COMPARATIVE ANALYSIS OF THE IMPACT OF FOOD PRICES ON HOUSEHOLD

FOOD SECURITY: EVIDENCE FROM THE NORTH-WEST AND KWAZULU-NATAL

PROVINCES, SOUTH AFRICA

By

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DECLARATION

I, **Lerato Phali,** declare that;

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ABSTRACT

The prevalence of household food insecurity in South Africa is not a result of a shortage of food but of a lack of access to food. Contributing to this are the rising food prices that adversely affect the rural poor, as most of them are net buyers of food. Due to the higher food prices, poor households are forced to spend a large proportion of their income on food. The objectives of this study are to determine socio-economic characteristics that influence household perceptions of food prices and to evaluate the impact of food prices on rural household food security in South Africa. The study considers two rural areas that have different food price regimes, namely, Jericho in the North-West Province and Swayimane in the KwaZulu-Natal Province. The results are based on household level data collected from a sample of 300 households using structured questionnaires. The Ordered Logit Regression (OLR) model was used to evaluate the impact of food prices on rural household food security status, using the Food Expenditure Income (FEI) ratio as a household food security indicator. The ratio indicates the proportion of household income spent on food. Its components are directly linked to two of the four aspects of food security, namely food stability and food accessibility. According to Engel's Law, the proportion of income spent on food declines as income increases. This implies that low income households spend a large proportion of their income on food, resulting in a high FEI ratio. The findings of the study indicated that households in Swayimane are more likely to be "well-off", compared to those in Jericho. Location, gender of household-head, number of permanently employed household members and total household income significantly influenced household food security.

Food price perceptions influence buying and consumption patterns of households. Using the Tobit regression model, households' socio-economic characteristics that determine household

perceptions of food prices were identified. A Food Price Perception (FPP) index was generated using principal components analysis and was used to evaluate the relationship between food price perceptions and household food expenditure patterns. The results showed that households in Jericho had higher perceptions of food prices and that location, total household income and the number of permanently employed household members influence a household's perception of food prices. Another finding was that households with a higher perception of food prices were low-income households that spend a large proportion of their incomes on food. The study recommends that policy priorities should be focused on the establishment of retail outlets in rural communities. Establishment of new employment opportunities and increased wages will also help improve household food security through increased food affordability.

LIST OF ACRONYMS

AFRA   Association for Rural Advancement

CCHIP   Community Childhood Hunger Identification Project

CGE   Computable General Equilibrium

CS   Community Survey

DAFF   Department of Agriculture, Forestry and Fisheries

FAO   Food and Agriculture Organization

FEI   Food Expenditure Income ratio

FGT   Foster, Greer and Thorbecke

FIVIMS   Food Insecurity and Vulnerability Information and Mapping System

FPP   Food Price Perceptions

GHS   General Household Survey

HFIAS   Household Food Insecurity Access Scale

HRSC   Human Sciences Research Council

IES   Income and Expenditure Survey

LFS   Labour Force Survey

MDG   Millenium Development Goals

NAMC   National Agricultural Marketing Council

NCS   National Consumption Survey

NDA   National Development Agency

NFCS   National Food Consumption Survey

OLR	Ordered Logit Regression
SANews	South African News Agency
SARPN	Southern African Regional Poverty Network
SASAS	South African Social Attitudes Survey
StatsSA	Statistics South Africa
UNDP	United Nations Development Program
WHO	World Health Organization
IFAD	International Fund for Agricultural Development
USAID	United States Agency for International Development
IFSPI	Integrated Food Security Production Intervention

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CHAPTER 1 INTRODUCTION

This chapter outlines the problem, objectives and the hypotheses this study aimed to address. It presents a background and a brief overview of the structure of the dissertation.

1.1 Background

Households are said to be food secure when they have year-round access to the amount and variety of safe foods their members need to lead active and healthy lives. At the household level, food security refers to the ability of the household to secure, either from its own production or through purchases, adequate and nutritious food for meeting the dietary needs of all members of the household (FAO, 2012). However, reports on food security have shown a lack of adequate food and slow economic growth, putting less developed nations and households at risk of being food insecure (FAO, 2009). As such in 1996, 189 nations made a promise to free people across the developing world from extreme poverty and set to reach the eight Millennium Development Goals (MDGs) by 2015 (UNAID, 2014). The MDG's were to eradicate extreme poverty and hunger, promote gender equality and empower women, reduce child mortality, improve maternal health, combat HIV/AIDS, malaria and other diseases, ensure environmental sustainability and develop a global partnership for development (WHO, 2014).

Despite efforts to combat national and household food insecurity, the increase in future demand for food, as a result of population and income growth, will make it more challenging to ensure food security (FAO, 2009). Slow agricultural productivity, which could be worsened by climate change and limited water supply, will also make it challenging for households to ensure food security. Another important factor negatively affecting food security is food price volatility, which, after the global 2007-2008 price hikes, led to an increase in the number of hungry

families (HSRC, 2012). This was especially serious in low income developing countries, where most poor people are net consumers of food (Son and Kakwani, 2009). Some of the causes of these price hikes include increased oil prices, increased demand for food and fuel, export restrictions and reduced production due to unfavorable climatic conditions (Jatta, 2013).

In South Africa, higher food prices increased the overall cost of living. The food price crisis led to an increase in the cost of purchasing food and made it increasingly difficult for low income households to afford what they could before the 2007-2008 price hikes (HSRC, 2012). This is because low income households rely on the very food that became too expensive. Rising food prices reduced total disposable income available for consumers and added to the financial strain experienced by consumers (Sekhampu and Dubihlela, 2012), forcing households to reduce their non-food expenditure. The low income households in South Africa purchase cheaper, unhealthy food when prices are high, because healthier diets generally cost more than a diet commonly eaten by poor families (Temple *et al*., 2010:1). Temple *et al*. (2010) found that in the Western Cape, a household with five individuals would have to increase their food expenditure by R1090 to afford a healthier diet.

