Food Insecurity in Cape Town: How Inadequate Access Affects Human Health and Livelihoods

by

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ABSTRACT

Despite the increase in research on urban food insecurity, little has explicitly focused on spatial food access and malnutrition and under-nutrition amongst the urban poor in South Africa. Therefore, using a quantitative household data survey completed by the African Food Security Urban Network in 2008, this study examines the relationship of spatial food access and malnutrition and under-nutrition in three areas of Cape Town's peri-urban areas: Ocean View, Philippi, and Khayelitsha. An analysis of the survey data yields significant relationships between supermarkets and dietary diversity, as well as a robust relationship between poor household food access and malnutrition and under-nutrition. This study examined the differences of dietary diversity between Ocean View, Philippi, and Khayelitsha. This research discovered that while Ocean View had the highest household dietary diversity scores, they were also the most vulnerable to fluctuations due to their lack of spatial access to supermarkets. This study is a departure point for future research on these critical aspects of urban food insecurity in South Africa.

DECLARATION

I declare that *Food Insecurity in Cape Town: How Inadequate Access Affects Human Health and Livelihoods* is my own work, that it has not been submitted for any degree or examination at any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

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LIST of ABBREVIATIONS

AB	Abalimi Bezekhaya
ANOVA	Analysis of Variance
DCD	Diet-Related Chronic Diseases
DD	Dietary Diversity
FAO	Food and Agriculture Organisation
FFOS	Frequency of Food Obtained from Source
GDP	Gross Domestic Product
HHHLE	Household Head Highest Level of Education
HDDS	Household Dietary Diversity Scores
HIPC	Household Income Per Capita
HS	Household Size
LPI	Lived Poverty Index
MLE	Maximum Likelihood Estimation
MLR	Multiple Linear Regression
PHA	Philippi Horticultural Area
SHH	Sex of Household Head
SA	South Africa
SFA	Spatial Food Access
SPSS	Statistical Package for Social Scientists
SSA	Sub-Saharan Africa
TFGW	Types of Foods Gone Without
UFS	Urban Food Security
UN	United Nations

CHAPTER 1:
INTRODUCTION

In 2007 the world reached its rural-urban tipping point. For the first time in human history, the majority of people across the globe lived in urban areas rather than in rural settings. Since 2007, urbanisation has continued to drive the growth of cities, the results of which are becoming increasingly evident. In particular, one serious and often overlooked implication of urbanisation has been the emergence of urban food insecurity. While attention has traditionally been focused on rural food insecurity, the focus has begun to shift (Battersby-Lennard, Fincham, Frayne, & Haysom, 2009). Although food insecurity has begun to attract global attention, it is still viewed as a household-level problem. Yet, with urbanisation, individual health and well-being have been threatened by rapidly increasing populations, rising poverty levels, growing strains on infrastructure, environmental degradation, volatile food prices, and limited access to healthy foods (D. Maxwell, 1999; S. Maxwell, 1996). The basis of this research is an insufficiency in knowledge related to the spatial food access dimension of urban food insecurity.

1.1 Background

Since the emergence of urban food security and the development of its associated research field, experts have identified many obstacles that continue to prevent its continued presence. According to Maxwell (1996), "it is impossible to speak of food security as being a problem of supply without at least making reference to the importance of access and entitlement." There is no greater example of the politics and impacts of access and entitlement than amongst developing cities' urban poor (Crush & Frayne, 2010a). Although an increase in the number of urban supermarkets has improved accessibility to food in spatial terms, the goods stocked in supermarkets are often financially unaffordable and hence inaccessible to the urban poor. In other words, urban food insecurity is not a problem of food resources being unavailable, but rather it is a problem of having sufficient access to those

available resources. In South Africa, these difficulties affect a notable proportion of the population (Benson, 2004).

Food access is not the only critical aspect of food insecurity; malnutrition and under-nutrition are also vital components. It is widely accepted that nutrition is a fundamental component of one's health. Yet, rising levels of urban food insecurity continue to act as a barrier to individual wellbeing thus profoundly restricting the health and livelihoods of millions (Benson, 2004). The greatest challenge in formulating strategies to deal with these health and livelihood barriers arises when food insecurity is not recognised as a political issue. Decision-makers perceive food insecurity as a household problem and hence it is the responsibility of individuals to feed themselves. It is evident that the current urban food system in South Africa does not support equal access to food, especially amongst the urban poor (Smith, 1998). These conditions continue to promote food insecurity in South African cities. Furthermore, due to growing pressures to attain goods and services within urban environments and rising levels of Diet-related Chronic Diseases (DCD) amongst urban populations, people in poor neighbourhoods are finding it increasingly difficult to adequately access healthy foods. As a result, populations are developmentally constrained and struggle to develop socially, as well as economically.

1.2 Research Focus

Within the literature, there is debate about the driving forces of urban food insecurity. Food insecurity exists in many cities, however, there is no individual aspect that universally contributes to its proliferation. Instead, several factors continue to promote the inability of populations to attain a diverse and nutrient-rich diet. In the case of Cape Town, the key characteristics to consider when discussing urban food insecurity, are health outcomes such as malnutrition and under-nutrition that result from inadequate food access. The specific study sites that will be addressed more explicitly later in this research are three of Cape Town's peri-urban areas – Ocean View, Philippi, and Khayelitsha. The consequences of urban

food insecurity are complex and affect communities' health, development, and livelihoods. Therefore, it is paramount that scholarship develops better understandings of the drivers of urban food insecurity in Cape Town, as well as highlights the severity of its effects. Specifically, given that an increasing number of urban poor face daily limitations to healthy food, exploration of the spatial element of food access is particularly important (De Swardt, Puoane, Chopra, & Du Toit, 2005).

At present, there is no universal definition of spatial food access (SFA). Rather, SFA is a developing concept that continues to take on new aspects and dimensions with each new study (Swindale & Bilinsky, 2006; Crush & Frayne, 2010; Battersby, 2011; Labadarios et al., 2011). Within this project, SFA is understood as the proximity and difficulty of populations to obtain food or reach food outlets in the three study sites of Ocean View, Philippi, and Khayelitsha. However, it is important to note that this definition is narrow as will be demonstrated in this study. Therefore, not only does this project seek to evaluate the effect of food access on urban food security, it will also attempt to define SFA in relation to malnutrition and under-nutrition more accurately.

While food access is a broad component of food insecurity, it also affects malnutrition and under-nutrition. Malnutrition and under-nutrition are also principal aspects in the food insecurity framework. South Africa's urban poor are vulnerable to malnutrition and under-nutrition due to the limited number of outlets, shops, and vendors that provide fresh nutrient-rich foods in many poor neighbourhoods (Crush & Frayne, 2010b). The urban poor are constrained to a limited variety of foods, many of which lack essential nutrients to support good health. Under-nutrition is defined by an inadequate intake of nutrients, whereas malnutrition is typified by a calorie-rich but nutrient poor diet. Hence, this study is interested in examining the relationship of SFA, and malnutrition and under-nutrition amongst the populations in Ocean View, Philippi, and Khayelitsha.

1.3 Study Sites

As discussed in Section 1.2 of this Chapter, this research focuses on three peri-urban areas of Cape Town. The analysis will concentrate on survey data collected from Ocean View, Philippi, and Khayelitsha. While each of the three sites has their own unique characteristics, all are also economically disadvantaged and experience varying levels of food insecurity. In short, Ocean View was selected due to its history of subsistence fishing; Pihilippi was included due to its proximity to urban agriculture sites; and Khayelitsha due to its rural-urban linkages. This study seeks to examine the relationships of food access, malnutrition and under-nutrition across the three sites and within each site, to emphasise the differences that exist. The specific features of each site are discussed more thoroughly in Section 3.2.2.

1.4 Research Question

In order to fill the knowledge gap that exists regarding the relationship of food access and malnutrition and under-nutrition amongst Cape Town's urban poor, this study seeks to identify the specific variables in question, examine the relationships that exist between them, and explain the significance of their interactions. Therefore the following question is central to the study:

- Does spatial food access account for differences in household nutrition across Ocean View, Philippi, and Khayelitsha, over and above poverty, education, and income?

1.5 Hypothesis

To guide the study, this project proposes the following hypothesis. Overall, this research expects to find that spatial food access has a negative correlation with household nutrition. More specifically, across Ocean View, Philippi, and Khayelitsha, this research expects to find that nutrition levels are the lowest in households that

have the poorest spatial food access despite controlling for household poverty, education, income, sex of household head, types of food gone without, frequency of food obtained from source, and household size. Poor spatial food access affects households by limiting their abilities of acquiring nutrient rich foods.

1.6 Chapter Outlines

Chapter 1: Introduction

Chapter one provides background information to this study and introduces the topics of food insecurity, food access, malnutrition and under-nutrition in South Africa. The Chapter also addresses the study rationale, research question, and hypothesis.

Chapter 2: Origins of the Study of Food Security from a Political Perspective

Chapter 2 guides the reader through the key topics relevant to this research. These are the origins of the study of food security; the impact of urbanisation; poverty; food access; and lastly nutrition. This Chapter also identifies food insecurity as a political topic. The literature review concludes that while there has been research performed on these topics, in the case of Cape Town little has been to evaluate the relationship of food access to nutrition amongst the urban poor.

Chapter 3: Research Design

Chapter 3 discusses the research design used to test the hypothesis of this study. In addition, the Chapter illuminates the research strategy. The strategy employed in this project is quantitative with a post-positivist research philosophy. The study relies on African Food Security Urban Network survey data with consent from the owners of it, to conduct statistical analysis. Finally, Chapter 3 addresses the limitations of this research.

Chapter 4: Describing the Data and Constructing the Scales

Chapter 4 presents the data that is examined in this research. In particular, the key study variables Spatial Food Access (SFA) and malnutrition and under-nutrition are identified and described to the reader. The latter sections of the Chapter reveal the descriptive statistics of the variables, as well as evaluate the reliability and validity of the data.

Chapter 5: Findings

Chapter 5 describes the research findings. To test the research hypothesis, a variety of multivariate analyses were conducted on the data. This study evaluated the relationship of various food sources and household dietary diversity. In addition, a multi-model regression tested a number of independent variables with the dependent variable to determine which variable had the most significant influence on household dietary diversity. Lastly, this Chapter explores differences in household dietary diversity between and within the study sites.

Chapter 6: Discussion

Chapter 6 critically examines the study findings with the literature review. In addition, Chapter 6 addresses the importance of these three key findings relative to the research question and hypotheses.

Chapter 7: Conclusion and Recommendations

Chapter 7 addresses the research question and hypotheses of this study. Furthermore, this Chapter summarises the findings and presents conclusions according to the research question and hypothesis, and proposes two recommendations for future research.

References

This study employed the Harvard (author, date) system of referencing. The reference section provides an alphabetical listing of all of the sources used in this study.

CHAPTER 2:
LITERATURE REVIEW

This Chapter reviews the literature relevant to this study. The first section of this Chapter identifies the origins of food security as a political issue. The second part of this Chapter examines the impact and cyclical relationship of urbanisation, poverty, food access, and nutrition on UFS. By exploring these topics, this Chapter will contextualise the historical development of UFS and then highlight its foremost challenges.

2.1 The Origins of the Study of Food Security

In the vocabulary of contemporary political discourse, the concept of food security is relatively new. The term 'food security' was developed during the early 1970s amidst pressure to label and describe growing global food concerns (D. Maxwell, 1999). The World Food Conference of 1974 marked the emergence of the development, understanding, and evolution of the concept of food security (S. Maxwell, 1996). In its simplest form, food security suggests that individuals possess a right to the security of food. More specifically, individuals have the right to adequate food to support healthy and dynamic lifestyles. Thus, when individuals or communities are without food, the right to food is not being met. Consequently, food security becomes a political issue. Numerous political forces including policy, the food system, and the political economy (poverty) intrinsically influence food security. In the early stages of food security studies, experts prioritised problems of food supply at both the national and international level (FAO, 2003). In particular, research focused on the volume and stability of food supplies. Yet, as knowledge expanded, the complexity of the term did as well.

Since the World Food Conference of 1974, numerous definitions of food security have emerged. The various definitions developed parallel to the evolving understanding of various global food-related discussions emerged surrounding hunger and food supplies. While hunger was a dominant concern at the time,

experts began to speak of the state of food and hunger as being in a state of crisis. In the 1970's experts believed insufficient food supplies were causing global food crises.

In 1983 the Food and Agriculture Organisation (FAO) expanded its understanding of the concept to incorporate access – spatial and economic – as essential elements of relevance (FAO, 2010). Interestingly, before 1983 experts did not include individual/household access as critical variables in terms of proximity to and affordability of food. The inclusion of 'access' was notable because it marked a departure point in addressing food security as not just a systemic problem, but also as an individual and household challenge. Over the ensuing years, the complexity of the term continued to evolve alongside a broader understanding of food, health, and nutrition.

By the 1990s, food security was widely recognised not only as a systemic, household or individual problem, but also as a global issue (FAO, 2003). Consequently, the definition of food security steadily grew to encompass increasing nutrition concerns such as inadequate micronutrient intake, stunting, and other Dietary-related Chronic Diseases (DCD) (FAO, 2003). In addition, this new understanding of food security incorporated the promotion of the "requirements of an active and healthy life" (FAO, 2003). Nevertheless, the evolution of the concept of food security did not cease there but rather continued to take on several new dimensions. Many of the iterations of food security came from international organisations, such as the United Nations (UN), who shifted their focus from hunger to incorporate nutrition and cultural preferences as important aspects.

In its advancement, following the 1996 World Food Summit, food security research shifted to include food safety and individual and cultural food preference (FAO, 2003). By 2001 the definition of food security had taken on another iteration and was described as:

> A situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 2010).

The definition represents what is the most widely used definition of the term today but is based on the definition that the FAO proposed in 2001. It is important to understand that food *insecurity* is therefore the inverse of the above definition. Food insecurity arises when a person or household does not have sufficient physical, social and/or economic access to safe and nutritious food. In this respect, it is clear that food access – particularly spatial and economic – is critically important in the establishment of food security and in the augmentation and support of human health and livelihoods. One of the domains of most concern to human health and livelihoods is the urban environment, where growing populations are continuously challenged by food insecurity and its associated impacts.

2.2 Urbanisation

In order to understand why food security research is shifting from rural to urban centres, it is important to recognise the many growing challenges of urbanisation. It is widely acknowledged that cities around the world are growing at rapid rates. South Africa, where approximately 60 per cent of the population is now urban, is no exception (Battersby-Lennard et al., 2009). Although the population shift from rural to urban is one that is happening globally, Sub-Saharan Africa (SSA) is expected to face a high 4 per cent annual growth rate (UN World Urbanisation Prospects, 2007). One of the main drivers of the rural to urban transition is employment and opportunity. However, it remains difficult for migrants to establish themselves and improve their socio-economic status due poor infrastructural mechanisms, particularly inadequate employment opportunities, housing and education, to support the influx of new migrants (Battersby-Lennard et al., 2009). For example, in Cape Town, Western Cape, the population has surged by 21 per cent over the last decade (City of Cape Town, 2010). As urbanisation continues to alter the 'foodscape' of cities, there are consequences: One consequence of the rapid population influx to cities is increased population density in the urban and peri-urban areas (Crush & Frayne, 2010b). In SSA particularly, the population of urban poor that live in slums

and townships[1] account for roughly 70 per cent of the total urban population (Schlein & Kruger, 2006). The population density in a recent study in three urban areas in Cape Town noted an average household size of 4, while the largest household in the study was 19 (Battersby-Lennard et al., 2009). What is important to note given these figures, is that many peri-urban households in economically deprived areas are small inadequately provisioned dwellings. For instance, many of these households are densely populated and lack modern cooking amenities and food storage facilities (Crush & Frayne, 2010a).

The spread of poverty from rural to urban areas is one of the central features altering the socio-economic and political environment of cities (Ravallion, 2007). Moreover, it is expected that over the coming decades, this trend will continue and even intensify (Frayne, Pendleton, Crush, & Acquah, 2010). Contrary to general perceptions, rapid urbanisation is not always associated with increased incomes and better standards of living (Crush, Frayne, & McLachlan, 2011). Rather, in the modern SSA context, rapid urbanisation is often characterised by decreased standards of living and increased frequencies of poverty (Ravallion, 2007). In short, urbanisation contributes to the inability of cities to establish adequate infrastructural mechanisms to cope with the increased pressures from rising populations.

2.3 Poverty

One of the obvious consequences of urbanisation relates to the increasing occurrence of poverty in cities. As with food security, traditionally poverty has been understood as a rural issue (Battersby-Lennard et al., 2009). Yet evidence suggests that rapid urbanisation is shifting the weight of poverty into cities (Cohen & Garrett, 2009). For example, recent research suggests that from the period of 1993 to 2002, the proportion of people living on $1 a day in urban areas globally has risen from 19

[1] Townships are densely populated peri-urban areas in South Africa. Townships are often over-crowded and resource poor, with limited access to water, sewerage, housing, education, food, and healthcare facilities (May, 1998).

per cent to 24 per cent (Ravallion, 2007). Furthermore, the cost of living in urban areas in SSA remains 30 per cent higher than in rural areas (Ravallion, 2007). In South Africa, these trends seem accurately representative of the urban environment despite the "relatively high rates of economic growth, poverty incidence has not improved" (Battersby-Lennard et al., 2009). According to a 2007 Statistics South Africa study, at least half of all South Africans, roughly 25 million, live in absolute poverty on less than $1 per day (Statistics SA and National Treasury, 2007). These figures are of particular concern when paralleled with recent food price increases, as well as ever-rising costs of electricity and fuel, which many urban residents depend upon daily (Labadarios et al., 2011). Such expenses have a deep impact on the urban poor and none more so than the rising costs of food.

There has been widespread political and media attention given to the recent food price increases over recent years, especially in the context of Africa. A recent food price report from the World Bank's Food Price Index reveals that prices have risen by 15 per cent between October 2010 and January 2011 alone (The World Bank, 2011). The impact of these increases is of particular concern to those living at or below the poverty line. Low income households are the most vulnerable to food price increases because a greater percentage of their incomes are spent on food (Altman, Hart, & Jacobs, 2009). Conversely, the urban poor also benefit the most when food prices fall. A recent study on Cape Town, indicates that food is the most significant household expenditure at 39 per cent of monthly income, amongst the urban poor (De Swardt et al., 2005).

Cape Town is a city endowed with a myriad of urban challenges, one of the most imperative being urban poverty. Due to the political legacies of apartheid, the majority of the wealth of Cape Town remains concentrated in the northern and southern suburbs of the city. In contrast, the sprawling impoverished townships are relegated to the Cape Flats. Another issue that complicates matters is that the population of Cape Town is expanding not only numerically, but also spatially, thus affecting the ways in which resources are accessed. One of the most vital resources often inaccessible to populations is food. The rapid urban sprawl has left many

urban areas with a scarce amount of nutrient-dense foods and limited vendors, which has perpetuated a cycle of poor food access (De Swardt et al., 2005).

2.4 Food Access

Traditionally research on food access and security has principally focused on issues of supply. However, in 1982 Amartya Sen (1982) questioned this dominant discourse and the linkages between physical food supplies, hunger and malnutrition. As a result, research and policy have gradually progressed to recognise the importance of affordability as well as the proximity of food resources. Amongst urban populations the main determinant of food insecurity is not strictly an issue of supply, but rather a matter of *access* to that supply (Crush & Frayne, 2010a). The shelves and aisles of supermarkets in cities are stocked full of processed and fresh foods. Yet, poor households and individuals are economically unable to access the essential food staples. South Africa currently produces sufficient food to ensure adequate diets for its entire population (Frayne et al., 2010). However, under-nutrition, defined as the inadequate intake of nutrients and or the existence of stunting or chronic disease, remains alarmingly prevalent (Frayne et al., 2010). Although the aggregate number of supermarkets throughout cities may be improving general accessibility of foodstuffs, the products these stores supply are becoming increasingly financially inaccessible to the majority of the population (Godfray, Beddington, Crute, & Haddad, 2010).

'Food deserts' are a recent phenomenon in urban areas and have been a recurring topic of study in UFS. Food deserts are populated urban areas where residents do not have sufficient access to an affordable and healthy diet (Cummins & Macintyre, 2002). Indeed, food deserts are one of the many factors contributing to the proliferation of deteriorating food access (Frayne et al., 2010). However, the majority of research on food deserts focuses on European and North American metropolises. Therefore, applying the same general assumptions about spatial food access and deserts in the South African urban context is problematic (Battersby, 2011a). Given the importance of informal and formal food vendors in urban South

Africa, purchasing behaviours are markedly different to those found in Europe and North America.

The growing 'supermarketisation' of the food industry is profoundly altering the urban 'foodscape' of South Africa (Crush & Frayne, 2010a). 'Supermarketisation' often leads to the closure of community stores and local markets (Hawkes, 2008). Local vendors and markets are often the only providers of fresh foods to poor neighbourhoods and communities in urban areas in South Africa (Crush & Frayne, 2010a). Although they are commonly regarded by the middle-class as nutritionally poor and unsafe sources of food, in the South African context street foods are an important source of food for many poor populations (Atkinson, 1995). Given the increased influence of 'supermarketisation' and the buying power of these corporate entities, for example Pick n' Pay, Woolworths, and Shoprite, small vendors struggle to stay competitive with supermarkets and to remain economically viable (Hawkes, 2008). While it is common for local vendors in South Africa to charge higher prices than supermarkets, for many of the urban poor these vendors are the only access they have to fresh foodstuffs (Battersby, 2011a). As a result, the communities that rely on local producers and vendors for their fresh foods become restricted with a lower availability of fresh foods. The relationship between informal food vendors and the urban poor is critical and if these vendors were to disappear neighbourhoods would face notable consequences (Atkinson, 1995). Over time, communities face the risk of spiralling downwards into cycles of insufficient food access. In addition, not only does 'supermarketisation' affect food access, it also influences the types of foods stocked and sold in supermarket aisles.

Recent reports suggest that consumption patterns have shifted globally from unprocessed nutrient-dense foods towards highly-processed nutrient-poor foods, allowing for the capitalisation of supermarkets (Hawkes, 2008). Supermarkets are able to conduct business in the locations they select, dictate prices, promote the products they wish to sell, and are not responsible for selling nutritious products to the public. Unfortunately, both retailers and producers of food share "the broad strategic aim of increasing profits" and supplying the "perceived needs" of customers (Hawkes, 2008: 6). The consequences of this shift from nutrient-dense to

nutrient-poor foods have only recently begun to surface in both the short and long-term. It is apparent that nutrition levels are negatively influenced by transitioned diets as cumulative studies have begun to illustrate (Popkin, 2006; Hawkes, 2008; FAO, 2010; Crush & Frayne, 2010). The transitioned diet is typified by the movement away from a plant-based diet, that is rich in fruit and vegetables, to one that is rich in calories provided by animal fats, sugar, and low in complex carbohydrates (Lock, Pomerleau, Causer, Altmann, & McKee, 2005).

