

FOOD INSECURITY AND QUALITY OF LIFE IN INFORMAL SETTLEMENTS OF
KATUTURA, WINDHOEK, NAMIBIA.

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
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ABSTRACT

Globally, with rapid urbanization in most cities of the World, more people are now living in urban areas than in rural areas. The housing backlog coupled with a shortage of housing subsidies means that for many there is no alternative but to live in informal settlements. Urban food insecurity is often overlooked since at aggregate level, economic and social conditions in urban areas are much better than those in rural areas. The urban poor often live in neighborhoods with poor sanitation, high environmental pollution and therefore high and chronic exposure to health hazards. Such unhealthy living conditions aggravate food insecurity and quality of life of individuals.

This study explored linkages between food insecurity and quality of life in informal settlements in Windhoek, Namibia and determine how socio economic factors mediate and explain both. A cross-sectional quantitative design through a two-stage cluster survey sampling was applied. The sample size of the study was 416 respondents selected from 40 Primary Sampling Units (PSU's). The research instrument used in this study was the face to face administered questionnaire, distributed to 416 respondents. The study measured three (3) indicators of food security namely, Household Food Insecurity Access Scores (HFIAS), Household Dietary Diversity Score (HDDS) and Months of inadequate Household Food Provisioning (MIHFP). Lived Poverty Index (LPI) and World Health Organization Quality of Life (WHOQoL) instruments were used to measure quality of life. Bivariate analysis using cross-tabulations and chi-square tests, were also carried out to relate explanatory variables to food insecurity and quality of life. A binary logistic regression was used to relate quality of life status with food security, controlling for confounders like the bio-demographic and socio-economic variables. Ordinal logistic regression model was used to investigate the effect of household characteristics to food insecurity and quality of life.

This study found that food insecure households in informal settlements are associated with poor quality of life. The study found that food insecure households in the informal settlements as measured by the HFIAP is 63%. Food insecure households have average levels of intake in any foods made from beans, peas, lentils, or nuts (54.1%); eggs (47.3%); potatoes, yams, manioc, cassava or any other foods made from roots or tubers (49.5%); vegetables (54.3%) and fruits (48.8%). Households in the informal settlements had less food in the months of August, November and January. Low level of education, large family size, female headed household and low/lack of income were associated with increased food insecurity. The four domains of quality of life were also assessed and it was found that the highest mean score was observed for domain 2 (Psychological health, mean= 63.8508) and domain 1 (Physical health, mean= 63.8018). The lowest mean score was observed for Domain 4 (Environmental health, mean= 37.1803).

Furthermore, it was found that there is a statistical significant relationship between food insecure households and quality of life (Physical health, Psychological health, Social relationships and Environmental health, $P < 0.005$). It is concluded that poor quality of life is associated with high levels of food insecurity in the informal settlements of Katutura and thus a linkage between food insecurity and quality of life exists. Thus, to improve food insecurity, there is also a need to focus on advancing quality of life of individuals. Further dedicated quality of life and food insecurity research in informal settlements is required.

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Dedication

This thesis is firstly graciously dedicated to residents of Katutura informal settlements in Windhoek. I thank them all for their generous assistance.

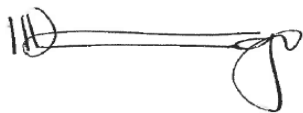
I also wish to dedicate this thesis to my ever-loving family, your support is endless. To my mother, Lavinia (Stephanus) Mbongo and late father Thomas Abraham Mbongo, for believing in us all and for giving us the best education.

Declarations

I, Laina Tulipomwene Mbongo, declare hereby that this study is a true reflection of my own research, and that this work, or part thereof has not been submitted for a degree in any other institution of higher education.

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A handwritten signature in black ink, consisting of a stylized 'L' and 'M' connected by a horizontal line, with a small loop at the end.

Laina Tulipomwene Mbongo

04 September 2017

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ACRONYMS

DHS	Demographic and Health Survey
EA	Enumeration Area
FAO	Food and Agriculture Organization
FANTA	Food and Nutrition Technical Assistance Programme
HDDS	Household Dietary Diversity Score
HDI	Human Development Index
HFIAP	Household Food Insecurity Access Prevalence
HFIAS	Household Food Insecurity Access Scale
HRQOL	Health- Related Quality of life
LPI	Lived Poverty Index
MAHFP	Months of Adequate Household Provision
MDI	Material Deprivation Index
MIHFP	Months of Inadequate Household Provision
MODA	Multiple Overlapping Deprivation Analysis
NSA	Namibia Statistics Agency
PHC	Population and Housing Census
PSU	Primary Sampling Unit
QoL	Quality of Life
UN	United Nations
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WHK	Windhoek
WHO	World Health Organization
WHOQOL	World Health Organization Quality of life

CHAPTER 1: INTRODUCTION

1.1. ORIENTATION OF THE PROBLEM

The world's population is becoming increasingly urbanized (Rashid, 2009). In 1950, 30 percent of the world's population lived in urban areas. By 2002 that figure had increased to 47 percent of the global population (UNDP, 2010). Today, 54 per cent of the world's population live in urban areas, a proportion that is expected to increase to 66 per cent by 2050. Projections show that urbanization combined with the overall growth of the world's population could add another 2.5 billion people to urban populations by 2050, with close to 90 percent of the increase concentrated in Asia and Africa (UN, 2015). Over three quarters of the population in industrialized countries now live in urban areas, while rural to urban migration in developing countries is increasing at a rapid pace (UN-Habitat, 2010).

In sub-Saharan Africa approximately 34% of the population currently lives in urban areas, by 2020 it is predicted that nearly half (46.2%) of the population will be urban (UN-Habitat, 2010). In Southern Africa, the expected urban growth rates (1.6) are much closer to the global average (1.8) (United Nations, 2014), which reflects the fact that the region is already highly urbanized. Almost 60 % of Southern Africa 's population lives in cities (UNESA, 2011); with a negative annual rural growth expected for the next half century, the towns and cities of the region will continue to absorb population growth as rural populations experience an absolute decline (UNESA, 2011). This expansive trend in urbanization has been associated with growth of slums and informal settlements in cities across the globe, particularly, in developing counties and about 90 percent of the world's informal settlements are in developing countries (UN-Habitat, 2010). As a result of the high cost

of housing, lack of good financing schemes, the increasing urban population is forced to live in substandard housing and unhealthy conditions giving rise to informal settlements (Olotuah, 2005).

The situation described by Olotuah (2005) above can be said as accurately describing the prevailing conditions of urbanization in Namibia. Windhoek, the capital city has by far been the major focus of urbanization. Its population increased from 13.7% in 2001 to 16.2% in 2011 and constitutes 36% of the total urban population (NSA, 2012).

Rapid urbanization has brought with it a host of challenges for local and national governments. The most visible challenge is the provision of adequate urban services and shelter for city residents (Basset et al., 2002). A rapid influx of people from the rural areas has resulted in an ever-increasing demand for basic public services and has placed great stress on existing city infrastructure. In Southern Africa, particularly rapid urbanization and slum-dwelling has meant increased poverty and food insecurity (Basset et al., 2002).

Urban food insecurity is often overlooked since at aggregate level, economic and social conditions in urban areas are much better than those in rural areas (Crush and Frayne, 2012). Unlike in rural areas, problems of food insecurity in urban areas are strongly related to the inadequate purchasing power of the urban poor which limits their access to adequate quantities of nutritious food (Basset et al., 2002). Moreover, the nutritional value of food consumed by the urban poor is often very low. The urban poor often live in neighborhoods with poor sanitation, high environmental pollution and consequently high and chronic exposure to health hazards (Rashid, 2009).

Increasing urban inequality is another challenge in the cities. In many cities, wealth and poverty coexist in close proximity (Khan et al., 2009). Informal settlers of the world's poorest cities often experiences multiple deprivations in terms of housing, food, education, health and basic services

(UN-Habitat, 2008). Furthermore, the (generally) poorly educated slum dwellers often lack knowledge on health threats. Poor environment conditions of slums exacerbate the risks of waterborne diseases (e.g. diarrhoea, cholera); airborne diseases (e.g. influenza, pneumonia, and tuberculosis) and foodborne diseases (Rashid, 2009).

Slum and squatter dwellers are experiencing a massive change in the quality of life as they live in the settlements that are characterized by numerous problems such as overpopulation, inadequate basic amenities, non-conventional housing and so on (Majale, 2002). Over the years, the incidences of crime and the degree of violence have also increased tremendously (Kessides, 2005). Many informal settlers experience a wide range of criminal activities ranging from petty to the armed and organized. Theft is most common. Crime is also facilitated by the anonymous character of the big city, and by such institutional weaknesses as poor wages and inadequate training of police, and by deficiencies in essential infrastructure such as streetlights. Women, the elderly, children and the weak are easy victims of all kinds of crime (Rashid, 2009).

In the last forty years, some governments of the developing world with their partners in the donor community have implemented numerous projects or programs aimed at upgrading low quality slum housing areas (Rashid, 2009). Thus, quality of life considerations are increasingly influencing the planning, delivery and evaluation of social, health, and medical services (Parmenter, 1994; Renwick et al., 1996). That is, improved quality of life is seen as a desired outcome of service provision.

Given the massive movement of the country's population into the city, understanding the particular role of city in shaping population's quality of life and food security becomes central to public policy making. Currently there is limited understanding of the complex relationships in urban

settings and its impacts on food security and quality of life. Also, relatively little work has been done to shed light on the relationship between quality of life and food security in regards to minority or disadvantage groups in urban areas. Understanding urban factors that lead to food secured households in informal settlements and better quality of life is central to the development of appropriate interventions and preventive measures.

1.2. STATEMENT OF PROBLEM

It has often been assumed that hunger and starvation are distinctively problems of rural areas. Therefore, researchers and academicians in this field neglected urban areas. Food security research mainly concentrated in rural food production and on the scope of its increase. On the other hand, urban areas have generally faced malnutrition, which is difficult to detect and takes a long time to correct, but its toll is usually greater than devastating but occasional famines. Unlike in rural areas, problems of food insecurity in urban areas are strongly related to the inadequate purchasing power of the urban poor which limits their access to adequate quantities of nutritious food (Basset et al., 2002).

Quality of life of people living in poor urban settlements is also of concern. Quality of life of urban poor is often characterized by poor sanitation, high environmental pollution and consequently high and chronic exposure to health hazards (Rashid, 2009). Such unhealthy living conditions aggravate quality of life of individuals. In general, individuals with poor quality of life endure hardship in most aspects of life such as health, education, housing, employment as well as participation in decision making. Food insecurity and quality of life are both common in informal settlements. Determining if there is any linkage between food insecurity and quality of life in informal

settlement will help in the understanding and improvement of food security and the quality of individuals in the urban poor.

1.3. OBJECTIVES

The main objective is to investigate food insecurity, quality of life and their linkage in urban informal settlements in Windhoek, Namibia and determine how socio economic factors mediate and explain both.

The specific objectives are to:

1. Identify the prevalence and determinants of food security.
2. Examine quality of life and its determinants in urban informal settlements.
3. Measure the effect of food security on quality of life in informal settlements and their association to quality of life.

1.4. RESEARCH QUESTIONS

Questions 1: Is there a link between food insecurity and quality of life in informal settlements of Katutura?

Question 2: What are the determinants of Food insecurity and quality of life in informal settlements of Katutura?

1.5 SIGNIFICANCE OF STUDY

The significance of the study was to establish and relate the linkage between food security and quality of life in informal settlements of Windhoek. The main goal is to generate local data to inform large scale programs to tackle the issues faced by the urban poor, particularly those in

informal settlements. The study particularly addresses the sustainable development goal 1, goal 6 and goal 11 which has targets aimed at zero hunger, improved lives of slum and informal settlement dwellers. Moreover Namibia Vision 2030 as implemented through the National development plans emphasize on the need for deliberate efforts to improve the quality of people's lives in Namibia to the level comparable to their counterparts in developed countries. The current NDP4 (2011-2016) was designed to achieve economic growth, alleviate poverty and eliminate inequality, with health and development of the people as one of the pillars. Quality of life assessments can also identify individuals at risk for poor health outcomes.

1.6 ORGANIZATION OF THE THESIS

The remainder of this study consist of five chapters. Chapter 2 discussed the relevant empirical, theoretical and conceptual scholarly literature upon which this study is based. Chapter 3 is the methodology and mainly focuses on the rationale behind the model. Therefore, previous studies with different approaches were reviewed in order to clarify the model selection. Also, previous studies especially based on food in/security and quality of life in informal settlements were reviewed for countries that have different characteristics. With this way, we were able to have different perspectives in terms of contemporary and historical periods. Chapter 4 focused on the analysis of household experience on food security. Chapter 5 fitted a model on food insecurity and quality of life and looked at the linkage between the two variables. Chapter 6 drew particular and general conclusions and made recommendation for further research.

CHAPTER 2: LITERATURE REVIEW

2.1. INTRODUCTION

This chapter presents a review of existing literature on food in/security and quality of life. The literature review links the purpose of the study to various theoretical perspectives and the current nature of variables related to the phenomenon.

This literature review is focusing on food security and quality of life in urban areas in general and in informal settlements in particular, exploring their linkages, its measurement and how it has been applied in studies of informal settlements. The literature review will focus on the definition of food security, quality of life and informal settlements, approaches to food insecurity, causes of food insecurity, quality of life as a determinant of food security, food security as a determinant of quality of life, the literature review will also look into the difficulties ‘shack dwellers’ experience.

2.2. URBANISATION AND URBAN POVERTY

Urbanization and poverty are two outcomes that have continuing trends some individuals may find disturbing. Urbanization is the expansion of a city in a metropolitan area, namely the proportion of total population or area in urban localities or areas. Poverty is the state of being without - often associated with need, hardship, and lack of resources across a wide variety of circumstances (Ooms et al., 2006).

Globally, the urban population is projected to increase from 3.5 billion in 2008 to nearly 5 billion in 2030 (UN Population Fund, 2007). Regionally, the highest population growth is taking place in Asia and Sub-Saharan Africa where urban population is expected to double from 2000 to 2030 (UN Population Fund, 2007).

The rate of urbanization throughout time is distinct from the rate of urban growth, which is the rate at which the urban population or area increases in a given period relative to its own size at the start of that period. In terms of a geographical place, urbanization means increased spatial scale and/or density of settlement and/or business and other activities in the area during a specific period of time (Ooms et al., 2006).

There is no consensus on a definition of urban poverty but two broad complementary approaches are prevalent: economic and anthropological interpretations. Conventional economic definitions use income (Wratten, 1995) or consumption complemented by a range of other social indicators such as life expectancy, infant mortality, nutrition, the proportion of the household budget spent on food, literacy, school enrolment rates, access to health clinics or drinking water, to classify poor groups against a common index of material welfare. Alternative interpretations developed largely by rural anthropologists and social planners working with rural communities in the third world allow for local variation in the meaning of poverty, and expand the definition to encompass perceptions of non-material deprivation and social differentiation (Wratten, 1995; Satterthwaite 1995a). Anthropological studies of poverty have shown that people's own conceptions of disadvantage often differ from those of professional experts. Great value is attached to qualitative dimensions such as independence, security, self-respect, identity, close and non-exploitative social relationships, decision-making freedom and legal and political rights (Ooms, Marla, & Joseph , 2006).

Informal settlements are often studied in the context of informal housing, recognizing the fact that they incorporate predominantly informal housing developments. The informal settlements range from sub-standard slums to housing that does not have the proper development permit. Informal housing can be described as housing that does not conform to the laws and regulatory frameworks

set up in a particular city (UN-HABITAT, 2003). In informal settlements, the decline in living conditions is accompanied by rapid deterioration of existing housing and homelessness (UN-HABITAT, 2007).

According to Amao (2012), the population growth which drives the increase of informal settlements can impose pressure on the inhabitants of informal settlements. While the people are usually poorly educated, competition in the city is high, and it is hard to find jobs. Pressures can also come from environmental hazards such as floods and fire. These pressures impact upon the well-being of the poor in these informal settlements. Poverty can also create long-term pressures. People are unable to obtain adequate food, clean water and other basic services, as well as education. Their health and living standards often suffer when their settlements are situated close to sources of pollution. The environmental hazards and vulnerable locations of informal settlements mean that the effects of the hazards on informal communities are great.

The inhabitants of the informal settlements have little ability to provide for themselves. They live in a state of uncertainty as they have no tenure over the land they occupy. At the same time, people living in hazardous location have the continuous threat of unpredictable disaster. Both external and internal hazards affect their livelihoods. The World Health Organization (2010) notes that informal habitants are frequently ill as a result of the poor quality of their environment and exposure to disease. They are in a state of persistent poverty and frustration. Disasters may cause death and loss, while the poor housing and sanitation also threaten their health.

The most striking immediate change accompanying urbanization is the quick change in the prevailing character of local livelihoods. Agriculture and more traditional local services and small-scale industry will give way to modern industry and urban and related commerce. This change

forces the city to draw on the resources of an ever-widening area for its own sustenance and goods to be traded or processed into manufactured items (Ooms et al., 2006).

As cities begin to form, the effects can include a dramatic increase in rent which often prices the local working class out of the market, including functionaries as employees of the local municipalities. Supermarkets and schools sometimes relocate or close down, as a result of the financial pressure. Dramatic increases in land values also encourage further development, and may bring increased tax revenue for local government (Ooms et al., 2006).