The National Agricultural Marketing Council (NAMC) reported that the cost of a basic food basket increased by about 6% (R485 to R514) from January 2014 to January 2015. This report, The Food Cost Review (2008) showed that South African rural consumers paid more for food items than urban consumers. According to the study, the reason for the difference in food prices between the rural and urban shops are transport costs, which include maintenance, fuel and the frequency of trips to and from suppliers. Other reasons for the difference in prices include low or no volume discounts for the rural outlets, stock losses (spoilage, breakage, products exceeding

their expiry dates and stock theft) and loading costs, which entails casual labour associated with loading at the wholesale markets (Ramabulana, 2011).

The impact of prices on household food security however varies between households, depending on the actual price they pay for food. Sellers often offer different prices for the same goods in a given market, a strategy called food price dispersion (Ramachandran and Sundararajan, 2005). Price dispersion exists in the South African food market and its main causes include unavailability of storage, transportation costs, road infrastructure and the monopolistic nature of rural food stores (Anania and Nisticò, 2010, Minten and Kyle, 1999, Effiong and Eze, 2010).

1.2 Problem Statement

Food access is an important determinant of household food security that is affected by households' total income and the price of food. Prices paid by households in low-income areas for food are higher than those in formal suburbs (Makgetla and Watkinson, 2002). In April 2010, households in rural areas paid R17.78 more for the same food basket as consumers in urban areas (NAMC, 2010). In January 2015, a basket of food, including, margarine 500g, sunflower oil 750ml, a loaf of white bread 700g, maize meal super 5kg, a loaf of brown bread 700g and full cream milk cost R9.84 more in rural areas than in urban areas (NAMC, 2015). Poor rural households are thus worse off, as the higher prices decrease their purchasing power. High food prices also lead to a decrease in the quality of food consumed and the number of meals consumed per day by households (Wood *et al*., 2009), which could affect the health status of the members. Deterioration of the health and nutritional status of children and lactating women, high school drop-out numbers by young individuals from school, and the selling off of productive assets by households are some of the adverse effects of high food prices (Von Braun, 2008). Presenting her Budget Vote Speech to the National Council of Provinces, the former

Minister of Agriculture, Joemat-Pettersson, said that lower-income South African households are the biggest victims of upward trends in food prices and that most of South Africa's poorest people spend about 60 percent of their income on food (SANews, 2013). Jacobs (2009) reported that the food expenditure shares of low income households vary between 38 and 71 percent (Jacobs, 2009). This makes rural households vulnerable to future price increases.

Considering the above problems associated with high food prices the following research questions are raised in the study:

(i)   What is the impact of high food prices on rural household food security in South Africa?

(ii)   What are the socio-economic factors influencing the level of food security of rural households in South Africa?

(iii)   Which are the socio-economic factors influencing households' perceptions of food price levels in rural areas in South Africa?

1.3 Objectives

The general study objective of this thesis was to evaluate the impact of food prices on rural household food security. The specific study objectives were to:

(i)   Determine the socio-economic factors influencing household perceptions of food price levels in Jericho and Swayimane in South Africa.

(ii)   Evaluate the impact of high food prices on household food security of rural households of Jericho and Swayimane in South Africa.

(iii)   Determine the socio-economic factors influencing the level of food security of rural households of Jericho and Swayimane in South Africa.

1.4 Hypothesis

    (i)   Rural household socio-economic characteristics do not affect their food security.

    (ii)   Food prices do not have an impact on rural household food security in South Africa.

    (ii)   Rural household socio-economic characteristics do not influence their perceptions of food price levels.

1.5 Justification of the Study

South Africa is largely deemed as a food secure nation, producing staple foods or having the capacity to import food if needed, in order to meet the nutritional requirements of its population (FAO, 2008). The country is food secure at a national level, but the same cannot be said at household level, especially for those in rural areas. Food access, which is affected by food prices, is key in ensuring household food security. Most rural households are net consumers of food, which pay higher prices for food and spend a large proportion of their income on food (Ravallion, 1990). The higher food prices lead to a change in consumption patterns, as households resort to consuming less and buying food of lower quality. The increased food expenditure makes them more sensitive to any increase in food prices (Yousif and Al-Kahtani, 2013) and households end up with less disposable income for other household necessities. It is therefore important to examine the impact of food prices on household food security, as this will give an insight into how prices paid for food affect household food security in areas that pay different prices for food. This will give direction in designing policy measures that can be put in place in order to mitigate the effects of high food prices. Understanding the impact of high food prices could also help government in policy interventions aimed at reducing household food security in the South Africa.

1.6 Chapter Overview

In Chapter 1, the research problems, objectives and the hypothesis were presented. In Chapter 2, literature on food security, the effects of prices on food, price dispersion and price perceptions, were reviewed. The chapter was concluded by reviewing past research findings of the impact of food prices on food security. Chapter 3, presents determinants of households' perceived food price in rural areas of Swayimane and Jericho in South Africa; and the impact of food prices on household food security is presented in Chapter 4. Both analysis used data collected in two rural areas in South Africa that pay different prices for food, namely Swayimane, KwaZulu-Natal, and Jericho, North-West Province. The conclusions, summary and policy recommendations from the findings of the study were presented in Chapter 5, which was concluded by recommending areas for further study.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

This chapter presents an overview of the world food crisis, food security and household food security in South Africa. Approaches to measuring food security, factors that affect household food security and the impact of food prices on food security, were discussed. Evidence of the impact of food prices on household food security from other developing countries in Africa and beyond was presented.

2.2 World Food Crisis

The United Nations Food and Agriculture Organization (FAO) estimates that nearly 870 million of the 7.1 billion people in the world, or one in eight, were suffering from chronic undernourishment in 2010-2012 and that almost all the hungry people, estimated at 852 million, live in developing countries and represent 15 percent of the population of those countries (FAO, 2012). As the global population approaches nine billion by 2050, demand for food will keep increasing, requiring sustained improvement in agricultural production and productivity. To meet the demand, projections suggest that a 50 percent increase in the world cereal production and an 85 percent increase in meat production are required before 2030 (FAO, 2012). Since the World Food Summit in Rome in 1996, where heads of states and governments met to discuss food security and released the Millennium Development Goals (MDGs), the following statistics prevail:

- Poverty rates have been halved; about 1.2 billion fewer people lived in conditions of extreme poverty in 2010 than in 1990.