2.5 Nutrition: You Are What You Eat

Nutrition is the fundamental key to one's health and livelihood. More generally, it is generally accepted that one is what one eats. Yet nutritional status improvements, characterised by an enhancement in nutrient intake and a reduction in Diet-related Chronic Disease (DCD), are rarely considered as explicit political concerns (Demment, Young, & Sensenig, 2003). At present, populations are ill-informed and thus inclined to make uneducated decisions surrounding food choices as well as health and nutrition regardless of their socio-economic standing (Peltzer, 2007; Oldewage-Theron & Napier, 2011). In instances of rapid urbanisation, the rates of both urban food insecurity and under-nutrition increase rapidly (Crush et al., 2011). Resulting from rapid increases in food insecurity are growing levels of under-nutrition and malnutrition. Under-nutrition, understood as the inadequate intake of nutrients, increases the potential for diet-related chronic diseases and stunting,[2] as does malnutrition, categorised by calorie rich but nutrient poor diets (Faber, 2007). Both under-nutrition and malnutrition are dominant concerns in many cities (Crush et al., 2011). Surprisingly, because the impacts of under-nutrition and malnutrition are so prevalent and severe, some scholarship suggests that these issues are more critical to overcome than urban poverty in achieving development goals (Garrett & Ruel, 2000). Recent studies estimate that malnutrition alone can account for annual

[2] Stunting refers to shortness in height in relation to age, compared to a standardised anthropometric measurement scale (height-for-age <-2 Standard Deviations from the US National Center for Health Statistics reference median) 2013-05-14 9:17 AM.

losses of 2 to 3 per cent of Gross Domestic Product (GDP) in developing countries (The World Bank, 2006).

Along with the economic concerns of malnutrition and under-nutrition, the short and long-term health consequences are also significant. In particular, stunting is a substantial threat to individual and community development. On a national level in South Africa, stunting is the most acute nutritional disorder, affecting one in five of the nation's children (Labadarios et al., 2005). As these children mature, many of them face the possibility of physical and cognitive limitations due to prolonged periods of inadequate of micronutrient intake (Demment et al., 2003). Over the past several decades, there have been substantial changes in food manufacturing and cultural appetites. Today's urban populations are not adequately accessing nutrient-dense foods but rather their consumption habits have "transitioned" toward a new form of diet (Popkin, 2006). Unfortunately, this transition is characterised by replacing food staples such as fruits, vegetables, and proteins with increased consumption rates of high-calorie foods such as fatty meats, oils, highly processed foods, snacks, and sugar rich foodstuffs (Popkin, 2006; Jacoby & Hawkes, 2008).

A primary concern of the transitioned diet is expressed by inadequate "dietary diversity" (Battersby-Lennard et al., 2009). Dietary diversity is a difficult variable to measure as a given household may be consuming a reasonable quantity of food, yet the nutritional quality of those foods may be poor. Importantly, neither Household Dietary Diversity Scores (HDDS) nor Types of Foods Gone Without (TFGW) give a complete picture of diet or nutrition. Instead, HDDS and TFGW are merely indicators of household scores. Nevertheless, these indicators are useful as they help to distinguish consumption patterns. In short, although HDDS and TFGW are useful indicators of consumption patterns, dietary diversity should stress food quality over quantity. For example, a household may consume four 'different' foods, yet those foods may all be variants of the same food group such as cereals (Swindale & Bilinsky, 2006). Therefore, household dietary diversity should be measured by calculating the number of different food types consumed instead of the total quantity of foods (Swindale & Bilinsky, 2006).

The most concerning consequence of the transitioned diet and its accompanying deprived levels of micronutrients is DCD. As highlighted by Demment et al. (2003), cereals provide far more energy per capita in developing countries than any other category of food. This pattern is problematic for two reasons. Firstly, a diet rich in cereals alone is deficient in the vital micronutrients found in fresh fruits, vegetables, and proteins (Walker, 1995; Jacoby & Hawkes, 2008). Secondly, current cereal manufacturing processes strip the majority of micronutrients and vitamins from previously unrefined grains (Demment et al., 2003). As a result, the cereal by-product that emerges contains a low bioavailability of essential proteins and micronutrients (Demment et al., 2003). A diet lacking in essential nutrients is sure to result in DCD. DCD consist of micronutrient deficiencies, stunting, obesity, osteoporosis, diabetes, cardiovascular disease, and certain types of cancer (Jacoby & Hawkes, 2008). Alarmingly, DCD continue to increase exponentially within urban populations (Swart & Sanders, 2008). Recent studies in South Africa have shown that the inadequate intake of fruit and vegetables is a significant problem that directly influences the prevalence of DCD (Lock et al., 2005). To summarise, it is evident that the trajectory of this new type of diet – both in the short and long term – are detrimental to human health, livelihoods, and ultimately human development (Benson, 2004). Therefore, this study seeks to evaluate the relationships of spatial food access on malnutrition and under-nutrition to give an indication of the severity of the problems households face in Ocean View, Philippi, and Khayelitsha.

2.6 Conclusion

As seen in Sections 2.1 to 2.5, urban food security is a complex and evolving political issue. A review of the literature highlights the political nature of urban food security via urbanisation, poverty, food access, and several aspects of nutrition particularly within the South African context. While food security has become a topic of growing discussion in policy circles, it has yet to become a central policy issue in South Africa. Some of the key political dimensions of food security in South Africa relate to inadequate food policy, the current centralised food system, and the poor political

economy. Although scholarly research on the topic of food security began decades ago and notable knowledge advancements have taken place however, certain gaps in research remain. As a result, there are particular areas still lacking critical evaluation. In reviewing the literature, two topics in particular establish themselves as central gaps within the UFS framework. Those two topics are spatial food access (SFA), and malnutrition and under-nutrition. Little research has been done that considers the relationship of SFA and malnutrition and under-nutrition. Therefore, it is evident that further research is required to develop a better understanding of the driving forces of urban food security amongst Cape Town's urban poor. In addition, this study contributes to knowledge by developing a theory around the key variables of SFA and malnutrition and under-nutrition in Cape Town.

CHAPTER 3:
RESEARCH DESIGN

Chapter 3 discusses the research design employed to identify, examine, and analyse the data to test the hypotheses of this study. This Chapter will explore the design and research strategy of this project, namely, a quantitative design. This Chapter also explains the use of survey and statistical analysis as methods for exploratory methodology. Lastly, this Chapter discusses the limitations and the appropriate methods for data analysis.

3.1 Research Structure

Section 3.1 overviews the structure of this research. Namely, this section explores the research design, research philosophy, and research strategy.

3.1.1 Research Design

This project uses a quantitative design. Quantitative research is the quantifying of observed phenomena in numerical form for further examination (Creswell, 2009). As this study employs survey data, a quantitative design offers the most effective way to examine the relationships between variables and to test the study hypothesis. A quantitative design is fundamental in undertaking this project given its wide scope, for example population and sample size (refer to Section 3.2.3), which were further complicated by time constraints. Although qualitative design is beneficial as it provides detailed case specific data, its methods, for example participant observation and/or lengthy interviews, are not feasible in a study of this size and scope. Instead, a quantitative design containing values provides a wider lens as well as more general access to information.

3.1.2 Research Strategy

The research strategy relates to the type of empirical research conducted in a research project. Given the scope and questions of this project, an exploratory research strategy was chosen. In general, exploratory research and quantitative research aim to provide an indication and the context of real world phenomena. Specifically, exploratory research focuses on testing hypotheses. Generally, exploratory studies are undertaken when a problem is not well defined or understood. Furthermore, exploratory research typically takes place as small-scale or pilot studies than can inform larger-scale research projects in the future (Guba & Lincoln, 1994).

3.2 Data Collection and Methods

Given the quantitative and exploratory nature of this research, survey data were instrumental in completing it. This section explains the justification and criteria for employing survey data in this study.

3.2.1 Survey

As this study relies on numerical data from the African Food Security Urban Network (AFSUN) Cape Town survey, it employs a quantitative research design via the use of surveys. The survey method is most advantageous for measuring UFS levels as it allows for the collection of specific measurements and quantities. Furthermore, surveys provide an assortment of different indicators of UFS and its associated issues such as malnutrition and under-nutrition. Lastly, the survey method is the most efficient way to accumulate data representative of large populations, which are difficult to access. On the other hand, a limitation of surveys is that they do not give specific measurements at the individual level but rather they provide general indications of phenomena across large populations (Creswell, 2009). Although this characteristic of surveys can be considered a limitation, it is

also an advantage as a greater number of responses can be collected over a short period.

The AFSUN study employed a specific form of data collection. Due to the potential literacy limitations of respondents in the study areas, AFSUN conducted surveys as interviews. Using field workers from the local communities, the University of the Western Cape, and the University of Cape Town, surveys were conducted in September and October 2008 (Battersby, 2011a). The reason for the facilitation of the survey interviews was to maximise the number of completed surveys and to facilitate respondents that may not fully understand the questions on their own. Face to face interviews also generally provide a higher return rate than do self-completed surveys. In addition, personal interview surveys are generally more expansive and thus provide more detailed responses than other survey types (Creswell, 2009). The rationale behind the AFSUN survey (Battersby-Lennard et al., 2009) was as follows:

- To measure the levels of food security amongst poor urban households;
- To understand the sources of food and related (in)security for urban households;
- To measure the relationship between chronic illness (with a focus on AIDS) on urban household food security; and
- To capture the role of migration and urbanisation in the experience of food security amongst urban households

The objectives above clearly establish the aims of the AFSUN study. Furthermore, the scope of these objectives justifies the use of survey data collection, as other methods would require greater resources. The AFSUN survey was cross-sectional and used a random but representative sample of households across the three urban settings of Khayelitsha, Philippi, and Ocean View.

3.2.2 Study Areas: Cape Town's Khayelitsha, Philippi, and Ocean View

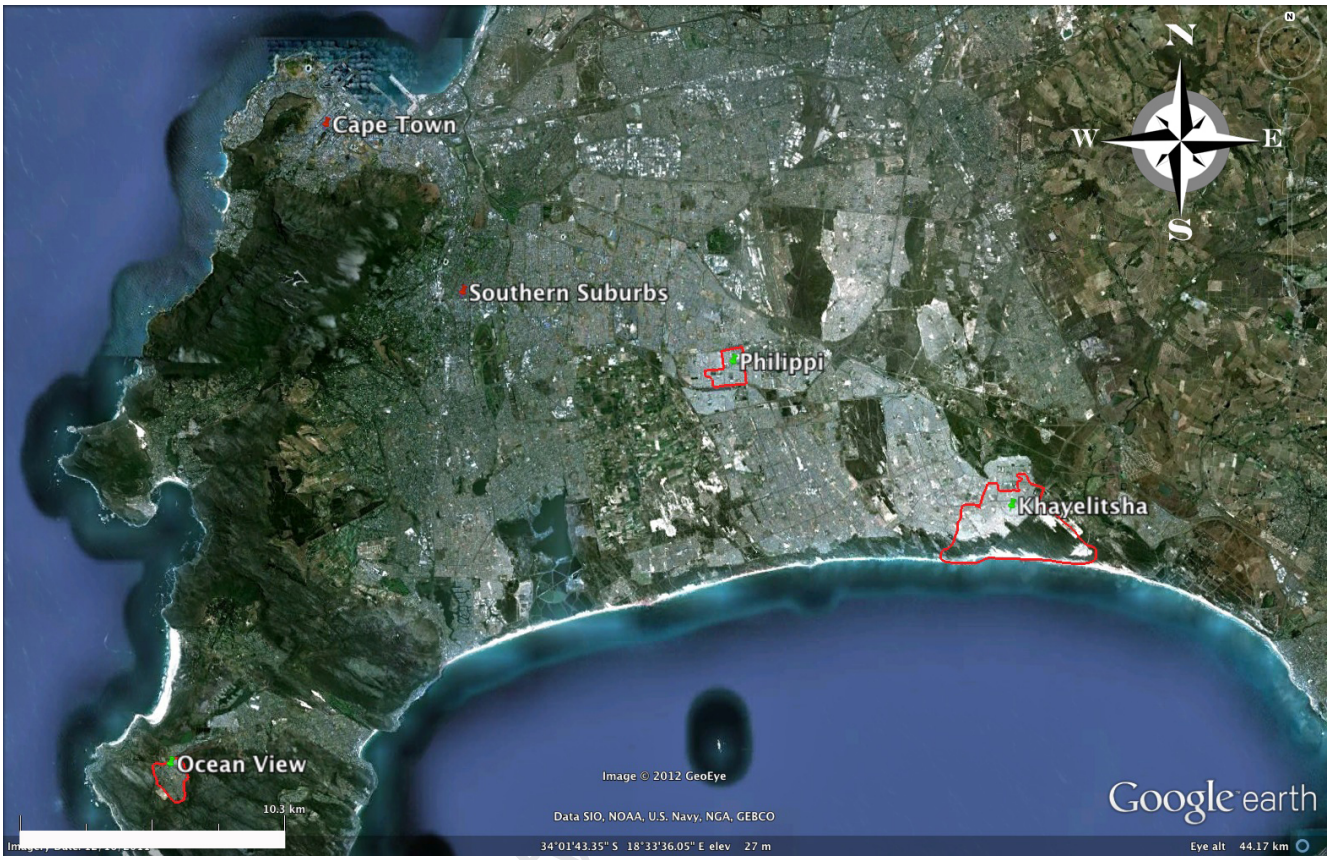
The city of Cape Town is located in South Africa's Western Cape Province. Many of Cape Town's urban challenges are not unique, however, its political, geographic, ethnic, and historical features are. Cape Town has high levels of urbanisation, economic polarisation, and food insecurity. Moreover, the city has a rapidly growing population, which has resulted in a 20.9 per cent increase over the last decade (City of Cape Town, 2010). Not surprisingly, with such high levels of population growth, the food systems of the city are increasingly strained. Much of Cape Town's population increase is due to migration (Battersby, 2011a). Consequently, the cultural diversity of the city is continuously transforming. In turn, this cultural transformation influences food preferences as discussed in the following sections.

The increasing ethnic diversity of Cape Town has shown signs of transition in lifestyle choices particularly in relation to nutrition and health (Crush et al., 2011). Unfortunately, food accessibility and affordability remain key restrictions to a substantial percentage of the population of Cape Town. For example, the 2009 AFSUN Cape Town survey conducted in the townships of Ocean View, Philippi, and Khayelitsha, indicated that 80 per cent of the sample populations were food insecure (Battersby-Lennard et al., 2009).

The AFSUN Cape Town study selected Ocean View, Philippi, and Khayelitsha, based on a specific set of criteria. Specifically, the AFSUN study aimed to examine UFS in economically disadvantaged areas in eleven cities across SSA. Within the broader study, each city was broken down into specific areas of study and included the following parameters: socio-economic conditions, geography, history, and ethnic diversity. The purpose of this survey was to try to capture and to compare the diversity of Ocean View, Philippi, and Khayelitsha, relative to UFS (Battersby-Lennard et al., 2009). Each of the three Cape Town study areas possessed unique features and characteristics. Figure 1 provides a visual illustration of the three sites included in the AFSUN survey, specifically Ocean View, Philippi, and Khayelitsha.

Figure 1. Map of the Three Study Areas: Ocean View, Philippi, and Khayelitsha

(Google Earth, 2012 (Accessed March 21, 2012))



Geographically closest to Cape Town, Philippi is located approximately 20 kilometres to the southeast of Cape Town in the area known as the Cape Flats. Two of the key reasons for the inclusion of Philippi as a study site involve the following: its proximity to the Abalimi Bezekhaya (AB)[3] head office and the Philippi Horticultural Area (PHA), which is a 1,500 hectare plot of farmland (Battersby, 2011a). Within the survey, AFSUN researchers examined the relationship between Philippi, AB and PHA, and the potential increase in UFS and nutrition levels. Given that neither Ocean View nor Khayelitsha has urban agriculture programs, the

[3] Abalimi Bezekhaya is a grass-roots urban agriculture and environmental action association, which operates in the Cape Flats townships. Its aim is to assist individuals, groups, and community-based organisations to initiate and support organic food growth and conservation. In doing so, it aims to promote sustainable lifestyles, job creation, poverty alleviation, and environmental renewal (Abalimi Bezekhaya, 2011).

AFSUN survey included Philippi to observe the role of urban agriculture in relation to UFS.

The second AFSUN survey site is Ocean View. Ocean View has several distinctive characteristics from the other study sites. Firstly, whereas Philippi is twenty kilometres southeast of Cape Town, Ocean View is located approximately 27 kilometres southwest of Cape Town on the Cape Peninsula. The second motivating for including Ocean View relates to its history of subsistence fishing. AFSUN claims this historical feature may influence the UFS and nutrition levels in the area. Thirdly, Ocean View is a predominantly coloured[4] ethnic area, which AFSUN hypothesises could account for different cultural predilections to food.

The third study site chosen for the AFSUN survey is Khayelitsha. In contrast to the Philippi and Ocean View sites, which are physically similar in size, Khayelitsha is notably larger. Furthermore, Khayelitsha is located approximately 31 kilometres to the southeast of Cape Town and the furthest from the City Bowl. One of the principal characteristics of Khayelitsha as compared to Ocean View and Philippi is its rural-urban linkages (Battersby, 2011a). Roughly fifty per cent of Khayelitsha's population are migrants from rural areas such as South Africa's Eastern Cape (City of Cape Town, 2010). Migrants often maintain ties to rural communities outside of Cape Town. As discussed previously (refer to section 2.3), rural-urban linkages are significant as they are often associated with elevated levels of poverty and food insecurity (Battersby, 2011a).

AFSUN includes these three sites to gauge UFS levels across economically disadvantaged areas in Cape Town with unique socio-economic and cultural features. Philippi is included due to its proximity to Cape Town as well as its relationship with urban agriculture projects. In addition, Ocean View is included based on its historical ties with subsistence fishing as well as its different cultural

[4] Contrary to international usage, in the South African context the term ''Coloured'' does not refer to black populations. Instead, the term alludes to a diverse group of people descended largely from slaves, indigenous Khoisan peoples, and other black people who were assimilated into colonial society by the late nineteenth century. As a result, of being partially descended from European settlers as well, Coloureds are commonly regarded as being of ''mixed race'' (Erasmus & Pieterse, 2001: 169).

characteristics, which are seen as being important factors that might influence food preferences. Last, Khayelitsha is included as it is has significant rural-urban linkages. Each of the three sites, although different share enough similarities to make them comparable.

3.2.3 Sample Design

So as to familiarise the reader with the design of the AFSUN survey, this section will discuss the method by which the survey was performed. The sample design relates to the selection of the population that was included in the survey of this study. The AFSUN Cape Town survey drew a sample of 1060 households across Philippi, Ocean View, and Khayelitsha. The population size of the survey totalled 4177 households. Each household head acted as the single respondent for each one of the 1060 households. Within the survey population, a total of 394 households were interviewed in Khayelitsha and 389 in Philippi respectively. In Ocean View, a total of 266 households were included (Battersby, 2011a). The purpose of the AFSUN Cape Town survey was to take a sample from a "range of urban typologies…reflecting the diversity of poorer areas in which people live" (Battersby-Lennard et al., 2009).

Given that the available City Census Data was from 2001 and out-dated, AFSUN instead relied on recent aerial photographs to select survey households. Furthermore, as study areas are subject to rapid change, data older than a few years was considered unreliable. Thus, using mid-2008 aerial photographs from the City of Cape Town's database of the various study sites, the AFSUN research team calculated the number of households in each dwelling area and selected an appropriate percentage of dwellings in each area as compared to the total for that given sample. Given the circumstances and limitations such as the out-dated city demographic material on the study sites, the aerial photograph-calculation method was the best technique available to ensure oversampling did not occur. While the process was not entirely random, attention was given so as to address the spatial aspect of sampling. The aerial photograph-calculation procedure reduced the possibility of sampling households adjacent to one another, limited oversampling of

any type of housing, and instead included households across various areas of the study sites. The purpose of minimising oversampling in this study was to reduce the potential for gender bias or narrow location focus in the data. Given the considerations of the AFSUN survey there are ways by which it could be improved, such as the inclusion of photographs. Unfortunately, this dissertation does not allow for such extensive quantitative tests.

3.2.4 Limitations

Given the wide reach of this project, it faced certain limitations. First, due to the time restraints and lack of available resources, this project did not collect its own primary data. Despite this limitation, the primary data employed, namely the AFSUN survey, provides a useful set of indicators of UFS across Khayelitsha, Philippi, and Ocean View. Second, given the out-dated census data available to AFSUN at the time of the sample design, aerial photographs were required to calculate semi-random but representative samples in the three study sites. Although this method is imperfect, it was the best method available at the time to produce spatially representative samples. Another limitation of the AFSUN survey relates to the fact that some areas were larger both spatially and in regards to population than the others. For example, Philippi and Ocean View are much smaller areas than Khayelitsha and the sample sizes did not accurately reflect these differences, which may have distorted the aggregate picture of the survey. The fact that the surveys were based on self-reported data is also a limitation. Self-reporting is not always the most accurate method for acquiring data. The inclusion of anthropometric data would certainly complement the AFSUN survey and add more explicit information relative to nutrition and health levels amongst the sample population. Given this limitation, this research used the AFSUN survey indicators to give a picture of what malnutrition/under-nutrition levels were within the sample population. Lastly, AFSUN conducted its survey in 2008 and some of the information collected may now be out-dated. Nonetheless, the AFSUN survey remains the most recent study

conducted across the three study sites and thus provided valuable data in understanding UFS amongst Cape Town's urban poor.

3.3 Data Analysis

This project conducted the data analysis component using the Statistical Package for Social Scientists (SPSS) computer software. In general, SPSS provides users with a wide array of comprehensive statistical tools thus giving users the capability to conduct a range of different statistical analyses. SPSS provides a plethora of options for analysis including multiple regression, multivariate analysis, and categorical data analysis. For the purpose of this study, descriptive statistics, Cronbach's Alpha reliability tests, factor analyses, bivariate correlation, Analysis of Variance (ANOVA), and Multiple Linear Regression (MLR) procedures were conducted. This study saw these various techniques as the most effective way to explain and analyse data.

CHAPTER 4:
DESCRIBING THE DATA AND CONSTRUCTING THE SCALES

Chapter 4 discusses the data examined in this study. This Chapter identifies the key study variables Spatial Food Access (SFA) and malnutrition and under-nutrition and their individual indicators. The latter sections of Chapter 4 examine the descriptive statistics of the variables and test the reliability and validity of the data. Before describing the more technical aspects of the data, however, it is essential to identify the variables and explain what it is they measure.

4.1 Study Variables

The purpose of descriptive statistics is to give the reader a clear image of the data to highlight its specific characteristics (Creswell, 2009). Therefore, this study principally employed two variables. To test the hypothesis of this study, the variables selected were, the independent (*X*) variable Spatial Food Access (SFA), and the dependent (*Y*) variable malnutrition/under-nutrition. Because this study had a limited number of variables to examine from within the primary data, those chosen were the best available. As discussed in Chapter 2, food access is a key variable in relation to food insecurity, therefore warranting its inclusion as the *X* variable. On the other hand, malnutrition and under-nutrition are also critical aspects of food insecurity. As such, malnutrition and under-nutrition were selected as the *Y* variable. The specific indicators within the variables are discussed further in the latter parts of this section, and tables of descriptive statistics for each indicator are provided in the text but also in Appendix 2.

The AFSUN survey measured SFA through three specific indicator questions. The first question used was Survey Question 12, which measured respondents'

scores on the Household Food Insecurity Access Scale (HFIAS) in the four weeks leading up to the study. The HFIAS provided an indication of overall household food access as shown in Table 1. On a scale across ten questions, households were categorised into one of four categories, food secure (0), mildly food insecure (1), moderately food insecure (2), and severely food insecure (3) (Battersby, 2011a). Therefore, the range distribution varied from 0 to 3. The questions focused on how often household food levels were negatively affected due to inadequate resources and availability of foods for consumption. The item with the highest score was (12c), 'In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources' with a mean (average score) of 1.39. Therefore, the sample population were forced to eat a limited variety of food due to a lack of resources more often than any of the other items listed in question 12. With a mean of 0.75, the item with the lowest score was, 'In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food'. Given this figure, a small proportion of the sample population went one day and one night without food. The relatively high standard deviation scores in this indicator variable indicate that there was a large amount of variance in the responses (data points are relatively distant from the mean) (Field, 2005). The mean across the ten items was 1.16 hence the sample population experienced moderate levels of food insecurity on the access scale.