In the field of urban sociology, the effect of urbanization on mentality and lifestyle has been a subject of research and debate. A general consensus hardly exists, though the differing views are closely related to one another. George Simmel a pioneer in German sociology and urban sociology, suggests that the increased concentration and diversity of people and ongoing activities in cities put urbanites under stress. This theory is considered the major cause of the urban mentality: detachment from others, self-centeredness, and a rational, calculating mind (Ooms et al., 2006). Ooms et al. (2006) further suggested that urbanization of any kind has some type of an effect on the appearance of poverty. It may not be the entire cause of the problem, but it cannot be denied that urbanization does affect poverty in some aspect.

Urbanization in the developing world has been a major contributor to progress towards attaining some of the Millennium Development Goals and Sustainable Development Goals, such as those related to poverty, sanitation and health. This is to be expected, given that on average a 10 per cent increase in a country's urban population results in a 30 per cent increase in that country's per capita output. In addition, per capita incomes are almost four times higher in majority-urban countries in comparison to majority-rural countries (Gapper, 2014).

Although urbanization itself is not the cause of poverty, unplanned urbanization is resulting in the shift of poverty to urban areas in developing countries (United Nations, 2014). In 2012, urban poverty was already a serious issue: 525 million urban inhabitants lived on under \$1 per day, while 1.2 billion citizens lived on under \$2 per day. The growth of slums has been inevitable, representing 38 per cent of urban growth around the world and three-quarters of urban population growth in sub-Saharan Africa. The global slum population has been growing by more than 20 million additional slum dwellers per year and will reach a projected total of 1.4 billion in 2020. In Africa, more than half of urban citizens live in informal settlements, where water supply and sanitation are severely inadequate. Climate change is also exacerbating the risk of disasters for populations living in such inadequate shelters (UNCTAD, 2013).

Rapid and unplanned urban growth threatens sustainable development when the necessary infrastructure is not developed or when policies are not implemented to ensure that the benefits of city life are equitably shared. Today, despite the comparative advantage of cities, urban areas are more unequal than rural areas and hundreds of millions of the world's urban poor live in sub-standard conditions. In some cities, unplanned or inadequately managed urban expansion leads to rapid sprawl, pollution, and environmental degradation, together with unsustainable production and consumption patterns (United Nations, 2014).

Adejumobi (2006) described poverty using social indicators, arguing that developing countries are characterized by the lowest social indicators in the world, including high infant mortality rate – with about 157 children out of 1000 dying before the age of five (5), and 90 out of 1000 dying before the age of one in Sub-Saharan African countries- low life expectancy and school enrollments. Many urban areas in sub-Saharan Africa also have very high prevalence rates for HIV/AIDs; where there are large urban populations unable to get required treatments and a lack

of programmes to protect those most at risk, these increase urban mortality rates significantly (Bonk, 2006).

Poverty can also create long-term pressures. People are unable to obtain adequate food, clean water and other basic services, as well as education. Ogumike and Odubogun (1999) indicated that minimum standards for food supply were based on nutritional requirements.

2.3. APPROACHES TO FOOD SECURITY

2.3.1. EARLY APPROACHES TO FOOD INSECURITY

The concept food security is deceptively simple. Essentially, it involves ensuring that all people have access to sufficient, safe and nutritious food to meet their dietary needs and their food preferences and ensure an active, healthy life (FAO, 2002).

The initial focus, reflecting the global concerns of 1974, was on the volume and stability of food supplies. Food security was defined in the 1974 World Food Summit as:

“Availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices (United Nations, 1975)”.

In 1983, FAO expanded its concept to include securing access by vulnerable people to available supplies, implying that attention should be balanced between the demand and supply side of the food security equation:

“Ensuring that all people at all times have both physical and economic access to the basic food that they need (FAO, World Food Security: a Reappraisal of the Concepts and Approaches, 1983)”.

In 1986, the highly influential World Bank report “Poverty and Hunger” (World Bank, 1986) focused on the temporal dynamics of food insecurity. It introduced the widely accepted distinction between chronic food insecurity, associated with problems of continuing or structural poverty and low incomes, and transitory food insecurity, which involved periods of intensified pressure caused by natural disasters, economic collapse or conflict. This concept of food security is further elaborated in terms of:

“Access of all people at all times to enough food for an active, healthy life”.

2.3.2. FOOD SECURITY IN THE 1990s

By the mid-1990s food security was recognized as a significant concern, spanning a spectrum from the individual to the global level. However, access now involved sufficient food, indicating continuing concern with protein-energy malnutrition. But the definition was broadened to incorporate food safety and also nutritional balance, reflecting concerns about food composition and minor nutrient requirements for an active and healthy life. Food preferences, socially or culturally determined, now became a consideration. The potentially high degree of context specificity implies that the concept had both lost its simplicity and was not itself a goal, but an intermediating set of actions that contribute to an active and healthy life.

The 1994 UNDP Human Development Report promoted the construct of human security, including a number of component aspects, of which food security was only one (UNDP, 1994).

This concept is closely related to the human rights perspective on development that has, in turn, influenced discussions about food security.

The 1996 World Food Summit adopted a still more complex definition:

“Food security, at the individual, household, national, regional and global levels [is achieved] when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO, Rome Declaration on World Food Security and World Food Summit Plan of Action, 1996)

This definition is again refined in The State of Food Insecurity 2001:

“Food security [is] a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, The State of Food Insecurity in the World 2001, 2002).

This implies availability and stability of food supplies at the national level, and physical and economic accessibility of required food at the household level.

Food-security language has become widely employed as a way of pursuing particular agendas and legitimizing particular actions, especially those of powerful actors, but at the expense of others. Food-security language is used to legitimize the securing of rights over agricultural lands (Alshareef, 2009; People’s Republic of China, 2008), which one African scholars described as ‘a dubious way to solve the food security conundrum in Ethiopia’, noting that it seems paradoxical that one of the most vulnerable countries in the world is handing over vast land and water resources to foreign investors to help food security efforts of their home countries.

It is used by transnational agribusiness corporations in the legitimization of their profit-generating activities (Archer Daniels Midland, 2010; Robert, 2010; Monsanto, 2010), which range from the corporatization and amalgamation of farmlands – sometimes pushing small- and medium-sized landholders off their farms – to the pursuit of revenues from patented inputs that have been argued to be detrimental to poor farmers in developing countries (Holt-Giminez, 2011). It is used to justify the pursuit of speculative profit by wealthy investors (Emerging Asset Management, 2010). It is also used in the pursuit of political agendas – for example, in concert with the subsidizing of electorally sensitive rural constituencies (USDA, 2010; Philpott, 2006) or, contrarily, providing an argument for the reduction of trade barriers in the quest for greater access to foreign markets. For example, the official Australian food-security policy position is that developing countries must reduce trade barriers in preference to supporting local food producers.

2.3.3. THE UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP) APPROACHES TO FOOD INSECURITY

The United Nations Development Programme (2012) made a comprehensive review of five (5) different approaches to Food Security. Food availability is the oldest and still the most influential. Although the core ideas of this approach could be traced back to the Venetian Thinker Giovanni Botero in 1588, it was Thomas Malthus in 1789 that populated it and it was also called the Malthusian approach. His approach is focused on the (dis) equilibrium between population and food: in order to maintain this equilibrium the rate of growth of food availability should not be lower than the rate of growth of population. Consequently, in this view food security is merely a matter of aggregate (per capita) food production. In a closed economy, this depends mainly on food production and stocks, while in an open economy also food trade can play a relevant role.

The long-lasting view of food security as a problem of food availability has been partly re-visited within a more macroeconomic approach. The focus on food sector – initially only agricultural production, and also food trade later on – has been criticized by economists for being too concentrated on one single economic sector. Recognizing that the economy is composed of many interdependent sectors, food security cannot be viewed as an exclusive problem of the agricultural/food sector. That is why the first attempt to broaden the discipline was actually an attempt to shift the analysis towards national economies as a whole. This meant bringing in the analysis variables such as Gross Domestic Product (GDP), economic growth, eventually, but not necessarily, highly dependent on food production. In a market economy, a stronger economic system can allow the import of goods such as food. This macro-economic framework was also more consistent with old and very influential economic theories such as Ricardo's comparative advantages, according to which each country has to specialize in the sector in which it has an advantage given by the abundance of a specific productive asset or by lower costs of production. This whole approach might be considered as a way to include within the food security framework the national “means” to increase aggregate food availability.

2.3.4. THE INTERNATIONAL LABOUR ORGANIZATION (ILO) APPROACH TO FOOD SECURITY

In the second half of 1970s, the International Labour Organization (ILO) has proposed a new model of development, the basic needs approach, with the intention of incorporating also non-economic dimensions of development (ILO, 1976). The problems of poverty, unemployment, and under-employment, registered in periods of rising economic growth, were the primary causes of the policy shift. Later on, two economists: Streeten (1981) and Stewart (1985) contributed to re-launch this approach. The advocates of the basic needs approach viewed development as a process

aiming to ensure to all the people the satisfaction of their basic needs. The fulfillment of basic needs was a precondition for a “full-life”, composed of material and nonmaterial elements (Stewart 1985). Given the practical nature of this approach, it was necessary to give a minimal interpretation to the full life, i.e. to make a small list of basic needs that governments and development agencies could ensure.

2.3.5. THE ENTITLEMENT APPROACH

For long time the debate on hunger and famine has been heavily affected by food availability approach rooted in Malthus’ thought. Only at the beginning of 1980s Amartya Sen’s entitlement approach contributed to challenge this perspective and shifted the focus from national food availability to people’s access to food. “The entitlement approach concentrates on each person’s entitlements to commodity bundles including food, and views starvation as resulting from a failure to be entitled to any bundle with enough food” (Sen, 1981). Entitlements depend on two elements: 1) the personal endowments, which are the resources a person legally owns such as house, livestock, land, and nontangible goods (Osmani, 1995). 2) The set of commodities the person can have access to through trade and production, i.e. the “exchange entitlement mapping” (Sen, 1981). Starting from a situation in which an individual has just enough means of subsistence, a decline of endowments can obviously lead the person to starvation.

2.3.6. THE SUSTAINABLE LIVELIHOODS FRAMEWORK AND THE CAPABILITY APPROACH TO FOOD SECURITY

The Sustainable Livelihoods (SL) framework is not just an approach to food security, but is a more general approach to development and poverty. Though the concept was certainly used previously, the “emphasis on livelihood” was given in the 1980s by Chambers (1983) who, in his seminal

book, introduced the basic elements of this approach, with a focus on rural development and poverty. Subsequently, the approach has been elaborated and expanded by Chambers himself and other scholars (Chambers 1987; Chambers and Conway 1992).

The ‘emancipatory realism’ security project of Ken Booth and the Welsh School of critical security studies offers one possible approach to penetrating the contradiction between food security as the elimination of hunger and as the re-production of hunger by existing food-security structures and strategies. It also offers some scaffolding upon which to build a framework for rethinking food security and constructing a new, alternative approach to the insecurity of increasing and widespread hunger (Battistella, 2007). In Battistella’s (2007) words, this is ‘theorising that seeks to struggle against the injustices of the world’. Together, these are defining characteristics of the emancipatory security project. For Battistella (2007), ‘emancipation seeks the securing of people from those oppressions that stop them carrying out what they would freely choose to do, compatible with the freedom of others’. Hunger is one of the most basic oppressions that people must be secured against. In this light, food security can be framed in terms of securing vulnerable populations from the structural violence of hunger.

The capability approach to food security was primarily elaborated in 1989 by Jean Drèze and Amartya Sen in the pioneering book *Hunger and Public Action*. The authors do not make any reference to the concept of food security, they instead developed a general analytical framework, based both on the capability and entitlement approach, for studying hunger –chronic or transitory– and all related aspects: undernourishment, malnutrition, famines, etc.

2.3.7. FOOD INSECURITY IN SUB-SAHARAN AFRICA

In the DRC, (and most of Sub-Saharan African countries), almost 70% of the population lives in rural areas and agriculture is often the main source of income for these families. The country is widely recognized as having enormous agricultural potential. Unfortunately, the succession of wars, looting, theft, insecurity and displacement have made rural people insecure and made it difficult to practice agriculture, worsening the already very difficult living conditions of the population (Ngeleza et al, 2011). The rural population is condemned to subsistence farming characterized by extremely low productivity, and exorbitant marketing costs, weak infrastructure (e.g., weak storage capacity and poor road networks) and a virtually non-existent market (Lebailly, 2010).

Producers who succeed in generating a surplus then face enormous difficulties in marketing their products. In this regard, transportation is the main bottleneck, and considerable costs are generated by poor infrastructure. Roads are indeed only passable on certain routes that have benefited from repairs to their infrastructure and agriculture services. Given the condition of the road network and current fuel prices, road transport costs remain fairly high. Inland waterways are not sufficient to offer a real alternative, and most still remain under development (Tecsult, 2009).

The Congolese rural economy has fallen into a vicious circle, where the continual deterioration of competitiveness generates market losses and subsequent inadequate investment (Hamilton, 2010). The exodus of the population to the cities is therefore inevitable and reinforces the state's disengagement from education and health in rural areas, which in turn affects farmers' production capacities, and so on.

According to the United Nations human settlements programme, UN Habitat, Africa is the fastest urbanizing continent in the world. By 2050, 60% of all Africans will be living in cities. But urbanization in Africa is not going hand-in-hand with widespread economic growth: many cities are in fact seeing a proliferation of urban poverty. Food insecurity and undernutrition is therefore also increasingly an urban issue, and with urban people more dependent than rural populations on whatever food they can afford to buy, it's tied closely to livelihoods (UN-Habitat, 2010).

Researchers of the African Food Security Urban Network (AFSUN) refer to urban food insecurity as an 'invisible crisis' due to its growing, but unaddressed, prevalence in African cities (Crush and Frayne, 2010). In African cities, food provisioning and exchange is carried out largely by the improvisational and self-directed activities of urban populations. In contrast to the global north, where food access is concentrated in supermarkets, household food provisioning in the global south takes place through a dynamic mix of market and non-market sources (agriculture and livestock production) and there is a heavy reliance on the informal food economy for both livelihood and food security, especially by the urban poor (Battersby, 2012; Battersby and Crush, 2014; Crush and Frayne, 2011).

The main determinants of food, livelihood and nutrition security are the same for urban and rural areas. However, there is a wide variation in the factors that affect these determinants. For example urban households are more dependent on food purchase, which, if they have sufficient purchasing power, can lead to a more varied diet and higher reliance on 'ready-made' and fast foods, compared to rural households. Food access has a direct impact on dietary diversity and has been seriously affected by rising food and fuel prices, conflict, and the primary or secondary effect of natural disasters in urban areas across the globe (Mohiddin, 2012).

Unlike in rural areas food insecurity problems in urban areas are not related to a lack of available food. Instead, they are related to inadequate purchasing power. Higher income inequality in urban areas is the reason that more than half of the urban population is below the poverty line in developing countries with varying income levels (FAO, 2004). Poverty in the urban areas of developing countries is growing faster than in rural areas. A recent World Bank and IMF report based on more than 200 surveys in 90 developing countries documented a slower pace of poverty reduction during 1993 to 2005 than in the past. The reduction report showed that the growth in urban poverty was 30 percent higher than rural poverty during that time period (IMF, 2007).

In towns and cities, food is likely to be available in markets, even if it's unaffordable. Urban dwellers have to purchase almost all their food as well as housing, transportation, health care and education. Urban food security reflects individual household circumstances. Relatively higher urban incomes may not compensate for what may be higher food prices and cash requirements. Urban residents often also lack land and other inputs to be able to produce their own food and thus buffer shocks (and in many cities urban agriculture is illegal) (UNESCO, 2006).

Rapid food price increases in 2007 and the first half of 2008 attracted serious policy attention. During the course of 2008, the United Nations issued a Comprehensive Framework for Action (CFA) on the food crisis and donors pledged more than US\$ 12 billion to assist low-income, food importing countries (Caesar, n.d.). The speeches and plans duly noted poor urban dwellers' vulnerability; they rely primarily on purchases for their food and this accounts for the bulk of their expenditure. Yet most policy prescriptions focused on addressing rural food production constraints, food stocks and macroeconomic measures. Action in these areas potentially contributes to longer-term urban food security, but policy makers and analysts paid less attention to direct improvements in urban food security.

According to World Food Programme (2008), higher prices may also translate into increased expenditure on food to the detriment of other household needs (e.g. education, health) and an even poorer diet, as families shift from energy-dense cereals to less energetic/micronutrient-rich but cheaper food products. While everybody is affected by food price rises, the most affected households are likely to be net food buyers and households that are already vulnerable to food insecurity.

2.3.8. FOOD INSECURITY IN NAMIBIA

In the early 1990s, new food security research began in Namibia but with an exclusive rural focus (Hay et al., 1990; NISER, 1992; Government of Namibia, 1993). This was the result of two main features of the immediate post-independence period. First, the new government was a developmental state and prioritized issues such as land reform and redistribution, health, education, community structure, poverty and livelihoods, and inequality and other social problems (Hansohm and Presland, 1998). Researchers became pre-occupied with these post-independence development priorities (Nickanor, 2014). Secondly, the widespread 1992 drought which affected the entire Southern African region severely impacted on small-scale crop farmers, livestock and commercial farmworkers in Namibia (NDTF, 1993).

Frayne (2004) demonstrated how poor urban households survived in Windhoek because of food remitted from the rural areas through informal and family urban-rural links. Frayne drew attention to the importance of food sharing and food borrowing, and the lack of urban agriculture in Windhoek. Methodologically and conceptually, he confirmed the importance in understanding urban food security of focusing on the multi-spatial household as a unit of analysis.