- Access to an improved drinking water source became a reality for 2.3 billion people.

- The economic and financial crisis has widened the global jobs gap by 67 million people.

- Chronic malnutrition among young children declined, but one in four children is still affected.

- Globally, nearly one in six children under the age of five are underweight; one in four are stunted (UNDP, 2014).

In order to achieve the MDGs, there needs to be population and income growth and urbanization, as well as an increase in the rate of increase in food production through technological change and productivity growth (FAO, 2009). The following section explains the concept of food security.

2.3 The Concept of Food Security

Food security is a term that emerged following the 1980s shift in food policy debate from food supply to food demand and the emergence of new emphases on food entitlement, vulnerability, risk and access (Maxwell & Slater, 2003, cited by Hendricks, 2005). The World Food Summit of 1996 defined food security as existing when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (WHO, 2014). The four key aspects of food security are availability, access, stability and utilization.

Food availability refers to the supply of enough food, of appropriate quality, which can be acquired through domestic production or imports. Availability of food through food production includes factors such as land use/tenure, soil management, crop breeding/selection, crop management, livestock breeding/ management and harvesting (FAO, 1997). Food access entails the attainment of adequate resources in order to acquire appropriate foods for a balanced nutritious diet. It depends on the ability to purchase or have command over food, using the entitlement relations operating in society (Brand, 2003). Entitlements are defined as the set of all

commodity bundles over which a person can establish command, "given the legal, political, economic and social arrangements of the community in which he or she lives (including traditional rights such as access to common resources)" (Carletto *et al*., 2013:30).

Food can be accessed in several ways. A household can produce its own food, and in that way it has direct access to food, but the amount of food it can produce depends on its resources and how well it can use its resources to provide enough food. Poor farmers and most women farmers often lack the necessary resources to produce therefore extension workers and agricultural investment companies assist them to meet production, given their constraints. Food that is purchased represents the economic access of food (FAO, 2012). Urban households purchase their food from retail food stores and rural households purchase the food that they do not produce. However, economic access to food is prone to risk, because most poor people spend a large portion of their income on food. Therefore any change in income, increase in food prices and job losses could mean less food is purchased and decreased food security levels (FAO, 2012).

The FAO (2012) defines food stability as the ability of a household to procure, through income, production and/or transfers, adequate food supplies on a continuing basis, even when the household is faced with situations of unpredictable stress, shocks or crises. It implies that households would be able to survive shocks and be able to cope with the effects of food deficits. Most farmers are well aware of the risks and have adopted coping strategies to stabilize food supplies, including intercropping and mixed cropping (FAO, 2012). In this way a continuous flow of food is produced. This may be difficult for poor farmers however, as they may not have adequate production resources, such as fertilizer and proper irrigation systems.

The last aspect of food security is food utilization, which refers to the metabolism of food by individuals. Food is stored, prepared, distributed and eaten in ways that are nutritionally adequate for all members of the household, including men and women, girls and boys (Mock *et al.*, 1999). Food may be obtained by households but there are different factors that affect how the food is utilized, the quality of the food as it is consumed and the quantity of food. In order for individuals to be food secure, the food they consume must be safe, healthy and should be able to meet standard nutritional requirements. Several factors, such as the processing, preparation and cooking of the food, affect its safety (Mosisi, 2009). The health status of individuals in a household also has an impact on food utilization. If the individual is not healthy, then the food may not be metabolized the way it should, and therefore the person does not acquire the necessary nutrients to lead a healthy life (Vozoris *et al.,* 2003). The following sections evaluate the level of food security in South Africa.

2.4 Food Security in South Africa

South Africa ranks among the countries with the highest rate of income inequality in the world. Approximately 57% of individuals in South Africa lived below the poverty income line in 2001, unchanged from 1996, and 32.3% in 2011 (StatsSA, 2014). In 2004 Limpopo and the Eastern Cape had the highest proportions of poor with 77% and 72% of their populations living below the poverty income line, respectively. The Western Cape had the lowest proportion living in poverty (32%), followed by Gauteng (42%) (SAPRN, 2004). In 2011, Limpopo and the Eastern Cape had 63.8% and 60.8% of their populations living below the poverty line, respectively, while the Western Cape and Gauteng had 24.7% and 22.9%, respectively (StatsSa, 2014). Using international poverty lines, the proportion of the population living below $1.25 (R15.40) a day was estimated to be 10.7%, while the proportion of those living below $2.50 (R30.70) a day was

estimated at 20.2% (StatsSA, 2014). While the government provides social grants to help minimize the effect of food insecurity, Machete (2004) reported that 40%-50% of South Africans lived in poverty in 2003. Therefore, in order to meet the objective set by the South African government of halving poverty between 2004 and 2014, it is important that household food security is achieved (Altman *et al*., 2009).

Food security is part of section 27 constitutional rights in South Africa. The Constitution states that every citizen has the right to have access to sufficient food and water and that the state must, by legislation and other measures, within its available resources, ensure the progressive realization of the right to sufficient food. According to the Department of Agriculture, Fisheries and Forestry (DAFF) (2012), South Africa faces the following challenges of ensuring that everyone has access to food at all times, at present and in the future: matching people's salaries to increasing food prices, so they can afford sufficient food at all times; ensuring that households and individuals make optimal choices to purchase healthy and safe food; ensuring that there are adequate safety nets and food emergency management systems to provide people that are unable to meet their food needs from their own efforts and mitigate the extreme impact of natural or other disasters on people; and to possess adequate and relevant information to ensure analysis, communication, monitoring, evaluation and reporting on the impact of food security programs on the target population. These challenges and problems of food insecurity and poverty in the country could be addressed by means of expanding employment opportunities, especially amongst the youth, and encouraging more rural households to produce most of their food (Ivanic and Martin, 2008).