Table 1. Descriptive Statistics – Measures of Household Food Access

	Mean	Standard Deviation
In the past four weeks, did you worry that your household would not have enough food?	1.3242	1.00038
In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	1.3797	.98555
In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	1.3918	.99723
In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	1.3565	1.00679
In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	1.3444	1.03199
In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	1.2864	1.04417
In the past four weeks, was there ever no food to eat of any kind in your household because of a lack of resources to get food?	1.0884	1.01968
In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	.8676	1.02894
In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	.7583	.96639
In the past week, did you or any household member eat a cooked meal less than once a day?	.9343	.97710

The distribution of values for questions 12 (a-j) provides a more detailed description of the responses within the sample population.[5] The distribution of the

[5] See Appendix 2 for the response value tables for items within questions 12, 13, 16, and 18.

HFIAS response values gives the reader a clearer indication of household food insecurity levels across the individual items.

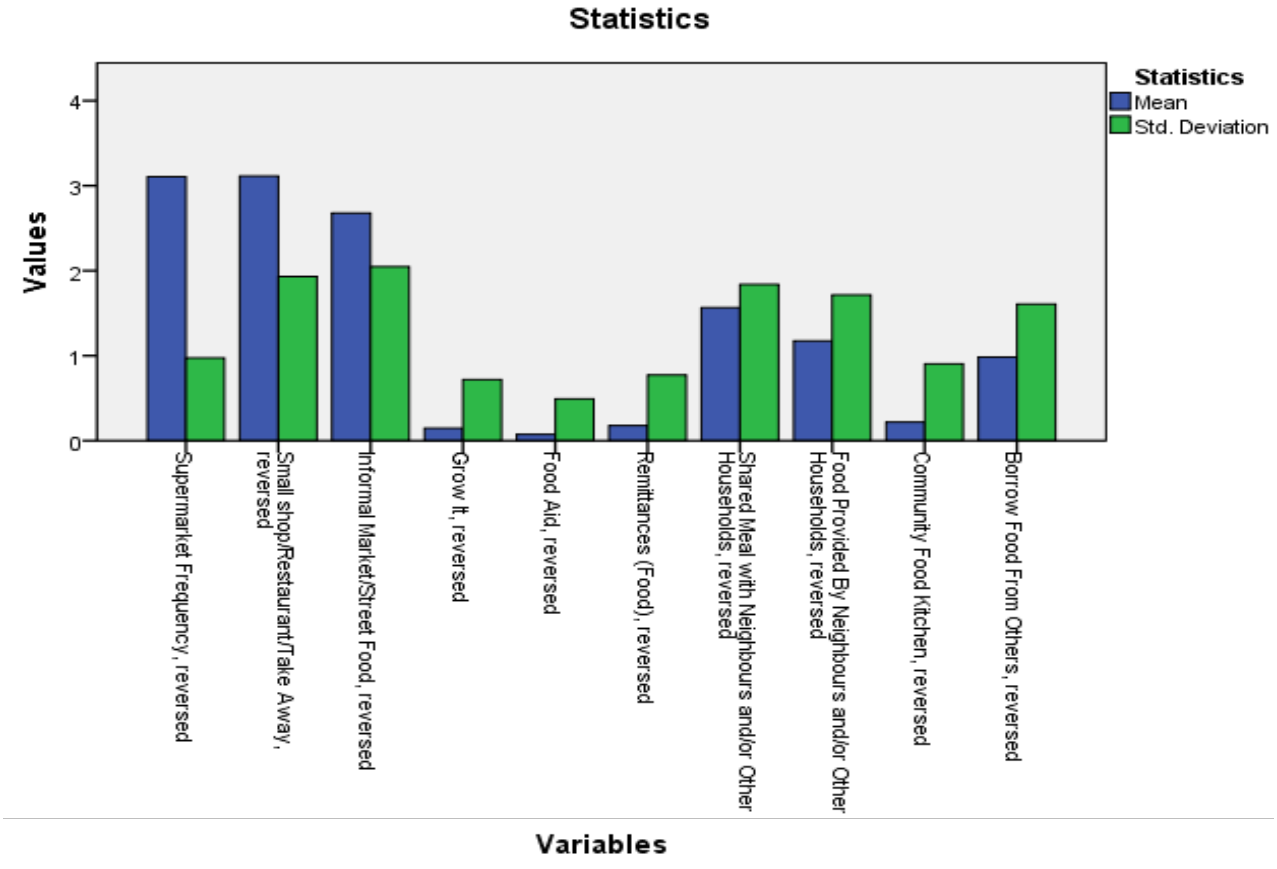
Table 2. Response Value Distribution of HFIAS

Household Food Insecurity Access Scale (HFIAS) for last four weeks	No (0)	Rarely (once or twice) (1)	Sometimes (3 to 4 times) (2)	Often (more than 10 times) (3)
a. In the past four weeks, did you worry that your household would not have enough food?	25	29	31	13
b. In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	23	27	35	13
c. In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	23	27	35	13
d. In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	25	26	34	13
e. In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	27	26	31	14
f. In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	30	25	30	14
g. In the past four weeks, was there ever no food to eat of any kind in your household because of a lack of resources to get food?	37	26	26	10
h. In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	51	18	20	8
i. In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	55	20	18	6
j. In the past week, did you or any household member eat a cooked meal less than once a day?	43	26	22	7

* Values are percentages of the total number of responses for each item.

The second question that gauged the independent variable, SFA, was Survey Question 18B 'Frequency Food Obtained from Source' (FFOS). The question asks households the frequency of which households obtained food from a variety of sources.[6] The survey measured the frequencies of food obtained from a variety of vendors on a scale of 0 to 5 beginning with 'Never' (0), 'Less than once a year' (1), 'At least once in six months' (2), 'At least once a month' (3), 'At least once a week' (4), and lastly 'At least five days a week' (5). Therefore, the FFOS indicator had a range of 5. Figure 2 presents the figures and values of FFOS in greater detail.

Figure 2. Descriptive Statistics – Frequency of Food Obtained from Source



[6] The two last sources listed in Survey Question 18B – 'other' and 'don't know' – did not provide meaningful data for analysis, thus were not included (See Appendix 1).

* Reversed indicates that the coding of the Frequency of Food Obtained from Source indicator was reversed to better suit this study.

As evident in Figure 2, the FFOS item with the highest mean was 'Small shop/Restaurant/Take Away' at 3.11. Hence, this source of food was the most frequented by households within the sample population. At the other end of the scale, the item with the lowest mean was 'Food Aid' at 0.07. Given the low mean score of 'Food Aid', it is evident that it was not a frequent source of food within the sample population. Furthermore, the high standard deviation scores for some of the items indicate notable variation in responses from the mean score (Field, 2005). Thus, those measures with high standard deviations are not accurate representations of the data, as responses would have varied significantly. The total mean for the ten FFOS items was 1.31, which indicates that households obtain their foods from a variety of sources at low frequencies.

In question 18B (a-j), the distributions of response values across the ten sources of food are as follows. The response values across this question give a useful indication of the frequency of food obtained from particular sources across the sample population. High scores indicate higher household frequencies of food purchased from that specific source whereas low response values indicate that given source of food was not frequently utilised by the sample population. Table 3 presents these figures.

Table 3. Response Value Distribution of FFOS

Frequency of Food Obtained from this Source	Never	Less than once a year	At least once in six months	At least once a month	At least once a week	At least five days a week
a. Supermarket	6	0	1	65	23	4
b. Small shop / restaurant / take away	25	1	2	11	34	28
c. Informal market / street food	34	1	2	7	36	19
d. Grow It	95	1	1	1	1	1
e. Food Aid	97	0	1	1	1	0
f. Remittances (food)	94	0	1	3	2	1
g. Shared Meal with neighbours and/or other households	56	1	3	18	18	5
h. Food provided by neighbours and/or other households	66	1	3	14	13	4
i. Community food kitchen	94	0	0	2	2	1
j. Borrow food from others	71	1	3	12	11	2

* Values are percentages of the total number of responses for each item.

The third independent variable indicator was Survey Question 16 'Which types of foods have you gone without?' (TFGW), which queried households about the types of foods they had gone without over the past six months due to increased food prices. Researchers coded the responses on a two-point scale of 'Yes' (1) and

'No' (2), thus the range was 1. The various food categories in Survey Question 16(a-l) covered most of the principal food groups including proteins, dairy, vegetables, fruit, legumes such as beans and lentils, nuts, foods made with fats, as well as sugars, as apparent in Table 4.

Table 4. Descriptive Statistics – Types of Foods Gone Without

	Mean	Std. Deviation
Any bread, rice noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or any other locally available grain?	1.5132	0.50006
Any potatoes, yams, manioc, cassava or other foods made from roots or tubers?	1.5868	0.49264
Any vegetables?	1.6245	0.48447
Any fruits?	1.6755	0.46842
Any Beef, pork, lamb, goat, rabbit, wild game, chicken, duck, other birds, liver, kidney, heart, or other organ meats?	1.6028	0.48954
Any eggs?	1.6528	0.47630
Any fresh or dried fish or shellfish?	1.7000	0.45847
Any foods made from beans, peas, lentils, or nuts?	1.6547	0.47568
Any cheese, yoghurt, milk or other milk products?	1.6330	0.48221
Any foods made with oil, fat, or butter?	1.5349	0.49902
Any sugar or honey?	1.5462	0.49809
Any other foods, such as condiments, coffee, tea?	1.5472	0.49800

The TFGW item with the highest mean was 'fresh or dried fish or shellfish' at 1.7. Accordingly, 'fish and dried fish or shellfish' was the type of food most commonly gone without within the sample population. On the other hand, the item with the lowest mean was 'bread, rice noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or any other locally available grain' with a mean of 1.51. Given this figure, 'bread, rice noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or any other locally available grain', were the most commonly consumed food type amongst the sample population. The relatively low standard deviation scores across the various TFGW items indicate

that the measures were accurate representations of the data because responses were generally close to the mean score (Field, 2005). The total mean for the 12 TFGW items was 1.60, which indicates that on average households went without more items than they consumed from the list. The response values for Question 16 TFGW are shown in Table 5. The response values for TFGW give the reader a more definite indication of the specific foods that households within the sample population were forced to go without.

Table 5. Response Value Distribution of TFGW

Types of Food Gone Without	Yes (1)	No (2)
a. Any Bread, Rice Noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or other grain?	49	55
b. Any Potatoes, Yams, Manioc, Cassava or any other foods made from roots or tubers?	41	59
c. Any Vegetables?	38	62
d. Any Fruits?	33	67
e. Any beef, pork, lamb, goat, rabbit, wild game, chicken, duck, other birds, liver, kidney, heart, or other organ meats?	40	60
f. Any Eggs?	35	65
g. Any Fresh or Dried Fish or Shellfish?	30	70
h. Any foods made from beans, peas, lentils, or nuts?	35	65
i. Any Cheese, yoghurt, milk or other milk products?	37	63
j. Any foods made with oil, fat, or butter?	46	54
k. Any sugar or honey?	45	55
l. Any other foods, such as condiments, coffee, or tea?	45	55

* Values are percentages of the total number of responses for each item.

The AFSUN survey question that gives the best indication of the dependent variable malnutrition/under-nutrition is Question 13, which measured Household Dietary Diversity Scores (HDDS). AFSUN quantified HDDS on a two-point scale 'Yes' (2) and 'No' (1), across twelve questions. Although HDDS is not a complete measure of diet, it is a useful indicator for the following reasons. First, HDDS offers valuable

insight into the diets of households in the sample. Second, diversified diets are linked with a number of improved outcomes such as birth weight, anthropometric status, adequate protein intake, and caloric adequacy (Swindale & Bilinsky, 2006). Conversely, low dietary diversity leads to harmful outcomes and negative health consequences including DCD and obesity. In simple terms, HDDS can provide important knowledge about human development and livelihoods in study areas. The twelve questions of Survey Question 13 gave an indication of the specific types of foods that households had consumed over the previous twenty-four hours. Table 6 gives a visual description of the various figures.

Table 6. Descriptive Statistics – Household Dietary Diversity Score

	Mean	Std. Deviation
Any bread, rice noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or other grain?	1.9319	0.25196
Any potatoes, yams, manioc, cassava or any other foods made from roots or tubers?	1.6765	0.46804
Any vegetables?	1.6192	0.48582
Any fruits?	1.3381	0.47329
Any beef, pork, lamb, goat, rabbit, wild game, chicken, duck, other birds, liver, kidney, heart, or other organ meats?	1.5718	0.49505
Any eggs?	1.2861	0.45216
Any fresh or dried fish or shellfish?	1.1603	0.36710
Any foods made from beans, peas, lentils, or nuts?	1.2781	0.44827
Any cheese, yoghurt, milk or other milk products?	1.4527	0.49800
Any foods made with oil, fat, or butter?	1.7185	0.44994
Any sugar or honey?	1.8283	0.37732
Any other foods, such as condiments, coffee, or tea?	1.8843	0.32008

The HDDS item with the highest mean was 'any bread, rice noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or other grain' at 1.93. Thus, 'bread, rice noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or other grain' were the most commonly consumed food group amongst the sample population. On the other hand, the item with the lowest mean

was ‘any fresh or dried fish or shellfish’ at 1.16. Hence, ‘fish and dried fish or shellfish’ was the least commonly consumed food amongst the sample population. As scores were measured on a two-point scale, the range for this indicator was 1. The relatively low standard deviation scores for the HDDS items indicates that the responses were generally close to the mean score and the mean score is an accurate representation of the data (Field, 2005). The mean for the twelve HDDS items was 1.55, which indicates that households consumed moderate levels of the various food items in this question prior to being surveyed. The response values for Question 13 give an indication of the specific responses to the various foods items on this list. Table 7 illustrates the response values in greater detail so as give the reader an accurate representation of the types of foods that households within the sample consumed.

Table 7. Response Value Distribution of HDDS

Household Dietary Diversity Score	No (1)	Yes (2)
a. Any Bread, Rice Noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or other grain?	7	93
b. Any Potatoes, Yams, Manioc, Cassava or any other foods made from roots or tubers?	32	68
c. Any Vegetables?	38	62
d. Any Fruits?	66	34
e. Any beef, pork, lamb, goat, rabbit, wild game, chicken, duck, other birds, liver, kidney, heart, or other organ meats?	43	58
f. Any Eggs?	71	29
g. Any Fresh or Dried Fish or Shellfish?	84	16
h. Any foods made from beans, peas, lentils, or nuts?	72	28
i. Any Cheese, yoghurt, milk or other milk products?	55	45
j. Any foods made with oil, fat, or butter?	28	72
k. Any sugar or honey?	17	83
l. Any other foods, such as condiments, coffee, or tea?	12	88

* Values are percentages of the total number of responses for each item.

4.1.1 Validity Testing Through Factor Analysis

To simplify the data and highlight the commonality of the various item loadings across variables, this study employed factor analyses. This study conducted separate factor analysis procedures for each of the four variables to produce indices to measure the responses across HFIAS, HDDS, TFGW, and FFOS respectively. The

factor analysis aimed to test whether the responses to the various questions could be reduced to a more parsimonious structure. The factor analysis procedures were all performed using SPSS. The maximum likelihood estimation (MLE) extraction method and oblique minimum (non-orthogonal) rotation were selected for each of the four procedures. This study employed the MLE method to find the likelihood of the parameter values of the specific data (Lynch, 2007). The purpose of MLE is to calculate the parameter values that make the data most likely to occur in the sample population (Lynch, 2007). Tables 8 and 9 offer visual illustrations of the output for HFIAS.

Table 8. Total Variance Explained – Household Food Insecurity Access Scale

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	Per cent of Variance	Cumulative Per cent	Total	Per cent of Variance	Cumulative Per cent	Total
1	6.450	64.500	64.500	6.153	61.533	61.533	5.704
2	1.173	11.729	76.228	0.895	8.946	70.479	4.980
3	0.434	4.340	80.569				
4	0.363	3.634	84.203				
5	0.340	3.401	87.603				
6	0.314	3.144	90.747				
7	0.268	2.684	93.430				
8	0.252	2.516	95.947				
9	0.209	2.087	98.034				
10	0.197	1.966	100.000				

Extraction Method: Maximum Likelihood.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

A total of ten HFIAS questions were factor analysed. As shown in Table 8, the factor analysis extracted a single factor with an eigenvalue exceeding one. Due to the fact

that the factor has an eigenvalue greater than one, the factor is reliable. Conversely, any factors with eigenvalues less than one have negative reliability and are not reported (Cliff, 1988). The single factor for HFIAS accounted for 62 per cent of the total variance across the ten items. This confirms the one-dimensional nature of this variable as measured by these ten individual items.

Table 9. Factor Matrix – Household Food Insecurity Access Scale

Factor Matrix[a]

	Factor
	1
In the past four weeks, did you worry that your household would not have enough food?	0.794
In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	0.805
In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	0.818
In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	0.843
In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	0.850
In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	0.838
In the past four weeks, was there ever no food to eat of any kind in your household because of a lack of resources to get food?	0.765
In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	0.738
In the past four weeks, did you or any household member go a while day and night without eating anything because there was not enough food?	0.694
In the past week, did you or any household member eat a cooked meal less than once a day?	0.648

Extraction Method: Maximum Likelihood.

a. 1 factor extracted. 4 iterations required.

* A single factor was controlled for, as the supplementary factors had eigenvalues below 1.

Table 9 presents the ten HFIAS items and their respective factor loadings. The three items with the highest loadings in descending order were: 'did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food' at 0.850, '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' at 0.843, and last at 0.838, 'did you or any household member have to eat fewer meals in a day because there was not enough food'. The item with the lowest loading at 0.648 was 'did you or any household member eat a cooked meal less than once a day'.

This study conducted the second factor analysis on the HDDS indicator. For the HDDS variable, a total of twelve items were factor analysed to try to reduce the data to a more parsimonious scale. Table 10 gives a visual depiction of these figures.

Table 10. Total Variance Explained – Household Dietary Diversity Score

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	Per cent of Variance	Cumulative Per cent	Total	Per cent of Variance	Cumulative Per cent	Total
1	3.082	25.686	25.686	1.788	14.896	14.896	1.888
2	1.428	11.901	37.587	1.663	13.861	28.757	2.133
3	1.197	9.978	47.565				
4	0.921	7.678	55.243				
5	0.875	7.293	62.536				
6	0.817	6.805	69.341				
7	0.785	6.540	75.881				
8	0.699	5.826	81.707				
9	0.674	5.617	87.323				
10	0.652	5.436	92.759				
11	0.546	4.550	97.309				
12	0.323	2.691	100.000				

Extraction Method: Maximum Likelihood.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

As illustrated in Table 10, the factor analysis extracted two factors with eigenvalues greater than one. Due to the fact that those two factors have eigenvalues greater than one, those factors are reliable. The first factor accounted for 15 per cent of the variance, whereas the second factor accounted for 14 per cent of the variance. Together, these two factors accounted for a total of 29 per cent of the variance across the 12 HDDS items. This confirms the two dimensional nature of this variable as measured by these 12 separate items.

Table 11. Factor Matrix – Household Dietary Diversity Score

Factor Matrix[a]

	Factor	
	1	2
Any bread, rice noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or other grain?	0.118	0.127
Any potatoes, yams, manioc, cassava or any other foods made from roots or tubers?	0.246	0.391
Any vegetables?	0.108	0.386
Any fruits?	0.185	0.523
Any beef, pork, lamb, goat, rabbit, wild game, chicken, duck, other birds, liver, kidney, heart, or other organ meats?	0.173	0.481
Any eggs?	0.128	0.506
Any fresh or dried fish?		0.332
Any foods made from beans, peas, lentils, or nuts?	0.105	0.373
Any cheese, yoghurt or other milk products?	0.269	0.501
Any foods made with oil, fat, or butter?	0.329	0.279
Any sugar or honey?	0.999	
Any other foods, such as condiments, coffee, or tea?	0.654	

Extraction Method: Maximum Likelihood.

a. 2 factors extracted. 13 iterations required.

* Two factors were controlled for, as the supplementary factors had eigenvalues below 1.

Table 11 presents the factor loadings of the twelve items in the HDDS indicator variable. The three highest loading items for factor 1 in descending order were 'sugar and honey' at 0.999, 'any other foods, such as condiments, coffee, or tea' at 0.654, and 'foods made with oil, fat, or butter' at 0.3. At 0.105, the item with the

lowest factor loading for factor 1 was 'foods made from beans, peas, lentils, or nuts'. Next, the three highest loading items for factor 2 in descending order were 'any fruits' at 0.523, 'any eggs' at 0.523, and third, 'any cheese, yoghurt or other milk products' at 0.506. The item with the lowest loading for factor 2 was 'any bread, rice noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or other grain' at 0.127. Conceptually, these two factors did not have a great deal in common. These factors are likely to be quite different due to the limited variety of foods available to the urban poor. As demonstrated by the response values of this question, the limited diversity and availability of foods continues to influence HDDS in the three AFSUN study sites.

This study performed the third factor analysis on the TFGW variable. In similar fashion to HDDS, TFGW also had twelve individual items that were factor analysed. Table 13 gives a detailed illustration of these various figures.

Table 12. Total Variance Explained – Types of Food Gone Without

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	Per cent of Variance	Cumulative Per cent	Total	Per cent of Variance	Cumulative Per cent	Total
1	3.560	29.665	29.665	2.819	23.493	23.493	2.848
2	2.454	20.451	50.116	2.020	16.832	40.325	2.161
3	0.995	8.296	58.412				
4	0.824	6.871	65.283				
5	0.715	5.962	71.245				
6	0.666	5.550	76.795				
7	0.612	5.102	81.898				
8	0.567	4.726	86.624				
9	0.535	4.456	91.080				
10	0.498	4.150	95.230				
11	0.388	3.231	98.460				
12	0.185	1.540	100.000				

Extraction Method: Maximum Likelihood.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

As presented in Table 12, the factor analysis extracted two factors with eigenvalues exceeding one. Factor 1 accounted for 23 per cent of the variance, whereas factor 2 accounted for 17 per cent of the variance. The total variance across the twelve TFGW items that these two factors accounted for was 40 per cent. This confirms the two-dimensional nature of this variable as measured by these 12 individual TFGW items.

Table 13. Factor Matrix – Types of Foods Gone Without

Factor Matrix[a]

	Factor	
	1	2
Bread, rice noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or any other locally available grain	0.528	
Potatoes, yams, manioc, cassava or other foods made from roots or tubers	0.568	0.173
Vegetables	0.453	0.262
Fruits		0.576
Beef, pork, lamb, goat, rabbit, wild game, chicken, duck, other birds, liver, kidney, heart, or other organ meats	0.166	0.355
Eggs	0.118	0.647
Fresh or dried fish or shellfish	-0.164	0.599
Foods made from beans, peas, lentils, or nuts	0.120	0.593
Cheese, yoghurt, milk or other milk products	0.209	0.521
Foods made with oil, fat, or butter	0.569	0.200
Sugar or honey	0.884	
Other foods, such as condiments, coffee, tea	0.880	-0.104

Extraction Method: Maximum Likelihood.

a. 2 factors extracted. 5 iterations required.