Nickanor (2014) argued that although poverty in low-and middle-income countries is often deeper and more widespread in rural than in urban areas, disproportionate attention to rural dwellers is probably misplaced. Many rural dwellers are net producers, and so may have their own crops or livestock to buffer shocks and may even benefit from higher prices. Few urban dwellers have these options. Nutritional status depends on more than just food, and results from the interaction of food, health and hygiene, and care. Urban women are more likely to work outside the home than their rural sisters, and may have less time for and more difficulty with child care. They tend to end breastfeeding two to three months earlier, often depriving their children of nutrients and immunity to disease (Crush and Frayne, 2012).

The jobs of urban poor people are casual, insecure, uncertain and low paying, and include street-vending, rickshaw-driving, construction and factory work. But these jobs tend to be permanent, in the sense that poor people stick with them, and do not move from job to job every day (Crush and Frayne, 2012). Urban people tend to buy food from local markets or neighborhood kiosks. These are frequently small and widely scattered. Wholesale markets, when they exist, are often old and located in city centers, hemmed in by and creating traffic congestion. Storage facilities are frequently inadequate or badly managed and refrigeration is scarce (Babu et al. 2014). According to Nickanor (2014), it is also of understanding that poor households tend to suffer more than others from price increases because they spend a bigger share of their income on food. Female-headed households are at greater risk to well-being because they tend to devote an even larger share to food.

2.4. APPROACHES TO QUALITY OF LIFE

Urbanization has raised the standard of living for many by offering employment opportunities and better public services. However, it also comes with important challenges, particularly for developing countries. In many parts of the world, urbanization has not taken place in a socially inclusive manner. According to United Nations Environment Programme (2011), many developing countries have not been able to predict and prepare for the rapid pace of urbanization that is in progress. Even where the trend is predictable, cities are unable to address the needs of growing populations and cope with surging requirements for housing, physical infrastructure, including roads and telecommunications technologies, and social services, such as health and education. The continuation of current urbanization patterns in the developing world could lead to urban decay and a low quality of life (United Nations Environment Programme, 2011).

In general, quality of life is the perceived “quality of an individual’s daily life, that is, an assessment of their well-being or lack thereof. This includes all emotional, social, and physical aspects of the individual’s life.” Whereas, in health care, health-related quality of life (HRQoL) is an assessment of how the individuals well-being may be affected over time by a disease, disability, or disorder.

The term ‘Quality of life’ is used to evaluate the general well-being of individuals and societies but its meaning is very complex, very comprehensive and varies with time and the person's beliefs. (Giovanni, 1998) asserted that quality of life has to do with how people live, feel and understand their daily lives. This includes aspects such as health, education, housing, employment and participation in decisions. (Ribeiro, 2005) notes that quality of life is a term that has emerged as a concept of living conditions, health and physical safety, mental and social ability. However,

definitions of quality of life have also been diverse. It has to do with how each one sees himself and the community (Constanza, 2008).

After 25 years of independence, Namibia with many resources (fish, diamonds etc.), industrialization growing at a high pace, peace and stability, one would think that it should be free of poverty. In reality, behind the image of prosperity, Namibia's income distribution is extremely unequal with many people still living at subsistence level and many in abject poverty (Nickanor, 2014). The Gini coefficient of Namibia is reported to be 59 (Word Bank, 2010). The signs of poverty are very visible in the informal settlements of Windhoek. Not only is housing a major problem, but there is also lack of basic services such as water, ablution facilities, electricity, roads, street lights, clinics and other infrastructure (Nickanor, 2014).

Although cities are focal points of economic development, innovation, and employment; act as centers of modern living, culture, science, education, health care, politics, and other basic services (Cohen 2006, Leon 2008), the failure to manage the impacts of rapid urbanization threatens the environment, human health, equity, urban productivity and hence the quality of life (Fadda and Jiron, 1999). These areas can be the breeding grounds for poverty exclusion and environmental degradation (UN-HABITAT, 2008). As a result of the high cost of housing, lack of good financing schemes, the increasing population is forced to live in substandard housing and unhealthy conditions giving rise to informal settlements (Olotuah, 2005).

Briceno-Leon (2005) believes that higher poverty, inadequate basic facilities, and lack of job opportunities in rural areas generally force people to move to cities. The pull factors of migration may include the expectation of higher income and better life. Generally rural migrants come to the cities under the illusion that cities will offer prospects of good employment, better education, a

good living standard and a life with rights and security (Briceno-Leon, 2005). Regrettably, the real situation in the cities, however, mostly does not come up to the migrants' expectation. On the contrary, migrants often find themselves in situations of unemployment, underemployment, hopelessness (Oloruntimehin, 1996) and Insecurity (Bricen-Leon, 2005).

The city's infrastructure and resources are not sufficient to provide facilities according to people's demand. Consequently, most of the migrants from low-income families encounter various problems such as insecurity and social discrimination. The majority of the migrants normally settle in slum and squatter settlements. Urban slum settlers are frequently exposed to adverse living conditions including insufficient provision of health care, drinking water, solid waste and waste water management, electricity and fossil fuels for cooking and heating (Khan et al., 2009). They often have no security of tenure and suffer from dense and poor structural housing facilities. Additionally, the generally poor-educated slum dwellers often lack knowledge on health threats. The poor environmental conditions of slums exacerbate the risks of waterborne diseases (e.g. diarrhoea, cholera) and airborne diseases (e.g. influenza, pneumonia, and tuberculosis) (Rashid 2009).

Increasing urban inequality is another challenge in the cities. In many cities, wealth and poverty coexist in close proximity i.e. rich, well-served neighborhoods and gated communities are often situated near densely populated slum communities. Slum dwellers of the world's poorest cities often experience multiple deprivations in terms of housing, food, education, health and basic services. The high level of inequality creates social and political fractures within the society, increases political tension, reduces investment and is associated with devastating consequences on societies (UN-HABITAT, 2008).

Richard et.al (2007) found that in South Africa, residents' satisfaction with informal dwellings is very low; the highest level of satisfaction is just over 10%. Access to water is typically from street taps and the highest level of satisfaction with this level of service was just over 50% and the lowest was less than 20%. Sanitation was mostly sub-standard non-flushing toilets and satisfaction ranged from the mid-20s to less than 10%). Once-weekly refuse removal was accessible to between 45% and 70% of residents and satisfaction ranged from just less than 40% to around 55%). Electricity access ranged from just over 10% to 50%). Generally, housing was considered inadequate and the service levels were low, as were satisfaction levels.

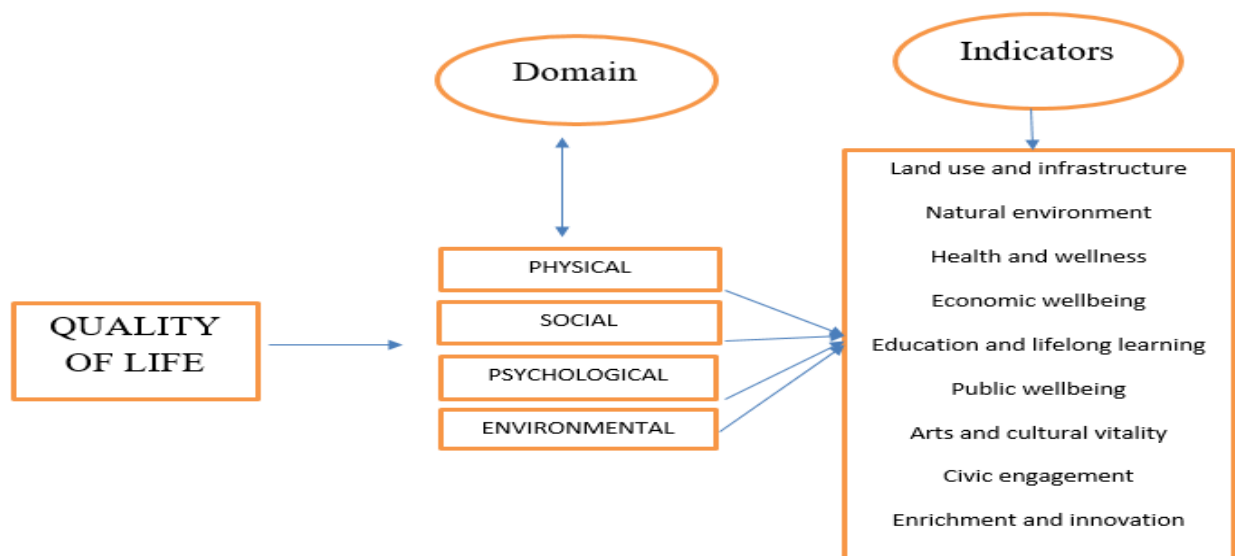
Richard et.al (2007) believes that seasonality affects urban incomes just as it does rural ones. Rain prevents many workers from working and can also make it difficult to get products to the cities, which results in higher food prices. Factories need fewer workers during seasonal slack periods.

2.5. CONCEPTUAL FRAMEWORK: QUALITY OF LIFE

Quality is a product of subjective judgment which arises from the overall perception which the individual holds towards what is seen as the significant elements at a particular point in time (Olayiwola, et al, 2006). In assessing the quality of life, social indicators such as health and levels of crime, subjective well-being measures (assessing people's evaluative reactions to their lives and societies), cultural and economic indices are very important. According to (Truckee, 2007) Indicators of quality of life can be categorized as follows: land use and infrastructure (Housing and mobility options enable families to be self-sufficient and businesses to be profitable, development that encourages healthy lifestyles and neighborhood livability, affordable housing, land use balance and sensitivity and mobility and convenience.), natural environment (clean air and water support healthy communities, recreational options and diverse wildlife; invest in natural

resources for future generations' enjoyment and open space access), health and wellness (It means that people have their basic medical needs met and access to a variety of medical facilities and services.), economic wellbeing (a thriving economy that provides valuable jobs, income for necessities and sufficient revenue for the public services: Economic resources allow individuals to be more self-reliant), education and lifelong learning (quality of life means everyone has access to quality educational opportunities throughout their lives. Skills to be a productive citizen that include self-sufficiency, personal enrichment and economic contribution), public wellbeing (safe neighborhoods, schools and workplaces, secure families and vibrant tourism, which encourages visitors to enjoy the outdoor experience and feel confident visiting the region's attractions and community responsiveness to its most vulnerable populations), arts and cultural vitality, civic engagement, enrichment and innovation.

Figure 1: Conceptual Framework: Quality of Life



2.5.1. MULTIPLE OVERLAPPING DEPRIVATION ANALYSIS (MODA)

Multiple Overlapping Deprivation Analysis provides a comprehensive approach to the multidimensional aspects of (child) poverty and deprivation. It is developed by the UNICEF office of Research, with support from the Division of Policy and Strategy, to facilitate the analysis of inequities and to provide instruments to identify deprived children. It encompasses a large set of tools used in multidimensions via multiple overlap analysis to multidimensional deprivation ratios and their decomposition. The MODA methodology places the child at the heart of the analysis and concentrates on those aspects of well-being that are relevant for the children at particular stages of their lives. Moreover, the analysis indicates which deprivations children experience simultaneously. The information found when analyzing groups of children with overlapping and non-overlapping deprivations points towards mechanisms needed for effective policy design to address children's needs as accurately as possible.

2.5.2. MATERIAL DEPRIVATION INDEX (MDI)

In 2011 a new measure of material deprivation, with a focus on older people's quality of life, was introduced. This is called the 'Material Deprivation Index' (MDI) and it aimed to capture wider elements of everyday life which impacted on the wellbeing of the elderly. To obtain the material deprivation data individuals were asked whether they had access to certain items, services, or experiences or not, and if not why they lacked access to them (Khalid, 2012). The answers to these questions were used to judge whether an individual was materially deprived or not. In summary, the questionnaire consisted of 15 weighted questions, the answers to which determined whether the person answering could be considered materially deprived or not (Khalid, 2012) (Appendix A).

2.5.3. HUMAN DEVELOPMENT INDEX APPROACH TO QUALITY OF LIFE

The Human Development Index (HDI) of the United Nations, is seen as a contribution to the search for a better and more comprehensive measure of socioeconomic welfare than GDP. It is the lives that people lead that are taken to be of intrinsic importance rather than the incomes that they enjoy.

HDI is a composite of three basic components: longevity, knowledge and income. Human development is seen as a process of expanding people's choices. Income is seen as contributing to this end primarily in the escape from poverty; above a threshold level it is considered to make a sharply diminishing contribution to human development, eventually tailing off to nothing. Longevity, measured by life expectancy, and knowledge, measured by a weighted average of literacy and schooling, are regarded as central to the enhancement of capabilities but not closely correlated with or strictly dependent on private income. The components are combined in a single index by measuring them in terms of the percentage of the distance between the minimum and the maximum values travelled in each case and averaging these scores into one index.

The HDI approach to measuring the quality of life also has obvious weaknesses. In common with heights, the approach runs into problems with regard to the weighting of different components of well-being. In this case, unlike with heights, it is at least possible to work out the implicit set of weights involved which are closely related to the choices for the maximum and minimum values for each component. When this is done, however, the results appear arbitrary.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter provides an outline on how the research process was carried out to get answers on research objectives and questions. The focus will be on the study population, sampling techniques, sample size, data collection methods and the control measures taken to ensure validity and reliability.

3.2. STUDY SITE

The study was undertaken in three informal settlements in Katutura, Windhoek, Namibia. The informal settlements selected are Samora Machel Constituency, Tobias Hainyeko Constituency and Moses Garoeb Constituency. The three informal settlements are located about 5 km from the city center, and are next to each other. The three informal settlements, are densely populated (49,178, 45,912 and 41,988 inhabitants per square km, respectively) (NSA, 2014). They are characterized by lack of basic infrastructure, high unemployment rates, poor water and environmental sanitation, poor housing, insecurity, violence, and poor health indicator.

Katutura has six (6) constituencies [Tobias Hainyeko, Katutura central, Katutura East, Soweto (John Pandeni), Samora Machael, Moses Garoeb], of which four (4) [Tobias Hainyeko, Samora Machael, Moses Garoeb, Khomasdal] have informal settlements but Khomasdal constituency was not included in the survey. According to the 2011 Namibian Population and Housing Census, the total population in the settlement was 199,100 with 52,100 households and an average household size, per constituency, ranging between 3.3 and 4.9 persons. Therefore over 60% of Windhoek

population lives in informal settlements. Figure 1 shows the map of Windhoek and the enumerated settlements are shown in figure 2.

Figure 2: Map of Windhoek informal settlements

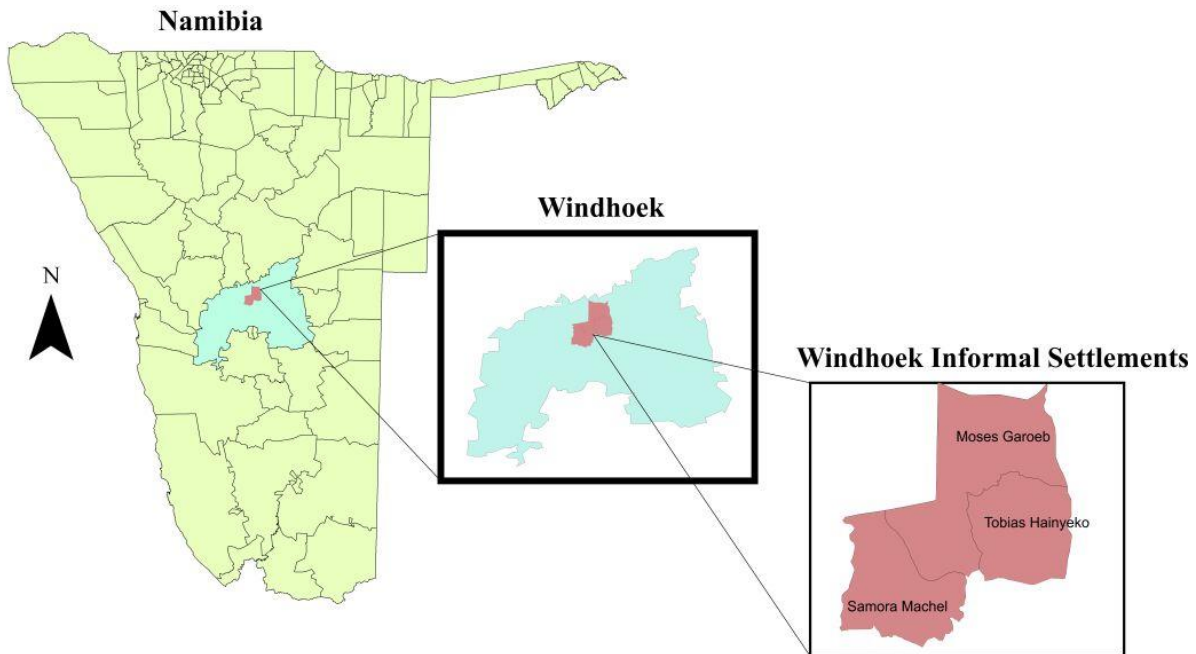
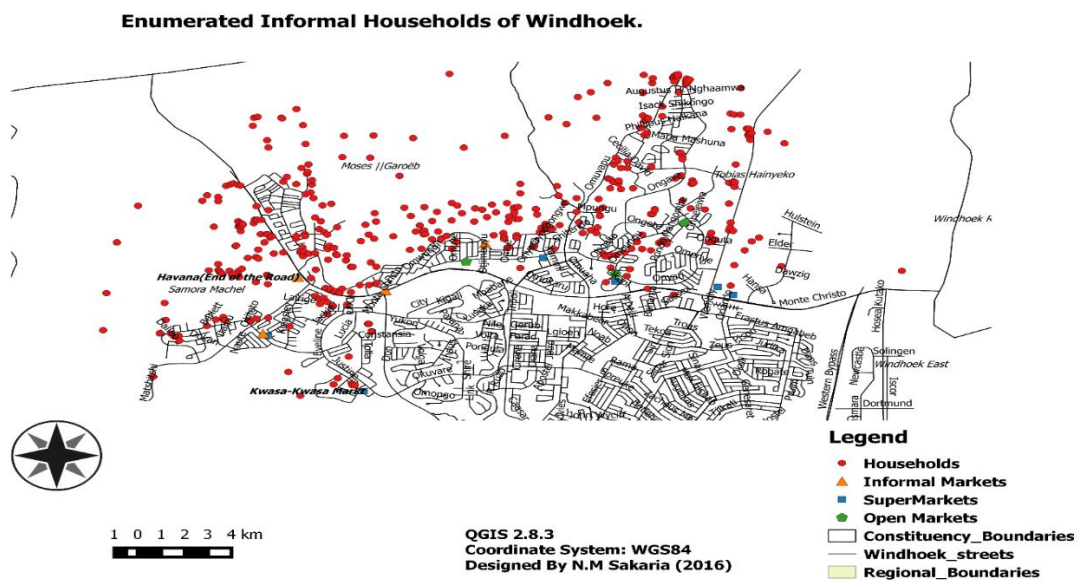


Figure 3: Enumerated informal settlements and Households of Katutura, Windhoek.



