which measures the inequality of wealth distribution and poverty levels for a country (NSA 2011c); representing the large gap that exists between the rich and poor in Namibia. Furthermore, this study respondent reflected the reality of high poverty rates as seen through their low income levels, especially amongst the vulnerable (Fig. **15** & **16**). It is important to note that environmental constrains may also be one of the large contributing factors to the lack of progress the country is making towards food security; where water scarcity and dry climatic conditions make it nearly impossible for the country to reach self-sustainability through crop

production. Furthermore, with the predicted climatic changes for Namibia, the prospects of future crop production on a large scale diminishes even more, leading to rethink the current strategies put in place to reach present and future food security. In addition, the inability of the country to produce food as a sustainable food security measure, means that especially vulnerable groups may be left at the mercy of high inflation prices; displaying a rather grim picture for household food security, if appropriate steps are not taken.

The interaction between the food security indicators and socio-economic factors did yield some interesting results. No relationship was found between the gender of the head of households and the food security status (HFIAS), household food diversity (HDDS) and the months in which households had adequate food (MAHFP) (Table. **3**). These results are interesting, as gender is often found to play a role in food security status of especially poorer households, where female headed households are historically found to be more food insecure in comparison to their male counter parts (Pendleton *et al*. 2012);Sasson 2012). Furthermore, the number of members in the households within this study, across all three sites, where independent to all three food security indicators (HFIAS, HDDS and MAHFP).,It was expected that household size would influence households' food security levels (Tantu *et al*. 2017); however, it may be that results within this study contradict common findings, due to high levels of chronic poverty found within these communities, that gender differences and household sizes did not influence level of food security significantly (Table. **2**). A relationship was found between employment levels and household's dietary diversity (HDDS) and months of adequate provisioning (MAHFP). This may indicate that employed households may be able to diversify their diets more, as well as have adequate access to food for longer periods over the year due to more steady incomes. It may be important to note that although, employment and MAHFP have a positive relationship, the reality remains that for most part of the year a majority of households still report not having adequate food (Fig. **18**); however, income ranges did have a positive relationship with both food HFIAS and HDDS scores. So why did employment not appear to significantly influence food security levels, but income did? It would be anticipated that employment range equates higher income, but informal communities are often found to source monetary income from a wide range of sources that often do not fall within formal employment (Nickanor 2013). Therefore households' heads may not necessarily be formally employed to have higher incomes than formally employed households. However it is important to note that although higher income within these communities did

influence food security levels, food insecurity remained high none the less. This may largely be due to the fact that incomes recorded for this study group did not exceed R5000, a value found to be barely sufficient to meet basic household needs as stated by Pendleton *et al*. (2012).

When looking at the findings of Pendelton *et al*. 2012 and Nickanor (2013) on urban food security in Windhoek, food insecurity status within informal households were found to be very high amongst respondents; results similar to those found for this study. However, the differences can be noticed for the outcomes of share of income on expenditure, where respondents from Nickanor's (2013) study reported spending only a small share of their income on food expenses, while a majority of respondents from this study reported spending over 50% of their income on food expenses. So why the differences between food expenses of similar communities over time? The answer may lie in the rapidly increasing cost of food prices over the past six years (Table. **5**), as well as the continued low income rates of poor households, which fail to match up with annual national food inflation rates. The vulnerable status of these households, means that their adaptive capacity is inheritantly low (IPCC 2007), therefore the combined factors of high market prices and continued low income may pose a real challenge in addressing food insecurity and poverty issues within these communities.

The dynamics of Windhoek's food security becomes even more interesting when looking at the findings of Ziervogel and Frayne's (2011) and Pendelton *et al*. 2012 studies that looked at both formal and informal households. These studies found that formula households in the city also reported experiences of household food insecurity (up to 64% of households). It does bring into question the state of food insecurity for different households, as these are often self-reported and may create a bias to real and perceived food insecurity. The high level of food insecurity reported by informal households was an anticipated outcome, due to chronic poverty within these communities; however, formal households were anticipated to report lower incidents of food insecurity, as these households often report higher household incomes (above the national poverty line), leading to better access to food. However, it may be important to note that both studies occurred during and post 2011 global financial crisis, when international markets were highly volatile and global food prices saw high levels of inflation (Milesi-Ferretti and Tille 2011). Thus, the timing of these two studies could have influenced the incidents of food security reported for those time periods amongst both formal and informal households, due to both

household types having to cope with rapidly increasing food prices. Having an overview at the extent of food insecurity within vulnerable communities is only the first step at planning towards a food secure future, how these communities cope under such adverse circumstances gives a greater understanding of their vulnerability, which will allow for better planning towards food secure communities.