Table 13 presents the factor loading scores of the twelve TFGW variable items that this study analysed. The three highest scoring items for the first factor in sequential order were, 'sugar or honey' at 0.884, 'other foods, such as condiments, coffee, tea' at 0.880, and 'foods made with oil, fat, or butter' at 0.569. The item with the lowest loading in factor 1 is 'fresh or dried fish or shellfish' at -0.164. The loadings for factor 2 are as follows. The three highest loading items for factor 2 are, 'eggs' at 0.647, secondly 'fresh or dried fish or shellfish' at 0.599, and thirdly 'foods made from beans, peas, lentils, or nuts' at 0.593. The lowest loading item in factor 2 was 'other foods, such as condiments, coffee, tea' at -0.104.

The fourth factor analysis was executed on the FFOS variable. The FFOS variable had 10 separate items that were factor analysed. Table 14 gives a visual diagram of these figures.

Table 14. Total Variance Explained – Frequency of Food Obtained from Source

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	Per cent of Variance	Cumulative Per cent	Total	Per cent of Variance	Cumulative Per cent	Total
1	1.828	18.283	18.283	1.435	14.347	14.347	1.434
2	1.552	15.523	33.806	0.834	8.343	22.690	0.850
3	1.194	11.943	45.748				
4	0.979	9.789	55.537				
5	0.965	9.649	65.187				
6	0.923	9.228	74.415				
7	0.821	8.210	82.625				
8	0.734	7.336	89.961				
9	0.616	6.161	96.122				
10	0.388	3.878	100.000				

Extraction Method: Maximum Likelihood.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Table 14 shows two factors extracted from the factor analysis with eigenvalues greater than one. Factor 1 accounted for 14 per cent of the variance whereas factor 2 accounted for 8 per cent of the variance. The total variance accounted for by these two factors combined equalled 23 per cent. Due to the fact that only two items had eigenvalues greater than one confirms the two-dimensional nature of FFOS as measured by these ten various items.

Table 15. Factor Matrix – Frequency of Food Obtained from Source

Factor Matrix[a]

	Factor	
	1	2
Supermarket	-0.127	
Small shop/Restaurant/Take Away		
Informal Market/Street Food	0.173	
Grow it		0.538
Food Aid		0.585
Remittances (Food)		0.401
Shared Meal with Neighbours and/or Other Households	0.599	
Food Provided by Neighbours and/or Other Households	0.974	
Community Food Kitchen	0.135	.157
Borrow Food from Others	0.234	.102

Extraction Method: Maximum Likelihood.

a. Attempted to extract 2 factors. More than 25 iterations required. (Convergence=.010). Extraction was terminated.

Table 15 presents the ten FFOS items and their various factor loadings. The three highest loading scores for factor 1 in descending order were 'Food Provided by Neighbours and/or Other Households' at 0.974, 'Shared Meal with Neighbours and/or Other Households' at 0.599, and 'Borrow Food from Others' at 0.234. The item with the lowest factor loading for factor 1 was 'Supermarket' at -0.127. The three highest factor loadings for factor two in descending order were, 'Food Aid' at 0.585, secondly 'Grow it' at 0.538, and thirdly 'Remittances (Food)' at 0.401. The item with the lowest loading for factor 2 was 'Borrow Food from Others' at 0.102.

4.1.2 Testing Reliability Using the Cronbach's Alpha Test

Following the factor analysis, a reliability analysis was conducted using the Cronbach's Alpha test to assess the internal consistency of the scale. Reliability is a critical component of any research, ensuring that the test, experiment, or measuring procedure of a study can be replicated to yield the same results across repeated trials (Creswell, 2009). For the four individual indicator variables, this study

performed separate Cronbach's Alpha tests. Table 16 provides a figure of the Cronbach's Alpha scores for HFIAS, HDDS, and TFGW respectively. A reliability test was not performed on the FFOS indicator, as is discussed in the latter part of the following paragraph.

Table 16. Reliability Statistics – HFIAS, HDDS, and TFGW

Reliability Statistics

Scale	Cronbach's Alpha	Cronbach's Alpha Based on Items	Number of Items
HFIAS	0.941	0.940	10
HDDS	0.731	0.725	12
TFGW	0.768	0.768	12

Table 16 presents the reliability statistics, in Cronbach's Alpha (α) scores, for the three indicators tested. First, the Cronbach's Alpha analysis for the HFIAS scale revealed a α=0.94, which indicates excellent internal consistency.[7] Therefore, due to the high α coefficient of this variable, the index is reliable. Second, the Cronbach's Alpha for HDDS as illustrated in Table 16, revealed a α=0.73, which signifies a good internal consistency. Thus, we can deduce that this index is reliable given its good α coefficient. Third, the Cronbach's Alpha reliability analysis for TFGW, shows a α=0.76 which suggests good internal consistency. Furthermore, because this indicator has a good α coefficient, the index is reliable. The fourth and last indicator was FFOS. The FFOS indicator did not undergo a reliability analysis. Given the FFOS indicator measures frequencies of individual and unrelated items, a scale cannot accurately measure this indicator. The reason being attempting to run a reliability analysis on an indicator with items that offer very low correlations typically provides a low reliability score.

[7] The guidelines in this study for evaluating Cronbach's Alpha coefficients: 0.60-70 = moderate, 0.71-0.80 = good, and 0.81 or above = excellent.

4.2 Conclusion

Chapter 4 established the rationale for the inclusion of the specific dependent (household dietary diversity) and the independent variables of this study (spatial food access, frequency of food obtained from source, and types of food gone without). In addition, this Chapter discussed the specific details of each variable. In addition, this Chapter examined the distribution of values for each of the four variables so as to clearly distinguish the question categories, measurements, and responses by the sample population. The response value distribution and descriptive statistics provided some noteworthy information. Specifically, the HFIAS indicator revealed that households showed moderate food insecurity on the access scale, FFOS showed that small shop/restaurant/take away was the most frequent source of food, TGFW illustrated that households generally went without more food types than were consumed and fresh or dried fish or shellfish were the least often consumed type of food, and finally HDDS indicated that foods from grains were the most commonly consumed food group and overall households exhibited moderate levels of dietary diversity. Chapter 4 also constructed a set of valid and reliable scales that measured the variables applied in this study. These scales form the foundation of the multivariate analysis in Chapter 5. Lastly, this Chapter tested and verified the statistical reliability of these scales.

CHAPTER 5:
FINDINGS

Chapter 5 describes the findings of this research. These include the multivariate analyses implemented to examine the key variables food access and dietary diversity. To test the hypothesis of this study, this section addresses the various statistical procedures to examine the data. This Chapter begins by discussing correlation analysis and progresses to examining the data in this technique. The next section discusses ANOVA and the associated procedures performed on the data. The third section of this Chapter examines MLR and its application in this study. Lastly, this Chapter addresses the second set of ANOVA and correlation procedures, which illuminated differences between and within Ocean View, Philippi, and Khayelitsha.

5.1 Correlation Analysis Findings

The purpose of a bivariate correlation analysis is to confirm a linear relationship between two quantitative variables (Field, 2005). If the analysis concludes that a significant relationship exists, then the researcher can deduce useful information about that relationship. When conducting a correlation analysis, the most important aspect to consider is: Is the relationship statistically significant? This study conducted the Pearson product-moment correlation coefficient analysis to examine the relationships between the various independent variables and the dependent variable. A total of four correlation procedures were conducted between the independent variables: Frequency of Food Obtained from Source (FFOS), Types of Food Gone Without (TFGW), Household Food Insecurity Access Scale (HFIAS), Household Income Per Capita (HIPC), Lived Poverty Index (LPI), Household Size (HS), and the dependent variable Household Dietary Diversity Scores (HDDS) in this section.[8] In Pearson's correlations, the *r*-value indicates the strength of the

[8] The correlation tables are available in Appendix C for reference.

relationship between the two variables, the *n*-value signifies the number of households, and the *p*-value relates to the significance of that test (Field, 2005). This study used the criterion of $p < 0.05$ (5 per cent) cut off point for statistical significance. Thus, a 95 per cent confidence level for results is the minimum requirement for dependability in this section of the study.

The first correlation procedure below aimed to analyse the relationship between HDDS and the various FFOS items. Table 17 shows the figures of the correlation clearly.

Table 17. Correlation – Frequency of Food Obtained from Source Items and Dietary Diversity

		Index of Dietary Diversity, 10 Items
Index of Dietary Diversity, 10 Items	Pearson Correlation	1
	Sig. (2-tailed) (*p*)	
	N	1014
Supermarket Frequency	Pearson Correlation	0.18
	Sig. (2-tailed) (*p*)	0.00
	N	1008
Small shop/Restaurant/ Take Away	Pearson Correlation	0.04
	Sig. (2-tailed) (*p*)	0.25
	N	1007
Informal Market/Street Food	Pearson Correlation	0.03
	Sig. (2-tailed) (*p*)	0.42
	N	1009
Grow It	Pearson Correlation	0.08
	Sig. (2-tailed) (*p*)	0.01
	N	1011
Food Aid	Pearson Correlation	-0.01
	Sig. (2-tailed) (*p*)	0.83
	N	1011
Remittances (Food)	Pearson Correlation	0.02
	Sig. (2-tailed) (*p*)	0.46
	N	1010

Shared Meal with Neighbours and/or Other Households	Pearson Correlation	0.01
	Sig. (2-tailed) (*p*)	0.65
	N	1011
Food Provided By Neighbours and/or Other Households	Pearson Correlation	-0.02
	Sig. (2-tailed) (*p*)	0.48
	N	1010
Community Food Kitchen	Pearson Correlation	-0.03
	Sig. (2-tailed) (*p*)	0.43
	N	1011
Borrow Food From Others	Pearson Correlation	-0.17
	Sig. (2-tailed) (*p*)	0.00
	N	1010

*FFOS items were scored 0 = never, 1 = rarely (once or twice), 2 = sometimes (3 to 10 times), 3 = often (more than 10 times).

The first FFOS item 'Supermarket', illustrated a weak positive relationship with HDDS having (r = 0.18, p = 0.00, and n = 1008). Due to the p-value ($p < 0.05$), the results are significant and unlikely to have occurred strictly because of chance. The relationship between 'Supermarket' and HDDS interacts in the direction hypothesised, namely that there is a positive relationship. In short, this study predicted the correlation would indicate that households that obtained food from supermarkets more frequently would express moderately higher HDDS. The next two FFOS items 'Small shop/Restaurant/Take Away' and 'Informal Market/Street Food' were insignificant due to their high ($p > 0.05$) values.

'Grow it', the next item in the correlation, revealed a weak positive relationship with HDDS with a (r = 0.08, a p = 0.01, and n = 1011). The figures were significant due to the low (p < 0.05) probability that the result occurred by chance. In similar fashion to 'Supermarket', the weak relationship of 'Grow It' and HDDS moved in the direction (positive) expected. Specifically, this study supposed that households that grow their own food would manifest higher HDDS, although only moderately, than those who did not. The following four FFOS items, 'Food Aid' (p = 0.83), 'Remittances' (p = 0.46), 'Shared Meal with Neighbours and/or Other Households' (p = 0.65), and 'Food Provided by Neighbours and/or Other Households' (p = 0.48) all displayed (p > 0.05) scores and were therefore insignificant. On the other hand, 'Borrow Food from Others' unveiled a (r = -0.17, p = 0.00, and n = 1010) in the correlation test with HDDS. Given these scores, the result is significant (p < 0.05) and shows a weak negative relationship between the two variables 'Borrow Food from Others' and HDDS. Meaning, households that frequently borrowed food from others also had moderately lower HDDS. This relationship moves in the direction anticipated by this study and indicates that if households are borrowing food often they are likely to receive a limited variety of foods from other households.

The results of the first correlation suggest that frequenting supermarkets positively influences HDDS. Given that supermarkets generally have a more diverse variety of foodstuffs available than do small shops, informal markets, and other food sources, this outcome was intuitive. If households have the resources, such as income, transportation, and time, to shop in supermarkets frequently, they are likely to have better HDDS. Alternatively, those households lacking the resources to shop at supermarkets regularly demonstrate lower HDDS. Given that few studies have examined the relationship of supermarkets and dietary diversity, specifically in the urban South African context, it is evident that further analysis is required.

The second correlation procedure in this study examined the relationship between TFGW and HDDS. Table 18 shows the statistics of this procedure.

Table 18. Correlation – Foods Gone Without and Dietary Diversity

		Index of Dietary Diversity, 10 Items
Index of Dietary Diversity, 10 Items	Pearson Correlation	1
	Sig. (2-tailed) (*p*)	
	N	1014
Index of Types of Food Gone Without, 12 Items	Pearson Correlation	-0.10
	Sig. (2-tailed) (*p*)	0.01
	N	683

*FFOS items were scored 0 = never, 1 = rarely (once or twice), 2 = sometimes (3 to 10 times), 3 = often (more than 10 times).

This test revealed a (r = -0.10, p = 0.01, and n = 683), which indicates an inverse relationship between the variables. The relationship is significant given its low ($p < 0.05$) probability of occurring strictly by chance. Additionally, the variables interact with one another in the anticipated (inverse) direction. The results indicate that households with greater TFGW scores should correspondingly exhibit lower HDDS. Hence, the more food types that households go without, the more likely the dietary diversity of that household is to decrease.

The third correlation assessed the relationship between HFIAS and HDDS. Table 19 illustrates the findings.

Table 19. Correlation – Food Access and Dietary Diversity

		Index of Dietary Diversity, 10 Items
Index of Dietary Diversity, 10 Items	Pearson Correlation	1
	Sig. (2-tailed)	
	N	1014
Index of Food Access (HFIAS), 10 Items	Pearson Correlation	-.41
	Sig. (2-tailed) (*p*)	.00
	N	979

*HFIAS was scored 0 = no, 1 = rarely (once or twice), 2 = sometimes (3 to 10 times), 3 = often (more than 10 times).

This procedure unveiled an (r = -0.41, p = 0.00, and n = 980), which establishes a positive relationship HFIAS and HDDS. The results of this correlation were significant and did not occur strictly by chance due to the low ($p < 0.05$) p-value score. In summary, as anticipated by this study, the variables had a positive relationship, which suggests that households with lower levels of food access exhibited lower HDDS.

The last correlation tested the relationships of the independent variables Household Size (HS), Lived Poverty Index (LPI), Household Income Per Capita (HIPC), and the dependent variable Household Dietary Diversity Scores (HDDS). Table 20 provides a visual reference of the figures.

Table 20. Correlation – Household Size, Poverty, Income, and Dietary Diversity

		Index of Dietary Diversity, 10 Items
Index of Dietary Diversity, 10 Items	Pearson Correlation	1
	Sig. (2-tailed) (*p*)	
	N	1014
Household Size	Pearson Correlation	0.01
	Sig. (2-tailed)	0.66
	N	1014
Lived Poverty Index	Pearson Correlation	-0.39
	Sig. (2-tailed) (*p*)	0.00
	N	873
Household Income Per Capita	Pearson Correlation	0.19
	Sig. (2-tailed) (*p*)	0.00
	N	1014

*LPI values were scored 1 = never, 2 = once or twice, 3 = several times, 4 = many times, 5 = always, 6 = don't know.

The first item Household Size (HS) showed a (r = 0.01, p = 0.66, and n = 1014). The results were insignificant given the high ($p > 0.05$) probability that the outcome occurred by chance. The results revealed a (r = -0.01, p = 0.66, and n = 1014), which indicates a negative relationship between household size and dietary diversity. The relationship was significant given the low possibility ($p < 0.05$) that the result occurred by chance. Furthermore, the inverse relationship interacts in the direction expected by this study and suggests that lower LPI scores correlate with higher HDDS. This outcome implies that households that scored lower on the LPI, less poverty, were expected to exhibit higher HDDS. Lastly, the final variable tested in the correlation procedure was HIPC. The test presented a (r = 0.19, p = 0.00, and n = 1014), which confirms a positive relationship between the variables. In addition, the results were significant ($p < 0.05$) and did not occur by chance. To summarise, the relationship interacts in the positive direction anticipated by this study and suggests that households with higher incomes per capita should have higher HDDS. The

independent variable with the strongest relationship in the correlation with HDDS was LPI. The Lived Poverty Index (LPI) showed a moderately stronger negative relationship with HDDS as compared to HS and HIPC.

5.2 Analysis of Variance Findings

ANOVA is an analysis of the variation between the mean scores of the dependent variable as well as an exploration of whether those scores differ significantly across the categories of the independent variable(s) (Cohen, Cohen, West and Aiken, 2003). This study conducted a one-way ANOVA. One-way ANOVA tests establish whether there are significant differences between the means of a group that the researcher is interested in and whether those means are significantly different from one another (variance) (Cohen et al., 2003). The important figures to identify in ANOVA procedures are the *F*-ratio and the significance level. The *F*-ratio indicates the average variability in the data that the given model can explain, compared to the average variability that is not explained by the same model (Field, 2005). In addition, the F-ratio tests for overall differences between group means (*Ibid*). In this study, the One-way ANOVA procedure examined the relationship between the means of Sex of Household Head (SHH) and HDDS as well as Household Head Highest Level of Education (HHHLE) and HDDS.

The first ANOVA procedure of this study evaluated the relationship between SHH and HDDS. Table 21 provides an overview of the figures.

Table 21. ANOVA – Sex of Household Head and Dietary Diversity

Index of Dietary Diversity, 10 Items

	Sum of Squares	df	Mean Square	F	Sig. (*p*)
Between Groups	0.63	1	0.63	11.81	0.00
Within Groups	53.45	1010	0.05		
Total	54.08	1011			

The results of the analysis revealed an (*F*-ratio of 11.81, and *p* 0.00). The mean scores for male-headed households were 1.55 and female-headed were 1.49, with a total number of 1012 households included. As a result, the figures suggest that there are significant ($p < 0.05$) differences between male versus female groups. Specifically, the statistics offer that male-headed households have higher HDDS as compared to female-headed households. Often men earn higher incomes, which insinuates that they may possess more disposable income for allocation towards food (Stats SA, 2004). Conversely, women often have lower incomes and subsequently less income to spend on food, which translates to lower HDDS as corroborated by the statistics.

The second ANOVA of this study examined the relationship between HHHLE and HDDS. Table 22 highlights the results.

Table 22. ANOVA – Household Head Level of Education and Dietary Diversity

Index of Dietary Diversity, 10 Items

	Sum of Squares	df	Mean Square	F	Sig. (*p*)
Between Groups	0.55	8	0.07	1.29	0.24
Within Groups	51.24	967	0.05		
Total	51.79	975			

The figures from the analysis presented an (*F*-ratio of 1.29, and *p* 0.24), generally the mean scores increased parallel to increased levels of education. Given the low *F*-ratio and the high *p*-value of the figures, this study confirms that no significant difference existed between groups, but rather within groups. Ultimately, however, the high ($p > 5$ per cent) possibility of these results occurring due to chance renders these figures insignificant.

5.3 Multiple Linear Regression Findings

As discussed in Chapters 1 and 2, few studies have examined the relationships between food access, malnutrition, and under-nutrition. Therefore, this study has attempted to construct statistical models to assess whether the relationships between the key independent (*X*) and dependent (*Y*) variables remain relevant after the introduction of other factors that could influence the results. For example, how food access influences dietary diversity while controlling for income. In order to assess these variables, this study uses Multiple Linear Regression (MLR). The purpose of MLR is to model the relationships amongst two or more explanatory variables as well as a response variable by fitting a linear equation to the observed data (Cohen et al., 2003). In addition, regression tests the significance of individual *X* with *Y* while holding other *X* variables constant. In doing so, regression statistics present the significance of the selected independent variable in relation to the dependent variable, regardless of all other independent variables. In this study, the MLR examined the relationship of the dependent variable HDDS with the explanatory independent variables HFIAS, FFOS, TFGW, LPI, HIPC, HS, SHH, HHHLE. In regression analysis, the most important statistics to report are the standardised beta coefficients (*β)*, the *t*-statistic, and lastly the significance (Field, 2005).

Given the numerous variables within this study, this research constructed a three-tiered model to examine the relationships between the different categories of *X* and *Y* variables.[9] The rationale behind the multi-level model was to observe the cumulative variation of scores between the regression models, while controlling for specific variables. The first model tested the relationship between the demographic variables Sex of Household Head (SHH), Household Head Highest Level of Education (HHHLE), Household Income Per Capita (HIPC), and Household Size (HS), with the dependent variable HDDS. Table 23 provides the statistics of the tested relationships.

[9] The regression and model summary tables are available in Appendix 3 for reference.

Table 23. Regression Model 1 – Demographic Indicators

Regression Model 1						
Model		Unstandardized		Standardized	t	Sig. (*p*)
		β	Std. Error	*β*		
1	(Constant)	1.48	0.036		41.22	0.00
	Sex of Household Head	-0.037	0.015	-0.08	-2.56	0.01
	Household Head Highest Level of Education	0.007	0.006	0.04	1.14	0.26
	Household Income Per Capita	5.15E-005	0.000	0.18	5.46	0.00
	Household Size	0.006	0.003	0.06	1.75	0.08

a. Dependent Variable: Index of Dietary Diversity, 10 Items.

The figures for SHH showed a (β of -0.08, *t*-value of -2.56, and *p*-value of 0.01). Due to the low *p*-value (< 0.05) of the relationship between SHH and HDDS, the outcome is significant and did not occur by chance. The relationship between SHH and HDDS is negative as indicated by the figures and the *t*-statistic suggests that the β differed significantly from zero (Field, 2005). The second *X* variable HHHLE was insignificant given the high probability ($p > 0.05$) that these figures occurred by chance. The third *X* variable HIPC, demonstrated a (β of 0.18, *t*-statistic of 5.46, and *p*-value of 0.00). The moderately high *t*-statistic confirms that β was significantly different from zero and the outcome is significant given the low ($p < 0.05$) *p*-value. The strong positive relationship between HIPC and HDDS suggests that households with higher incomes per capita should have moderately better HDDS. The last *X* variable of model one exceeds the cut-off point for acceptable probability ($p < 0.05$), ergo the relationship was insignificant.

The second regression model tested the relationships of the independent variable deprivation indicators Lived Poverty Index (LPI) and Types of Food Gone Without (TFGW), while controlling for those (SHH, HHHLE, HIPC, and HS) from

model one, with the dependent variable HDDS. Table 24 shows the figures of this procedure.

Table 24. Regression Model Two – Deprivation Indicators

Model		Unstandardized		Standardized	t	Sig. (*p*)
		β	Std. Error	*β*		
	(Constant)	1.64	0.07		23.89	0.000
	Sex of Household Head	-0.04	0.02	-0.08	-1.94	0.05
	Household Head Highest Level of Education	0.02	0.01	0.09	2.19	0.03
2	Household Income Per Capita	2.60E-005	0.00	0.08	1.84	0.07
	Household Size	0.00	0.00	0.01	0.27	0.79
	Lived Poverty Index	-0.07	0.01	-0.28	-6.65	0.00
	Index of Types of Food Gone Without, 12 Items	-0.06	0.04	-0.07	-1.71	0.09

a. Dependent Variable: Index of Dietary Diversity, 10 Items

The results differed from model one, showing that with the introduction of the deprivation indicators some of the relationships of the demographic indicators changed, such as HHHLE and HIPC. The first *X* variable SHH computed in the analysis was insignificant given the ($p = 0.053$), which exceeds the acceptable cut off point ($p < 0.05$) for the probability that the result occurred by chance. The second *X*

variable HHHLE, demonstrated notably different scores as compared to model one with a (β of 0.09, *t*-statistic of 2.19, and *p*-value of 0.03). The relationship between HHHLE and HDDS remained positive. However, in model two the relationship was significant given its low ($p < .05$) probability of occurring by chance. The *t*-statistic of 2.19 indicates that β was significantly different from zero. Hence, improved HDDS should mirror a higher education level of the household head. The third *X* variable in model two HIPC also revealed discernible score differences in comparison to the first model. HIPC showed a (β of 0.08, *t*-statistic of 1.84, and *p*-value of 0.07). While in the first model the relationship between HIPC and HDDS was significant, in the second model the outcome was insignificant due to the ($p > 0.05$) probability of the outcome occurring by chance. The next *X* variable HS also demonstrated substantial score differences in its relationship with HDDS in model two versus the first regression model. In the latter model, HS had a (β of 0.01, *t*-statistic of 0.268, and *p*-value of 0.79). Although the relationship scores of HS and HDDS were notably different from the first and second models, the relationship remained insignificant given the high ($p > 0.05$) probability of the results occurring by chance.