As a nation, South Africa is deemed to be food secure, but according to recent data the same cannot be said for households, especially those in rural areas (Altman *et al*., 2009; de Cock *et al*,

2013). A household is defined as the logical social unit through which to view the question of access to food, in spite of intra-household inequities in the distribution of food (Maxwell, 1996). Various methods to assess the food security of South African households have been used. These include the National Food Consumption Survey (NFCS), Food Insecurity and Vulnerability Information and Mapping System (FIVIMS), General Household Survey (GHS), the Income and Expenditure Survey (IES), Community Survey (CS), South African Social Attitudes Survey (SASAS) and Labour Force Survey (LFS), (de Cock *et al*., 2013).

The National Food Consumption survey results showed that, at national level, one out of two households experienced hunger, about 51.6%, as determined by the hunger scale. Approximately one out of three was at risk of hunger and only one out of five was food secure (Labadarios *et al.,* 2007). The results of the Income and Expenditure Survey for 2005/2006 showed that at food expenditure levels reported in the IES, only one in five households meet their average dietary energy cost and that food insecurity is rife in rural areas. About 85% of rural households are unable to afford even the 'below average dietary energy costs' (Jacobs, 2009).

The SASAS results in 2008 showed that only 48% of the households surveyed were food secure, 26% percent were at risk of hunger and 25.9% were experiencing hunger. The FIVIMS conducted in 2005 showed that 63% of the households surveyed ran out of money to buy food and 35% of the children in the households surveyed went to bed hungry (Labadarios *et al.,* 2011). The General Household Survey, which profiles hungry households in terms of location, dwelling and employment, showed that, in 2007, 12% of the children of the households sampled and 10.6% of the adults experienced hunger. The Labour Force Survey conducted between 2002 and 2007 shows that four million people fell below the food security threshold (Jacobs, 2009).

The high level of poverty and hunger that exists, especially in rural areas, shows that food insecurity is still a great concern for many households in South Africa (Raheem and Worth, 2011).

In order to combat household food insecurity and the effects of high food prices, the Integrated Food Security Production Intervention (IFSPI) was initiated by the South African government (SANews, 2013). The program seeks to help smallholder farmers and households by improving their ability to increase production of basic food, therefore increasing access to and availability of, food.

The following section identifies dimensions of household food security, identifying household types and the type of shocks and other factors that could affect household food security status.

2.5 Factors Affecting Household Food Security

Household food insecurity is caused by variations in the amount of food provided by the work and wealth of the household (Battisti and Naylor, 2009), suggesting that the level of food consumed in a household can change due to shocks in production and/or in a change in household wealth. The following are some of the factors that would potentially affect a household's level of food security:

Output shocks: The amount of output a household produces may decrease, or less food could be purchased. The effects of these output shocks can be offset by individuals adjusting or changing their roles (Godfray *et al*., 2010). This will depend on their "allocative flexibility" and whether or not they will have access to new resources (Maxwell, 1996).

Food Shocks: Food shocks are caused by less food available in the market or a sudden increase in prices. Households can either produce their own food or work to earn an income and then

purchase food (Wheeler and Von Braun, 2013). These ways of accessing food are not fixed though. Loss of work means direct loss of food purchasing power, as the household does not receive an income and therefore cannot purchase food. Climate change also poses a threat to subsistence food production and plays a role in food production changes (Simelton, 2012).

Asset shocks: This is an unexpected drop in the quality and quantity of assets. Examples are the death and theft of livestock, repossession of machinery or other assets by lending institutions, or the fall in value of assets due to rapid inflation (Akter and Basher, 2014). Households manage assets differently and have assets in different forms, so during periods of stress they are forced to relinquish the assets at different times and ways. Some assets can be converted directly into food products for short-term consumption (Stephens *et al*., 2012) or may be sold in the future when the situation or condition becomes worse.

Other factors contributing to the food insecurity status of South African households are increases in the cost of electricity and oil prices. Regular increases in the oil price result in higher prices for food items and fertilizer, in the production of which petroleum forms an important input. The cost of transportation also increases, forcing food prices to increase proportionately (Altman *et al*., 2009).

There is evidence that there is a positive relationship between a mother's age and *per capita* calorie intake (which has been used as a food security indicator) at household level, because the mother's age enhances experience regarding provision of proper and required food for the family (Iram and Butt, 2004). Another factor that contributes to household food security is the dependency ratio. There is a negative relationship between the dependency ratio and household food security. A dependent does not contribute to the household's total income, but has a fixed

share in household consumption (Shinns and Lyne, 2005), thus taking a share of consumption, with no role in income generation. The effect of household size on food security can be positive or negative. If individuals in a household are actively involved in on-farm activities, increasing the supply of labor, then there is more output for consumption. However, if there are many children and elderly people in a household then household size has a negative impact on food security (Babatunde *et al*., 2007).

Education is widely believed to be an important determinant of food security. Knowledge gained through education has been known to improve nutritional access to food. With the right information, households purchase and utilize nutritious food, thus improving their food security status (Dauda, 2010). Education also contributes to human capital. Unemployment levels are highest amongst uneducated people (Shinns and Lyne, 2005). In South Africa, about 60% of adults with no formal education and 15% of matriculants are poor (Shinns and Lyne, 2005). Lack of education is a key determinant of unemployment status, which in turn is also one of the significant factors affecting welfare. Policy priorities should therefore be focused on the promotion of education (de Cock *et al.*, 2013).

There is evidence that households with employed household heads have a higher probability of being food secure (Tshediso, 2013). If more people in the household are employed then there is more income to purchase food and other necessities. Income is a significant determinant of household food security, as it determines the affordability of food. Low-income households spend a large proportion of their income on food; therefore any change in income has a substantial effect on their food security (Melgar-Quinonez *et al*., 2006). Households with more productive assets, livestock ownership and those that use fertilizer and irrigation systems are more food secure than those that do not (Kidane *et al*., 2005). Sinyolo (2013) found that the

welfare of the irrigators was better than that of non-irrigators and that it is a key determinant of rural welfare. Different dimensions of food security are discussed in the following section.

2.6 Measuring Food Security

Food security is a multifaceted phenomenon and so are the methods to assess it. The "assessment methodologies and methods can differ considerably, even within the boundaries of the qualitative and quantitative traditions" (Migotto *et al*., 2006:2). When measuring food security, it is important to investigate how a household determines its access to food and how the food is distributed within it (Altman *et al*., 2009). The different food security components, availability, access and utilization, each capture different but interrelated dimensions of the concept. No single indicator can cover all aspects of food insecurity and provide policymakers with relevant and timely information in a cost-effective manner. For this reason, efforts have been made in order to find reliable indicators that are easy to work with and that can be used together (Migotto *et al*., 2006).