Implications of dietary diversity and coping strategies to food security

The coping strategies used within these communities gives an understanding of their resilience to their existing food system. The coping strategies and HDDS did provide some interesting insight into the eating habits of the urban poor. The study group was found to self-report on having at least one meal per day, which was considered the norm within these communities (Figs. **19, 20** & **21**). Furthermore, the HDDS revealed that although on average households had 7 of the 12 food groups in one day, the reality is that the major groups consumed very low in nutrition, with cereals and sugar making up a large portion of food consumed daily (Fig. **17**), a finding similar to urban communities survey in the Western Cape, South Africa (Battersby 2011). In addition, the HDDS may under report the levels of nutritional intake of households as the score does not assess quantities consumed over a 24 hour period, a distinction which may provide very different insights into the nutritional and caloric intake of these households. Such poor diets can be contributed to low financial income, as well as market types and distribution within these communities.

The high dependency of households on cereals, such as maize, to meet their daily food requirements (a trend common in southern Africa) (Cudjoe *et al*. 2010), does pose as a significant risks to these households future food access. With the anticipated decrease in yield of crops like maize in the global south (Fig. **7**) (IPCC 2007), due to climate change, households access to these foods are put at risk, as the demand remains high but future supply is predicted to decrease. This is especially true for Namibia where little of the staples consumed are produced in the country due to water and climatic limitations. This decrease in a major food group consumed amongst surveyed households may further worsen the state of household food insecurity, unless households find a more financially accessible alternative. Moreover, households within these communities often resort to decreasing both their food portions and number of meals a day to cope with food shortages (Figs. **19, 20** & **21**). These types of coping strategies may pose

significant risk (such as decreased health) to these communities, by further increasing their vulnerability to shocks in the food system (IPCC 2007).

Distance, financial constrains or both?

Many of the markets found in Windhoek were clustered around the city centre, however a few fully functional shops were present within 1.61km of the extension in which the study areas occurred (Fig. **22**). However, the distance of the informal settlements to these formal markets may be underestimated due to the use of extension boundaries, instead of informal settlement boundaries to conduct the distance analysis. Furthermore, the use of Euclidian distances instead of street networks, may have also lead to over representation of fully functional markets within a 1.61 km proximity to informal settlements (Battersby and Crush 2014). The location of these informal settlements on the fringes of the extensions (in which they occur) may indicate in reality that households travel distances further than 1.61km to reach markets. In addition the low number of shops within these constituencies may reflect that needs of the community may not be met as the population number relative to shops is much higher. However, the presence of informal markets within the study area may cancel out the effect of travelling to further formal markets to meet households' daily dietary needs, but it would also be prudent to understand that daily shopping may not be a luxury these households have and thus finances may still remain the main confounding factor for household food and nutrition security.

What did seem to have a larger influence on market access as opposed to distance, was finances. Firstly, households' incomes fell below the poverty line stated by the World Bank (R24.54) (Table. **4** & **5**), and secondly baskets for both formal and informal markets totaled over most households' monthly income brackets (Fig. **15**), reducing the purchasing power of these households. These findings are similar to those of Nickanor (2013) who looked at the female headed informal households' food security, where households reported financial constrains playing a much larger role in market access than physical constrains.