The first deprivation indicator processed in the second regression model was LPI. The relationship between LPI and HDDS establishes (β of -0.28, *t*-statistic of -6.65, and *p*-value of 0.00). Therefore, there was a significant ($p < 0.05$) negative relationship between the two variables. Moreover, the negative relationship between variables indicates that higher LPI scores relate to lower HDDS. Finally, the relatively low *t*-statistic of -6.65 corroborates that β was significantly different from zero (Field, 2005). The second and last *X* variable computed in regression model two is TFGW. The results indicated that TFGW produced a (β of -0.07, *t*-statistic of -1.71, and *p*-value of 0.09). Given these figures, the relationship between TFGW and HDDS is insignificant given the ($p > 0.05$) likelihood that the results occurred by chance.

The third regression model included the demographic and deprivation indicators from the earlier models as well as measures of food access. Table 25 provides the figures of this model.

Table 25. Regression Model 3 – Food Access Indicators

Regression Model 3						
Model		Unstandardized		Standardized	t	Sig. (*p*)
		β	Std. Error	β		
	(Constant)	1.68	0.07		23.70	0.00
	Sex of Household Head	-0.04	0.02	-0.09	-2.14	0.03
	Household Head Highest Level of Education	0.01	0.01	0.05	1.28	0.20
	Household Income Per Capita	1.62E-005	0.00	0.05	1.15	0.25
3	Household size	-0.00	0.00	-0.01	-0.16	0.88
	Lived Poverty Index	-0.03	0.01	-0.13	-2.41	0.02
	Index of Types of Food Gone Without, 12 Items	-0.06	0.04	-0.07	-1.80	0.07
	Frequency of Food Obtained from Source, 10 Items	0.04	0.02	0.10	2.48	0.01
	Index of Food Access (HFIAS), 10 Items	-0.08	0.02	-0.26	-4.92	0.00

a. Dependent Variable: Index of Dietary Diversity, 10 Items

The variables included in model three assessed the relationships of the independent variables SHH, HHHLE, HIPC, HS, LPI, TFGW, FFOS, and HFIAS with HDDS. The first of those was SHH, which showed a (β of -0.09, *t*-statistic of -2.13, and *p*-value of 0.03). As a result, SHH displays a significant negative relationship with HDDS given

the low ($p < 005$) probability of the result emerging due to chance. The *t*-statistic of -2.13 suggests that β was significantly different from zero. The next X variable in the regression model was HHHLE, which presented a (β of 0.05, *t*-statistic of 1.28, and *p*-value of 0.20). The relationship of HHHLE and HDDS was insignificant due to the high ($p > 0.05$) possibility that the outcome was by chance. The third *X* variable in the regression model was HIPC, which revealed a (β of 0.05, *t*-statistic of 1.15, and *p*-value of 025). However, the findings were insignificant given the ($p > 0.05$) likelihood that the statistics occurred by chance. The fourth *X* variable HS illustrated a (β of -0.01, *t*-statistic of -0.16, and *p*-value of 0.88). Due to the high ($p > 0.05$) probability that these results materialised by chance, they are insignificant. However, the following *X* variable the LPI, exhibited a significant negative relationship with HDDS. LPI revealed a (β of -0.13, *t*-statistic of -2.41, and *p*-value of 002). The outcome was significant given the ($p < 005$) likelihood that it occurred by chance. Given the negative relationship of LPI with HDDS, means that households with more acute LPI scores would correspondingly exhibit lower HDDS. The *t*-statistic of -2.41 in this relationship indicates that β was significantly different from zero.

The fifth variable in the third regression model was TFGW, which established a (β of -0.07, *t*-statistic of -1.80, and *p*-value of 0.07). Due to the ($p > 0.05$) possibility of the outcome occurring by chance the relationship was insignificant. The next variable FFOS displayed a (β of 0.10, *t*-statistic of 2.48, and *p*-value of 0.01). The figures corroborate that FFOS and HDDS share a significant ($p < 0.05$) positive relationship. Hence, suggesting that the higher the frequency of households obtaining food, the more probable they are to have higher dietary diversity. The moderate *t*-statistic (2.48) advocates that the β differed significantly from zero. The last *X* variable to show a significant relationship with HDDS was HFIAS. The analysis showed a (β of -0.26, *t*-statistic of -4.92, and *p*-value of 0.00). Hence, there is a significant negative relationship between HFIAS and HDDS. That relationship is significant due to the ($p < 0.05$) likelihood that the result happened by chance. In

addition, the relatively low *t*-statistic corroborates that β was significantly different than zero. The results indicate that HFIAS significantly influences HDDS.

In conclusion, the statistics advise that households with lower HFIAS would have less access to food and thus consume a less varied diet. Regression model three illustrated that although there were other factors that significantly influenced HDDS the variable with the most robust relationship with HDDS was HFIAS. In other words, HFIAS was the best predictor of HDDS, regardless of all other factors including education, income, poverty, types of food gone without, the frequency of food obtained from sources, sex of household head, and household size.

5.4 Examining Differences Between and Within the Study Sites

Using four procedures, this section examines the differences between and within each of the three study sites. First, this study performed an ANOVA to examine the differences between mean household dietary diversity (HDDS) in Ocean View, Philippi, and Khayelitsha comparatively. Secondly, three correlations were conducted, one for each study site, to examine the relationships of four key HFIAS indicators on HDDS. The data from this analysis provides figures to illuminate the differences of food access, malnutrition, and under-nutrition across and within the three sites.

5.4.1 ANOVA – Examining Differences in Dietary Diversity in the Study Sites

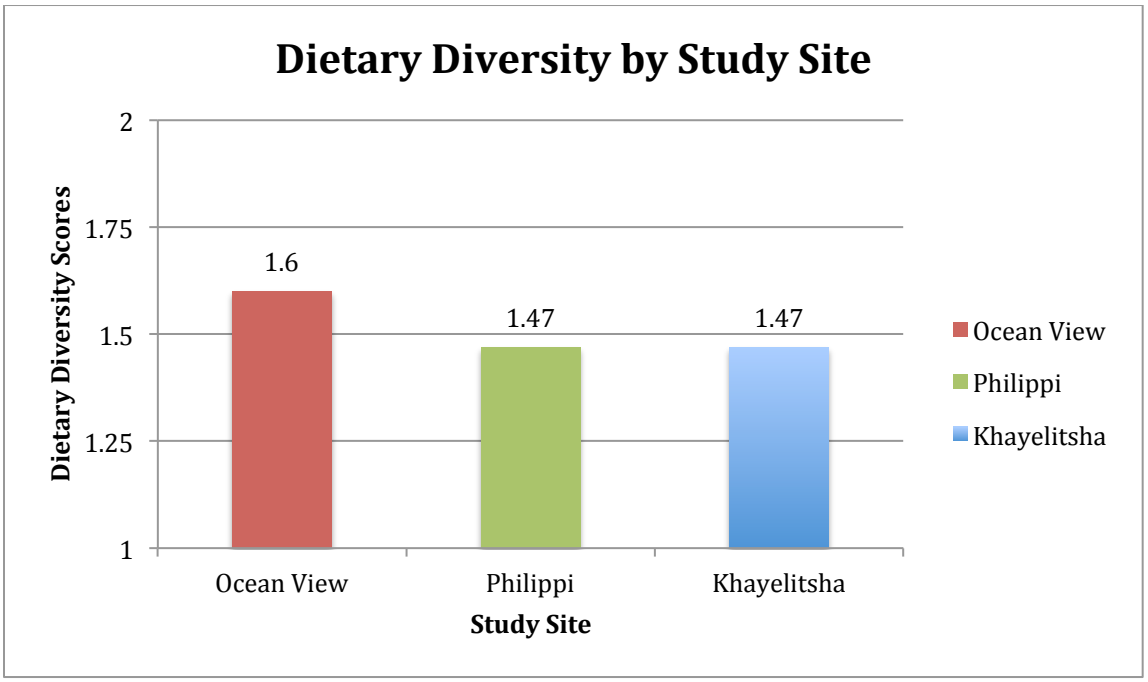
This study conducted the ANOVA procedure to analyse average HDDS in the three study areas of Ocean View, Philippi, and Khayelitsha. The ANOVA used the location indicators to illustrate differences in HDDS in each of the respective sites. Tables 26 and Figure 3 demonstrate the data from the analysis.

Table 26. ANOVA Differences in HDDS by Study Site

Index of Dietary Diversity, 10 Items

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.46	2	1.73	34.53	0.00
Within Groups	50.67	1011	0.05		
Total	54.13	1013			

Figure 3. Household Dietary Diversity Scores by Study Site



Note: Household Dietary Diversity Scores were measured as either 'Yes' (2), or 'No' (1).

The statistics of the procedure established an (*F*-ratio of 34.53, and *p* of 0.00). The total mean score for Ocean View was 1.60 where as both Philippi and Khayelitsha showed means of 1.47. Therefore, at 0.13, Ocean View exhibited a notably higher HDDS than the other sites. The number of households in each site included Ocean View with 260 households, Philippi with 378 households, and Khayelitsha with 376 households. The *F*-ratio suggests that there was moderate variability between the

group means but significant differences within groups. Hence, Philippi and Khayelitsha both had the same HDDS scores evidently showing no variation between them versus Ocean View showed notably higher HDDS. Although there was only a 0.13 difference in HDDS scores between the sites, given the values and number of items of the HDDS scale, this difference is substantial. Furthermore, these figures were significant as all F-ratios were below ($p < 0.05$) the acceptable cut off point for probability, which confirms that the results occurred due to chance.

5.4.2 Correlation – Differentiation of HDDS by HFIAS by Location

The correlation procedures in this section aimed to examine the strengths of the relationships between four key HFIAS indicators[10] and HDDS in Ocean View, Philippi, and Khayelitsha. Once this study revealed the strengths of those relationships, a comparison was made to explain the differences. To begin, the relationship of *X* (HFIAS) and *Y* (HDDS) in Ocean View was examined. Table 27 presents the figures.

[10] The HFIAS indicators selected were questions 12 a,f,e, and g.

Table 27. Correlation – Household Food Access Items and Dietary Diversity in Ocean View

		Index of Dietary Diversity, 10 Items
Index of Dietary Diversity, 10 Items	Pearson Correlation	1
	Sig. (2-tailed)	
	N	260
In the past four weeks, did you worry that your household would not have enough food?	Pearson Correlation	-0.43
	Sig. (2-tailed)	0.00
	N	260
In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	Pearson Correlation	-0.42
	Sig. (2-tailed)	0.00
	N	260
In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	Pearson Correlation	-0.45
	Sig. (2-tailed)	.00
	N	260
In the past four weeks, was there ever no food to eat of any kind in your household because of a lack of resources to get food?	Pearson Correlation	-0.44
	Sig. (2-tailed)	0.00
	N	260

The HFIAS items each showed very similar figures relative to HDDS in the Ocean View sample. The first item 'In the past four weeks, did you worry that your household would not have enough food' showed a (r = -0.43, p = 0.00, and n = 260). While the second item, 'In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food' unveiled a (r = -0.42, p = 0.00, and n = 260). The third item 'In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food' demonstrated a (r = -0.45, p =0.00, and n = 260). Lastly,

'In the past four weeks, was there ever no food to eat of any kind in your household because of a lack of resources to get food' had a (r = -0.44, p = 0.00, and n = 260). Given these figures, significant ($p < 0.05$) inverse relationships existed between the four HFIAS indicators and HDDS. In sum, the more often households worried about having enough food, ate smaller and fewer meals than needed, and had no food due to a lack of resources, corresponded with lower HDDS in Ocean View.

The second correlation between the four HFIAS indicators and HDDS examined the relationship of the variables in the Philippi sample. Table 28 presents the findings.

Table 28. Correlation – Household Food Access Items and Dietary Diversity in Philippi

		Index of Dietary Diversity, 10 Items
Index of Dietary Diversity, 10 Items	Pearson Correlation	1
	Sig. (2-tailed)	
	N	378
In the past four weeks, did you worry that your household would not have enough food?	Pearson Correlation	-0.33
	Sig. (2-tailed)	0.00
	N	378
In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	Pearson Correlation	-0.32
	Sig. (2-tailed)	0.00
	N	373
In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	Pearson Correlation	-0.31
	Sig. (2-tailed)	0.00
	N	377
In the past four weeks, was there ever no food to eat of any kind in your household because of a lack of resources to get food?	Pearson Correlation	-0.29
	Sig. (2-tailed)	0.00
	N	376

The figures from the correlation confirmed significant relationships existed between each of the four HFIAS items and HDDS in Philippi. All of the four FFOS items had *p*-values of 0.00, which suggests that the negative relationships between

these items and HDDS were significant. The *r*-values for the relationships ranged from the strongest being -0.33 for 'In the past four weeks, did you worry that your household would not have enough food,' to the weakest being -0.29 for 'In the past four weeks, was there ever no food to eat of any kind in your household because of a lack of resources to get food.' Overall, the HFIAS items showed moderate negative relationships with HDDS signifying that lower HFIAS correlates with lower dietary diversity scores in Philippi.

Table 29. Correlation – Household Food Access Items and Dietary Diversity in Khayelitsha

		Index of Dietary Diversity, 10 Items
Index of Dietary Diversity, 10 Items	Pearson Correlation	1
	Sig. (2-tailed)	
	N	376
In the past four weeks, did you worry that your household would not have enough food?	Pearson Correlation	-0.31
	Sig. (2-tailed)	0.00
	N	374
In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	Pearson Correlation	-0.24
	Sig. (2-tailed)	0.00
	N	373
In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	Pearson Correlation	-0.21
	Sig. (2-tailed)	0.00
	N	374

In the past four weeks, was there ever no food to eat of any kind in your household because of a lack of resources to get food?	Pearson Correlation	-0.17
	Sig. (2-tailed)	0.00
	N	371

In a similar fashion to the two previous correlations between the four HFIAS items and HDDS in Ocean View and Philippi, the figures from the last analysis provided similar results. This procedure revealed that significant relationships existed between each of the HFIAS items and HDDS in Khayelitsha. Due to the *p*-values of 0.00 exhibited by all the correlations, suggests that the negative relationships between the four HFIAS items and HDDS were significant. The *r*-values for the relationships ranged from the strongest at -0.31 for 'In the past four weeks, did you worry that your household would not have enough food,' to the weakest at -0.17 for 'In the past four weeks, was there ever no food to eat of any kind in your household because of a lack of resources to get food.' In summary, the HFIAS items showed weaker negative relationships with HDDS in Khayelitsha as compared to Ocean View and Khayelitsha. However, the results still indicate that lower HFIAS relates to lower dietary diversity scores in Khayelitsha.

The outcomes of the three correlations provide useful figures for understanding the differences between HFIAS and HDDS in each of the three study sites. The most robust negative relationship existed between HFIAS and HDDS in Ocean View as compared to Philippi and Khayelitsha. Therefore, household dietary diversity in Ocean View is more likely to decrease alongside lower levels of food access. Although HDDS in Philippi and Khayelitsha will also decrease correspondingly with HFIAS, the fluctuations would not be as prominent as they would in Ocean View due to the lack of a supermarket in the immediate vicinity. Although the findings have not explicitly dealt with spatial food access, the ensuing discussion (Chapter 6) will address it more specifically in light of the findings and literature.

CHAPTER 6:
DISCUSSION

Through the exploration of the three key findings discussed in Chapter 5, Chapter 6 compares and contrasts the findings of this study with current literature. The key findings that will be discussed are: supermarkets and dietary diversity, household food access and dietary diversity, and dietary diversity by study site.

6.1 Supermarkets and Dietary Diversity

The source of food indicator (FFOS) from the AFSUN survey provided valuable insight into where the urban poor in Ocean View, Philippi, and Khayelitsha obtained their food. Surprisingly, this study found supermarkets to be the most commonly frequented food outlet.[11] Furthermore, supermarkets also revealed the strongest relationship between dietary diversity as compared to other sources of food (refer to Section 5.1). The results indicated that households, which visited supermarkets more frequently, had higher dietary diversity than those who visited them less frequently.

Recent research discusses the extent to which supermarkets have permeated poor urban areas in SSA (Crush & Frayne, 2010a). Generally supermarkets were more important sources of food to households than were informal sources (small shops, cafes, restaurants, and fast-food outlets). Moreover, the increased authority of supermarkets in urban environments is increasingly pressuring informal markets and vendors to remain competitive. Overall, the literature implies that food insecurity is directly related to food sourcing. Specifically, the "more food insecure a household is, the more it relies on the informal sector and the less it patronises supermarkets" (Crush & Frayne, 2010a: 30). This study identified similar that household members frequented small shops and informal markets more on a day-to-day basis, while supermarkets were usually visited once a month. In this light,

[11] For reference, Table 4 illustrates the response values for the FFOS indicator.

supermarket purchases are larger and therefore less frequent than everyday purchases made from other vendors.

Recent research suggests that the dietary implications of supermarkets are both positive and negative (Hawkes, 2008). For example, supermarkets can allow for a more diverse diet to be available and accessible to populations. However, supermarkets can also limit the ability of marginalised populations to purchase a quality diet (Hawkes, 2008). Supermarkets can encourage the consumption of calorie-rich, nutrient-poor, and highly processed foods. Generally, the most significant dietary implication of supermarkets is that they universally encourage over-consumption, regardless of the type of food (Crush et al., 2011).

In respect to the food outlets available in Ocean View, Philippi, and Khayelitsha, there are some differences. Ocean View for instance, does not have a supermarket within its immediate proximity. There is, however, a superette[12] in Ocean View, which respondents commonly frequented. The nearest supermarket to Ocean View is several kilometres away and requires transport for access. Transport not only takes time, but is also costly. On the other hand, in Philippi a supermarket is located directly across the major motorway in the area, providing household access without the need for motor transport. Similarly, Khayelitsha has two supermarkets within its confines that provide options for food purchase in the area.

6.2 Household Food Access and Dietary Diversity

Chapter 5 established Household Food Access (HFIAS) as the most significant factor in relation to Household Dietary Diversity (HDDS). Although other factors such as income, poverty, and education, were included in the analysis ultimately, HFIAS proved to be the most critical variable. Generally, the literature also supports the notion that food access is the principal variable (Crush & Frayne, 2010a; Battersby,

[12] A superette is a small shop that provides some fresh foods, but primarily carries cooked take-away and processed packaged foods. Generally superettes do not offer the same variety and selection of fresh foods, as do supermarkets.

2011; Crush et al., 2011). However, other literature contends that poverty is the most significant influence in relation to dietary diversity as the following section discusses.

6.2.1 Poverty and Dietary Diversity

The term 'food poverty' is often used to describe a situation that exists when households lack the adequate financial resources to obtain a nutritionally adequate diet (Rose & Charlton, 2001). The food poverty framework emphasises income and expenditure. For example, in their study, Rose & Charlton (2001) argue that if households earned higher incomes and could therefore allocate more money towards food, their dietary diversity would correspondingly increase and ultimately so would nutrition levels. In addition, other authors stipulate that the urban poor are the most vulnerable to food price increases due to their limited incomes (Jacobs, 2009; Warshawsky, 2011). Thus, these studies suggest that the urban poor are forced to allocate a disproportionate amount of their income towards food. Given that the urban poor generally have limited incomes, the high price of food restricts their ability to purchase a diverse range of foodstuffs. In the long-term, the effects of which may result in reduced dietary diversity. Therefore, rising food prices as well as cultural food preferences likely affected those living in Ocean View, Philippi, and Khayelitsha.

Another important component of poverty amongst the urban poor relates to the types of food preparation and storage facilities that are available to households. For instance, many urban poor households lack modern household appliances such as refrigeration machines, stoves and ovens, and adequate storage facilities for foods (Crush et al., 2011). These limitations can markedly influence the types of foods that households purchase and consume. If households do not have the ability to prepare and store food at home, they are likely to acquire food that will not perish quickly and or purchase ready-to-eat foods from outlets. Ultimately, the limited numbers of foods households consume negatively affects dietary diversity and nutrition levels. While the AFSUN survey did not gauge household facilities, it is

plausible that the inability of households in Ocean View, Philippi, and Khayelitsha to store and prepare healthy foods, negatively influenced their food choices.

It is apparent that poverty, food price increases, income, and food insecurity, link intrinsically to one another. Nonetheless, as discussed by the World Bank (2006) the alleviation of poverty does not guarantee improved dietary diversity and improved nutrition. As highlighted in Section 2.5, although food may be economically accessible, it may also be spatially inaccessible (Crush & Frayne, 2010a). On the other hand, food may be spatially accessible, but economically inaccessible. While it is evident that poverty is certainly a factor in relation to dietary diversity, malnutrition, and under-nutrition, is not the only variable to consider in the context of Cape Town. The findings in Chapter 5 suggested that other factors, specifically food access, exhibited even stronger relationships with HDDS.

6.2.2 Food Access and Dietary Diversity

Although traditionally scholarship has understood food access in terms of limited availability of food, this approach has begun to shift. As far back as 1996, the term access broadly linked to food security (Maxwell, 1996). Today, experts consider access as the critical variable relative not only to food insecurity, but also to dietary diversity and nutrition. The results of the regressions in Chapter 5 confirmed that food access illustrated a robust negative relationship with household dietary diversity, even after other factors such as poverty, income, and education, were considered.

Recent literature emphasises that while availability of food is important, it is superseded by the failure to *access* food resources in the context of the urban poor (Battersby, 2011b). Furthermore, while in most urban areas some food is available, the quality of those foodstuffs in terms of its nutritional content is insufficient. In environments where packaged and highly-processed foods devoid of nutrients are available more often than a diverse variety of nutrient-dense healthy foods, populations will consume what is available and easy to obtain (Benson, 2004). Over time, the dietary implications of transitioned diets (refer to Section 2.5), lead to

malnutrition for those who can afford this poor-quality diet, and under-nutrition for those who struggle to obtain food regularly (Bourne, Lambert, & Steyn, 2002). Furthermore, many poor urban households lack the time, transport, and income, to access foods outside their immediate vicinities, which further compounds their ability to acquire nutrient-rich foods. Evidently, the influence of inadequate food access on nutrition is not just a household problem but instead a political issue.

Due to the political history of South Africa and the legacies of apartheid, many of the urban poor reside in densely populated peri-urban areas of Cape Town. A significant proportion of these populations are descendants of (non-white) families who were forcibly re-located from their homes in central urban areas and moved to the periphery with inadequate infrastructure and services (May, 1998). The areas that those families were moved to included the Cape Flats (Philippi and Khayelitsha) and Ocean View. Over time, with the increased influence of urbanisation and deficient infrastructure, difficulties in these areas such as food insecurity have been exacerbated. Within Ocean View, Philippi, and Khayelitsha, some of the factors that lead to food insecurity, include minimal public transportation, over-crowding, scarce food outlets, and dwellings that lack the space and facilities conducive to preparing and storing food. These conditions are typical of food insecure urban areas (Cohen & Garrett, 2009). Due to such limitations, substantial proportions of these populations remain isolated without sufficient access to resources and nutrient-rich foods (Frayne et al., 2010). Over time, the health levels of populations living in these areas have and will continue to deteriorate. As discussed in Section 2.1, "all people at all times have the right" to food security (FAO, 2010). However, as proven by the figures in Chapter 5, the right to healthy food is not being met in these sites.