Different indicators are needed to acquire information about the welfare status of a country or household, as there is no single measure of food security. At the national or household level, food requirements and food supply indicators can be used. For household food security, food availability, access and utilization are used as indicators. Thus no single food security measure is the best, as researchers use indicators that optimally suit the objective of their studies.

There are common food security methodologies used in South Africa which are sometimes combined to develop an index or indicator. These include the Household Vulnerability Analyses, the Food and Early Warning Systems, Food Insecurity and Vulnerability Information and Mapping Systems (FIVIMS). Some indicators are also formed from surveys such as the Food

Expenditure Survey (FES), National Consumption Survey (NCS) and the South African Social Attitudes Survey (SASAS) (Rose and Charlton, 2002).

The Community Childhood Hunger Identification Project (CCHIP) index in South Africa was formulated from the NCS and SASAS and was developed by Swindale and Bilinsky (Labadarios *et al*., 2011). It is an index that enables researchers to classify households into one of three groups; not hungry, at risk of hunger and hungry (Olson, 1999). It defines hunger as the "mental and physical condition arising from not eating enough food because of insufficient economic resources within the family or community" (Labadarios *et al.,* 2011:891). The limitation of this index, however, is that food security is a broader concept than hunger. Hunger is food insufficiency. The inclusions of items measuring coping behaviors would make CCHIP a better food security index (Scott and Wehler, 1998).

Food consumption measures are often used to analyze food security (Hoddinott and Yohannes, 2002). One method commonly used is to estimate the total household production and the amount of food purchased, as well as the food consumed over a period of time. Another method is to ask each individual about the food they consumed in the past and to check the food's caloric content (Bickel *et al*., 2000). The drawback with these two methods is that individuals might not remember everything they ate or purchased and they both give consumption values but do not measure vulnerability or sustainability.

The Low Energy Availability (LEA) method assesses whether or not the energy available to a household from its food purchases and home production is less than the sum of its members' recommended energy intakes (Rose *et al*., 2002). However, if members of a household do not

recall some of the food purchased and the energy consumed from food production, then the measure is not reliable (Kennedy *et al.*, 2010).

Food access is a measurable concept that can be defined and examined to classify households by their level of food security (access) (Swindale and Bilinsky, 2006). This is the underlying concept of the Household Food Insecurity Access Scale (HFIAS). The HFIAS measures several dimensions of household food insecurity and is relatively easy to analyze and interpret (Knueppel *et al.*, 2010). The drawback of the HFIAS is respondent bias (Bertelli and Macoursal, 2014), as people would offer a particular response over other responses, especially when dealing with questions referring to their welfare. The dietary diversity score complements the HFIAS measure by the assessment of household dietary adequacy, giving a better measurement of food security (Becquey *et al.*, 2010). The drawbacks of the dietary diversity score however, are that it is challenging to assess food portion sizes and to ascertain the human requirements for some nutrients (Pérez-Escamilla and Segall-Corrêa, 2008).

The Food Poverty Indicator (FPI) is a ratio that indicates the ability of a household to afford a basic, nutritionally adequate diet (Rose *et al.*, 2002). A household is defined to be in food poverty when the amount of money it spent on food was inadequate to purchase a basic, nutritionally adequate diet. The ratio captures the total sum of expenditure on food and the estimated monetary value of the food it produces. The cost of a nutritionally adequate food plan for a household is included in the ratio as the denominator (Rose *et al.*, 2002). According to Engel's Law, the proportion of income spent on food declines as income increases. The proportion of expenditure for food becomes less, resulting in a lower Food Expenditure/Income (FEI) ratio. The FEI ratio indicates the proportion of income spent on food. This indicator is suitable for this study, as it captures the amount spent on food, which is directly influenced by

the prices paid for the different food items and the prices paid in the different study locations. The advantage of the ratio as a welfare indicator is that it counters the problem of different household sizes and composition. The following section reviews literature on food prices and their determinants.

2.7 High Food Prices and Their Impact on Household Food Security

In Africa, a typical family spends between 50 and 70 percent of its budget on staple foods (Baiphethi and Jacobs, 2009). Surges in the price of food in this region can make the difference between life and death, between health and sickness, between peace and violence, between progress and poverty (Diao *et al.*, 2008). In South Africa, the effects of the global food price crisis led to a slight rise in the proportion of hungry households between 2007 and 2008 (HSRC, 2012). Female-headed households experienced a slightly greater impact of the crisis (HRSC, 2012). Also, according to the World Bank's Food Price Watch, a brief tracking food prices and poverty trends, global food prices are 36% above their levels a year ago and are close to their 2008 peak. The brief also showed that higher world market prices of food commodities (especially wheat, rice, soya and maize) caused a significant increase in the number of hungry people (World Bank, 2011).

Beyond the immediate impact of higher food prices on the cost of the food purchased by households there is evidence that higher overall inflation hurts the poor the most (Wodon and Zaman, 2008). Commonly known as the global food crisis, the food price surge in 2007–2008 caused an increase of more than 60% in two years. The crisis did not end there. The global food price rose again sharply in 2010—surpassing the 2008 peak, before moderating a bit in the last quarter of 2011 (Huh and Park, 2013). At the macro level, the increased global food prices have an impact on food exported and imported, exchange rate movements, foreign exchange reserves,

patterns of food consumption and trade and marketing policies. The net effects on domestic countries depend on whether the country is a net food exporter or importer (World Bank, 2012). It is therefore important to understand the determinants of food price in order to design appropriate policies to deal with issues driven by food price inflation, such as household food insecurity.