3.3. RESEARCH DESIGN AND SAMPLING

The study used a quantitative cross-sectional design. The selection of participants followed a two-stage sampling approach, with the goal of obtaining a representative sample of adults and children for each area. The sampling frame for data collection was drawn from the 2011 population and housing census (PHC).

At first stage of sampling, 30 enumeration areas (EAs) were selected in each of the 3 constituencies using proportional to size sampling, targeting adults aged 18 years and older head of households [because these are fewer]. The boundaries of the EAs for these areas were defined in the 2011 PHC. Second, households were selected in each EAs.

The following assumptions were incorporated in the sample size calculation, that non-participation rate or non-contact rate will be 20%, and an attrition rate of 20%, drawn from the 2006/07 Namibian demographic and health survey. Such large non-response rates are assumed because urban city is a well-documented correlate of survey non-response. Physical barriers to participation, respondents concerns with crime and privacy, constant change of address all made it impossible to have a high participation on response rate.

The sample size calculation for cluster surveys was based on the following assumptions: (a) Target population size of 200,000 individuals or 300 clusters; (b) Estimated percentage in the target population with the event of interest [children malnutrition] of 25 % based on the 2006/07 Namibian DHS; (c) Confidence interval width of 5% or Confidence coefficient of 95%; (d) Estimated Design effect (DEFF) of 2; (e) Percent Response of 60% (a combined effect of non-response and attrition) and (f) On average, there will be 1 eligible individual per household.

3.4. RESEARCH INSTRUMENT

A questionnaire was used to cover all aspects of the survey. The survey instrument or tools depicted questions from various related surveys including: the DHS modules on health; FANTA module on food security and WHO quality of life module (WHOQoL-BREF) (WHOQoL, 1993). The survey topics to be covered are listed in Table 1.

Table 1: Key survey topics for population health surveillance study in Katutura settlement, Windhoek.

Livelihoods	Food security	Health care access and utilization	Health conditions	Health risk factors: knowledge, behavior and attitudes	Quality of life	Other social and environmental factors
Household activities; Assets [Financial, human, natural, physical. Social support networks]	Nutrition, Dietary conditions (quality, variety, or desirability of diet); disrupted eating patterns and reduced food intake	Health coverage, health seeking behavior	Asthma, depression, diabetes, obesity, helminths, respiratory infections, diarrhea, Days sick past 1 week/month	Alcohol use, smoking/tobacco use, nutrition,	Self-rated health, Health-related quality of life, Perceived stress, lived poverty index	Education, employment, perceived violence, mode of transportation

3.5. FOOD SECURITY MEASUREMENT

This study measured three (3) indicators of food security, Household Food Insecurity Access Scores (HFIAS), Household Dietary Diversity Scores (HDDS) and Months of Inadequate Household Food Provisioning (MIHFP). The HFIAS was devised by the Food and Nutrition Technical Assistance Programme (FANTA) of USAID as a universally applicable food insecurity measurement tool (Coates, Swindale, & Bilinsky, 2007). The HDDS and MIHFP measures were similarly devised by FANTA as “two strategic objective level indicators of household food access” (Coates, Swindale, & Bilinsky, 2007).

3.5.1 HOUSEHOLD FOOD INSECURITY ACCESS SCALE (HFIAS)

The Household Food Insecurity Access Scale is based on the idea that the experience of food insecurity causes predictable reactions and responses that can be captured and quantified through a survey and summarized in a scale (Coates, Swindale, & Bilinsky, 2007). The indicator combines questions about perceptions of food vulnerability or stress with questions about the respondent’s behavioral responses to insecurity. Nine separate questions are asked. Each of the questions in the following table is asked with a recall period of four weeks (30 days). The respondent is first asked an occurrence question – that is, whether the condition in the question happened at all in the past four weeks (yes or no). If the respondent answers “yes” to an occurrence question, a frequency-of-occurrence question is asked to determine whether the condition happened rarely (once or twice), sometimes (three to ten times) or often (more than ten times) in the past four weeks. Example:

1. In the past four weeks, did you worry that your household would not have enough food?

0 = No (skip to Q2)

1 = Yes

1. a. How often did this happen?

1 = rarely (once or twice in the past four weeks)

2 = Sometimes (three to ten times in the past four weeks)

3 = Often (more than ten times in the past four weeks)

The HFIAS occurrence questions relate to three different domains of food insecurity (access) found to be common to the cultures examined in a cross-country literature review (FANTA 2004, Coates, 2004). The generic occurrence questions, grouped by domain, are:

1) Anxiety and uncertainty about the household food supply:

- Did you worry that your household would not have enough food?

2) Insufficient Quality (includes variety and preferences of the type of food):

- Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?
- Did you or any household member have to eat a limited variety of foods due to a lack of resources?
- Did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food

3) Insufficient food intake and its physical consequences:

- Did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?
- Did you or any household member have to eat fewer meals in a day because there was not enough food?
- Was there ever no food to eat of any kind in your household because of a lack of resources to get food?
- Did you or any household member go to sleep at night hungry because there was not enough food?
- Did you or any household member go a whole day and night without eating anything because there was not enough food?

For purposes of more advanced statistical analysis, Coates et al. (2007) recommend calculating a single score for each household (the HFIAS score) (Coates et al., 2007). This score is a summation of the household's answers to the nine questions where No = 0; Rarely = 1; Sometimes = 2, and Often = 3. The HFIAS score varies between 0 (where all households answer 'no' to every question i.e. most secure) and 27 (where all households answer 'often' to every question i.e. most insecure). The higher the score, the more food insecurity the household experienced.

3.5.2 HOUSEHOLD FOOD INSECURITY ACCESS PREVALENCE

The Household Food Insecurity Access Prevalence (HFIAP) Status indicator can be used to report household food insecurity (access) prevalence and make geographic targeting decisions with scores ranging from 0-27. The HFIAP is a categorical measure and provides a way of classifying each household into one of four food in/security groups based on the responses to individual

questions: food secure, mildly food insecure, moderately food insecure and severely food insecure (Coates, Swindale, & Bilinsky, 2007).

According to Coates, Swindale, & Bilinsky, (2007), a food secure household experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely. A mildly food insecure (access) household worries about not having enough food sometimes or often, and/or is unable to eat preferred foods, and/or eats a more monotonous diet than desired and/or some foods considered undesirable, but only rarely. But it does not cut back on quantity nor experience any of three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating). A moderately food insecure household sacrifices quality more frequently, by eating a monotonous diet or undesirable foods sometimes or often, and/or has started to cut back on quantity by reducing the size of meals or number of meals, rarely or sometimes. But it does not experience any of the three most severe conditions. A severely food insecure household has graduated to cutting back on meal size or number of meals often, and/or experiences any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating), even as infrequently as rarely. In other words, any household that experiences one of these three conditions even once in the last four weeks (30 days) is considered severely food insecure.

Figure 3 illustrates this categorization. The categorization scheme is designed to ensure that a household's set of responses will place them in a single, unique category.

Figure 4: Categories of Food Insecurity (Access)

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

Source: J. Coates, A. Swindale & P. Billinsky, 2007

3.5.3 HOUSEHOLD DIETARY DIVERSITY SCORE (HDDS)

Lack of Dietary Diversity often accompanies food insecurity and thus the quality and of food consumed is an important aspect of food security. Measures of dietary diversity tend to be of two types: those based on whether an individual food is consumed or not and those that are based on whether any food from a particular food group is consumed. When comparing dietary diversity based on food groups and individual foods, regression analysis shows that dietary diversity based on food groups is a stronger determinant of nutritional adequacy (Ruel, 2002; 2003).

The HDDS adopts the food group approach and asks how many of 12 different groups were consumed in the household over a specific recall period (usually 24 hours) (Hoddinott and

Yohannes, 2002; Swindale and Ohri-Vachaspati, 2005; Swindale and Bilinsky, 2006b). The classification recommended for Africa by the FAO is shown in Table 2, which food group types primarily based on their nutrient content. The number of food groups consumed in a household provides a measure of the quality of the diet by reflecting the dietary diversity.

Table 2: Food Types in groups to construct HDDS

	Food groups
1.	Any (local food) bread, rice, noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or (any other local grain)
2.	Potatoes, yams, cassava, or any foods made from roots and tubers
3.	Vegetables
4.	Fruits
5.	Beef, pork, lamb, goat, rabbit, wild game, chicken, duck, other birds, liver, kidney, heart or other organ meats
6.	Eggs
7.	Fresh or dried fish or shellfish
8.	Food made from beans, peas, lentils or nuts
9.	Cheese, yoghurt, milk or other milk products
10	Foods made with oil, fat or butter
11	Sugar/honey
12	Any foods such as condiments/tea/coffee

The respondent was asked a yes/no 24 hour recall question for each of the twelve food groups with regard to food consumed by household members in the home or prepared in the home for consumption by household members outside the home e.g. at lunchtime when at work. The sum of the 'yes' responses provides a score out of 12 for each household. The individual household scores are then averaged to construct a HDDS for a given population. The closer the score is to twelve the greater the dietary diversity.

3.5.4 MONTHS OF ADEQUATE HOUSEHOLD FOOD PROVISIONING (MAHFP)

According to Coates, Swindale, & Bilinsky, (2007), the resources available to the household and the management and availability of these resources throughout the year defines food access. Respondents were asked to reflect on the situation over the previous 12 months and answer the following questions:

- In the past 12 months, were there months in which you did not have enough food to meet your family's food needs?
- If yes, which were the months (in the past 12 months) in which you did not have enough food to meet your family's needs? The higher the number of months that a household did not have had adequate food, the greater the likelihood that it is food insecure and therefore vulnerable to food insecurity (Bilinsky and Swindale, 2007). The overall MAHFP for a population is calculated on a monthly basis by determining the proportion of households with an inadequate food supply for that month.

3.6 QUALITY OF LIFE MEASUREMENT

3.6.1. LIVED POVERTY INDEX

The Lived Poverty Index (LPI) developed by the Afrobarometer (Mattes, 2008), is an experiential measure that consists of six (6) survey questions that measure how frequently people actually go without basic necessities during the course of a year. It measures a portion of the central core of the concept of poverty that is not well captured by existing measures, and thus offers an important complement to official statistics on poverty and development. Because people are the best judges of their own interests, respondents are best placed to tell us about their quality of life, though they might not be able to do it with a great deal of precision.

The questions on LPI are as follow: Over the past year, how often, if ever, have you or your family gone without enough: food to eat; clean water for home use; medicines or medical treatment; enough fuel to cook your food; a cash income? A range of response options are offered, starting with never for those that experienced no shortages, to just once or twice, several times, many times and always. Afrobarometer implemented this survey across a number of countries and this permits/allows for monitor not only shifts in the levels and nature of poverty over time, but also to compare experiences across countries and regions.

The responses to this set of Afrobarometer questions can be combined to calculate an average score for each individual respondent, and for each country, that captures overall levels of “lived poverty.”

The Lived Poverty Index (LPI) score ranges along a five point scale from 0 (which can be thought of as no lived poverty) to 4 (which would reflect a constant absence of all basic necessities).

3.6.2 WORLD HEALTH ORGANIZATION QUALITY OF LIFE (WHOQOL)

The WHOQOL is a quality of life assessment developed by the WHOQOL group with fifteen international field centers, simultaneously, in an attempt to develop a quality of life assessment that would be applicable cross-culturally. The questions ask how you feel about your quality of life and domains are derived from the questions (Appendix A). Below is 25 questions that are asked.

- How would you rate your quality of life?
- How satisfied are you with your health?
- To what extent do you feel that physical pain prevents you from doing what you need to do?
- How much do you need any medical treatment to function in your daily life?
- How much do you enjoy life?
- To what extent do you feel your life to be meaningful?
- How well are you able to concentrate?
- How safe do you feel in your daily life?
- How healthy is your physical environment?
- Do you have enough energy for everyday life?
- Are you able to accept your bodily appearance?
- Have you enough money to meet your needs?
- How available to you is the information that you need in your day-to-day life?
- To what extent do you have the opportunity for leisure activities?
- How well are you able to get around?
- How satisfied are you with your sleep?
- How satisfied are you with your ability to perform your daily living activities?
- How satisfied are you with your capacity for work?
- How satisfied are you with yourself?

- How satisfied are you with your personal relationships?
- How satisfied are you with the support you get from your friends?
- How satisfied are you with the conditions of your living place?
- How satisfied are you with your access to health services?
- How satisfied are you with your transport?
- How often do you have negative feelings such as blue mood, despair, anxiety, depression?

From the 25 questions, four domains were computed (WHOQOL- BREF, 1993).

Domain 1 (physical) score = $Q3 + Q4 + Q10 + Q15 + Q16 + Q17 + Q18$

Domain 2 (psychological) score = $Q5 + Q6 + Q7 + Q11 + Q19 + Q25$

Domain 3 (social) score = $Q20 + Q21$

Domain 4 (environmental) score = $Q8 + Q9 + Q12 + Q13 + Q14 + Q22 + Q23 + Q24$

Transformed scores were estimated using tables for standardizing scores from 0-100 with the lowest score of zero and the highest score of 100. (See Appendix A and B for additional information).

3.7. STATISTICAL ANALYSIS

3.7.1 DATA ENTRY

All data were entered in data- entry screen designed in Microsoft access for better quality check and error control. The entry form is designed in such a way that it should permit capture of repeated measurements. Then the data was cleaned and exported to SPSS software for detailed statistical analysis.

3.7.2. STATISTICAL METHODS

Based on established survey design theory, sampling weights were calculated and applied to survey observations. A probability selection weight (at EA, household and respondent levels) and a post-stratification weight to reflect the age, sex of the 2011 Namibia census was applied.

Descriptive statistics were generated to summarize the levels of food insecurity and quality of life, relate survey main outcomes and explanatory factors. Bivariate analysis using cross-tabulations and chi-square test, were carried out to relate explanatory variables to food insecurity and quality of life.

A binary logistic regression was used to relate quality of life status with food security, controlling for confounders like the bio-demographic and socio-economic variables. Ordinal logistic regression model was used to investigate the effect of household characteristics to food insecurity and quality of life.

3.8. RESEARCH ETHICS

Participants were made aware of the purpose of the research with a consent letter, while specifying the nature of the research, accompanied with a letter asking for permission to interview participants.

All participants were made aware of the right participants have, and the responsibilities researchers have towards the participants. For example, participants were informed of the right for voluntary participation and that the respondent could pull out of the research anytime, if they feel like it.

Participant were further assured that the information they provided as well as individual household coordinates (from GPS's) will be kept confidential and will not be reported in a manner which can be traced back to individuals.

3.9. CONCLUSION

The preceding chapter presented an in-depth discussion of the research methodology. The aim was to outline how the researcher approached the methodology of data collection, sampling, and selection of the study population. Explanations were also given as to how validity and reliability were ensured and ethics observed.

CHAPTER 4: HOUSEHOLD FOOD INSECURITY EXPERIENCE

4.1. INTRODUCTION

This chapter presents and discuss findings of levels of food in/security in informal settlements of Katutura, the quality of the diet in poor households and the variability in household food in/security over time using the FANTA methodology discussed in Chapter 3. It particularly examines responses to food insecurity, dietary diversity score, variety of food consumed, Months of Adequate Household Provision as well as food sources.

4.2. LEVELS OF FOOD SECURITY

Food security is a basic human right. However, during the period 2010 - 2012, 852 million people in developing countries remained food insecure (FAO, 2012). Table 1 shows household food insecurity access scale and household food insecurity prevalence levels for informal settlements of Katutura. In the informal settlements of Katutura, 63 percent of the households are food insecure and 37 percent food secure. The households had a mean of 9.88 and median of 7.0 of the household food insecurity access on the scale between 0 and 27. These scores are below the middle point, indicating mildly food insecurity (access) experienced by households.