There is growing concern in South Africa about the state of the urban food system. The growing influence of supermarketisation and the lack of local and federal policy to support equal and adequate food access, indicates that malnutrition and under-nutrition will continue on its current trajectory (Frayne et al., 2010). The current food system is catered to support the financial interests of shareholders and profit-seekers over the nutrition and the health of populations (Hawkes, 2008). In

Cape Town, supermarkets are most commonly located in wealthy neighbourhoods with few situated within proximity to the urban poor (Battersby, 2011b). The consequences manifest in poor spatial food access, which in turn, restricts households' abilities to acquire a diverse assortment of nutritionally rich foods. In the case of Ocean View, Philippi, and Khayelitsha, the statistics of this study reveal that food access negatively influences dietary diversity and ultimately household malnutrition and under-nutrition levels.

6.3 Differences in Dietary Diversity by Study Site

The data analysis in Chapter 5 highlighted significant differences in dietary diversity between Ocean View, Philippi, and Khayelitsha. In response to the higher dietary diversity scores exhibited by Ocean View, this section explores the possible explanations for the differences between sites. By incorporating the findings of this study with findings from similar studies should help to elucidate the possible reasons for the differences. One of the most notable differences between the three study sites is the average HIPC. As discussed previously (Section 6.1), higher household incomes often link to higher dietary diversity (Hawkes, 2008). As such, this section considers the potential influence of household income per capita on dietary diversity between the study sites.

Section 5.4 confirmed that while Philippi and Khayelitsha exhibited lower average household dietary diversity scores of 1.47, Ocean View displayed higher average scores at 1.60. Numerous reports contend that greater household incomes often equate to greater dietary diversity (Rose & Charlton, 2001; Swindale & Bilinsky, 2006; Crush et al., 2011). In these cases, households with higher incomes have more money to allocate towards the purchase of food. Thus, in theory wealthier households should be able to afford a more diverse assortment of items than those households with lower incomes. Given the substantially higher average monthly household income per capita in Ocean View of 906 (Rand) compared to those in Philippi with 559 per month, and Khayelitsha with 544 per month,

indicates that meaningful differences exist between the sites.[13] More so, Ocean View had 1.6 times the average income per capita compared to Philippi, and 1.67 times the average income per capita of Khayelitsha. Due to the notably higher household income per capita scores in Ocean View, households manifested greater dietary diversity than households in Philippi and Khayelitsha.

Although Ocean View exhibited higher household dietary diversity scores, it was also the site most vulnerable to dietary diversity fluctuations as a result of reduced food access. On the other hand, whereas Philippi and Khayelitsha showed lower dietary diversity scores both were less susceptible to reduced dietary diversity as a result of limited food access. The result of this relationship is principally attributed to the proximity to supermarkets of each study site. As discussed in Section 5.1, supermarkets positively correlate with greater dietary diversity in this study. Therefore, the lack of spatial access to supermarkets, as is the case in Ocean View, makes households more susceptible to fluctuations in dietary diversity. While households in Philippi and Khayelitsha had lower average incomes, due to the proximities of supermarkets to these sites households were able to maintain more stable dietary diversity scores. Having a supermarket near households allows for steady availability and spatial access to food. While in Ocean View's case, the lack of a supermarket nearby limits household access.

6.4 Summary of Discussion

Chapter 6 critically assessed the findings of this research in relation to the relevant literature. The first section of this Chapter (Section 6.1) discussed the relationship of supermarkets to HDDS. Specifically, supermarkets were positively related to increased dietary diversity across Ocean View, Philippi, and Khayelitsha. In addition, households that visited supermarkets more frequently were expected to have higher HDDS than those who visited them less often. However, not all households had the resources (time, transport, and income) to visit supermarkets on a regular

[13] The Household Income per Capita by Study Site table is available in Section 3.6 of Appendix 3.

basis. Therefore, supermarkets were visited less regularly than other sources of food such as informal markets and small shops. While the dietary implications of visiting supermarkets in this study indicate greater HDDS, supermarkets are criticised for encouraging over-consumption all types of foods, regardless of nutritional content (Crush et al., 2011).

The second section (6.2) of Chapter 6 explored household food access and HDDS. While this section generally discussed the importance of food access to HDDS, the first section addresses the literature that recognises poverty as a prominent factor. The urban poor are seen to be the most vulnerable to food price increases and therefore are limited to a narrow variety of foods, especially fresh fruit and vegetables. Another aspect of poverty that affects food choices relates to the type of preparation and storage facilities that exist in many poor urban households. In the second part of segment of Section 6.2, moved beyond poverty and concentrated more explicitly on food access. This section identified that the urban poor often have limited access to nutrient-rich foods, whereas the foods that are often available are devoid of nutrition. Consequently, food choices are negatively influenced. Therefore acquiring nutrient-rich foods requires substantial resources including the time, transport, and income. Regardless of socio-economic standing, equal access to nutrient rich foods is a basic right and closely linked to political dimensions of inadequate food access.

The third section (6.3) addressed the differences in dietary diversity by study site. Ocean View exhibited higher HDDS than both Philippi and Khayelitsha. The factor that was most likely to explain the higher dietary diversity was HIPC. On average Ocean View had significantly higher household incomes than households in either Philippi or Khayelitsha. However, households in Ocean View were also far more vulnerable to fluctuations in HDDS as a result of food access changes. These unique circumstances in Ocean View are attributed to the poor spatial food access of the area, as households are required to travel outside of Ocean View to reach a supermarket. Hence, making it far more difficult for households to regularly access a diverse variety of nutrient rich foods.

CHAPTER 7:
CONCLUSIONS

The goal of this research was to evaluate and analyse the relationship of SFA with malnutrition and under-nutrition in Cape Town. In particular, this study focused on the three urban poor areas of Ocean View, Philippi, and Khayelitsha. The hypothesis in Section 1.5 acted as the framework for analysis to guide this study. Due to the lack of previous research examining SFA and malnutrition and under-nutrition in Cape Town, this study aimed to contribute to future research. In addition, this research sought to develop a theory about SFA and malnutrition and under-nutrition in Cape Town.

The first section of Chapter 7 provides a discussion of the research hypothesis as well as the research findings and conclusions. Furthermore, the second section of this Chapter provides recommendations for future research. Finally, the last section of Chapter 6 reflects on the contributions of this study to research.

7.1 Summary of Findings and Conclusions

By revisiting the research hypothesis and findings of this study, the following section provides three primary conclusions. First, supermarkets were found to positively influence household dietary diversity. Secondly, poor household food access was found to negatively influence dietary diversity. Third, Ocean View exhibited higher household dietary diversity than Philippi and Khayelitsha, but was more vulnerable to food access fluctuations.

7.1.1 Research Hypothesis Tested

The findings of this study supported the research hypothesis and rejected the null hypothesis. The analysis revealed that households with poor spatial food access did

exhibit lower nutrition levels, while controlling for household size, education, sex of household head, income, poverty, types of food gone without, and frequency of food obtained from various sources. Although there were limitations in this study, the indicator variables (HFIAS and HDDS) provided beneficial data for future research. Given these findings, the data indicates that spatial food access is the critical variable in connection with malnutrition and under-nutrition in Ocean View, Philippi and Khayelitsha.

7.1.2 Conclusion 1: Supermarkets Positively Influence Dietary Diversity

The literature and the findings of this study identify the positive relationship between supermarkets and household dietary diversity. The findings revealed that households in the study sites did not visit supermarkets daily but instead on a monthly basis to purchase food. However, the more frequently households visited supermarkets the higher their dietary diversity scores. In Philippi and Khayelitsha, although average household dietary diversity scores were lower than in Ocean View, the geographic location of the supermarkets relative to the sites was significant. Due to the fact that no supermarkets exist in Ocean View, households were more vulnerable to food access fluctuations. On the other hand, although households in Philippi and Khayelitsha showed lower overall HDDS, the proximity of supermarkets to the sites made them less vulnerable to food access fluctuations. Therefore, we can theorise that SFA to supermarkets is a significant factor in relation to household dietary diversity.

7.1.3 Conclusion 2: Poor Food Access Positively Affects Dietary Diversity

Much of the contemporary literature (Klerk et al., 2004; Altman et al., 2009; Battersby-Lennard et al., 2009; Crush & Frayne, 2010a; Crush et al., 2011) supports the notion that difficulty accessing nutrient-rich foods (food access) is a key factor in the proliferation of food insecurity. However, while the findings of this study correspond with the literature, the results indicate that poor spatial food access

positively affects household dietary diversity specifically in Ocean View, Philippi, and Khayelitsha. Therefore, the findings reject the null hypothesis and confirm the hypothesis of this study. Despite some of the other factors (HS, HHHLE, HIPC, SHH, LPI, FFOS, TFGW) illustrating relationships with HDDS, none demonstrated relationships as robust or significant as HFIAS with HDDS. This research concludes that the isolation, lack of transportation and limited food vendors, within Ocean View, Philippi, and Khayelitsha, promote poor spatial food access. Over time, poor spatial food access can lead to low dietary diversity, which in turn can lead to malnutrition and under-nutrition.

7.1.4 Conclusion 3: Differences in Dietary Diversity by Study Site

This study identified differences in household dietary diversity across the three study sites. Few contemporary studies have examined food insecurity in Ocean View, Philippi, and Khayelitsha (Battersby-Lennard et al., 2009; Battersby, 2011a; Battersby, 2011b), and none to this point have examined the differences in household dietary diversity by site. Therefore, the findings illustrating higher dietary diversity scores in Ocean View over Philippi and Khayelitsha were important. Ocean View displayed higher dietary diversity than Philippi and Khayelitsha, which was likely due to the higher average household income per capita as compared to the other sites. Despite Ocean View exhibiting the highest dietary diversity scores, households were the most vulnerable to fluctuations due to changes in food access. The fact that Ocean View did not have a supermarket within its immediate proximity restricted its residents from easily obtaining a variety of foods, hence explaining the spatial food access vulnerability of Ocean View's populations.

7.2 Recommendations and Future Research

By integrating the conclusions of this research the following section makes two recommendations for future study.

7.2.1 Recommendation 1: Nutritional Outcomes of Using Various Food Sources

Conclusion 1 in Section 7.1 reiterated the significance of supermarkets to household dietary diversity. While this finding revealed the importance of supermarkets in relation to dietary diversity in Ocean View Philippi, and Khayelitsha, further study evaluating the long-term nutritional outcomes of using supermarkets versus other food outlets in South Africa would be essential. As indicated in Section 6.1, supermarkets encourage over-consumption regardless of the type of food (Crush et al., 2011). Hence, more comprehensive research documenting the nutrition and health outcomes of supermarketisation in urban South Africa is necessary. Alternatively, the dietary implications of acquiring food from other sources, such as informal vendors, street foods, and take away food, are critical to developing a wider knowledge base.

7.2.2 Recommendation 2: Evaluating Spatial Food Access, Sources of Food, and Nutritional Outcomes

Conclusion 2 acknowledged the influence of food access on household diversity and thus malnutrition and under-nutrition in Ocean View, Philippi, and Khayelitsha, whereas Conclusion 1 identified the importance of supermarkets to dietary diversity. Together, these two conclusions indicate that spatial food access is a critical issue in relation to nutritional outcomes. Given the limited number of indicators available in this study, especially related to nutritional status, for example anthropometric measurements and DCD, there is opportunity for further research. One possibility for future study would be to identify the proximity of food outlets to a chosen population and to examine the frequency by which those households or

individuals access food from various sources while evaluating their nutritional statuses. A study of such breadth would help to further elucidate the influence of spatial food access and sources of food with nutritional outcomes. Ultimately, the conclusions of such research could provide beneficial knowledge to policy planners and decision makers about key aspects of planning, health, and urban development.

7.3 Contribution to Knowledge

Chapter 2 (Literature Review) established a gap in knowledge concerning SFA and malnutrition and under-nutrition especially in the context of urban South Africa. In reference to this knowledge gap, this research examined the relationship of SFA to malnutrition and under-nutrition amongst Cape Town's urban poor and contributed to strengthening the current knowledge base. Although this research faced certain limitations (refer to Chapter 3) the significance of the findings of this study act as an important departure point for future research. Specifically, this study has shown that poor spatial food access does affect malnutrition and under-nutrition, and that supermarkets positively affect household dietary diversity in Ocean View, Philippi, and Khayelitsha. As a result, this research has established a framework for future analysis of urban food insecurity and the effects of spatial food access on nutrition, health, and the livelihoods of populations in South Africa.

REFERENCES

African Food Security Urban Network (AFSUN), 2009, Urban Food Security Baseline Household Survey.

Avery, M.L., Kreit, B. & Falcon, R. 2011. *In The Future of Foodscapes: Food Web 2020*, Paolo Alto, California.

Battersby, J., 2011. "The State of Urban Food Insecurity in Cape Town", *African Food Security Urban Network,* Queen's University and AFSUN: Kingston and Cape Town, pp. 1-42.

Battersby, J., 2011. Urban Food Insecurity in Cape Town South Africa: An Alternative Approach to Food Access. *Development Southern Africa*, 28(4), pp.1–17.

Battersby-Lennard, J., Fincham, R., Frayne, B., & Haysom, G. 2009. "Urban Food Security in South Africa: Case Study of Cape Town, Msunduzi and Johannesburg." *African Food Security Urban Network,* Queen's University and AFSUN: Kingston and Cape Town (15), pp. 5-46.

Benson, T. 2004. Africa's Food and Nutrition Security Situation: Where Are We and How Did We Get Here ? *Food Policy*, (August).

Bourne, L.T., Lambert, E.V. & Steyn, K. 2002. Where does the black population of South Africa stand on the nutrition transition? *Public health nutrition*, 5(1A), pp. 157-62.

City of Cape Town, 2010. *City of Cape Town Demographics Scenario*. Cape Town.

Cliff, N., 1988. The Eigenvalues-Greater-Than-One Rule and the Reliability of Components. *Psychological Bulletin*, 103(2), pp.276-279.

Cohen, J., Cohen P., West, S., and Aiken, L. 2003. *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences, 3rd ed.* Mahwah: Lawrence Erlbaum Associates, Inc., Publishers.

Cohen, M.J. & Garrett, J.L. 2009. The Food Price Crisis and Urban Food (In)Security. (August), pp. 1-39.

Creswell, J.W. (2009) *Research Design Qualitative, Quantitative, and Mixed Methods Approaches*. London: Sage Publications.

Crush, J. & Frayne, B. 2010. "The Invisible Crisis *:* Urban Food Security in Southern Africa," *African Food Security Urban Network,* Queen's University and AFSUN: Kingston and Cape Town*,* pp. 1-43.

Crush, J. & Frayne, B. 2010. "Pathways to Insecurity : Urban Food Supply and Access in Southern African Cities", *African Food Security Urban Network,* Queen's University and AFSUN: Kingston and Cape Town, pp. 1-39.

Crush, J. Frayne, B., Drime, S. & Caesar, M. 2011. "The HIV and Urban Food Security Nexus", *African Food Security Urban Network,* Queen's University and AFSUN: Kingston and Cape Town*,* pp. 1-29.

Crush, J., Frayne, B. & McLachlan, M. 2011. "Rapid Urbanisation and the Nutrition Transition in Southern Africa", *African Food Security Urban Network,* Queen's University and AFSUN: Kingston and Cape Town, pp. 1-49.

Crush, J., Hovorka, A. & Tevera, D. 2010. "Urban Food Production and Household Food Security in Southern African Cities*"*, *African Food Security Urban Network,* Queen's University and AFSUN: Kingston and Cape Town, pp. 1-28*.*

Cummins, S. & Macintyre, S. 2002. "Food Deserts" – Evidence and Assumption in Health Policy Making. *BMJ (Clinical research ed.)*, 325 (7361), pp. 436-8.

de Swardt, C., Puoane, T., Chopra, M. & du Toit, A. 2005. Urban Poverty in Cape Town. *Environment and Urbanisation*, 17(2), pp. 101-111.

Demment, M.W., Young, M.M. & Sensenig, R.L. 2003. Providing Micronutrients Through Food-based Solutions: A Key to Human and National Development. *The Journal of Nutrition*, 133(11), pp. 3875-4061.

Erasmus, Z. & Pieterse, E. (2001) Re-imaging Coloured Identities in Post-Apartheid South Africa. (*In* Coloured by History, Shaped by Place: New Perspectives on Coloured Identities in Cape Town, Cape Town: Kwela Books, pp.167-185).

Field, A. (2005) *Discovering Statistics Using SPSS*. 2nd Ed. Sage Publications Ltd., London.

Food and Agriculture Organisation of the United Nations, 2010. *The State of Food Insecurity in the World: Addressing food insecurity in protracted crises*, Rome, Italy.

Food and Agriculture Organisation of the United Nations, 2003. Trade and Food Security: Conceptualizing the Linkages. In *presentation at the Conference on Trade, Agricultural Development, and Food Security: The Impact of Recent Economic and Trade Policy Reform, Food and Agricultural Organisation, Rome, July*. Rome, Italy, p. 315. Available at: http://129.3.20.41/econ-wp/it/papers/0308/0308012.pdf [Accessed September 26, 2011].

Frayne, B., Pendleton, W., Crush, J., Acquah, B. 2010. "The State of Urban Food Insecurity in Southern Africa", *African Food Security Urban Network,* Queen's University and AFSUN: Kingston and Cape Town, pp. 1-51.

Garrett, J. & Ruel, M.T. 2000. Achieving Urban Food and Nutrition Security in the Developing World., (3), pp.1-20. Available at: http://www.ucl.ac.uk/dpu-projects/drivers_urb_change/urb_society/pdf_liveli_vulnera/ifpri_garett_food_security.pdf [Accessed October 2, 2011].

Godfray, H. C. J., Beddington, J.R., Crute, I.R. & Haddad, L. 2010. Food security: the challenge of feeding 9 billion people. *Science*, 327(812), pp. 812-816.

Guba, E.G. and Y.S. Lincoln (1994) Competing Paradigms in Qualitative Research. (*In* Denzin, N.K. and Y.S. Lincoln (eds) *Handbook of Qualitative Research*. Thousand Oaks: Sage Publications. pp. 105-117).

Hawkes, C. 2008. Dietary Implications of Supermarket Development: A Global Perspective. *Development Policy Review*, 26(6), pp. 657-692.

Jacobs, F., 2009. The Status of Household Food Security Targets in South Africa. *Agrekon*, 48(4), pp.410–433.

Jacoby, E. & Hawkes, C. 2008. *Agriculture and food policies can promote better health and mitigate the burden of chronic non-communicable diseases in the Americas*. London: Centre for Food Policy. Available at: http://www.bvsde.paho.org/texcom/cd045364/agriculture.pdf [Accessed May 28, 2011].

Labadarios, D., McHiza, Z., Steyn, N., Gericke, G., Maunder, E., Davids, Y. D., Parker, W. 2011. Food Security in South Africa: a Review of National Surveys. *Bulletin of the World Health Organization*, 89(12), pp.891-9.

Labadarios, D., Steyn, N., Maunder, E., MacIntyre, U., Gericke, G., Swart, R., Huskisson, J., Dannhauser, A., Voster, Hh., Nesumvni, Ae., Nel, Jh. 2005. The National Food Consumption Survey (NFCS): South Africa, 1999.

Lynch, S., M. (2007) *Introduction to Applied Bayesian Statistics and Estimation for Social Scientists*. New York: Springer.

May, J., 1998. Poverty and Inequality in South Africa, The Centre for Social Development Studies, The University of KwaZulu Natal, pp.1-11. Available at: http://www.info.gov.za/otherdocs/1998/poverty/presentation.pdf

Maxwell, D. 1999. The Political Economy of Urban Food Security in Sub-Saharan Africa. *World Development*, 27(11), pp. 1939-1953.

Maxwell, J.A. 1996. *Qualitative Research Design: An Interactive Approach.* Sage Publications, London.

Maxwell, S. 1996. Food Security: A Post-Modern Perspective. *Food Policy*, 21(2), pp. 155-170.

May, J. & Rogerson, C.M. 1995. Poverty and Sustainable Cities in South Africa: The Role of Urban Cultivation. *Habitat International*, 19(2), pp. 165-181.

Oldewage-Theron, W.H. & Napier, C.E., 2011. Nutrition Education Tools for Primary School Children in the Vaal region. *Development Southern Africa*, 28(2), pp.283-292.

Peltzer, K. 2007. Nutrition Knowledge Among a Sample of Urban Black and White South Africans. *South African Journal of Clinical Nutrition*, 17(1), pp. 1-8.

Popkin, B.M. 2006. Global Nutrition Dynamics: the World is Shifting Rapidly Toward a Diet Linked with Non-communicable Diseases. *The American journal of clinical nutrition*, 84(2), pp. 289-98.

Puoane, T., Steyn, K., Bradshaw, D., Laubscher, R., Fourie, J., Lambert, V. & Mbanga, N. 2002. Obesity in South Africa: the South African Demographic and Health Survey. *Obesity Research*, 10(10), pp. 1038-48.

Ravallion, M. 2007. Urban Poverty. *Finance & Development*, 44(3), pp. 15-17.

Rose, D. & Charlton, K.E. 2001. Prevalence of Household Food Poverty in South Africa: Results from a Large, Nationally Representative Survey. *Public Health Nutrition*, 5(3), pp. 383-389.

Schlein, L. & Kruger, S. 2006. "Urban Poor Worse off than Rural Poor but Good Policies can Reduce Slums" at *http://www.citymayors.com/society/urban_poor.html*

Sen, A. 1982. Third World Quarterly The Food Problem : Theory and Policy. *Third World Quarterly*, 4(3), pp. 447-459.

Smith, D.W. 1998. Urban Food Systems and the Poor in Developing Countries. *Transactions of the Institute of British Geographers*, 23(2), pp. 207–219.

Statistics, S.A., 2004. *Census 2001: Primary tables South Africa Census '96 and 2001 compared*, Pretoria, Statistics South Africa. pp. 1-110. Available at: http://www.statssa.gov.za/census01/html/RSAPrimary.pdf.

Statistics South Africa. 2007. A National Poverty Line for South Africa. Pretoria, Statistics South Africa. Available at: http://www.treasury.gov.za/publications/other/povertyline/Treasury%20StatsSA%20poverty%20line%20discussion%20paper.pdf

Statistics South Africa, 2011. *Statistical Release Mid-year Population Estimates 2011*. Pretoria, Statistics South Africa, pp. 1-16.

Swart, R. & Sanders, D. 2008. Nutrition: A Primary Health Care Perspective. *South African Health Review 2008*, Durban: Health Systems Trust; pp. 129–148. Available at: http://healthlink.org.za/uploads/files/chap9_08.pdf [Accessed September 10, 2011].

Swindale, A., & Bilinsky, P. (2006). *Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide (v.2).* (pp. 1-13). Washington, DC: Food and Nutrition Technical Assistance Project, Academy for Educational Development.

Temple, N.J., Steyn, N. P., Myburgh, N. G. & Nel, J. H. 2006. Food Items Consumed by Students Attending Schools in Different Socioeconomic Areas in Cape Town, South Africa. *Nutrition*, 22(3), pp. 252-8.

UNESA, 2007. Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2006 Revision and World Urbanisation Prospects: The 2007 Revision. Available at: http://esa.un.org

Vorster, H.H., Bourne, L.T., Venter, C.S. & Oosthuizen, W. 1999. Contribution of Nutrition to the Health Transition in Developing Countries: a Framework for Research and Intervention. *Nutrition reviews*, 57(11), pp. 341–349.