The domestic food price in South Africa has positively responded to the global trends, the proportion of hungry families increased by 2-3% during the global price hikes (HSRC, 2012) and this has been attributed to the high degree of price transmission which existed between the international and domestic market (Alemu and Ogundeji, 2010). A meeting organized by DAFF 2010, aimed at exploring the root causes of food price increases, ended in different stakeholders justifying the prices they offer. The producers complained that they do not benefit from the higher prices and that they have to incur disproportional higher input costs. The retailers and processors attributed the higher food prices to higher exchange rates, higher electricity prices and the higher cost of transportation. Higher domestic food prices have an adverse effect on household welfare.

At the household level, the important factor to ensure food security is access to food. In rural areas, staple food production is important for the poor, even though vast shares of the households are net food buyers (FAO, 2012). In South Africa, rural households produce their own food and depend on the market or on government programs and assistance from other households (Baiphethi and Jacobs, 2009). Recent studies have shown an increase in dependence on market purchases by both urban and rural households (Baiphethi and Jacobs, 2009), making them vulnerable to price increases.

High food prices have a negative impact on consumers, but rural poor consumers are worse off, as they spend a larger portion of their income on food (Jacobs, 2009). The higher food prices lead to a decrease in purchasing power and jeopardize households' levels of food security (Son and Hakwani, 2009). Rural households decrease the quantities of food consumed and decrease the number of meals per day (Wood *et al.*, 2009) when food prices are high. Households also tend to resort to food with lower nutritional value, which generally cost less (Son and Kakwani, 2009). This, in turn, could affect their health status. Household members may experience a drop in entitlement as rising food prices devalue the real wage in the casual labor market (Gustafson, 2013). High food prices also negatively affect productivity, as individuals cannot learn and work properly, thus increasing the burden on government to provide and help vulnerable households (Ngidi, 2013). The next section explores high food price impact evaluation techniques.

2.8 High Food Price Impact Evaluation Techniques

Several studies have been carried out concerning the impact of high food prices on household welfare. The approaches may be similar, but they are all different in one way or another. The methodological approach chosen depends not only on the research question but also on the available data for the study. The type of data available, the underlying model, as well as the parameter of interest generally determine the methodology appropriate for non-experimental data (Blundell and Costa-Dias, 2000).

The data can be primary or secondary in nature. Wodon and Zaman (2008) relied mainly on simulation by using available nationally representative household surveys in 2008. They used information gathered during a price shock in order to gain insight on how the households changed their dietary quality and other coping mechanisms. Another approach is *ex post* analysis using representative household data linking the shock to outcome variables.

For an analysis of food price impacts on household food security, it is important to first decide on the parameters to be simulated (de Janvry and Sadoulet, 2008). A technique to be considered when measuring the food price impact on food security, welfare or poverty, is to simulate the effect of the price or income change over a given period of time. This is done to evaluate the changes in food security that are presumed to have come about after the observed price or income change. Results are important for actual welfare analysis (de Janvry and Sadoulet, 2008). Another option is to consider only the prices of the key foods. This is done by specifying the group of food items of interest (the staple foods) (de Janvry and Sadoulet, 2008). Ivanic and Martin (2008) represent the impact of price changes on an individual household. They used an expenditure function to characterize household consumption, factor supply behavior and a profit function. This is done to represent household production activities through unincorporated enterprises such as family farms.

Most researchers have used the method of updating the poverty line over time, using the Laspeyres index (Hyun and Kakwani, 2009). The Laspeyres index measures the bundle of goods, using current prices and base period quantities (Moulton and Stewart, 1999). It uses the average budget shares of goods in the consumer's basket. However, this index does not consider the distributional impact of price changes (Hyun and Kakwani, 2009) and tends to overstate inflation. These price impact measures put different weights on food insecurity depending on how far the consumers are from the poverty line; therefore the impact of food prices on poverty is different for every poverty measure used (Hyun and Kakwani, 2009).

2.9 Food Price Impact on Household Food Security: Evidence from Empirical Literature

Evidence from literature shows a negative relationship between household food security and high food prices. Valero-Gil and Valero (2008) evaluated the effects of rising food prices on poverty in Mexico, using Mexico's National Income and Expenditure Survey of Households for 2006. They used a partial equilibrium framework, where they considered the direct impact that a changing food price will have on household expenditure. They considered the first-order impacts of rising prices. The study used consumption and expenditure to evaluate poverty and established poverty lines, which they defined as the income necessary to cover the costs of minimum necessities for nutrition. This was reported to be $15.4 daily. They also evaluated the creation of a food program, which is available to the poorest families in the country. The study found that the poverty rate was expected to increase by 27% after a 15% price hike, but would only increase to 26.85% for individuals under the food program.

A study of the impact of fuel and food prices on Mozambican households found that, in the short run, the poorest are affected the most after a price increase or when food prices are high. The study uses a comparative static Computable General Equilibrium (CGE) model of Mozambique. The advantage of the CGE model is that it is suitable for analyzing external shocks, trade/tax policies, income distribution and structural changes (Arndt *et al*., 2008). The study found that a 10% increase in food prices led to 1.8% increase in poverty.

Ivanic and Martin (2008) found that poverty rates were 0.5% and 0.8% higher in Malawi and Zambia, respectively, after a 10% food price increase. They also found that price increases affect households in urban areas, but not as much as in rural areas. They reported a 0.3% and a 0.2% increase in poverty rates after a 10% increase in prices in Malawi and Zambia, respectively. Using the partial equilibrium framework, they considered the direct impacts of changes in the

prices of staple foods on households to evaluate the implications of high global food prices for poverty in low-income countries.

Ravalllion (1990) investigated the rural welfare effects of food price changes under induced wage responses in Bangladesh and found that there is an average decrease of 0.94% in welfare after a 10% increase in food price. Another study found that the short-run and the long-run effects of a food price increase move in opposite directions. As a result of the price increase, the percentage increases in the poverty gap ratio, as well as in the severity of poverty, were 113.48% and 129.41%, respectively (Son and Kakwani, 2009). These results were found in a study measuring the impact of price changes on poverty in Brazil.

Households in Ghana needed about 20.2% of their total household expenditure after price changes in the 1990s in order to afford the same food. Results of a study on food price changes and consumer welfare in Ghana in the 1990s revealed that there were some differences in impact of price changes between urban and rural households. The results indicated that the burden of higher consumer prices fell largely on the poor and on rural households (Ackah and Appleton, 2007).