In light of food prices increasing at a startling rate nationwide, it brings into question the fate of the urban poor to further food insecurity, as markets in Namibia mainly follow the neo-liberal market policies that are based on free markets. Under this model, market prices are driven by supply and demand. This means that government has minimum to no intervention in pricing. Under these unregulated markets, profit−seeking behaviour results in a decline of urban food

security, due to low government intervention (Rocha 2006). As more and more urban households are failing to financially access markets, these unregulated markets become non-beneficial for the households and other social welfare. Byerlee *et al*. (2006) stated that diversified diets of the urban dwellers most likely buffered them to some extent against the adverse effects of fluctuating market prices; however diversification of diets within surveyed households was low, indicating their high vulnerability towards changing food prices. Dirba and Renk's (2007) assessment of market analysis to address food security, was a useful guide developed to help countries both forecast changes in market prices, as well as analyse and understand how households access to markets will be influenced by market functions and conditions. An interesting question though, is whether formal and informal markets provide the same level of food access to urban households?

The results obtained in this study did shed some light on cost and diversity difference between these markets. Although it is known that formal markets are diverse in produce, it remains uncertain within the Namibian context whether informal markets can be a more affordable, healthy alternative food source for the urban poor, as these are often located in closer proximity to these communities. In terms of cost of produce, informal markets appear to have higher pricing for items, and this may be due to their suppliers, which are often wholesalers that have already placed profits on their goods, which informal markets further increase, to meet their own profit targets. Despite these differences between these two market types, informal households are found to frequent informal markets almost as much as formal ones, in addition food insecure household patronised informal market more than formal ones (70 % of food insecure) (Pendleton *et al*. 2012) .With this in mind it does beg the question, why these markets do not fail within these communities despite high prices and less diversity? The answer may be found in that these markets are targeting a niche community, which are often far from formal markets and thus resolve to purchase from informal markets, despite higher cost. In addition profit margins are most likely much lower than formal markets, but yet still enough to maintain the business. Moreover, the urban poor often purchased food on a needs-based system, which may mask the high costs incurred over the long run, therefore doing little to alleviated household food insecurity.

Are interventions meeting the needs of the urban poor?

Interventions analysed in this study provided some useful insight on how the country is addressing food security of the urban poor. Interventions ranged from addressing utilization, all the way to access dimensions of food security (Fig. **23**). Although urban interventions were found to be less frequent than those aimed at addressing rural food security, the country is taking minor steps to address food security within the urban context, albeit very slowly both across time and space. Kimani_Murage *et al*'s (2014) statement that poor governance and poor planning is at the root of increased poverty within Sub-Saharan Africa, may provide further insight as to why to why Namibia is making such slow progress towards food security for urban populations. Furthermore, water scarcity and dry climatic conditions may be critical in explaining the country is struggling to reach food security. From the projects analysed, it does highlight that urban food interventions have only started to receive attention post 2000, and much more concentrated a decade after (Table. **6**), an observation that was noted in Nickanor (2013) as well. This indicates that there is still much to be done to combat food insecurity in the urban poor within the country.

A large number of urban interventions analysed were targeted at increasing human capacity (Fig. **23**), which would enable improved household food security. Interventions were also found to improve employment and income, allowing better access to markets for poor households. However, it might be important to highlight that those interventions appear to be a by-product of other national agendas and not specifically designed to target food insecurity for the urban poor. None the less, these interventions do add value in combating urban food insecurity.

From the interventions specifically designed to improve food security within urban households, the focus was placed largely on food distribution, an often costly approach (Table. **6**). This can be seen in the school feeding scheme and the national food bank projects. Food based distribution provides a good tool to alleviate food insecurity problems in the present, however countries should aim to lead households into a state of self-food sufficiency, as food based distribution often acts as only a short term solution for a much larger problem. Urban agriculture would serve as ideal long term solution to food insecurity, as it does not only provide households access to food, but produce can be sold as additional income to households. Dima *et al*.'s (2002) study conducted in low-income households in Windhoek and Oshakati found in that 79% of informal surveyed households were engaged in urban/peri-urban agriculture, which is a stark

difference to findings now, as almost none of the survey households practiced any form of urban agriculture. It does lead to the question of "what has changed?" in the last 15 years that such a sharp decline in urban agriculture has occurred? The answer may be found in the change of urban culture over the years where household food production has become less popular as households may rather prefer buying from markets. Furthermore, informal households are located in areas that have poor water resources and soils that would make any type of agricultural productions difficult and un-sustainable (Nickanor 2011).