Walker, Alexander R.P. 1995. Nutrition-Related Diseases in Southern Africa: With Special Reference to Urban African Populations in Transition. *Nutrition Research*, 15(7), pp. 1053-1094.

Warshawsky, D.N. 2011. *Urban Food Insecurity and the Advent of Food Banking in Southern Africa*. Cape Town: African Food Security Urban Network.

APPENDIX 1:
THE AFSUN URBAN FOOD SECURITY BASELINE HOUSHOLD SURVEY

QUESTIONNAIRE NUMBER ☐

URBAN FOOD SECURITY BASELINE HOUSEHOLD SURVEY

IDENTIFICATION OF HOUSEHOLD

COUNTRY	(1) Namibia (2) Botswana (3) Lesotho (4) Swaziland (5) Mozambique (6) Malawi (7) Zambia (8) Zimbabwe (9) South Africa	☐
NAME CITY	(1) Windhoek (2) Gaborone (3) Maseru (4) Manzini (5) Maputo (6) Blantyre (7) Lusaka (8) Harare (9) Cape Town (10) Durban/PMB (11) Johannesburg	☐
INTERVIEW LOCATION	_____	
PSU/EA NUMBER	.....	
HOUSEHOLD NUMBER	.....	
INTERVIEW STATUS	[1 = Completed; 2 = Refused; 3 = Not at home; 4 = Premises empty]	☐
NUMBER OF CALLS	[to household where interview actually took place]	☐

TO BE COMPLETED BY INTERVIEWER

TIME INTERVIEW: STARTED _____ COMPLETED _____

NAME OF INTERVIEWER _____

SIGNATURE _____

COMMENTS:

DATE OF INTERVIEW

DAY ☐☐

MONTH ☐☐

YEAR 2 0 0 8

TO BE COMPLETED BY SUPERVISOR

NAME OF SUPERVISOR _____

SIGNATURE _____

COMMENTS:

HOUSEHOLD BACK-CHECKED? [Yes=1; No=2] ☐

QUESTIONNAIRE CHECKED? [Yes=1; No=2] ☐

SUPERVISOR	INTERVIEWER	FIELD EDITOR	OFFICE EDITOR	CODED BY	KEYED BY
☐☐	☐☐	☐☐	☐☐	☐☐	☐☐

1

PROJECT INFORMATION AND INFORMED CONSENT

Project Description

Urban food security is an emerging area of development concern and academic enquiry, and which is fundamentally different to questions of food security within the rural and agricultural sectors. Thus, in order to carry out informed and effective training and capacity building activities, the first step is to build the knowledge base concerning urban food security and poverty in the region. This Urban Food Security Baseline Household Survey is the first step in this process of building a knowledge resource base, and will be carried out in 11 partner cities in SADC.

This project is funded by the Canadian International Development Agency (CIDA), and is jointly implemented by Queen's University in Canada and the University of Cape Town. The project is a response to the mounting levels of poverty and food insecurity in the cities of Southern Africa, and aims to address these issues through a focused and sustained program of training and capacity building. To this end, the University of Cape Town has been identified as a regional focal point, and will carry out this project's core activities through the newly established Program in Urban Food Security (PUFS).

Consent

READ OUT ALOUD

I am working as a Researcher for the [INSERT INSTITUTION]. We are talking to people in [INSERT CITY NAME] about how they get food and other important and related social and economic issues. Your household has been randomly selected and we would like to discuss these issues with yourself, or an adult member of your household.

Your opinions will help us to get a better idea about how people in [INSERT CITY NAME] feel about these issues. There are no right or wrong answers. The interview will take about 45 minutes. Your answers will be confidential. They will be put together with over 300 other people we are talking to in [INSERT CITY NAME] to get an overall picture. We will not be recording your name, and it will be impossible to pick you out from what you say, so please feel free to tell us what you think.

Are you willing to participate? (CIRCLE THE ANSWER GIVEN)

Yes…1 **No…2**

IF NO: READ OUT: Thank you for your time. Goodbye.

IF YES: IF WILLING TO PARTICIPATE, READ OUT THE FOLLOWING:

Thank you for agreeing to participate in this study. Just to emphasize, any answers you provide will be kept absolutely confidential, and there is no way anyone will be able to identify you by what you have said in this interview. We are not recording either your address or your name, so you will remain anonymous. The data we collect from these interviews will always be kept in a secure location. You have the right to terminate this interview at any time, and you have the right to refuse to answer any questions you might not want to respond to.

Are there any questions you wish to ask before we begin?

Specify: ……..

SECTION A: HOUSEHOLD COMPOSITION

List on the grid below the details for all people living in the household including people who are usual members of the household who are away working (migrants) or for other reasons. ***See page 5 for codes to be entered***.

PNO	1	2	3	4	5	6	7	8	9	10
1a Relation to HHD head										
1b Sex										
1c Age										
1d Marital status										
1e Highest level of education										
1f Occupation *(most important first accept up to two)*										
1g Income last month for main occupation										
1h Lives away from this household?										
1i Work status										
1j Current country of work										
1k Where born?										
1l Where living now?										
1m Why moved to present location? *(Enter up to three reasons for moving)*										
1n Health Status *(Enter up to three health issues)*										
1o Where was main meal eaten yesterday?										
1p Who in the household normally does any of the following: *(See code list on page 5 for activities. Enter up to four activities)*										

SECTION A: HOUSEHOLD COMPOSITION (CONTINUED)

FOR ALL PEOPLE BELONGING TO THE HOUSEHOLD (here and away).

(See the following page for codes to be entered)

PNO	11	12	13	14	15	16	17	18	19	20
1a Relation to HHD head										
1b Sex										
1c Age										
1d Marital status										
1e Highest level of education										
1f Occupation *(most important first accept up to two)*										
1g Income last month for main occupation										
1h Lives away from this household?										
1i Work status										
1j Current country of work										
1k Where born?										
1l Where living now?										
1m Why moved to present location? *(Enter up to three reasons for moving)*										
1n Health Status *(Enter up to three health issues)*										
1o Where was main meal eaten yesterday?										
1p Who in the household normally does any of the following: *(See code list on page 5 for activities. Enter up to four activities)*										

4

Codes for Q1 (One code for each)

1a Relation to head
1 Head
2 Spouse/partner
3 Son/ daughter
4 Adopted/ foster child/ orphan
5 Father/ mother
6 Brother/sister
7 Grandchild
8 Grandparent
9 Son/ daughter-in-law
10 Other relative
11 Non-relative
97 Refused
98 Don't know
99 Missing

1b Sex
1 Male
2 Female
9 Missing

1c Age at last birthday
0 under 1 year
Whole numbers only
97 Refused
98 Don't know
99 Missing
(If respondent is older than 96, record 96)

1d Marital status
1 Unmarried
2 Married
3 Living together/ cohabiting
4 Divorced
5 Separated
6 Abandoned
7 Widowed
97 Refused
98 Don't know
99 Missing

1e Highest education
1 No formal schooling
2 Some Primary
3 Primary completed (Junior or Senior)
4 Some high school
5 High school completed
6 Post secondary qualifications not university (diploma, or degree from technikon or college)
7 Some university
8 University completed
9 Post-graduate
97 Refused
98 Don't know
99 Missing

1f Occupation
01 Farmer
02 Agricultural worker (paid)
03 Agricultural worker (unpaid)
04 Service worker
05 Domestic worker
06 Managerial office worker
07 Office worker
08 Foreman
09 Mine worker
10 Skilled manual worker
11 Unskilled manual worker
12 Informal sector producer
13 Trader/ hawker/ vendor
14 Security personnel
15 Police/ Military
16 Businessman/ woman(self-employed)
17 Employer/ Manager
18 Professional worker
19 Teacher
20 Health worker
21 Civil servant
22 Fisherman
23 Truck driver
24 Pensioner
25 Scholar/ Student
26 House work (unpaid)
27 Unemployed/ Job seeker
28 Other (specify)
97 Refused
98 Don't know
99 Missing

1h Lives/works away from this household but still a member of the household
1 No
2 Yes, migrant-working
3 Yes, migrant-looking for work
4 Yes, attending school
5 Other (specify)
9 Missing

1i Work status (wage employment)
1 Working full-time
2 Working part-time/ casual
3 Not working – looking
4 Not working – not looking
7 Refused
8 Don't know
9 Missing

1j Current country of (work
1 Works in home country
2 Mozambique
3 Namibia
4 Angola
5 Zimbabwe
6 Lesotho
7 Botswana
8 Malawi
9 Zambia
10 Swaziland
11 Tanzania
12 South Africa
13 Rest of Africa
14 Europe/UK
15 North America
16 Australia/NZ
17 Asia/China
18 Other
19 Not applicable (students, pensioners, etc)
97 Refused
98 Don't know
99 Missing

1k Where born
1 Rural area
2 Urban area
3 Foreign country rural area
4 Foreign country urban area
7 Refused
8 Don't know
9 Missing

1l Where living now?
1 Same rural area
2 Different rural area
3 Same urban area
4 Different urban area
5 Foreign country rural area
6 Foreign country urban area
7 Urban area
8 Rural area
97 Refused
98 Don't know
99 Missing

1m Why to present location
1 Housing
2 Land for livestock/grazing
3 Land for crop production
4 Formal sector job
5 Informal sector job
6 Food/hunger
7 Military Service
8 Drought
9 Overall living conditions
10 Safety of myself/family
11 Availability of water
12 Political exile
13 Asylum
14 Education/schools
15 Crime
16 Attractions of the city: urban life/ modern life
17 Illness related (HIV/AIDS)
18 Illness related (not HIV/AIDS)
19 Moved with family
20 Sent to live with family
21 Marriage
22 Divorce
23 Abandoned
24 Widowed
25 Freedom/democracy/peace
26 Retirement
27 Retrenchment
28 Eviction
29 Deaths
30 Floods
31 Religious reasons
32 Returned to former home
33 Other (specify)
96 Not moved
97 Refused
98 Don't know
99 Missing

1n Health Status
1 Accident
2 Diabetes
3 Asthma
4 Hypertension and stroke
5 Heart problems
6 Arthritis
7 Physical disability
8 HIV/ AIDS
9 Tuberculosis (TB)
10 Malaria
11 Chronic diarrhoea
12 Weight loss (severe)
13 Pneumonia
14 Cancer
15 Mental illness
16 Other (specify)
17 None of the above (good health)
99 Missing

1o Where was main meal eaten yesterday?
1 Home (this household)
2 Small shop
3 Informal market/street food
4 Shared meal with neighbours/or other households
5 Work place
6 School
7 Community food kitchen
8 Food provided by neighbours/ or other households
9 Did not eat a meal
10 Other (specify)
98 Don't know
99 Missing

1p Who in the household normally:
1 Buys food
2 Prepares food
3 Decides who will get food (allocates)
4 Grows food (produces)
5 Does none of the above
98 Don't know

SECTION B: HOUSEHOLD DATA			
2	Which one of the following **housing types** best describes the type of dwelling this household occupies? *(DO NOT read aloud - circle only **ONE** answer for the column labeled **'Code'**)*	**Housing Type**	**Code**
		a. House	1
		b. Town house	2
		c. Flat	3
		d. Traditional dwelling/ homestead	4
		e. Traditional dwelling with built-on rooms	5
		f. Hostel/ Compound	6
		g. Hotel/ Boarding house	7
		h. Room in backyard	8
		i. Room in house	9
		j. Room in flat	10
		k. Squatter hut/ shack	11
		l. Mobile home (caravan/ tent)	12
		m. Other *(specify):*	13
3	Which of the following best describes the **household structure?** *(DO NOT read aloud - ask about household type and circle only **ONE** answer)*	**Household Structure**	**Code**
		a. Female Centered *(No husband/ male partner in household, may include relatives, children, friends)*	1
		b. Male Centered *(No wife/ female partner in household, may include relatives, children, friends)*	2
		c. Nuclear *(Husband/ male partner and wife/ female partner with or without children)*	3
		d. Extended *(Husband/ male partner and wife/ female partner and children and relatives)*	4
		e. Under 18-headed households female centered *(head is 17 years old or less)*	5
		f. Under 18-headed households male centered *(head is 17 years old or less)*	6
		g. Other *(specify):*	7

4 **Household income from all sources (in the last one (1) month):**

(a) & (b) Read list aloud, circle the code that applies (column (b)) and complete the information for that row; leave rows blank for categories that do not apply.

(c) Enter amount over the past one (1) month to nearest currency unit in column (c).For income in kind i.e. 'Remittances – goods/ food', 'Income from farm products' and in some cases perhaps also 'Gifts', estimate the monetary value over the past month and record this figure in (c).

(a) Income categories	(b) Code	(c) Amount (to nearest currency unit)
a. Wage work	1	
b. Casual work	2	
c. Remittances – Money	3	
d. Remittances - Goods	4	
e. Remittances - Food	5	
f. Income from **rural** farm products	6	
g. Income from **urban** farm products	7	
h. Income from formal business	8	
i. Income from informal business	9	
j. Income from renting dwelling	10	
k. Income from Aid 1) food	11	
2) cash	12	
3) vouchers	13	
l. Pension/disability/other social grants	14	
m. Gifts	15	
n. Other (specify)	16	
o. Refused to answer	17	
p. Don't know	18	

5 **Household monthly expenses for the last *month* for items (a) through (f) & *year* for items (g) through (o).**

(Read list aloud, circle the code that applies and complete the information for that row; leave rows blank for categories that do not apply; if an annual expense give a monthly estimate.

If the household has no expenses, circle ONLY code = '17' for 'NONE'.

If respondent refuses to answer, circle ONLY code = '18' for 'Refused to answer'.)

(a) Expense categories	(b) Code	(c) Amount (to nearest currency unit)	
a. Food and Groceries	1		Last month
b. Housing (rent, mortgage)	2		Last month
c. Utilities (write total for all: water, sewer, electricity, telephone, etc)	3		Last month
d. Transportation	4		Last month
e. Savings	5		Last month
f. Fuel (firewood, paraffin, gas, candles, etc)	6		Last month
g. Medical (medical aid, medical costs)	7		Last year
h. Education (school fees, books, uniforms)	8		Last year
j. Insurance (life, burial, etc.)	10		Last year
k. Funeral costs	11		Last year
l. Home-based care	12		Last year

	m. Remittances	13		Last year
	n. Debt service/repayment	14		Last year
	o. Goods purchased to sell	15		Last year
	p. Other (specify type of expenditure & time)	16		
	q. NONE	17		
	r. Refused to answer	18		

6 **To what extent do people in your household use strategies other than jobs (regular formal employment) to make a living?**

Use the code list below to record the extent to which people in the household use other strategies:

1 = Not at all
2 = Slightly
3 = Partly dependent
4 = Totally dependent

Record the appropriate code in the last column.

Way to make a living	Code
a. Field crops	
b. Garden crops	
c. Tree crops	
d. Livestock	
e. Marketing	
f. Crafts	
g. Begging	
h. Gifts	
i. Casual labour	
j. Rent out space to lodgers	
k. Formal credit	
l. Informal credit	
m. Self employed at home	
n. Other (specify)	

7 **How would you say the economic conditions of your household are today compared to your household a year ago?**

(Circle one answer only)

Economic conditions	Code
Much worse	1
Worse	2
The same	3
Better	4
Much better	5

8 **Living Poverty Index**

Over the past year, how often, if ever, have you or your family (household) gone without:
(Read each question aloud and circle the most appropriate response. Circle only ONE answer for EACH ROW).

Conditions	Never	Just once or twice	Several times	Many times	Always	Don't know
a. Enough food to eat?	1	2	3	4	5	6
b. Enough clean water for home use?	1	2	3	4	5	6
c. Medicine or medical treatment?	1	2	3	4	5	6
d. Electricity in your home?	1	2	3	4	5	6
e. Enough fuel to cook your food?	1	2	3	4	5	6
f. A cash income?	1	2	3	4	5	6

8

SECTION C: CONTRIBUTION OF TRANSFERS TO SURVIVAL/ LIVELIHOODS

IF THIS HOUSEHOLD HAS A MEMBER LIVING AND WORKING ELSEWHERE - A MIGRANT WORKER - (SEE QUESTION 1H - M), PROCEED TO SECTION C BELOW.

IF NOT, SKIP SECTION C AND PROCEED TO SECTION D

9	**Do you think that this household has been affected positively or negatively by having a person(s) living and working elsewhere?** *(Probe for strength of opinion; circle only **ONE** answer)*	**Affect on household**	**Code**
		Very positive	1
		Positive	2
		Neither positive nor negative	3
		Negative	4
		Very negative	5
		Don't know (*do not read)*	6
10	**How important are remittances (cash, food and goods) for the survival of this household in the following ways?** *(Probe for strength of opinion; circle only **ONE** answer)*	**Importance of remittances**	**Code**
		Very important	1
		Important	2
		Neutral	3
		Not important	4
		Not important at all	5
		Don't know	6
11	**If other members of this household were to migrate to another location to work, do you think this household would be:** *(Probe for strength of opinion; circle only ONE answer)*	**Condition of household**	**Code**
		Better off	1
		About the same	2
		Worse off	3
		Don't know	4

SECTION D: FOOD INSECURITY

12 HOUSEHOLD FOOD INSECURITY ACCESS SCALE (HFIAS)

*(READ the list and categories and circle only **ONE** answer for each question)*

Household Food Insecurity Access Scale (HFIAS) for last four weeks	No (Answer to question is 'No')	Rarely (once or twice)	Sometimes (3 to 10 times)	Often (more than 10 times)
a. In the past four weeks, did you worry that your household would not have enough food?	1	2	3	4
b. In the past four weeks were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	1	2	3	4
c. In the past four weeks did you or any household member have to eat a limited variety of foods due to a lack of resources?	1	2	3	4
d. In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	1	2	3	4
e. In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	1	2	3	4
f. In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	1	2	3	4
g. In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	1	2	3	4
h. In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	1	2	3	4
i. In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	1	2	3	4
j. In the past week, did you or any household member eat a cooked meal less than once a day?	1	2	3	4

13 HOUSEHOLD DIETARY DIVERSITY SCORE (HDDS)

Now I would like to ask you about the types of foods that you or anyone else in your household ate yesterday during the day and at night.

(Read the list of foods. Circle yes in the box if anyone in the household ate the food in question, circle no if no one in the household ate the food)

Types of food	Yes	No
a. Any [INSERT ANY LOCAL FOODS], bread, rice noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or [INSERT ANY OTHER LOCALLY AVAILABLE GRAIN]?	1	2
b. Any potatoes, yams, manioc, cassava or any other foods made from roots or tubers?	1	2
c. Any vegetables?	1	2
d. Any fruits?	1	2
e. Any beef, pork, lamb, goat, rabbit, wild game, chicken, duck, other birds, liver, kidney, heart, or other organ meats?	1	2
f. Any eggs?	1	2
g. Any fresh or dried fish or shellfish?	1	2
h. Any foods made from beans, peas, lentils, or nuts?	1	2
i. Any cheese, yoghurt, milk or other milk products?	1	2
j. Any foods made with oil, fat, or butter?	1	2
k. Any sugar or honey?	1	2
l. Any other foods, such as condiments, coffee, tea?	1	2

14 MONTHS OF ADEQUATE HOUSEHOLD PROVISIONING (MAHP)

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

(a) In the past 12 months, were there months in which you did not have enough food to meet your family's needs? *(READ the question and circle the appropriate answer)*	Yes	1
	No	2
	(If NO, skip to Section E: AIDS AND FOOD SECURITY) If YES, continue with Q 14b)	

(b) 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?

(Do not read the list of months. Working backward from the current month:

*Circle the **one** ('Yes' column) if the respondent identifies that month as one in which the household did not have enough food to meet their needs.*

*Circle the **two** ('No' column) if the respondent identifies that month as one in which the household did have enough food to meet their needs)*

Months in which household did not have enough food to meet needs	Yes	No
a. January	1	2
b. February	1	2
c. March	1	2
d. April	1	2
e. May	1	2
f. June	1	2
g. July	1	2
h. August	1	2
i. September	1	2
j. October	1	2
k. November	1	2
l. December	1	2

15	**EXPERIENCE OF FOOD PRICE CHANGES** Now I would like to ask you about your household's experience of food prices over the past six months. **Over the past six months, have you or your household gone without certain types of food because of the price of food (it is unaffordable)?** *(Circle the appropriate answer)* *(If NEVER OR DON'T KNOW, skip to Section E: AIDS AND FOOD SECURITY* *OTHERWISE, continue with Q16)*	**Frequency of going without food**	**Code**
		Never	1
		About once a month	2
		About once a week	3
		More than once a week but less than everyday of the week	4
		Every day	5
		Don't know	9

16 **You have said that over the past six months, you or your household have gone without food because of the increase in the price of food items. Which types of foods have you gone without?**

(Read the list of foods. Circle 'Yes' in the box if anyone in the household ate the food in question.
Circle 'No' if no one in the household at the food).

Types of food	**Yes**	**No**
a. Any [INSERT ANY LOCAL FOODS], bread, rice noodles, biscuits or any other foods made from millet, sorghum, maize, rice, wheat, or [INSERT ANY OTHER LOCALLY AVAILABLE GRAIN]?	1	2
b. Any potatoes, yams, manioc, cassava or any other foods made from roots or tubers?	1	2
c. Any vegetables?	1	2
d. Any fruits?	1	2
e. Any beef, pork, lamb, goat, rabbit, wild game, chicken, duck, other birds, liver, kidney, heart, or other organ meats?	1	2
f. Any eggs?	1	2
g. Any fresh or dried fish or shellfish?	1	2
h. Any foods made from beans, peas, lentils, or nuts?	1	2
i. Any cheese, yoghurt, milk or other milk products?	1	2
j. Any foods made with oil, fat, or butter?	1	2
k. Any sugar or honey?	1	2
l. Any other foods, such as condiments, coffee, tea?	1	2

17	**Besides the increase in food price, what other problems (by order of importance) prevented you in the past six months from having enough food to meet your family's needs?** *(Do not read options, write number in front of the identified cause by order of importance (1=highest).* *Probe: Did you experience any other problem?)*	**Problem**	**Rank**
		a. Insecurity/violence	
		b. Death of a working household member	
		c. Death of the head of the household	
		d. Death of other household member	
		e. Serious illness of household member	
		f. Accident of household member	
		g. Loss/ reduced employment for a household member	
		h. Reduced income of a household member	
		i. Relocation of the family	
		j. Reduced or cut-off of remittances from relatives	
		k. Taking in orphans of deceased parent(s)	
		l. Health risks/ epidemics (e.g. cholera)	
		m. Floods, fire and/or other environmental hazards	
		n. Increased cost of water	
		o. End of a social grant	
		p. End of food aid	
		q. Theft	
		r. Political problems/issues	
		s. Other (please specify)	
		t. None	
		u. Don't know	99

18 **a) Where does this household normally obtain its food?**

(Read the list of food sources. Circle 'Food Code'in the box if anyone in the household answers yes to the food source on the list.)

b) How often does the household normally obtain its food from these sources?