2.10 Summary

Food access plays an important role in ensuring household food security. High food prices make it challenging for low-income rural households to gain access to basic, nutritionally adequate food. Chapter 2 presented some evidence from the literature, that many households in South Africa are still food insecure and that low-income households spend a large portion of their incomes on food, making them vulnerable to high food prices. This is particularly the case for rural households, as they pay higher food prices than their urban counterparts. However, due to

the fact that food price dispersion exists, some communities pay more for food than others. The next two chapters focus on comparing household food security and perceptions of food prices between communities that have different food price regimes, namely Swayimane, KwaZulu-Natal, and Jericho, North-West.

CHAPTER 3 DETERMINANTS OF RURAL HOUSEHOLD PERCEPTIONS OF FOOD PRICES IN SOUTH AFRICA: EVIDENCE FROM NORTH-WEST AND KWAZULU-NATAL

3.1 Introduction

A household's perception of food prices is important in its purchasing decisions. It determines whether the household will continue purchasing the food item or resort to lower-priced or substitute goods. Price perceptions also influence whether or not consumers are satisfied with their purchases, given their budget constraints. In this chapter the empirical findings of the determinants of rural households' perceptions of food prices in South Africa are presented and discussed, addressing the first objective of the study. The background is presented in section 3.2, followed by the research methods in section 3.3. The empirical findings of the study are presented in section 3.4 and are discussed in section 3.5. The chapter is concluded in section 3.6, where the policy recommendations are made and conclusions are drawn.

3.2 Background

A household's perception of the level of food prices affects its purchasing decisions and determines its total food expenditure (Steenhuis *et al.*, 2011). "Perception is the process by which people identify, select, interpret and organize sensory stimulation into a unique and meaningful picture of their world and is an important concept in consumer behavior" (Uhl and Brown, 1971:1). Price perceptions play an important role in consumer decisions, as they affect what, when, where and how much to buy (Alba *et al.*, 1994). They also influence whether or not consumers are satisfied with purchases and whether or not they would continue making these purchases.

If low income households perceive that the price they pay for a certain food product is high, they could resort to buying more inferior foods, which could have lower nutritional value (Bowman, 2006) or purchase less food (Steenhuis *et al.*, 2011). Perceptions of food prices influence the quality, quantity and the combination of purchased food and could decrease a household's willingness to buy (Zhou and Nakamoto, 2001). The importance of studying the relationship between food price perceptions and socio-economic characteristics of rural households is derived from decreased consumption as a result of decreased quantity of food and decreased nutritional value due to the purchase of less and cheaper foods and because perceptions of food prices influence household welfare (Vozoris *et al.*, 2003).

Household food price perceptions do not necessarily depend on the prices paid for food products, but also on access to price information and socio-economic characteristics (Nagle and Holden, 1995). Households in high food price areas could perceive prices they pay to be low because of imperfect market information. Similarly, those in low price areas could perceive food prices to be high if they spend a large proportion of their income on food (Anania and Nisticò, 2010). Lack of retail outlets in poor rural communities (Haese and Van Huylenbroeckand, 2005) results in consumers having to travel long distances and incur higher transport costs to purchase food. If consumers cannot find the food items they want to purchase in retail outlets, or if they have to travel long distances to buy them (as is the case with rural households), a cost has been incurred (Zeithmal, 1988). These search costs all enter either explicitly or implicitly into a household's perception of food prices (Zeithaml, 1988). Therefore factors such as distance to nearest retail outlets and transport costs to access the outlets would influence household perceptions of food prices. Consumers are also more sensitive to prices if the total food expenses are high in relation to household income. This is the case for low income households, who are more likely to have

higher food price perceptions (Nagle and Holden, 1995). The present study evaluated the relationship between household food perceptions and household socio-economic characteristics. It determines the factors that significantly influence household food price perceptions in two rural areas in South Africa that pay different prices for food.

3.3 Research Methods

The study was conducted in Jericho, North-West, and Swayimane, KwaZulu-Natal. These are two rural areas in South Africa where households pay different prices for the same food products.

3.3.1 Study Area Description

The North-West Province is situated south of Botswana and north of the Free State Province. It consists of four district municipalities and has an estimated population of 3 676 300. Commercial agriculture is of one of the dominant sectors in North-West. About 64 000 people, which is 1.7% of the province's population are employed in the agricultural sector. About 35.0% of the population is illiterate and the unemployment rate stood at 28.0% in 2010. More than 60% of the people in the province are living below the poverty line (NDA, 2014). This study focuses on the rural area of Jericho (also known as Mmatope-a-Seretsana in Setswana), in the Bojanala Platinum District, under the Bakwena ba Mogopa Tribal authority.

The KwaZulu-Natal Province is situated in the south-east part of South Africa; it has 10 district municipalities and one metropolitan municipality and has two of the largest ports in Africa (Durban and Richards Bay). About 50% of the people of KwaZulu-Natal are considered to live in poverty. According to AFRA (2014:1), "9% of households live in informal dwellings, 22% live in traditional dwellings and 61.2% of rural households are without electricity". This study

focuses on the area of Swayimane, situated in the uMshwathi Municipality, within the north-east quadrant of the uMgungundlovu District Municipality. The area is under the leadership of the Gcumisa Tribal Authority and 66.2% of its residents live beneath the poverty line (Burns and Esterhuizen, 2008).

While the two areas have similar characteristics, there is a difference in farming activities. Farming is challenging in Jericho, because of high temperatures and low annual rainfall. Jericho has an annual average rainfall 540mm, compared to 922mm in Swayimane. Households in Jericho travel to many distant areas to buy food, such as Mmabatho, Mabopane, Hammanskraal, with some travelling to central Pretoria to take advantage of lower food prices. Households in Swayimane travel to the same areas, namely Dalton, Pietermaritzburg and Wartburg, to purchase food. The two areas have different livelihoods. Swayimane is predominantly a farming community, whereas most respondents in Jericho work away from their homes, in the mining industry. Different prices for the same products exist between the two areas, thus allowing for an analysis of household perceptions of food prices and their determinants.