An element of un-sustainability did emerge when looking at the duration of the interventions, as well as the management there of. Over the past eight months between November 2016 and June 2017, promising interventions came to a halt due to poor governance and corruption. This time period witnessed the temporary halt to the national food bank scheme, under the Harambe prosperity plan, as well as the SME bank, which both aimed to improve the standard of living amongst the urban poor. Such failures hinder progress made in combating food insecurity issues, which leads to instability in beneficiary communities. Furthermore, elements of poor governance also becomes evident when there are discrepancies in beneficiary selection for interventions (a practice reported by households surveyed) leading to overall social unrest within these communities, which digresses valuable progress made over time.

Chapter 6: Conclusion and recommendations

Informal settlements in Windhoek suffer from severe food insecurity. The reliance on starch as the main source of food with very little diversity of other foods, shows the need to not only focus on food insecurity issues within communities, but to emphasise both food and nutrition security. Reduced food intake may further increase the current and future vulnerability of these communities by hindering child development and reduce health. This increased vulnerability decreases the resilience of these communities to adverse effects, both in the present and the future. The location of informal settlements on the fringes of the city did not appear to drastically influence access to both formal and informal food markets for households, furthermore informal markets appear to fill a gap where formal markets may lack; however the lack of finances to gain access to these markets is a huge hindrance for households to reach a food secure state. Furthermore, if food inflation rates continue to rise at this current rate while household incomes remain low, the situation will worsen beyond its current state (an already dire one).

The findings from the study does provide insight which can aid towards better programme development and interventions at various scales, that will target the main issues that lead to urban food insecurity, in order to reach a food secure state within the urban poor. By better understanding both formal and informal market influence on household food security, policies can be developed to become more inclusive to address these communities' vulnerabilities in order to move towards a food secure state. However, it will be important to understand that approaches, such as increased local food production in the form of agriculture, will only offer a very limited solution due to sever water scarcity and harsh environmental and climatic conditions of the country. Having an overview of interventions, further allows seeing where progress is being made, if interventions target the main issues that lead to urban food security and possible areas of improvement that will result in effective and sustainable household food security. A multi-disciplinary approach, as well multi-stakeholder buy in needs to be taken, in order to combat urban poverty and hunger if the country is to reach its National Development Goals by 2030, as well as meet the global SDG targets on poverty reduction and eradication of hunger.

A few recommendations can be made based on the findings of this study that may prove to be helpful in providing lasting solutions for urban households as well as expand and strengthen on certain points within the study. These include:

1. Long term monitoring of household food security through annual household surveys, this will provide a database to monitor changes in the status of household food security and the possible cause of these changes, furthermore investigation into the sources of food within households should be investigated in order to determine the extent of the roles formal and informal markets play in meeting food demands.
2. Focus groups with key informants that represent a wide demographic in the community to discuss perceptions of food security and effectiveness of interventions rolled out in the community.
3. Annual documentation on the boundaries of informal settlements using aerial photos and satellite images in order to monitor growth of informal settlements. This will provide formal data on the boundaries of these settlements for future analysis on physical market access and community dynamics.
4. Encourage the registration of formal markets within informal settlements and their boundaries, to keep record of food availability in terms of market presence.
5. Stricter control on dissemination of food parcels to ensure that all registered and qualifying households benefit from national interventions to alleviate food insecurity and poverty.
6. Investigate the feasibility of urban food agriculture to alleviate food insecurity in poor urban households and to what extend this can aid in household food security given the countries scarce water resources.
7. Sustainability methods of projects that are rolled out into communities must be investigated and improved to ensure that interventions have a lasting effect. This can be done by securing consistent funding for projects that aim to alleviated food insecurity in poor urban households, through the Ministry of Poverty Eradication and other partners.

Appendix A: Research tools

Consent form (Food security in Windhoek Namibia)

- The researcher has explained the study to me and I fully understand the aim of the research and my contribution towards it.
- I am aware that I will remain anonymous in the study
- I know that I can stop the interview at any time when I want to and will not answer questions that I do not want to answer.
- I know that this interview will be recorded.
- I give permission for pictures to be taken of the interview process
- I have the contact details of the researcher in case I have any questions regarding the interview or anything about the study.