(Probe for frequency that food is obtained from the source as given by respondent (a - k) and circle the appropriate number on the scale)

Source of food	(a) Food Code	(b) Frequency Food Obtained from this Source					
		At least five days a week	At least once a week	At least once a month	At least once in six months	Less than once a year	Never
a. Supermarket	1	1	2	3	4	5	6
b. Small shop	2	1	2	3	4	5	6
c. Informal market	3	1	2	3	4	5	6
d. Grow it	4	1	2	3	4	5	6
e. Food aid	5	1	2	3	4	5	6
f. Remittances (food)	6	1	2	3	4	5	6
g. Shared meal with neighbours and/or other households	7	1	2	3	4	5	6
h. Food provided by neighbours and/or other households	8	1	2	3	4	5	6
i. Community food kitchen	9	1	2	3	4	5	6
j. Borrow food from others	10	1	2	3	4	5	6
k. Other (specify):	11	1	2	3	4	5	6
l. Don't know	99						

19 **In the last week, where did members of this household obtain their food?**

(Read the list of food sources. Circle 'Yes' in the box if anyone in the household answers yes to the food source on the list.)

(Circle 'No' if no one in the household obtains food from the source being read out on the list.)

Source of food	Yes	No
a. Supermarket	1	2
b. Small shop	1	2
c. Informal market	1	2
d. Grow it	1	2
e. Food aid	1	2
f. Remittances (food)	1	2
g. Shared meal with neighbours and/or other households	1	2
h. Food provided by neighbours and/or other households	1	2
i. Community food kitchen	1	2
j. Borrow food from others	1	2
k. Other (specify):	1	2
l. Don't know	9	9

APPENDIX 2:

RESPONSE VALUE TABLES

2.1 Response Values for Question 12 (a-j) Household Food Insecurity Access Scale

* Note that the response values for this question were recoded as:
(1=0) (2=1) (3=2) (4=3).

a) Worrying About Food

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	272	25.7	25.7	25.7
	1.00	312	29.4	29.5	55.2
	2.00	333	31.4	31.5	86.7
	3.00	141	13.3	13.3	100.0
	Total	1058	99.8	100.0	
Missing	System	2	.2		
Total		1060	100.0		

b) Not able to eat Preferred Foods

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	250	23.6	23.7	23.7
	1.00	293	27.6	27.7	51.4
	2.00	375	35.4	35.5	86.9
	3.00	138	13.0	13.1	100.0
	Total	1056	99.6	100.0	
Missing	System	4	.4		
Total		1060	100.0		

c) Eat a Limited Variety of Foods

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	251	23.7	23.8	23.8
	1.00	286	27.0	27.1	50.9
	2.00	370	34.9	35.1	86.1
	3.00	147	13.9	13.9	100.0
	Total	1054	99.4	100.0	
Missing	System	6	.6		
Total		1060	100.0		

d) Eat Foods That They Did Not Want To

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	271	25.6	25.8	25.8
	1.00	276	26.0	26.2	52.0
	2.00	364	34.3	34.6	86.6
	3.00	141	13.3	13.4	100.0
	Total	1052	99.2	100.0	
Missing	System	8	.8		
Total		1060	100.0		

e) Smaller Meal Than Wanted

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	285	26.9	27.0	27.0
	1.00	281	26.5	26.6	53.5
	2.00	333	31.4	31.5	85.1
	3.00	158	14.9	14.9	100.0
	Total	1057	99.7	100.0	
Missing	System	3	.3		
Total		1060	100.0		

f) Fewer Meals Than Wanted

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	315	29.7	30.0	30.0
	1.00	270	25.5	25.7	55.7
	2.00	316	29.8	30.1	85.7
	3.00	150	14.2	14.3	100.0
	Total	1051	99.2	100.0	
Missing	System	9	.8		
Total		1060	100.0		

g) No Food To Eat

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	396	37.4	37.6	37.6
	1.00	275	25.9	26.1	63.8
	2.00	273	25.8	26.0	89.7
	3.00	108	10.2	10.3	100.0
	Total	1052	99.2	100.0	
Missing	System	8	.8		
Total		1060	100.0		

h) Go To Sleep Hungry

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	542	51.1	51.6	51.6
	1.00	197	18.6	18.8	70.4
	2.00	219	20.7	20.9	91.2
	3.00	92	8.7	8.8	100.0
	Total	1050	99.1	100.0	
Missing	System	10	.9		
Total		1060	100.0		

i) 24 Hours Without Food

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	581	54.8	55.3	55.3
	1.00	210	19.8	20.0	75.3
	2.00	193	18.2	18.4	93.6
	3.00	67	6.3	6.4	100.0
	Total	1051	99.2	100.0	
Missing	System	9	.8		
Total		1060	100.0		

j) Cooked Meal Less Than Once a Day

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	459	43.3	43.7	43.7
	1.00	281	26.5	26.7	70.4
	2.00	232	21.9	22.1	92.5
	3.00	79	7.5	7.5	100.0
	Total	1051	99.2	100.0	
Missing	System	9	.8		
Total		1060	100.0		

2.2 Response Values for Question 13 (a-l) Household Dietary Diversity Scale

* Note that the response values were reversed from 'Yes' (1) and 'No' (2), to 'Yes' (2) and 'No' (1).

a) Any Bread, Rice Noodles, buiscuits or any other foods made from millet, sorghum, maize, rice, wheat, or other grain?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	72	6.8	6.8	6.8
	2.00	986	93.0	93.2	100.0
	Total	1058	99.8	100.0	
Missing	System	2	.2		
Total		1060	100.0		

a) Any Potatoes, Yams, Manioc, Cassava or any other foods made from roots or tubers?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	341	32.2	32.4	32.4
	2.00	713	67.3	67.6	100.0
	Total	1054	99.4	100.0	
Missing	System	6	.6		
Total		1060	100.0		

c) Any Vegetables?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	401	37.8	38.1	38.1
	2.00	652	61.5	61.9	100.0
	Total	1053	99.3	100.0	
Missing	System	7	.7		
Total		1060	100.0		

d) Any Fruits?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	695	65.6	66.2	66.2
	2.00	355	33.5	33.8	100.0
	Total	1050	99.1	100.0	
Missing	System	10	.9		
Total		1060	100.0		

e) Any beef, pork, lamb, goat, rabbit, wild game, chicken, duck, other birds, liver, kidney, heart, or other organ meats?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	453	42.7	42.8	42.8
	2.00	605	57.1	57.2	100.0
	Total	1058	99.8	100.0	
Missing	System	2	.2		
Total		1060	100.0		

f) Any Eggs?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	751	70.8	71.4	71.4
	2.00	301	28.4	28.6	100.0
	Total	1052	99.2	100.0	
Missing	System	8	.8		
Total		1060	100.0		

g) Any Fresh or Dried Fish?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	885	83.5	84.0	84.0
	2.00	169	15.9	16.0	100.0
	Total	1054	99.4	100.0	
Missing	System	6	.6		
Total		1060	100.0		

h) Any foods made from beans, peas, lentils, or nuts?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	758	71.5	72.2	72.2
	2.00	292	27.5	27.8	100.0
	Total	1050	99.1	100.0	
Missing	System	10	.9		
Total		1060	100.0		

i) Any Cheese, yoghurt or other milk products?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	573	54.1	54.7	54.7
	2.00	474	44.7	45.3	100.0
	Total	1047	98.8	100.0	
Missing	System	13	1.2		
Total		1060	100.0		

j) Any foods made with oil, fat, or butter?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	295	27.8	28.1	28.1
	2.00	753	71.0	71.9	100.0
	Total	1048	98.9	100.0	
Missing	System	12	1.1		
Total		1060	100.0		

k) Any sugar or honey?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	181	17.1	17.2	17.2
	2.00	873	82.4	82.8	100.0
	Total	1054	99.4	100.0	
Missing	System	6	.6		
Total		1060	100.0		

l) Any other foods, such as condiments, coffee, or tea?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	122	11.5	11.6	11.6
	2.00	932	87.9	88.4	100.0
	Total	1054	99.4	100.0	
Missing	System	6	.6		
Total		1060	100.0		

2.3 Response Values for Question 16 (a-l) Types of Foods Gone Without

a) Any Bread, Rice Noodles, buiscuits or any other foods made from millet, sorghum, maize, rice, wheat, or other grain?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	72	6.8	6.8	6.8
	2.00	986	93.0	93.2	100.0
	Total	1058	99.8	100.0	
Missing	System	2	.2		
Total		1060	100.0		

b) Any Potatoes, Yams, Manioc, Cassava or any other foods made from roots or tubers?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	341	32.2	32.4	32.4
	2.00	713	67.3	67.6	100.0
	Total	1054	99.4	100.0	
Missing	System	6	.6		
Total		1060	100.0		

c) Any Vegetables?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	401	37.8	38.1	38.1
	2.00	652	61.5	61.9	100.0
	Total	1053	99.3	100.0	
Missing	System	7	.7		
Total		1060	100.0		

d) Any Fruits?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	695	65.6	66.2	66.2
	2.00	355	33.5	33.8	100.0
	Total	1050	99.1	100.0	
Missing	System	10	.9		
Total		1060	100.0		

e) Any beef, pork, lamb, goat, rabbit, wild game, chicken, duck, other birds, liver, kidney, heart, or other organ meats?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	453	42.7	42.8	42.8
	2.00	605	57.1	57.2	100.0
	Total	1058	99.8	100.0	
Missing	System	2	.2		
Total		1060	100.0		

f) Any Eggs?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	751	70.8	71.4	71.4
	2.00	301	28.4	28.6	100.0
	Total	1052	99.2	100.0	
Missing	System	8	.8		
Total		1060	100.0		

g) Any Fresh or Dried Fish?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	885	83.5	84.0	84.0
	2.00	169	15.9	16.0	100.0
	Total	1054	99.4	100.0	
Missing	System	6	.6		
Total		1060	100.0		

h) Any foods made from beans, peas, lentils, or nuts?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	758	71.5	72.2	72.2
	2.00	292	27.5	27.8	100.0
	Total	1050	99.1	100.0	
Missing	System	10	.9		
Total		1060	100.0		

i) Any Cheese, yoghurt or other milk products?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	573	54.1	54.7	54.7
	2.00	474	44.7	45.3	100.0
	Total	1047	98.8	100.0	
Missing	System	13	1.2		
Total		1060	100.0		

j) Any foods made with oil, fat, or butter?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	295	27.8	28.1	28.1
	2.00	753	71.0	71.9	100.0
	Total	1048	98.9	100.0	
Missing	System	12	1.1		
Total		1060	100.0		

k) Any sugar or honey?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	181	17.1	17.2	17.2
	2.00	873	82.4	82.8	100.0
	Total	1054	99.4	100.0	
Missing	System	6	.6		
Total		1060	100.0		

l) Any other foods, such as condiments, coffee, or tea?

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1.00	122	11.5	11.6	11.6
	2.00	932	87.9	88.4	100.0
	Total	1054	99.4	100.0	
Missing	System	6	.6		
Total		1060	100.0		

2.4 Response Values for Question 18B (a-l) Frequency of Food Obtained from Source

* Note that the values were recoded from the original survey and changed to: (6=0) (5=1) (4=2) (3=3) (2=4) (1=5).

a) Supermarket Frequency

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	66	6.2	6.3	6.3
	2.00	14	1.3	1.3	7.6
	3.00	689	65.0	65.4	73.0
	4.00	245	23.1	23.3	96.3
	5.00	39	3.7	3.7	100.0
	Total	1053	99.3	100.0	
Missing	System	7	.7		
Total		1060	100.0		

b) Small shop/Restaurant/Take Away

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	263	24.8	25.0	25.0
	1.00	7	.7	.7	25.7
	2.00	20	1.9	1.9	27.6
	3.00	111	10.5	10.6	38.1
	4.00	361	34.1	34.3	72.4
	5.00	290	27.4	27.6	100.0
	Total	1052	99.2	100.0	
Missing	System	8	.8		
Total		1060	100.0		

c) Informal Market/Street Food

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	363	34.2	34.4	34.4
	1.00	10	.9	.9	35.4
	2.00	20	1.9	1.9	37.3
	3.00	76	7.2	7.2	44.5
	4.00	381	35.9	36.1	80.6
	5.00	204	19.2	19.4	100.0
	Total	1054	99.4	100.0	
Missing	System	6	.6		
Total		1060	100.0		

d) Grow It

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	1007	95.0	95.3	95.3
	1.00	7	.7	.7	95.9
	2.00	9	.8	.9	96.8
	3.00	14	1.3	1.3	98.1
	4.00	11	1.0	1.0	99.1
	5.00	9	.8	.9	100.0
	Total	1057	99.7	100.0	
Missing	System	3	.3		
Total		1060	100.0		

e) Food Aid

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	1029	97.1	97.4	97.4
	1.00	4	.4	.4	97.7
	2.00	5	.5	.5	98.2
	3.00	12	1.1	1.1	99.3
	4.00	5	.5	.5	99.8
	5.00	2	.2	.2	100.0
	Total	1057	99.7	100.0	
Missing	System	3	.3		
Total		1060	100.0		

f) Remittances (Food)

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	998	94.2	94.5	94.5
	1.00	4	.4	.4	94.9
	2.00	5	.5	.5	95.4
	3.00	27	2.5	2.6	97.9
	4.00	17	1.6	1.6	99.5
	5.00	5	.5	.5	100.0
	Total	1056	99.6	100.0	
Missing	System	4	.4		
Total		1060	100.0		

g) Shared Meal with Neighbours and/or Other Households

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	587	55.4	55.5	55.5
	1.00	7	.7	.7	56.2
	2.00	34	3.2	3.2	59.4
	3.00	190	17.9	18.0	77.4
	4.00	185	17.5	17.5	94.9
	5.00	54	5.1	5.1	100.0
	Total	1057	99.7	100.0	
Missing	System	3	.3		
Total		1060	100.0		

h) Food Provided By Neighbours and/or Other Households

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	696	65.7	65.9	65.9
	1.00	10	.9	.9	66.9
	2.00	28	2.6	2.7	69.5
	3.00	151	14.2	14.3	83.8
	4.00	133	12.5	12.6	96.4
	5.00	38	3.6	3.6	100.0
	Total	1056	99.6	100.0	
Missing	System	4	.4		
Total		1060	100.0		

i) Community Food Kitchen

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	995	93.9	94.1	94.1
	1.00	2	.2	.2	94.3
	2.00	3	.3	.3	94.6
	3.00	20	1.9	1.9	96.5
	4.00	23	2.2	2.2	98.7
	5.00	14	1.3	1.3	100.0
	Total	1057	99.7	100.0	
Missing	System	3	.3		
Total		1060	100.0		

j) Borrow Food From Others

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	.00	748	70.6	70.8	70.8
	1.00	9	.8	.9	71.7
	2.00	33	3.1	3.1	74.8
	3.00	126	11.9	11.9	86.7
	4.00	115	10.8	10.9	97.6
	5.00	25	2.4	2.4	100.0
	Total	1056	99.6	100.0	
Missing	System	4	.4		
Total		1060	100.0		

APPENDIX 3:

CORRELATION, ANOVA, MLR, and HIPC by STUDY SITE TABLES

3.1 Correlation Tables

Correlations

		Index of Dietary Diversity, 10 Items
Index of Dietary Diversity, 10 Items	Pearson Correlation	1
	Sig. (2-tailed)	
	N	1014
Frequency of Food Obtained from Source, 10 Items	Pearson Correlation	.013
	Sig. (2-tailed)	.675
	N	1002

Correlations

		Index of Dietary Diversity, 10 Items
Index of Dietary Diversity, 10 Items	Pearson Correlation	1
	Sig. (2-tailed)	
	N	1014
Index of Types of Food Gone Without, 12 Items	Pearson Correlation	-.104**
	Sig. (2-tailed)	.007
	N	683

Correlations

		Index of Dietary Diversity, 10 Items
Index of Dietary Diversity, 10 Items	Pearson Correlation	1
	Sig. (2-tailed)	
	N	1014
Index of Food Access (HFIAS), 10 Items	Pearson Correlation	-.406**
	Sig. (2-tailed)	.000
	N	979

Correlations

		Index of Dietary Diversity, 10 Items
Index of Dietary Diversity, 10 Items	Pearson Correlation	1
	Sig. (2-tailed)	
	N	1014
Household Size	Pearson Correlation	.014
	Sig. (2-tailed)	.662
	N	1014
Lived Poverty Index	Pearson Correlation	-.387**
	Sig. (2-tailed)	.000
	N	873
Household Income Per Capita	Pearson Correlation	.192**
	Sig. (2-tailed)	.000
	N	1014

3.2 ANOVA Tables

Descriptives – SHH and HDDS

Index of Dietary Diversity, 10 Items

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Male	529	1.5255	.22874	.00995	1.5060	1.5451	1.00	2.00
Female	483	1.4758	.23148	.01053	1.4551	1.4965	1.00	2.00
Total	1012	1.5018	.23128	.00727	1.4875	1.5160	1.00	2.00

ANOVA – SHH and HDDS

Index of Dietary Diversity, 10 Items

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.63	1	.63	11.81	.001
Within Groups	53.45	1010	.05		
Total	54.08	1011			

Descriptives HHHLE and HDDS

Index of Dietary Diversity, 10 Items

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
No formal schooling	55	1.4945	.25850	.03486	1.4247	1.5644	1.10	2.00
Some Primary	197	1.4650	.23526	.01676	1.4319	1.4980	1.00	2.00
Primary completed	113	1.5088	.24222	.02279	1.4637	1.5540	1.00	2.00
Some High school	405	1.5086	.22482	.01117	1.4867	1.5306	1.00	2.00
High school completed	181	1.5155	.22132	.01645	1.4830	1.5479	1.00	2.00
Post-secondary qualifications not university	14	1.5357	.23732	.06343	1.3987	1.6727	1.20	1.90
Some university	7	1.4286	.17995	.06801	1.2621	1.5950	1.20	1.70
University completed	2	1.6500	.07071	.05000	1.0147	2.2853	1.60	1.70

Post-graduate	2	1.7500	.21213	.15000	-.1559	3.6559	1.60	1.90
Total	976	1.5009	.23047	.00738	1.4864	1.5154	1.00	2.00

ANOVA – HHHLE and HDDS

Index of Dietary Diversity, 10 Items

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.55	8	.07	1.29	.243
Within Groups	51.24	967	.05		
Total	51.79	975			

3.3 Regression Tables

Model 1 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.215[a]	.046	.042	.22563

a. Predictors: (Constant), Household Size, Sex of Household Head, Household Head Highest Level of Education, Household Income Per Capita.

Regression Model 1

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.48	.036		41.22	.000
	Sex of Household Head	-.037	.015	-.081	-2.56	.011
	Household Head Highest Level of Education	.007	.006	.037	1.14	.255
	Household Income Per Capita	5.15E-005	.000	.180	5.46	.000
	Household Size	.006	.003	.056	1.75	.081

b. Dependent Variable: Index of Dietary Diversity, 10 Items.

Model 2 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	.370[a]	.137	.128	.21742

a. Predictors: (Constant), Index of Types of Food Gone Without, 12 Items, Household Size, Sex of Household Head, Household Head Highest Level of Education, Lived Poverty Index, Household Income Per Capita.

Regression Model 2

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
2	(Constant)	1.64	.07		23.89	.000
	Sex of Household Head	-.04	.02	-.08	-1.94	.053
	Household Head Highest Level of Education	.02	.01	.09	2.19	.029
	Household Income Per Capita	2.60E-005	.00	.08	1.84	.066
	Household Size	.00	.00	.01	.27	.789
	Lived Poverty Index	-.07	.01	-.28	-6.65	.000
	Index of Types of Food Gone Without, 12 Items	-.06	.04	-.07	-1.71	.087

a. Dependent Variable: Index of Dietary Diversity, 10 Items

Model 3 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
3	.432[a]	.186	.174	.21030

a. Predictors: (Constant), Index of Food Access (HFIAS), 10 Items, Household size, Sex of household head, Household Head Highest Level of Education, Frequency of Food Obtained from Source, 10 Items, Index of Types of Food Gone Without, 12 Items, Household Income Per Capita, Lived Poverty Index.

Regression Model 3

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
3	(Constant)	1.68	.07		23.70	.000
	Sex of Household Head	-.04	.02	-.09	-2.14	.033
	Household Head Highest Level of Education	.01	.01	.05	1.28	.202
	Household Income Per Capita	1.62E-005	.00	.05	1.15	.249
	Household size	-.00	.00	-.01	-.16	.877
	Lived Poverty Index	-.03	.01	-.13	-2.41	.016
	Index of Types of Food Gone Without, 12 Items	-.06	.04	-.07	-1.80	.073
	Frequency of Food Obtained from Source, 10 Items	.04	.02	.10	2.48	.014
	Index of Food Access (HFIAS), 10 Items	-.08	.02	-.26	-4.92	.000

a. Dependent Variable: Index of Dietary Diversity, 10 Items

3.4 ANOVA Differences in HDDS Between Study Sites

Descriptives – HDDS and Location

Index of Dietary Diversity, 10 Items

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Ocean View	260	1.60	.20627	.01279	1.5763	1.6267	1.10	2.00
Philippi	378	1.47	.23172	.01192	1.4430	1.4898	1.00	2.00
Khayelitsha	376	1.47	.22746	.01173	1.4461	1.4922	1.00	2.00
Total	1014	1.50	.23115	.00726	1.4878	1.5163	1.00	2.00

ANOVA – HDDS and Location

Index of Dietary Diversity, 10 Items

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.461	2	1.730	34.53	.00
Within Groups	50.665	1011	.050		
Total	54.126	1013			

3.5 Correlation - Differentiation of HDDS by HFIAS by Study Site Tables

Correlation - Differentiation of HDDS by HFIAS – Ocean View

		Index of Dietary Diversity, 10 Items
Index of Dietary Diversity, 10 Items	Pearson Correlation	1
	Sig. (2-tailed)	
	N	260
In the past four weeks, did you worry that your household would not have enough food?	Pearson Correlation	-.43
	Sig. (2-tailed)	.00
	N	260
In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	Pearson Correlation	-.42
	Sig. (2-tailed)	.00
	N	260
In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	Pearson Correlation	-.45
	Sig. (2-tailed)	.00
	N	260
In the past four weeks, was there ever no food to eat of any kind in your household because of a lack of resources to get food?	Pearson Correlation	-.44
	Sig. (2-tailed)	.00
	N	260

Correlation - Differentiation of HDDS by HFIAS – Philippi

		Index of Dietary Diversity, 10 Items
Index of Dietary Diversity, 10 Items	Pearson Correlation	1
	Sig. (2-tailed)	
	N	378
In the past four weeks, did you worry that your household would not have enough food?	Pearson Correlation	-.33
	Sig. (2-tailed)	.00
	N	378
In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	Pearson Correlation	-.32
	Sig. (2-tailed)	.00
	N	373
In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	Pearson Correlation	-.31
	Sig. (2-tailed)	.00
	N	377
In the past four weeks, was there ever no food to eat of any kind in your household because of a lack of resources to get food?	Pearson Correlation	-.29
	Sig. (2-tailed)	.00
	N	376

Correlation - Differentiation of HDDS by HFIAS – Khayelitsha

		Index of Dietary Diversity, 10 Items
Index of Dietary Diversity, 10 Items	Pearson Correlation	1
	Sig. (2-tailed)	
	N	376
In the past four weeks, did you worry that your household would not have enough food?	Pearson Correlation	-.31
	Sig. (2-tailed)	.00
	N	374
In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	Pearson Correlation	-.24
	Sig. (2-tailed)	.00
	N	373
In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	Pearson Correlation	-.21
	Sig. (2-tailed)	.00
	N	374
In the past four weeks, was there ever no food to eat of any kind in your household because of a lack of resources to get food?	Pearson Correlation	-.17
	Sig. (2-tailed)	.00
	N	371

3.6 Household Income per Capita by Study Site

Household Income per Capita

Location	Mean	N	Std. Deviation
Ocean View	905.7307	276	1000.88162
Philippi	559.2297	389	822.71753
Khayelitsha	543.6197	394	595.93395
Total	643.7282	1059	815.34750