Table 3: Levels of food insecurity in informal settlements of Katutura

Food insecurity in informal settlements of Katutura		
<i>Household Food Insecurity Access Scale (HFIAS)</i>		
Mean	9.88	
Median	7.0	
Standard deviation	9.64	
<i>Household Food Insecurity Access Prevalence (HFIAP)</i>		
	No.	Percent
Food Secure	154	37%
Food Insecure	262	63%
Total:	416	100%

4.2.1. HOUSEHOLD EXPERIENCES OF FOOD INSECURITY

Insufficient quantity of food leads to food insecurity. Table 4 shows that 20 percent male headed and 17.6 percent female headed households in informal settlements had to often eat a smaller meal than felt needed because there was not enough food, 26.3 percent female headed and 16.4 male headed households sometimes eat a smaller meal than they felt needed. Having to eat fewer meals in a day is very common. About 20.6 percent male headed and 15.4 percent female headed households often had to eat fewer meals in a day because there was not enough food, with 29.3 percent of female headed and 13.7 percent of male headed households have to sometimes eat fewer

meals in a day because there was not enough food (Table 4). Female-headed households are at greater risk to well-being because they tend to devote an even larger share to food.

Due to a lack of financial sources, households had to take smaller quantities of meals. It was found that 26.3 percent of the female headed households sometimes experienced not having ever any food to eat of any kind in their households because of a lack of resources to get food, 13.0 percent and 9.6 percent, often and rarely correspondingly experienced not having ever any food to eat of any kind in their households (Table 4). This implies that males are to some extent more engaged in income generating activities than females in the study area. According to Nickanor (2014), food insecurity is a major problem for all poor households in informal settlements, but the situation of female headed households is particularly bad.

Female headed households are disadvantaged when it comes to access to land, livestock and other assets, health care, markets and extension services (Crush and Frayne, 2011). These inequalities are caused by inter-alia, limited access to information, cultural practices that disenfranchise female heads of households or minimize the status of girls and women. The other precursor is less educational opportunities for females. Traditional norms about asset division marginalize women and girls. The cumulative effect of all this is less security in asset ownership, low human capital formation and diminished earning opportunities. The study found that 26.3 percent of female headed households and 14.3 percent of male headed households of residents in informal settlements of Katutura sometimes go to sleep at night hungry because there was not enough food, 21 percent male headed households compared to 15.4 percent of female headed households and often had gone to sleep at night hungry because there was not enough food in their households (Table 4).

In addition, 18.3 percent male headed households often go a whole day and night without eating anything because there was not enough food, 14.9 percent of the male headed households sometimes have to go a whole day and night without eating anything and 5.9 percent male headed households rarely have to go a whole day and night without eating anything because there was not enough food (Table 4). Table 4 further shows that there is statistically significant relationship between food insecurity and sex of head of household ($p < 0.005$).

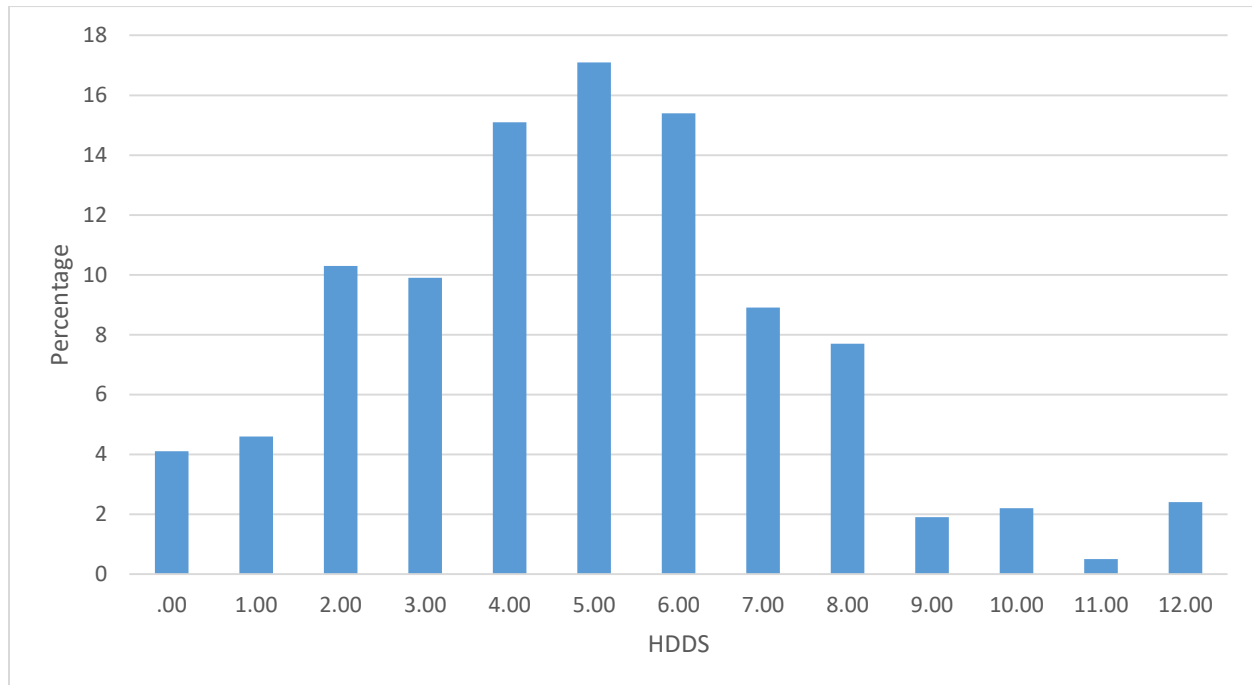
Table 4: Responses to food insecurity in informal settlements of Katutura

In the past four weeks did you or household	No	Rarely	Sometimes	Often	P- Value
<i>Have to eat a smaller meal than you felt you needed because there was not enough food</i>					
Male	54.7	9.0	16.4	19.9	0.062
Female	45.4	10.2	26.3	17.6	
<i>Have to eat fewer meals in a day because there was not enough food</i>					
Male	52.5	13.2	13.7	20.6	0.002
Female	45.7	9.6	29.3	15.4	
<i>Was there ever no food to eat of any kind in your household because of a lack of resources to get food</i>					
Male	56.2	9.9	14.3	19.7	0.005
Female	49.5	9.6	27.9	13.0	
<i>Go to sleep at night hungry because there was not enough food</i>					
Male	58.0	6.8	14.1	21.0	0.003
Female	49.3	10.5	26.3	13.9	
<i>Go a whole day and night without eating anything because there was not enough food</i>					
Male	61.4	5.9	14.4	18.3	0.004
Female	50.0	11.5	25.0	13.5	

4.2.2. HOUSEHOLD DIETARY DIVERSITY SCORE

The study found that households limited the variety of foods consumed and went for cheaper but less nutritious foods with most of their meals consisting of mainly carbohydrates. Household dietary diversity consists the number of different food groups consumed over the past 48 hours. The mean score for Katutura informal settlements as a whole is 4.8 out of a possible 12, reflecting a less varied diet (Figure 4).

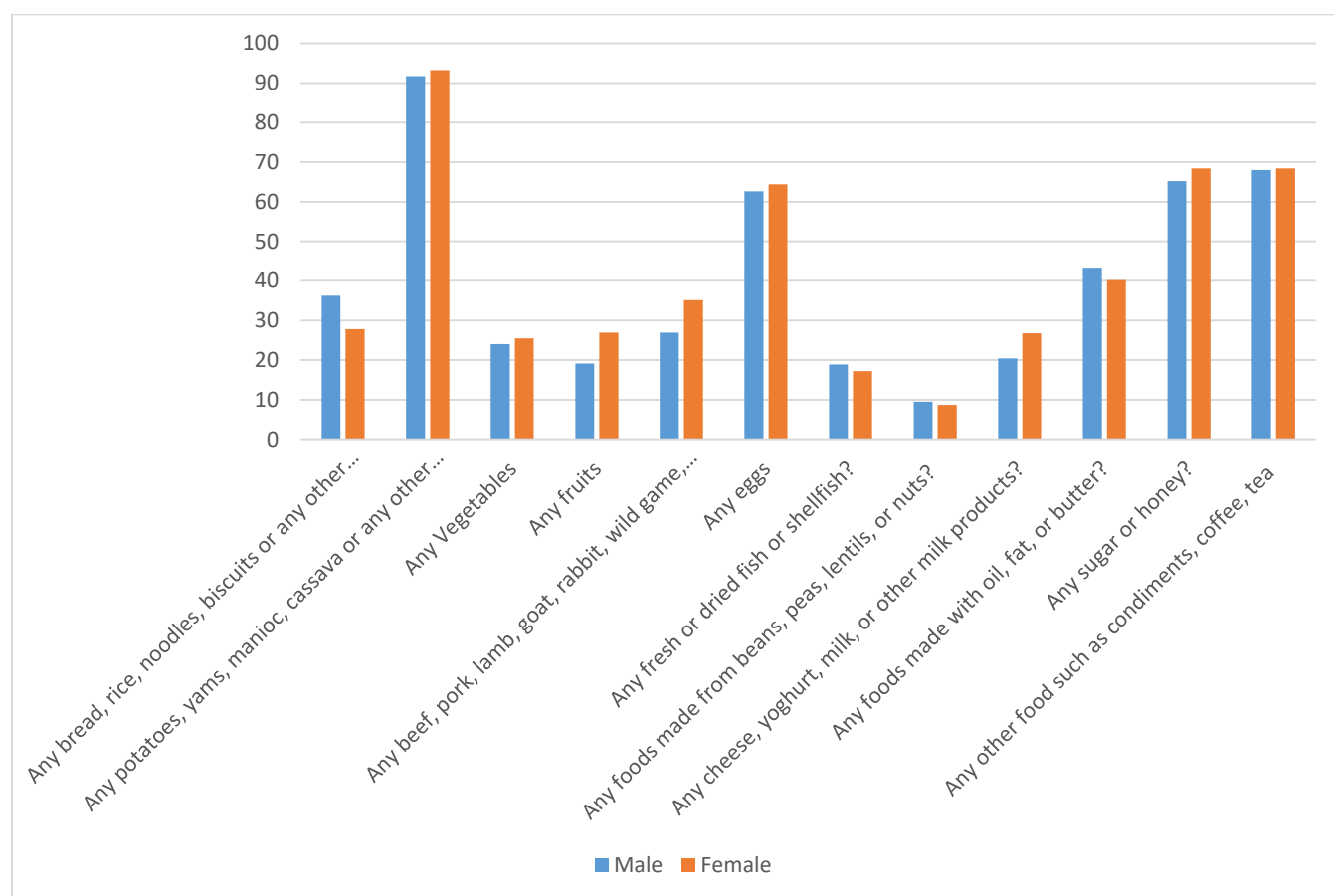
Figure 5: Household Dietary Diversity Score Average



The severity of household food insecurity in Windhoek's informal settlements is not only reflected in the high prevalence of food shortages, but also in the type of diet which they can afford to eat (Nickanor, 2014). Households were asked about the type of foods they or anyone else in their households ate during the day and at night the day before the interview. Overall, households in informal settlements of Katutura consume more carbohydrates food such as bread, rice, noodles,

biscuits or any other foods made from millet, sorghum, maize, rice and wheat (Figure 5), coffee, tea or any other condiment and meat such as beef, pork, lamb, rabbit, wild game, chicken, duck, other birds, liver, kidney, heart or other organ meat most. The least consumed food in the informal settlements are any foods made from beans, peas, lentils, or nuts as well as eggs

Figure 6: Types of food



4.2.3. FOOD INSECURE HOUSEHOLDS AND VARIETY OF FOOD CONSUMED

Table 5 indicates that food insecure households average levels of intake in any foods made from beans, peas, lentils, or nuts (54.1%), eggs (47.3%), potatoes, yams, manioc, cassava or any other foods made from roots or tubers (49.5%), vegetables (54.3%) and fruits (48.8%). They however have a higher intake in bread, rice, noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or (any other locally available grain) (64.9%) as well as any fresh or dried fish or shellfish (68.2%). According to Crush (2011), fresh food such as vegetables, fish and meat are bought and consumed immediately or dried due to a lack of electricity which limits storage of fresh food. The 2012 FAO report showed that world-wide, more than 2.5 million children die each year from malnutrition as a consequence of food insecurity.

Table 5: Food insecure households and variety of food consumed.

Type of food	Food Insecurity	
	Count	Percent
Any bread, rice, noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or (any other locally available grain)?	250	(64.9%)
Any potatoes, yams, manioc, cassava or any other foods made from roots or tubers?	50	(49.5%)
Any Vegetables	51	(54.3%)
Any fruits	62	(48.8%)
Any beef, pork, lamb, goat, rabbit, wild game, chicken, duck, other birds, liver, kidney, heart, or other organ meats?	168	(64.1%)
Any eggs	35	(47.3%)
Any fresh or dried fish or shellfish?	90	(68.2%)
Any foods made from beans, peas, lentils, or nuts?	20	(54.1%)

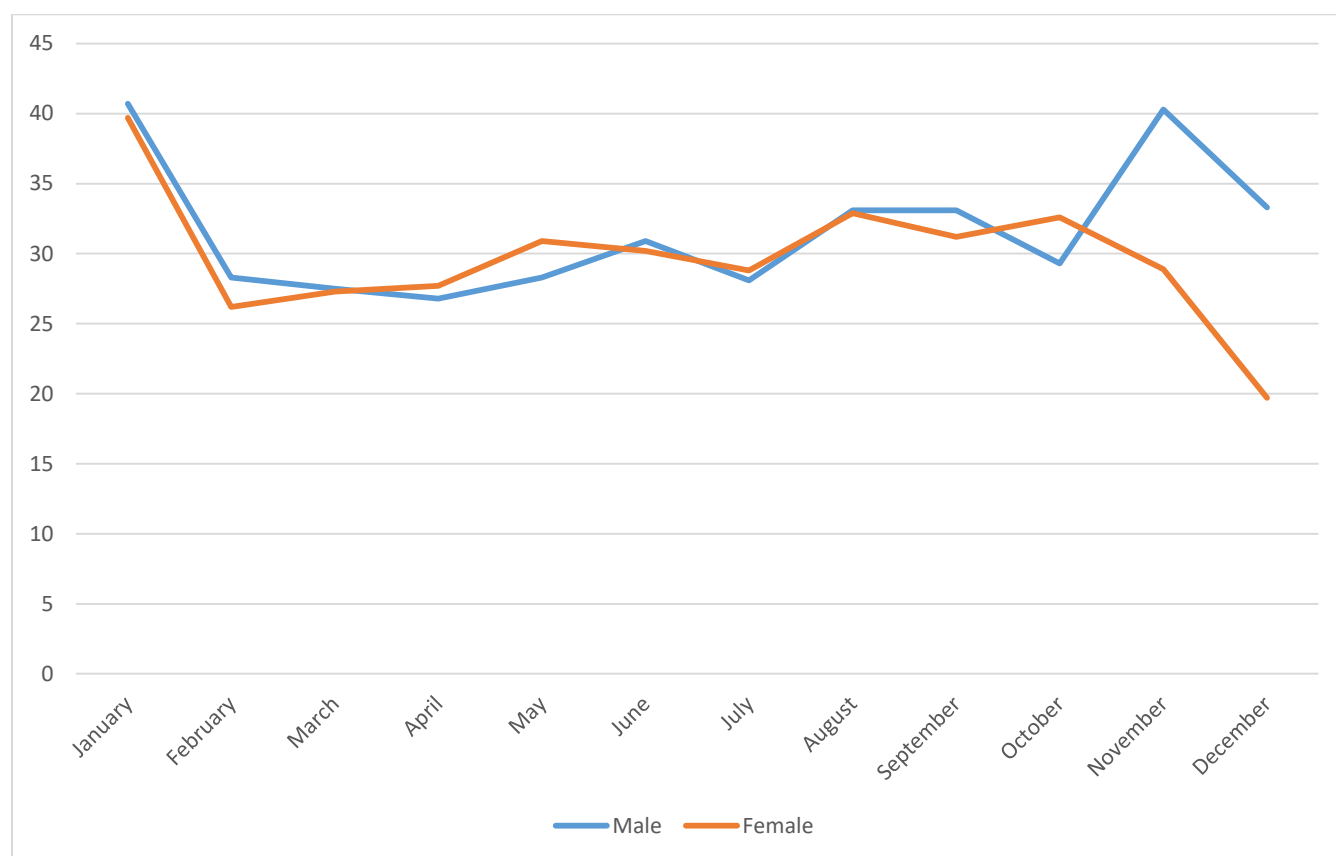
Any cheese, yoghurt, milk, or other milk products?	61	(62.9%)
Any foods made with oil, fat, or butter?	98	(56.6%)
Any sugar or honey?	174	(63.0%)
Any other food such as condiments, coffee, tea	171	(61.1%)

4.2.4 MONTHS OF ADEQUATE HOUSEHOLD PROVISION (MAHP)

The study found that households were severely food insecure in some months more than others. Household heads were asked to state the months they did not have enough food. Figure 5 shows that household suffered more in the months of November, August and January and were better off in the months of December and March in the informal settlements of Katutura, Windhoek, Namibia. Male headed households were more well off throughout the year more especially during November and December (Figure 6).

Many people, savings and bonuses are mostly used up in the Month of December when people take holidays to spend time with families and other social activities such as weddings and reunions of which much of the expenditure is on food. The higher spending during December festivities leaves households unable to recover financially in January as they start work and schools also reopens. With expenditures on the education on the increase, a period of food insecurity is experienced in the first months of the year. According to Nickanor (2014), the months of May, June and July are the coldest months in Namibia and households in the informal settlements spend much more on fuel to heat their homes. Interestingly, seasonality affects urban incomes just as it does rural ones. Rain prevents many workers from working and can also make it more difficult to get products to the cities, which results in higher food prices. Factories need fewer workers during seasonal slack periods (Ersado, 2002).