I agree to be interviewed: ☐ Yes ☐ No

I agree to have my interview recorded: ☐ Yes ☐ No

Signature: _____ Date: _____

Participant information sheet (Food security household surveys)

Dear: Sir/Madam

My name is Nelly Black from the University of the Witwatersrand. I am completing a Master's degree in the School of Animal, Plant &Environmental Sciences. In my study, I want to learn if people in this community have enough food and where they buy their food. I also want to find out how people in this community cope when they do not have enough food. I am doing this study to understand what the food related problems are in the community. This study will also be done in three other communities. The information may be used to help develop programmes in the community.

The interview will not take more than 40 minutes. Please know that you may refuse to answer any questions that you do not want to answer, and you may stop the interview at any time. Please note that you will **NOT** be paid for the interview. I will not record your name anywhere and no one will know who you are and that you participated, except for me. I would also like to ask for permission to record this interview as well as take pictures; this is to help me get the correct information. Recordings will only be listened to by me. Your answers will form part of my Masters document for my degree at the university. A copy of the dissertation will be handed to the councillor's office which may be shared with the community.

If you have any queries and/or questions please contact me:

Researcher: Nelly Black

University of the Witwatersrand

Animal, Plant & Environmental Sciences

+264817781577/ +27736967167

Email: nelly.black52@gmail.com

Supervisor: Mary Scholes

Email: Mary.scholes@wits.ac.za

Tell: +27117176407

Your participation in my research will be highly appreciated. Thank you for your time.

Table 7. Demographical information

Question	**Response**
1.Name	
2. Surname	
3. Age	
4. Employed	
5. Gender	
6. Language	
7. Head of household	
8. Number of people living in the house over the past month?	
9. Where were you born?	
10. How long have you lived in Windhoek?	
11. Highest level of education?	

Table 2. Household Food Insecurity Access Scale (HFIAS) Measurement Tool

NO	QUESTION	RESPONSE OPTIONS	CODE
1	In the past four weeks, did you worry that your household would not have enough food?	0 = No (skip to Q2) 1=Yes	
1a.	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 like to eat, because of a lack of money or being unable to get it?	0 = No (skip to Q3) 1=Yes	
2a.	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 less of different kinds of food because of less money or no/far from shops	0 = No (skip to Q4) 1 = Yes	
3a.	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 money or shops to get other types of food?	0 = No (skip to Q5) 1 = Yes	
4a.	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 smaller food portions because there was not enough food?	0 = No (skip to Q6) 1 = Yes	
5a.	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 other household member have to eat less meal in a day because there was not enough food?	0 = No (skip to Q7) 1 = Yes	
6a.	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 at all in your household because of lack of money/shops too far/can't borrow to get food?	0 = No (skip to Q8) 1 = Yes	
7a.	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 (skip to Q9) 1 = Yes	
8a.	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)	
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 (questionnaire is finished) 1 = Yes	
9a.	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)	

Table 3. HFIAP categories

Question	Frequency		
	Rarely (1)	**Sometimes (2)**	**Often (3)**
1a			
2a			
3a			
4a			
5a			
6a			
7a			
8a			
9a			

Food secure

Moderately food insecure

Mildly food insecure

Severely food insecure

Table 4. Household Dietary Diversity Score (HDDS)

Questions	Coding categories
Now I would like to ask you about the types of foods that you or anyone else in your household ate yesterday during the day and at night. **1=Yes** **0=No**	
A. Any Mahangu, bread, rice, spaghetti, macaroni, cookies, Ouma rusks or any other foods made from millet, sorghum, maize, rice, wheat, oshikundu, samp	
B. Any potatoes, sweet potatoes, cassava	
C. Any vegetables?	
D. Any Fruits?	
E. Any beef, pork, lamb, goat, rabbit, wild game, chicken, duck, or other birds, liver, kidney, heart, Matangara/afvaal?	
F. Any eggs?	
G. Any fresh or dried fish or shellfish?	
H. Beans, peas, lentils, or nuts or any food made from it?	
I. Any cheese, yogurt, milk, Omaire (sour milk), Oshikandela	
J. Any foods made with oil, fat, or butter?	
K. Any sugar or honey?	
L. Any other foods, such as spices, tomato sauce, chutney, mayonnaise, coffee, tea?	