Figure 7: Months in which households did not have enough food in informal settlements



4.2.5. FOOD SOURCES

Although there may be food from suppliers, it is difficult to buy due to lack of income. Food insecurity in the urban informal settlements therefore goes hand in hand with income making access to food (determined by the purchasing power of individuals) more of an issue than the availability of food itself. There are a variety of sources from which households can obtain their food. This includes supermarkets, small shop/restaurant/ take away, informal markets/street food and shared meal with neighbors and or other households. Food security is further determined by the frequency in which household get sources on food source patronage. About 63.7 percent of residents go to supermarkets at least once in a month, 25.1 percent go to

informal markets at least five days a week (Table 6). Furthermore, Table 6 illustrates that 3.8 percent share meals with neighbors and or other households at least five days a week.

Urban poor people tend to buy food from local markets or neighborhood kiosks. These are frequently small and widely scattered. Wholesale markets, when they exist, are often old and located in city centers, hemmed in by and creating traffic congestion. Storage facilities are frequently inadequate or badly managed and refrigeration is scarce. This raises marketing costs. Street vendors are part of poor urban communities' daily routine, and vending is an important source of livelihoods, especially for women. Although street foods can be purchased in small quantities, are nutritious and save on preparation time, they can sometimes be relatively expensive.

Table 6: Frequency of food obtained from sources

Source of food	Frequency food obtained from this source (Percentage)			
	At least five days a week	At least once a week	At least once a month	At least once in six months
Supermarket	3.6	22.4	63.7	4.1
Small shop/restaurant/take away	11.1	11.5	20.0	0.7
Informal markets/street food	25.1	23.0	16.8	1.0
Shared meal with neighbors and/or other household	3.8	12.3	7.5	2.2

4.2.6. DETERMINANTS OF FOOD INSECURITY

This section examines some of the demographic, social and economic variables that are most correlated with food insecurity in informal settlements.

The binary logistic regression shows that, Sex, Education and Lived Poverty Index (No enough food to eat, No enough fuel to cook food) are factors associated with food insecurity. In addition, odd ratios indicate that females are 1.345 times more food insecure than males. The odd ratios of marital status (Going steady (in a relationship), single (not in a relationship)), Education (Primary, Higher), no electricity available and piped water available are all less than 1, depicting an improved association with food security. The variables female headed households, not married (living with spouse), work status (Working full-time, Working part-time/casual, Not working –looking, Not working – not looking) and not having enough medicine or medical treatment are associated with increased food insecurity.

Household head education largely contributed on working efficiency, competency, diversify income, adopting technologies and becoming visionary in creating conducive environment to educate dependents with long term target to ensure better living condition than illiterate ones. This is due to educated household head plays a significant role in shaping household members. Thus, being literate reduces the chance of becoming food insecure in the sample households.

The jobs of urban poor people are casual, insecure, uncertain and low-paying, and include street-vending, rickshaw-driving, construction and factory work. But these jobs tend to be permanent, in the sense that poor people stick with them, and do not move from job to job every day (Garret, 2005).

Table 7: Bivariate Binary regression analysis of food insecurity and selected socio-demographic household characteristics

Variables	Food Insecurity [Frequency (%)]	Coefficient	P-Value	Odd Ratio	95% CI for Odd ratios	
					Lower	Upper
Sex of Household head						
Male	118 (57.6)	0.0	-	1.00	-	-
Female	143 (68.4)	1.345	0.011	7.506	1.598	35.267
Marital status						
Married(living with spouse)	43 (51.8)	0.0	-	1.00	-	-
Not married (living with spouse)	10 (66.7)	-0.375	0.341	2.431	0.391	15.114
Going steady (in a relationship)	59 (70.2)	-1.195	0.282	0.408	0.079	2.092
Single (not in a relationship)	88 (61.1)	-1.243	0.102	0.303	0.073	1.269
Education						
None	32 (72.7)	0.0	-	1.00	-	-
Primary	182 (74.9)	-2.574	0.002	0.022	0.002	0.233
Higher	46 (40.7)	-1.243	0.001	0.165	0.055	0.495
Work status						
Working full-time	80 (53.7)	0.0	-	1.00	-	-
Working part-time/casual	55 (59.8)	0.518	0.291	3.936	0.309	21.132
Not working – looking	88 (70.4)	0.966	0.109	9.683	0.601	15.947
Not working – not looking	25 (73.5)	0.635	0.493	2.492	0.183	13.889
Household asset: Electricity						
No electricity	244 (63.7)	0.0	-	1.00	-	-
Electricity available	18 (47.1)	-1.763	0.721	0.633	0.052	7.775
Household asset: Piped water						
No piped water	254 (64.6)	0.0	-	1.00	-	-
Piped water available	8 (47.4)	-1.637	0.469	0.269	0.008	9.435
Lived Poverty Index:						
Enough food to eat	-	0.00	-	1.00	-	-
Enough clean water	-	1.221	0.989	0.997	0.647	1.538
Enough med. treatment	-	0.194	0.249	1.256	0.855	1.829
Electricity in your home	-	1.135	0.574	1.079	0.828	1.406
Enough fuel to cook	-	-0.191	0.042	0.700	0.481	1.017
Cash income	-	1.164	0.403	0.872	0.633	1.202

Food security, regardless of location, depends on food availability, and households' ability to access food depends on income as well as food prices (Cohen and Garret, 2010). Having a job and wage income is a critical asset for the urban poor because it reduces their vulnerability to risk and enables them to provide food for their households (Moser, 1998). Factors such as low income from wage amount (N\$2 100- 3 000 per month (P=0.001; 95% confidence interval (CI) 0.080 – 0.511), N\$3 100- 4 000 (P= 0.014; 95% CI 0.115 – 0.782) were significantly associated with food-insecurity (Table 8).

Table 8: Bivariate Binary regression analysis of food insecurity and source of income

Household Income	Food Insecurity [Frequency (%)]	Coefficient	P- Value	Odd Ratio	95% CI	
					Lower	Upper
Income wage work:						
1 – 1000	23 (51.1)	0.0	-	1.00	-	-
1100 – 2000	47 (71.2)	-0.738	0.131	0.478	0.183	1.247
2100 – 3000	30 (62.5)	-1.599	0.001	0.202	0.080	0.511
3100 – 4000	9 (33.3)	-1.204	0.014	0.300	0.115	0.782
4100 – 5000	6 (66.7)	0.000	1.000	1.000	0.332	3.013
> 5000	10 (33.3)	-1.386	0.086	0.250	0.051	1.214
Casual work amount:						
1 – 1000	35 (58.3)	0.0	-	1.00	-	-
1100 – 2500	10 (58.8)	-0.742	0.287	0.476	0.122	1.865
2600- 4200	7 (63.6)	-0.762	0.348	0.467	0.095	2.292
>5000	4 (40.0)	-0.965	0.283	0.381	0.065	2.222
Income from informal business:						
1 – 1000	30 (61.2)	0.0	-	1.00	-	-
1100 – 2300	4 (80.0)	-0.457	0.752	0.633	0.037	10.740
2400 – 5000	3 (42.9)	-1.386	0.442	0.250	0.007	8.560
>8000	1 (50.0)	0.288	0.858	1.333	0.057	31.121
Income from pension/ disability/ or other grant						
1-500	7 (33.3)	0.0	-	1.00	-	-
600- 1500	9 (75.0)	0.693	0.641	2.000	0.108	36.954
>1600	1 (50.0)	-1.099	0.482	0.333	0.016	7.140

4.3. CONCLUSION

This chapter has assessed the levels of food insecurity by looking at the household food experiences in the informal settlements of Katutura using quantitative indicators. The chapter found that households of the informal settlements are highly food insecure due to insufficient quantity of food. This chapter further highlighted that households often limits the variety of foods consumed and in turn opted for cheaper but less nutrient foods. Carbohydrate food such as wheat, bread and rice are consumed more compared to vegetables and fruits. Food in the informal settlements is mostly obtained from open markets and street vendors. The Binary logistic regression showed that Sex, Education and Lived Poverty Index are factors associated with food insecurity.

CHAPTER 5: QUALITY OF LIFE AND FOOD INSECURITY

5.1. INTRODUCTION

Chapter 5 presents results on quality of life and the linkage between quality of life and food insecurity. The sections discussed in this chapter includes, lived poverty index, WHOQOL, linkage between food security and physical health, psychological health, social relationships and environmental health.

5.2 POVERTY

The reality associated with informal settlements is the poverty levels within which their inhabitants live, and the social exclusion to which they are subjected as a consequence of, among other factors, a lack of sufficient income to satisfy their basic needs (Paudel, 2003). Their daily challenges according to (Baharoglu and Kessides, 2004) include; limited access to employment opportunities and income, inadequate and insecure housing and services, violent and unhealthy environments, and limited access to adequate health and education opportunities.

Table 9 show results of food insecure households and the times they have gone without a condition for the past year (prior to the interview date). Not having enough food to eat is experienced in informal settlements of Katutura, nearly 87% always find themselves with no enough food to eat, 89.3% experience not having enough food to eat many times, 79.4% sometimes find themselves with no enough food to eat, 65.7% go once or twice with no enough food to eat and 34.1% of households in informal settlements never experienced not having enough food to eat. Not having enough clean water is a problem, in informal settlements of Katutura, about 86.7% households are always not having enough clean water, 93.9% have experienced not having enough clean water

many times, 70.8% of households only experienced not having enough clean water several times and 53.5% of households never experienced not having enough clean water.

Medical treatment in informal settlements is not accessible all the times. About 63.9% of the households in informal settlements go without medicine or medical treatment all the time, 88.6% have gone without medicine or medical treatment many times, 75% of the households on several occasions did not have enough medicines or medical treatment, 75% have only gone once or twice with no enough medicine or medical treatment and at least 53.6% have never gone without medicine or medical treatment. About 62.4% of the households in informal settlements do not have electricity in their homes.

About 85% of the insecure households always go without cash and 38.8% never went without cash. Food insecure households experience going without enough fuel to cook their food, of which 85.7% are always not having enough fuel to cook food, 84.6% have experiences it many times, 74.7% several times, 50% once or twice and 41% never experienced never having enough fuel to cook their food.

Table 9: Lived Poverty Index

Food Insecure households					
	Never	once or twice	Several times	Many times	Always
Enough food to eat	43 (34.1%)	23 (65.7%)	77 (79.4%)	75 (89.3%)	27 (87.1%)
Enough clean water	107 (53.5%)	25 (71.4%)	46 (70.8%)	46 (93.9%)	13 (86.7%)
Medicine or medical treatment	104 (53.6%)	9 (75.0%)	24 (75.0%)	31 (88.6%)	23 (63.9%)
Electricity in your home	58 (53.7%)	5 (55.6%)	10 (66.7%)	15 (75.0%)	78 (62.4%)
Enough fuel to cook your food	45 (41.7%)	21 (50.0%)	56 (74.7%)	55 (84.6%)	30 (85.7%)
Cash income	26 (38.8%)	11 (33.3%)	54 (64.3%)	66 (75.9%)	72 (84.7%)
Enough food to eat	43 (34.1%)	23 (65.7%)	77 (79.4%)	75 (89.3%)	27 (87.1%)

5.3. WORLD HEALTH ORGANIZATION QUALITY OF LIFE (WHOQoL)

Table 10 present descriptive statistics of the domains of WHOQoL. The highest mean score was observed for Domain 1 (Physical health, mean = 63.8508) and Domain 2 (psychological health, mean = 63.8018). The facts indicates that the highest mean satisfaction rating was found for Physical health, implying good activities of daily living, less dependency on medicinal substances and medical aids, enough energy and mobility, less pain and discomfort, sufficient sleep and rest and good work capacity. Moreover, the lowest mean score was shown for Domain 3 (Social relations = 60.9206) not very good personal relations, sex life and support that they get from their friends and was also observed for Domain 4 (Environmental health, mean = 37.180) implying very poor environmental health .

Table 10: Descriptive statistics of four domains of WHOQoL-Bref

Domain	N	Minimum	Maximum	Mean	Std. Deviation
Physical health (Transformed)	401	14.29	100.00	63.80	16.02
Psychological (Transformed)	401	29.17	95.83	63.85	12.04
Social Relations (Transformed)	401	0.00	100.00	60.92	21.58
Environmental (Transformed)	401	0.00	87.50	37.62	17.94

As urged in the introduction to this paper, urban food insecurity and low quality of life are growing under conditions of rapid urbanization, and the rural- urban gap is narrowing (Fotso, 2006; Fotso, 2007; Anyamele, 2009). Household members that rated their quality of life “Very poor”; 33.3 percent have low physical health and 19.0 percent have high physical health. Psychological health is very low (50 percent) in informal settlements. The environmental health is low to middle class in informal settlements (Table 10). No low quality of life was observed for physical and psychological health in informal settlements among residents who rated their quality of life “very good”. Furthermore, of those that rated their quality of life “Very good”, about 4.1 percent have low environmental health, 10.3 experienced middle environmental health and 18.8 percent experienced high environmental health (Table 11).

Table 11: Domains of Quality of life (in percentage)

How do you rate your quality of life?	Physical health			Psychological health			Social relations			Environmental health		
	Low	Middle	High	Low	Middle	High	Low	Middle	High	Low	Middle	High
Very poor	33.3	16.5	19.0	50	26	12.7	26	16	21.5	22.9	6.3	0
Poor	40	19.0	13.4	50	20.9	11.0	20	21.5	12.0	27.6	6.9	0
Neither poor nor	26.7	37.3	18.2	0	34.6	20.4	30	36.8	21.0	25.3	32.6	15.6
Good	0	24.1	47.1	0	28.0	43.1	18	23.6	47.0	20.0	44.0	65.6
Very good	0	3.2	14.4	0	43.1	12.7	6	2.1	13.0	4.1	10.3	18.8

Table 12 shows that males are stronger (59.5 percent, Physical health) than females, however they both have low psychological health of 50 percent. Females have 67.3 percent low social relationship and 42.9 higher social relationships. On environmental health, 51.4 percent males rated environmental health low and 48.4 percent of females rated environmental health high.

Single (not in a relationship) persons have high (38.8 percent) physical health as well as a high percentage in low physical health. They also rated low social relationships at 55.8 percent and high social relations at 31.4 percent. In addition, single persons rated low environmental health at 33.9 percent, middle environmental health at 32.6 percent and high environmental health at 21.9 percent. Not married (living with partner) and widowers/widowed persons experienced low psychological health of 50 percent each. Married (living with spouse) couples rated low environmental health at 15.5 percent middle environmental health at 53.1 percent.

Working (full time) head of households have high (39.9 percent) physical health and those that are working on a part time/casual basis have low physical health. Residents that are working have no

psychological problem and those that are not working (looking and not looking) have 50 percent each low psychological health. Persons that are not working but are looking for employment have highest share (49.0 percent) in low social relationships and those that are working full-time have a good environmental health whilst those that are not working (not looking) have a low environmental health percentage (9.6 percentage).

Head of households with primary education and no education have lower physical health, 40 percent and 46.7 percent respective. Of those that acquired tertiary education, no report of low physical health, low psychological health and low social health and only 1.1 percent of environmental health (Table 12).

Table 12: Quality of life and demographic and socio-economic determinants, using Chi-Square

	Physical Health			Psychological Health			Social Relations			Environmental		
	Low	Middle	High	Low	Middle	High	Low	Middle	High	Low	Middle	High
Sex of Household												
Male	46.7	39.5	59.5	50	46.5	53.8	32.7	45.8	57.1	51.4	50.6	51.6
Female	53.3	60.5	40.1	50	53.5	46.2	67.3	54.2	42.9	48.6	49.4	48.4
P- Value	0.001			0.347			0.003			0.984		
Marital Status												
Married (living with Souse)	13.3	21.6	19.1	0	18.8	20.4	1.9	20.0	23.5	15.5	23.0	21.9
Not married (living with spouse)	20.0	25.9	17.0	50.0	22.1	17.2	23.1	20.0	19.1	21.3	21.3	6.3
Going steady (in a relationship)	6.7	18.5	19.1	0	19.7	18.3	7.7	21.4	20.1	21.3	18.0	12.5
Single (not in a relationship)	0.0	1.2	0.5	0	0.5	1.1	1.9	0.7	0.5	0	1.1	0
P - Value	0.004			0.010			0.001			0.207		
Work Status												
Working – Full time	28.6	34.2	39.9	0	36.6	39.0	25.5	34.6	42.7	31.9	38.6	59.4
Working – Part-time/Casual	7.1	21.3	25.7	0	20.3	25.8	17.6	19.1	26.6	25.9	23.4	9.4
Not working – Looking	35.7	32.3	31.1	50	34.2	27.5	49.0	30.9	26.6	32.5	31.6	21.9
Not working – Not looking	28.6	12.3	3.3	50	8.9	7.7	7.8	15.4	4.0	9.6	6.4	9.4
P - Value	0.004			0.207			0.000			0.095		
Highest level of Schooling												
None	40	9.9	8.5	50	11.7	7.0	19.2	10.3	6.9	12.1	9.0	6.3
Primary	46.7	70.4	51.1	50	64.3	52.7	57.7	69.0	52.0	68.4	52.2	40.6
Higher	0	3.1	4.3	0	2.3	5.9	0	3.4	5.4	1.1	6.2	9.4
P - Value	0.000			0.007			0.000					
Household Assets:												
No Piped Water	73.3	91.4	92.6	100	89.2	92.5	90.4	90.3	91.2	93.1	88.8	87.5
Piped water available	26.7	8.6	7.4	0.0	0.8	7.5	9.6	9.7	8.8	6.9	11.2	12.5
P - Value				0.479			0.960			0.309		
No Electricity	93.3	96.3	96.2	100	96.2	96.2	94.2	96.6	96.6	96.6	97.8	87.5
Electricity available	6.7	3.7	3.2	0	3.8	3.8	5.8	3.4	3.4	3.4	2.2	12.5
P -value	0.777			0.962			0.711			0.017		
Household income												
Wage income												
1-1000	25.0	18.5	11.7	13.2	15.4	-	15.8	15.4	13.3	21.8	7.5	13.6
1100-2000	62.5	32.1	29.1	36.8	26.0	-	42.1	33.3	28.3	39.1	24.7	27.3
2100-3000	0.0	27.2	22.3	22.6	23.1	-	31.6	23.1	21.2	21.8	25.8	13.6

3200-4000	0.0	13.6	13.6	10.4	15.4	-	5.3	9.0	16.8	6.9	18.3	18.2
4300-5000	12.5	1.2	6.8	3.8	4.8	-	0.0	3.8	5.3	4.6	2.2	13.6
>5000	0.0	7.4	16.5	13.2	15.4	-	5.3	15.4	15.0	5.7	21.5	13.6
P - Value			0.092			0.628			0.675			0.001
Casual income												
1-1000	100	51.5	58.1	51.2	57.5	-	72.2	54.2	50.0	55.3	52.8	50.0
1200-2500	0	21.2	20.9	18.6	22.5	-	18.2	25.0	18.8	26.3	16.7	16.7
3000-4200	0	9.1	14.0	16.3	10.0	-	0.0	20.8	12.5	10.5	16.7	16.7
>5000	0	18.2	7.0	14.0	10.0	-	9.1	0.0	18.8	7.9	13.9	16.7
P - value			0.657			0.755			0.206			0.899
Informal business income												
1-1000	60.9	83.3	-	63.6	86.7	-	71.4	69.6	72.2	66.7	80.0	-
1300-2300	17.4	0.0	-	12.1	6.7	-	28.6	8.7	5.6	20.8	0.0	-
3000-5000	13.0	16.7	-	18.2	6.7	-	0.0	13.0	22.2	12.5	15.0	-
>5000	8.7	0.0	-	6.1	0.0	-	0.0	8.7	0.0	0.0	5.0	-
P - value			0.138			0.405			0.354			0.128
Pension/Disability/Any grant												
0-500	0.0	57.1	25.0	18.2	44.4	-	25.0	18.2	60.0	41.7	14.3	0.0
800-1500	100	42.9	50.0	72.7	44.4	-	25.0	81.8	40.0	41.7	85.7	100
>3000	0.0	0.0	25.0	9.1	11.1	-	50.0	0.0	0.0	16.7	0.0	0.0
P - Value			0.128			0.403			0.017			0.347

5.4. THE LINKAGE BETWEEN FOOD SECURITY AND QUALITY OF LIFE

5.4.1. INTRODUCTION

Ordinal regression model was used to analyze the relationship between food security and quality of life. The dependent variable used is the four domains of quality of life. Threshold (Food Security) represents the response variable in the ordered logistic regression. The threshold estimate for [Physical health, Psychological health, social relationships and environmental health= 1.00] is the cutoff value between low and middle threshold and the threshold estimate for [Physical health, Psychological health, social relationships and environmental health = 2.00] is the cutoff value between middle and high threshold. Underneath Threshold are the predictors in the model.

The influence of each predictor variable on the response variable was determined by examining the coefficients of each factor. The interpretation of values of coefficients is determined by factors. A factor level with a higher coefficient indicates a greater probability of being in one of the upper level categories of the cumulative response. A factor with a negative sign (indicator) indicates that its level had a negative effect on the corresponding category of the response variable. The converse is true for a factor with a positive sign. Therefore, interpretation of the model was based on the parameter estimates, as shown in Table 13, 14, 15 and 16.

5.4.2. FOOD SECURITY AND QUALITY OF LIFE

Table 14 shows that food insecurity is significant for both physical health, psychological health, social relationships and environmental health. Table 10 further indicates that for a unit increase in food insecure households, we expect a 1.301 increase in the log odds of being in a lower level of physical health, a 1.183 increase in the psychological health, 1.296 increase in the odds of being

in a lower level of social relationships and a 1.781 increase in the odds of being in a lower level of environmental health.

Table 13: Relationship between Food Insecurity and Quality of Life (Katutura, 2016; N=416).

Variable	Category	Estimate	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Food Security	[Physical health = 1,00]	-2.849	0.268	0.000	-3.375	-2.323
	[Physical health = 2,00]	.374	0.132	0.004	0.116	0.632
	[Insecurity=1]	1.301	0.235	0.000	0.840	1.761
	[Secure=2]	0 ^a	.	.	.	.
Food Security	[Psychological h= 1,00]	-5.017	0.710	0.000	-6.409	-3.625
	[Psychological h = 2,00]	.561	0.129	0.000	0.309	0.813
	[Insecurity=1]	1.183	0.219	0.000	0.754	1.612
	[Secure=2]	0 ^a	.	.	.	.
Food Security	[Social relation = 1,00]	-1.586	0.157	0.000	-1.893	-1.278
	[Social relation = 2,00]	0.396	0.124	0.001	0.152	0.640
	[Insecurity=1]	1.296	0.221	0.000	0.863	1.729
	[Secure=2]	0 ^a	.	.	.	.
Food Security	[Envir. h = 1,00]	0.349	0.127	0.006	0.101	0.598
	[Envir. h = 2,00]	3.314	0.239	0.000	2.846	3.783
	[Insecurity=1]	1.781	0.235	0.000	1.320	2.242
	[Secure=2]	0 ^a	.	.	.	.

Note: h= health, Envir= Environmental

5.4.3. PHYSICAL HEALTH AND FOOD SECURITY IN INFORMAL SETTLEMENTS OF KATUTURA

Parameter estimates of the Logit coefficients of the model gives lower and upper limits of the 95 per cent confidence intervals, displays values of the Wald Test, degrees of freedom (df), and the significance probability. Whether an estimate is significant or not determines whether to reject or accept the null hypothesis. The null hypothesis states that each parameter estimate contributes zero to the relationship with the response variable. For an estimate to differ significantly from zero, its significance value must be less than the significance level of 0.05. Therefore, according to the model, only two variables, Work status (“working part-time” and “not working”) and Tenure status (“Owner/family”) had levels with significant values compared to reference levels. Furthermore, no factor level indicated a greater probability of being in the upper level categories of middle health. The categories of marital status (married (living with spouse), married not (living with partner), married not (living with spouse) and going steady (in a relationship)) indicated middle physical health and the predictor variables food insecure and no education showed that its levels had a negative effect on quality of life (Table 14).

Table 14: Physical health: Proportional Odds Model estimates and 95 per cent significance values

	Estimate	Std. Error	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
<i>Food Insec.:</i> Physical h = 1,00	-16.325	2.683	0.000	-21.584	-11.066
Physical h = 2,00	-12.570	2.706	0.000	-17.874	-7.267
Food Insecure	-1.173	0.295	0.000	-1.751	-0.594
Food Secure	<i>reference</i>	.	.	.	.
Male	.589	0.347	0.090	-0.091	1.125
Female	<i>Reference</i>	.	.	.	.
Married(living with spouse	1.623	1.086	0.037	-0.505	3.750
Not married (living with partner)	1.579	1.359	0.142	1.060	6.389
Going steady(in a relationship)	1.994	1.091	0.133	-0.414	4.130
Single (not in a relationship)	<i>Reference</i>	.	.	.	.
No education	-0.241	0.916	0.793	-2.037	1.555
Primary education	0.108	0.835	0.469	-1.529	1.744
Tertiary education	<i>Reference</i>	.	.	.	.
Working (fulltime)	1.354	0.488	0.006	0.398	1.373
Working (part-time)	1.685	0.513	0.001	0.680	1.739
Not working (looking)	1.571	0.483	0.001	0.625	1.037
Not working (not looking)	<i>Reference</i>	.	.	.	.
No piped water	-.008	0.556	0.988	-1.098	1.082
piped water available	<i>Reference</i>	.	.	.	.
No electricity	.837	0.720	0.244	-0.573	2.248
Electricity available	<i>Reference</i>	.	.	.	.
Moses Garoeb	-.041	0.326	0.899	-0.681	0.598
Tobias Hainyeko Constituency	0.086	0.325	0.792	-0.551	0.723
Samora Machel Constituency	<i>Reference</i>	.	.	.	.
House	-.790	0.665	0.235	-2.094	0.514
Flat	-.819	1.695	0.629	-4.140	2.503
Room	<i>Reference</i>	.	.	.	.
Owner/Family	-2.686	1.687	0.957	-3.214	3.397
Tenant	-2.697	1.708	0.733	-3.932	2.764
Tied accommodation	<i>Reference</i>	.	.	.	.
Female centred	1.306	1.525	.392	-3.458	2.976
Male centred	.799	1.518	.599	-3.980	2.417
Nuclear	.924	1.535	.547	-3.379	3.090
Extended	1.748	1.545	.258	-2.279	4.300
Under 18 Male centred	<i>Reference</i>	.	.	.	.

5.4.4. PSYCHOLOGICAL HEALTH AND FOOD SECURITY IN INFORMAL SETTLEMENTS OF KATUTURA

In psychological health, Table 15 indicates that there is a negative relationship between food insecure household and their psychological health. It further shows that factors such as food insecure, no education, primary education, secondary education, working (full-time), not working(looking), Household structure, Household tenure, No electricity, No flush toilet had a negative effect on psychological health of Katutura residents.

The population growth which drives the increase of informal settlements can impose pressure on the inhabitants of informal settlements (UN- Habitat, 2007). While the people are usually poorly educated, competition in the city is high, and it is hard to find jobs. These pressures impact upon the well-being of the poor in these informal settlements. Poverty can also create long-term pressures.

Table 15: Psychological health: Proportional Odds Model estimates and 95 per cent significance values

	Estimate	Std. Error	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
<i>Food insecure</i> : Psychological h = 1,00	-23.928	2.761	0.000	-29.338	-18.517
Psychological h = 2,00	-18.259	2.669	0.000	-23.490	-13.028
Food Insecure	-0.911	0.264	0.001	-1.429	-0.394
Food Secure	<i>reference</i>	.	.	.	.
Male	0.207	0.331	0.532	-0.441	0.855
Female	<i>Reference</i>	.	.	.	.
Married(living with spouse	0.927	1.106	0.401	0.123	3.598
Not married (living with partner)	1.294	.882	0.142	-0.435	3.022
Going steady(in a relationship)	1.311	.874	0.133	-0.401	3.023
Single (not in a relationship)	<i>Reference</i>	.	.	.	.
No education	-1.063	0.791	0.179	-2.613	0.487
Primary education	-.438	0.683	0.521	-1.776	0.900
Higher education	<i>Reference</i>	.	.	.	.
Working (fulltime)	-0.076	0.177	0.866	-0.954	0.803
Working (part-time)	0.306	0.470	0.514	-0.614	1.226
Not working (looking)	-0.164	0.449	0.714	-1.044	0.715
Not working (not looking)	<i>Reference</i>	.	.	.	.
No piped water	0.151	0.549	0.783	-0.925	1.459
piped water available	<i>Reference</i>	.	.	.	.
No electricity	0.125	0.681	0.854	-1.209	1.899
Electricity available	<i>Reference</i>	.	.	.	.
Moses Garoeb	0.244	0.304	0.422	-0.352	0.316
Tobias Hainyeko Constituency	0.162	0.297	0.584	-0.419	4.947
Samora Machel Constituency	<i>Reference</i>	.	.	.	.
House	-1.174	0.760	0.122	-2.663	0.514
Flat	0.817	2.107	0.698	-3.313	2.503
Room	<i>Reference</i>	.	.	.	.
Owner/Family	-2.686	1.687	0.957	-3.214	3.397
Tenant	-2.697	1.708	0.733	-3.932	2.764
Tied accommodation	<i>Reference</i>	.	.	.	.
Female centred	-0.981	1.606	0.541	-4.128	2.166
Male centred	-1.628	1.599	0.397	-4.490	1.779
Nuclear	-0.628	1.607	0.696	-3.778	2.522
Extended	-0.634	1.615	0.695	-3.798	2.531
Under 18 Male centred	<i>Reference</i>	.	.	.	.

5.4.5. SOCIAL RELATIONS AND FOOD SECURITY IN INFORMAL SETTLEMENTS OF KATUTURA

Various explanatory variables are linked to higher social relationships. There is a negative relationship between food security and social relationships. The variables work status, marital status, sex, and education (Higher) have a positive effect on social relationships whereas the variables food insecure, marital status (single and divorced), education (none, primary) and no flush toilet have a negative effect on social relationships (Table 16).

Table 16: Social Relationships: Proportional Odds Model estimates and 95 per cent significance values

	Estimate	Std. Error	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
<i>Food Insec.:</i> Social relations = 1,00	-15.171	2.712	0.000	-20.487	-9.855
Social relations = 2,00	-13.040	2.717	0.000	-18.366	-7.715
Food Insecure	-1.065	0.263	0.000	-1.580.	-0.550
Food Secure	<i>reference</i>	.	.		
Male	0.207	0.313	0.101	-0.101	1.125
Female	<i>Reference</i>	.	.	.	.
Married(living with spouse	1.860	0.887	0.036	0.123	3.598
Not married (living with partner)	1.294	0.882	0.142	-0.435	3.022
Going steady(in a relationship)	1.311	0.874	0.133	-0.401	3.023
Single (not in a relationship)	<i>Reference</i>	.	.	.	.
No education	-.226	0.746	0.140	-2.561	0.361
Primary education	-.234	0.670	0.694	-1.576	1.049
Higher education	<i>Reference</i>	.	.	.	.
Working (fulltime)	0.560	0.415	0.177	-0.253	1.373
Working (part-time)	0.876	0.441	0.047	0.012	1.739
Not working (looking)	0.233	0.410	0.571	-0.571	1.037
Not working (not looking)	<i>Reference</i>	.	.	.	.
No piped water	-0.333	0.540	.995	-1.061	1.054
piped water available	<i>Reference</i>	.	.	.	.
No electricity	0.751	0.611	0.219	-0.446	1.948
Electricity available	<i>Reference</i>	.	.	.	.
Moses Garoeb	-0.054	0.292	0.853	-0.627	0.519
Tobias Hainyeko Constituency	-0.195	0.280	0.485	-0.744	0.353
Samora Machel Constituency	<i>Reference</i>	.	.	.	.
House	-0.790	0.665	0.235	-2.094	0.514
Flat	-0.819	1.695	0.629	-4.140	2.503
Room	<i>Reference</i>	.	.	.	.
Owner/Family	-2.686	1.687	0.957	-3.214	3.397
Tenant	-2.697	1.708	0.733	-3.932	2.764
Tied accommodation	<i>Reference</i>	.	.	.	.
Female centred	1.306	1.525	.392	-1.684	4.295
Male centred	.799	1.518	.599	-2.177	3.775
Nuclear	.924	1.535	.547	-2.085	3.933
Extended	1.748	1.545	.258	-1.279	4.776
Under 18 Male centred	<i>Reference</i>	.	.	.	.

5.4.6. ENVIRONMENTAL HEALTH AND FOOD SECURITY IN INFORMAL SETTLEMENTS OF KATUTURA

Environmental health have an impact on quality of life of an individual. The results in Table 17 indicates that there is a negative relationship between food security and quality of life in environmental health. Table 17 further shows that the variables sex, marital status (Divorced), education (no education and primary), work status (part-time), no electricity and no piped water are found to have a negative effect on quality of life. Also the variable “no flush toilet” was associated with middle environmental health. Low environmental health was associated with variables such as work status (not working-looking), marital status (single (not in a relationship), married (living with spouse), married not (living with spouse), not married (living with partner)).

Assessment of the infrastructural facilities revealed that the daily life pattern of the residents is characterized by unpleasant and difficult situation as majority adjudged that the conditions of the available infrastructural facilities are poor while some basic ones such as playground, open space, recreational area, and fire station, outdoor advertisements among others are not even available.

The informal settlements lack effective refuse collection service and has no central sewage system therefore; the main mode of solid waste disposal is through drainage and chart pushers who eventually dispose them to unknown destination or at times on the existing streets. The need for children to play coupled with the absence of playgrounds has made them to convert streets to playgrounds. The existing road conditions are extremely poor and there is very few to limited water taps and there is lack of electricity in houses.