Table 5. Months of Adequate Household Food Provisioning (MAHFP)

QUESTIONS AND FILTERS	**CODING CATEGORIES**
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. Were there months, in the past 12 months, in which you did not have enough food to meet your family's needs?	|___| IF NO, END HERE
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? 1. This includes any kind of food from any source, such as own production, purchase or exchange, food aid, or borrowing. 2. Do not read the list of months aloud. Yes=1, No=0	
A .January (new year)	**A** |___|
B. December (Christmas)	**B** |___|
C. November (yearend school exams)	**C** |___|
D. October (matric exams)	**D** |___|
E. September (spring)	**E** |___|
F. August (start of the second school holiday)	**F** |___|
G. July (midwinter)	**G** |___|
H. June (beginning winter)	**H** |___|
I. May (Cassinga month)	**I** |___|
J. April (start of the first school holiday)	**J** |___|
K. March (Easter)	**K** |___|
L. February (Valentines)	**L** |___|

Table 6. Share of income on food

No.	**Question**
1.	Are your wages:

	a) Daily b) Weekly c) Monthly
2.	What does your income range between? a) 0-500 NAD b) 500-1000 NAD c) 1000-1500 NAD d) 1500- 2000 NAD e) 2000-5000 NAD f) 5000- more NAD
3.	How much of your salary do you spend on food? a) Less than half (<50%) b) Half (50%) c) More than half (>50%)

Table 7. Coping strategy index (CSI)

In the past 30 days, if there have been times when you did not have enough food or money to buy food, how often has your household had to:	**Relative Frequency**					**Severity Ranking**	**Score**
	All the time? Every day	**Often? 3-6 days per week**	**Once in a while? 1-2 days per week**	**Hardly at all? <1 day per week**	**Never 0*/week**		
1. Rely on less preferred and less expensive foods?							
2. Borrow food, or rely on help from a friend or relative?							
3. Purchase food on credit?							
4. Grow food in backyard?							
5. Send household members to eat elsewhere?							

6. Send household members to beg?							
7. Smaller amount of food when you eat?							
8. Only some people eat like the children or adults?							
9. People that work eat, while the other do not?							
10. Divide money and buy cooked food from shops or local markets?							
11. Eat fewer times in the day?							
12. Don't eat all?							
Total							

Participant information sheet (focus groups)

Dear: Sir/Madam

My name is Nelly Black from the University of the Witwatersrand. I am completing a Master's degree in the School of Animal, Plant &Environmental Sciences. In my study, I want to learn if at which kinds of shops you buy food and what kind of food brands people in the community buy. I would also like to know distance to shops and food prices affect you. This study will also be done in two other communities. The information may be used to help develop programmes in the community.

The group discussion will not take more than 30 minutes. Please know that you may refuse to answer any questions that you do not want to answer, and you may leave the discussion group at any time. Please note that you will **NOT** be paid for taking part in the discussion group. I will not record your name anywhere. No one outside of this focus group will know that you have participated and your identity will be kept private. Your answers will form part of my Masters document for my degree at the university. A copy of the dissertation will be handed to the councillors' office which may be shared with the community.

If you have any queries and/or questions please contact me:

Researcher: Nelly Black

University of the Witwatersrand

Animal, Plant & Environmental Sciences

Tell: +264817781577/ +27736967167

Email: nelly.black52@gmail.com

Supervisor: Mary Scholes

Email: Mary.scholes@wits.ac.za

Tell: +27117176407

Your participation in my research will be highly appreciated. Thank you for your time

Appendix B: Ethics clearance certificate

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Black

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H16/08/04**
PROJECT TITLE	Food security, vulnerability and interventions: A glimpse at Windhoek's informal settlements'
INVESTIGATOR(S)	Miss H Black
SCHOOL/DEPARTMENT	APES/
DATE CONSIDERED	19 August 2016
DECISION OF THE COMMITTEE	Approved unconditionally
EXPIRY DATE	13 September 2019

DATE 14 September 2016 **CHAIRPERSON** (Professor J Knight)

cc: Supervisor : Professor M Scholes

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

Signature

15 / 09 / 2016
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

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