Table 17: Environmental health: Proportional Odds Model estimates and 95 per cent significance values

	Estimate	Std. Error	Sig.	95% Confidence Interval	
				Lower	Upper
<i>Food Insecurity:</i>	11.270	2.927	0.000	5.533	17.007
Environmental h = 1,00	14.523	2.910	0.000	8.820	20.226
Environmental h = 2,00					
Food Insecure	-1.552	0.276	0.000	-2.094	-1.010
Food Secure	<i>reference</i>	.	.	.	.
Male	-0.387	0.322	0.230	-1.018	0.245
Female	<i>Reference</i>	.	.	.	.
Married(living with spouse)	1.942	1.037	0.061	-0.090	3.974
Not married (living with partner)	1.768	1.157	0.127	-0.500	4.036
Going steady(in a relationship)	1.683	1.041	0.106	-0.357	3.723
Single (not in a relationship)	<i>Reference</i>	.	.	.	.
No education	-0.226	0.743	0.761	-1.682	1.230
Primary education	-0.234	0.647	0.717	-1.501	1.033
Higher education	<i>Reference</i>	.	.	.	.
Working (fulltime)	0.309	0.454	0.496	-0.581	1.200
Working (part-time)	-0.263	0.475	0.580	-1.195	0.669
Not working (looking)	-0.148	0.458	0.747	-1.045	0.750
Not working (not looking)	<i>Reference</i>	.	.	.	.
No piped water	-0.003	0.540	0.995	-1.061	1.054
piped water available	<i>Reference</i>	.	.	.	.
No electricity	-0.227	0.674	0.736	-1.549	1.095
Electricity available	<i>Reference</i>	.	.	.	.
Moses Garoeb	0.048	0.306	0.875	-0.553	0.649
Tobias Hainyeko Constituency	0.474	0.298	0.111	-0.109	1.057
Samora Machel Constituency	<i>Reference</i>	.	.	.	.
House	0.457	0.733	0.533	-0.980	1.894
Flat	0.356	1.812	0.844	-3.196	3.908
Room	<i>Reference</i>	.	.	.	.
Owner/Family	-2.686	1.816	.139	-6.246	0.874
Tenant	-2.697	1.842	.143	-6.307	0.913
Tied accommodation	<i>Reference</i>	.	.	.	.
Female centred	-1.859	1.607	0.248	-5.009	1.292
Male centred	-1.404	1.600	0.380	-4.541	1.733
Nuclear	-2.828	1.628	0.082	-6.019	.364
Extended	-1.742	1.620	0.282	-4.918	1.434
Under 18 Male centred	<i>Reference</i>	.	.	.	.

5.5. CONCLUSION

Food insecurity in the informal settlements is a reality. This chapter proved that on average, 80 percent of the residents do not have enough daily food. The facts outlined of households not having enough food to eat on a daily basis are accompanied by not having enough clean water, of which residents have to travel long distances to obtain water that they have to pay for. There is no electricity in the informal settlements and household members have to rely on the use of fuel or wood, which is not always available. Medical treatment in the informal settlements is also a problem as it is not accessible all the times which leads to residents having to go without medicine or medical attention when they need it.

Environmental health and social relationships of residents was found to be poor. Households with poor quality of life are associated with poor physical health. Factors such as poor education, unemployment, and unmarried have a negative effect on quality of life. Ordinal regression model found that food insecurity is significant for both physical health, psychological health, environmental health and social relationships. This means that the poorer the household's physical health, psychological health and social relationships, the more food insecure they are.

CHAPTER 6: DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

6.1. INTRODUCTION

This chapter present main discussion and conclusions drawn from the study findings. This chapter will further discuss the limitations encountered during the research process and recommendations.

6.2. DISCUSSION OF FINDINGS

The findings of the research shows that more people in the informal settlements of Katutura are food insecure. The results from the study shows that the majority of the insecure households have to often eat a smaller meal than felt needed because there was not enough food, sometimes eat a smaller meal than needed and most of the time often had to eat fewer meals in a day than needed because of a lack of food in the household. The study further found that household members have experienced most of the times not having ever any food to eat of any kind in their households because of a lack of resources to get food. The residents of the insecure households sometimes have gone to sleep at night hungry simply because there was not enough food in their households.

Food security, regardless of location, depends on food availability; and households' ability to access food depends on income as well as food prices (Cohen and Garret, 2010).). Having a job and wage income is a critical asset for the urban poor because it reduces their vulnerability to risk and enables them to provide food for their households (Moser, 1998). This study found that households with a monthly income below 3000 were associated with increased food insecurity.

The study concurs with Nickanor (2014) that the severity of household food insecurity in Windhoek's informal settlements is not only reflected in the high prevalence of food shortages,

but also in the type of diet which they can afford to eat. The household survey collected HDDS data on how many food groups had been consumed by the household in the previous 24 hours. It found that households in informal settlements of Katutura consume more carbohydrate foods such as bread, rice, noodles, biscuits and any other condiment and meat such as beef, pork lamb, rabbit, wild game, chicken, duck, other birds, liver, kidney, heart or other organ meat most. The least consumed food in the informal settlements is any food made from beans, peas, lentils, or nuts as well as eggs.

Apart from high levels of household food insecurity and lack of dietary diversity, there is also the issue of whether the intensity of food security varies over time. Although this phenomenon is generally associated with the agricultural cycle in rural areas, urban areas may also experience more intense food insecurity at certain times of the year (Nickanor, 2014). The study found that households in informal settlements suffered more in the months of November, August and January and were better off in the months of December and March.

Urban poor tend to buy food from local markets or neighborhood kiosks. These are frequently small and widely scattered. Wholesale markets, when they exist, are often old and located in city centers, hemmed in by and creating traffic congestion. There is a variety of sources from which households can obtain their food. This includes supermarkets, small shop/ restaurant/ take away, informal markets/street food and shared meals with neighbors and other households. Food insecurity is further determined by the frequency in which household members visit this sources. This study found that residents of informal settlements rarely go to supermarkets and most of their foods are purchased from informal markets or street food.

The binary logistic regression found that a household head with no education and a large household size are associated with increased food insecurity. Households that are headed by females are more food insecure than those headed by males. Households with no piped water, no flushing toilet and no electricity are found to be associated with increased food insecurity.

How is quality of life related to food insecurity? In explaining the linkage between quality of life and food insecurity, this paper examined how the four domains of quality of life are related to food insecurity. Ordinal logistic regression model at 95% Confidence Interval was applied to determine the relationship between the two variables. As argued in the introduction to this paper, urban food insecurity and low quality of life are growing under conditions of rapid urbanization, and the rural–urban gap is also narrowing (Fotso 2006; Fotso 2007; Anyamele, 2009). Household members that rated their quality of life “Very poor” had low physical health. Psychological health is very low (50 percent) in informal settlements. The environmental health is low to middle class, no high environmental quality of life is experienced in informal settlements of Katutura. No low quality of life was observed for physical and psychological health in informal settlements among residents who rated their quality of life “very good”.

The study further found that food insecurity is significant for both physical health, psychological health, social relationships and environmental health. It further revealed that for a unit increase in food insecure households, we expect a 1.301 increase in the log odds of being in a lower level of physical health, a 1.183 increase in the psychological health, 1.296 increase in the log odds of being in a lower level of social relationships and a 1.781 increase in the log odds of being in a lower level of environmental health.

6.3. CONCLUSIONS

With half of the World's population estimated to live in urban areas, and virtually all population growth expected to be in urban areas of low and middle-income regions, now it's time for policies to address the challenges of food insecurity and quality of life in informal settlements.

The study analyzed the determinants of urban household food insecurity and quality of life and find the linkage between the two variables in the informal settlements of Katutura. Firstly, the study described the demographic and socioeconomic characteristics of the food insecure sample households as well as quality of life in the informal settlements by using descriptive statistics. Secondly, the study identified factors that determine the urban household food insecurity and quality of life in informal settlements using binary logistic regression and multiple regression analysis. Thirdly, ordinal logistic regression model was used to investigate the linkage between food insecurity and quality of life.

In summary of this thesis paper, food insecurity is a common problem in informal settlements of Katutura, Windhoek. There is a positive relationship between food insecurity and quality of life and thus the study concluded that the two variables are linked and determine each other. Food insecurity and quality of life is further influenced by biological, social, economic and household characteristics.

This study highlights the plight of Namibians living in urban informal settlements in general and Katutura informal settlements in particular where poverty levels dictate the degree of food insecurity and poor/low quality of life. As an immediate solution, social grants may help to alleviate deprivation by increasing household income, but medium- and long-term strategies such

as increased employment opportunities, education and improved household infrastructure such as piped water, flush toilet and electricity are required.

In conclusion, the study found that poor quality of life is associated with high levels of food insecurity in the informal settlements of Katutura and thus a linkage between food insecurity and quality of life exists. Thus, to improve food insecurity, we need to concentrate on advancing quality of life of individuals. Further dedicated quality of life and food insecurity research in informal settlements is required.

6.4. STUDY LIMITATIONS

The study encountered a few limitations. The study was only limited to informal settlements thus no overall city coverage. There was no (qualitative) in-depth interviews used to get explanations to specific behaviors and trends.

6.5. RECOMMENDATION

The possible areas of intervention that emanate from the results of the research study are discussed. To meet the rising challenge of urban food insecurity and improve quality of life in informal settlements, governments, communities and aid agencies must work together.

To address urban food insecurity and quality of life, the government and its partners need to consider the factors that affect food and livelihood of the poor. The effect of education on household food insecurity and quality of life confirms the significant role of the variable in consideration for betterment of living condition. The more household head educated, the higher will be the probability of educating family member and familiar with modern technology, which

the twenty first century so badly demands. So, strengthening both formal and informal education and vocational or skill training should be promoted to reduce food insecurity and advance quality of life in the informal settlements. The access to employment opportunity negatively related with food insecurity and quality of life in the study area. Access to job helps urban households to diversify their income which in turn alleviates the food deficiency among poor households. Therefore; both government and civil society organizations have roles to play in addressing these issues. The policy initiatives that will do most to enhance the potential for self-employment are basic condition in reducing food insecurity in the city.

Government and donor agencies tend to view food insecurity and quality of life as general indicators of the successes of other development activities, rather than as the central focus of their antipoverty strategies. In order to improve food insecurity in informal settlements, we must first focus on improving the quality of life of individuals and households in the informal settlements.

Improving food insecurity and quality of life in informal settlements in Katutura will require a more direct, more focused, and more integrated approach. Policy makers cannot afford to miss the opportunity to use and build on currently available knowledge and resources to dramatically reduce hunger, poverty and improve quality of life of residents of informal settlements of Katutura. Urban informal settlements will continue to grow, and this problems will only grow with them- unless we take action now.

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Appendix A: WHOQOL-BREF

[Questionnaire]

The following questions ask how you feel about your quality of life. I will read out each question to you, along with the response options. Please choose the answer that appears most appropriate. If you are unsure about which response to give to a question, the first response you think of is often the best one (The numbers after responses indicates the scores of the responses).

Please keep in mind your standards, hopes, pleasures and concerns. We ask that you think about your life in the last four weeks (The overall quality of life and general health facet).

1. How would you rate your quality of life?

Very poor: 1

Poor: 2

Neither poor nor good: 3

Good: 4

Very good: 5

2. How satisfied are you with your health?

Very dissatisfied: 1

Dissatisfied: 2

Neither satisfied nor dissatisfied: 3

Satisfied: 4

Very satisfied: 5

The following questions ask about how much you have experienced certain things in the last four weeks.

3. To what extent do you feel that physical pain prevents you from doing what you need to do?

Not at all: 5

A little: 4

A moderate amount: 3

Very much: 2

An extreme amount: 1

4. How much do you need any medical treatment to function in your daily life?

Not at all: 5

A little: 4

A moderate amount: 3

Very much: 2

An extreme amount: 1

5. How much do you enjoy life?

Not at all: 5

A little: 4

A moderate amount: 3
Very much: 2
An extreme amount: 1

6. To what extent do you feel your life to be meaningful?

Not at all: 5
A little: 4
A moderate amount: 3
Very much: 2
An extreme amount: 1

7. How well are you able to concentrate?

Not at all: 1
A little: 2
A moderate amount: 3
Very much: 4
Extremely: 5

8. How safe do you feel in your daily life?

Not at all: 1
A little: 2
A moderate amount: 3
Very much: 4
Extremely: 5

9. How healthy is your physical environment?

Not at all: 1
A little: 2
A moderate amount: 3
Very much: 4
Extremely: 5

The following questions ask about how completely you experience or were able to do certain things in the last four weeks.

10. Do you have enough energy for everyday life?

Not at all: 1
A little: 2
Moderately: 3
Mostly: 4
Completely: 5

11. Are you able to accept your bodily appearance?

Not at all: 1
A little: 2
Moderately: 3

Mostly: 4
Completely: 5

12. Have you enough money to meet your needs?

Not at all: 1
A little: 2
Moderately: 3
Mostly: 4
Completely: 5

13. How available to you is the information that you need in your day-to-day life?

Not at all: 1
A little: 2
Moderately: 3
Mostly: 4
Completely: 5

14. To what extent do you have the opportunity for leisure activities?

Not at all: 1
A little: 2
Moderately: 3
Mostly: 4
Completely: 5

15. How well are you able to get around?

Very poor: 1
Poor: 2
Neither poor nor good: 3
Good: 4
Very good: 5

16. How satisfied are you with your sleep?

Very dissatisfied: 1
Dissatisfied: 2
Neither satisfied nor dissatisfied: 3
Satisfied: 4
Very satisfied: 5

17. How satisfied are you with your ability to perform your daily living activities?

Very dissatisfied: 1
Dissatisfied: 2
Neither satisfied nor dissatisfied: 3
Satisfied: 4
Very satisfied: 5

18. How satisfied are you with your capacity for work?

Very dissatisfied: 1
Dissatisfied: 2
Neither satisfied nor dissatisfied: 3
Satisfied: 4
Very satisfied: 5

19. How satisfied are you with yourself?

Very dissatisfied: 1
Dissatisfied: 2
Neither satisfied nor dissatisfied: 3
Satisfied: 4
Very satisfied: 5

20. How satisfied are you with your personal relationships?

Very dissatisfied: 1
Dissatisfied: 2
Neither satisfied nor dissatisfied: 3
Satisfied: 4
Very satisfied: 5

21. How satisfied are you with the support you get from your friends?

Very dissatisfied: 1
Dissatisfied: 2
Neither satisfied nor dissatisfied: 3
Satisfied: 4
Very satisfied: 5

22. How satisfied are you with the conditions of your living place?

Very dissatisfied: 1
Dissatisfied: 2
Neither satisfied nor dissatisfied: 3
Satisfied: 4
Very satisfied: 5

23. How satisfied are you with your access to health services?

Very dissatisfied: 1
Dissatisfied: 2
Neither satisfied nor dissatisfied: 3
Satisfied: 4
Very satisfied: 5

24. How satisfied are you with your transport?

Very dissatisfied: 1
Dissatisfied: 2
Neither satisfied nor dissatisfied: 3
Satisfied: 4

Very satisfied: 5

The following question refers to how often you have felt or experienced certain things in the last four weeks.

25. How often do you have negative feelings such as blue mood, despair, anxiety, depression?

Never: 5

Seldom: 4

Quite often: 3

Very often: 2

Always: 1

APPENDIX B: STEPS TO COMPUTE QUALITY OF LIFE DOMAINS

Steps	Steps SPSS syntax for carrying out data checking, cleaning and computing total scores
Check all 26 items from assessment have a range of 1-	RECODE Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16 Q17 Q18 Q19 Q20 Q21 Q22 Q23 Q24 Q25 Q26 (1=1) (2=2) (3=3) (4=4) (5=5) (ELSE=SYMSIS). (This recodes all data outside the range 1-5 to system missing)
Reverse 3 negatively phrased items	RECODE Q3 Q4 Q26 (1=5) (2=4) (3=3) (4=2) (5=1) (This transforms negatively framed questions to positively framed questions)
Compute domain scores	COMPUTE PHYS= MEAN.6 (Q3, Q4, Q10, Q15, Q16, Q17, Q18)*4. COMPUTE PSYCH= MEAN.5 (Q5, Q6, Q7, Q11, Q19, Q26)*4. COMPUTE SOCIAL=MEAN.2 (Q20, Q21, Q22)*4. COMPUTE ENVIR=MEAN.6 (Q8, Q9, Q12, Q13, Q14, Q23, Q24, Q25)*4. (These equations calculate the domain scores. All scores are multiplied by 4 so as to be directly comparable with scores derived from the WHOQOL-100. The “.6” in “MEAN.6” specifies that 6 items must be endorsed for the domain score to be calculated.)
Transform scores to 0-100 scale	COMPUTE PHYS= (PHYS-4)*(100/16). COMPUTE PSYCH= (PSYCH-4)*(100/16). COMPUTE SOCIAL= (SOCIAL-4)*(100/16). COMPUTE ENVIR=(ENVIR-4)*(100/16)
Delete cases with > 20% missing data	COUNT TOTAL=Q1 TO Q26 (1 THRU 5) (This command creates a new column “total”. “Total” contains a count of the WHOQOL-BREF items with values 1-5 that have been endorsed by each subject. The “Q1 TO Q26” means that consecutive columns from “Q1”, the first item, to “Q26”, the last item, are included in the count. It therefore assumes that data is entered in the order given in the assessment.) SELECT IF (TOTAL>21). EXECUTE (This second command selects only those cases where “total”, the “total number” of items completed, is greater than or equal to 80%. It deletes the remaining cases from the dataset.)

Tables for converting raw scores to transformed scores

Raw	Transformed
7	0
8	6
9	6
10	13
11	13
12	19
13	19
14	25
15	31
16	31
17	38
18	38
19	44
20	44
21	50
22	56
23	56
24	63
25	63
26	69
27	69
28	75
29	81
30	81
31	88
32	88
33	94
34	94
35	100

Raw	Transformed
6	0
7	6
8	6
9	13
10	19
11	19
12	25
13	31
14	31
15	38
16	44
17	44
18	50
19	56
20	56
21	63
22	69
23	69
24	75
25	81
26	81
27	88
28	94
29	94
30	100

Raw	Transformed
2	0
3	6
3	19
4	25
5	31
5	44
6	50
7	56
7	69
8	75
9	81
9	94
10	100

Raw	Transformed
8	0
9	6
10	6
11	13
12	13
13	19
14	19
15	25
16	25
17	31
18	31
19	38
20	38
21	44
22	44
23	50
24	50
25	56
26	56
27	63
28	63
29	69
30	69
31	75
32	75
33	81
34	81
35	88
36	88
37	94
38	94
39	100
40	100