3.3.2 Sampling Techniques and Data Collection Methods

A systematic random sampling procedure was used in selecting the respondents. A sample of 150 respondent households was selected in each area as this is a large enough sample to yield unbiased results, also due to working within a resource budget. The sections around Jericho are Madibeng, Moketeleng, Tlowe, Gatlabedi, Moretele, Bollantlokwe, Dikebu, Bedwang, Kgomo-Kgomo and Lebotlwane. The 10 areas in Swayimane are Gojini, Sokhasini, Gcumisa, Mabeleni, Swayimane, KwaPhumelela, KwaKhanyile, Nkululeko, Dlamini and Nomgaka. Fifteen households were selected from each of the 10 sections in the respective areas. Every fifth household was selected in order to get a representative sample of the whole community. This

sampling procedure was used because it is simple and allows researchers to add a degree of system into the random selection of households (Cochran, 1946). Primary data were collected using structured questionnaires. The data for this study were collected by eight enumerators, who were conversant with the local language in each area. Local stores and supermarket owners were also interviewed to informally ascertain the different prices charged in each area. The same questionnaire was used for both areas and it included information about the household head, household assets, consumption, income, expenditure, agricultural production activities and household food expenditure.

3.3.3 Analytical Methods

The study employed both descriptive and econometric techniques. Descriptive analysis used the paired t-test comparison of means tests to check whether or not the mean of food price perceptions is different among household groups. Econometric analysis employed the Tobit regression model to evaluate the relationship between perception scores and demographic and socio-economic characteristics of the sampled households. Food price perceptions of 18 different food items included in a modified National Agricultural Marketing Council (2014) basic food basket, were collected, using 5 point Likert Scales, where 1 means that the household perceives the food item to be very cheap and 5 means that it perceives the food item to be very expensive. The perceptions were based on the different items the households purchase, not on the overall perceptions of different food brands in the market. From the scales, principal components analysis was used to generate the Food Price Perception (FPP) index. The score is censored at a minimum of -4.82 and a maximum of 7.078, making it a suitable dependent variable to be used in a Tobit regression. Higher scores indicate that the household's overall perception of food price levels are high, implying that they perceive that food is expensive. The FPP index was then used

as an explanatory variable in a Tobit regression, explaining variation in household food expenditure patterns. The household food expenditure patterns were expressed as Food Expenditure/Income (FEI) ratios, censored at a minimum of 0.25 and a maximum of 1.53. The FEI ratio indicates the proportion of household income spent on food. It is simply the household's expenditure on food divided by the total household income as given below.

$$Food\ Expenditure\ Income = \frac{Total\ Food\ Expenditure}{Total\ Income} \qquad (1)$$

3.3.4 Empirical Models

3.3.4.1 Principal Component Analysis

Principal component analysis (PCA) has been widely used to generate indexes (Muchara *et al.*, 2014; Howe *et al.*, 2012; Sinyolo *et al.*, 2014) and was used in this study to generate the FPP index. The FPP index was used as a dependent variable in the Tobit model regressions to determine the factors that affect households' perception of food prices. Adding the perception scores of each household would imply that every food item included has equal influence on the total perception of food prices. Therefore, PCA is a better choice as some households consume more of other food items than others. The food items therefore do not carry the same weight in influencing their overall perceptions of food prices.

3.3.4.2 Tobit Regression Model

The Tobit regression was employed to estimate the statistical relationship between household socio-economic characteristics and the FPP index. The sample size is relatively large; therefore the Tobit regression will yield estimates that are efficient and consistent, as the assumptions of zero mean, constant variance and a normally distributed residual term are met (Greene, 2003). The PCA-derived composite index of food price perception was used as the dependent variable

(*Y*). Given the right- and left-censoring at minimum (*Y*min) and maximum (*Y*max) score, the 2-limit Tobit regression is specified in equation 1 as:

$$Y^*{}_i = \beta_1 + \beta_2 X_i + \dots \beta_j X_i + u_i \tag{1}$$

$$E(u_i \,|X_i) = 0 \tag{2}$$

where $Y^*{}_i$ is a latent variable representing household FPP scores, X is the vector of explanatory variables, β is a vector of estimated parameter coefficients and u_i is the vector of independently and normally distributed residuals with a common variance (Greene, 2003). The actual FPP scores can be represented as $\quad Y_i = 0 \;\; if \; Y_i{}^* \le 0$

$$Y_i = Y_i{}^* \;\; if \; Y_i{}^* > 0$$

where Y_i are the actual FPP scores.

The second Tobit regression is specified in equation 3 as;

$$Y^*{}_i = \beta_1 + \beta_2 X_i + \dots \beta_j X_i + u_i \tag{3}$$

$$E(u_i \,|X_i) = 0 \tag{4}$$

where $Y^*{}_i$ is a latent variable representing household FEI ratios, X is the vector of explanatory variables, β is a vector of estimated parameter coefficients and u_i represents the residuals (Greene, 2003). The explanatory variables included are the FPP Index, number of permanently employed people, household location (1= Jericho; 0= Swayimane) and household head education level (1= If attended secondary school; 0 = if not). The actual FEI scores can be represented as

$$Y_i = 0 \;\; if \; Y_i{}^* \le 0$$

$$Y_i = Y_i{}^* \;\; if \; Y_i{}^* > 0$$

where Y_i are the actual FEI ratios.

Table 1 presents the explanatory variables included in the estimated Tobit models to determine the factors that influence household perceptions of food prices.

Table 1: Description of variables used in the Tobit regression model

Variable	Variable Description	Expected signs of coefficient estimates.
Income	Total household income in rands (R)	-
Gender	Household head gender. (Male=1; Female=0)	-
Farming	Household's involvement in farming activities. (Yes=1; No=0)	-
Household size	Number of persons permanently residing in the household	+
Age	Age of the household head (years)	-
No. of permanently employed	Continuous: number of people that are permanently employed in the household	-
Education	Household head education level (1=high school 0= Never been to high school)	-
Distance from the stores	Distance between the household and the market place (km)	+
Fare	Transport cost to get to the market place (R)	+
Welfare grants	Access to government welfare grants (Yes=1, No=0)	+

Based on a priori expectations

Two regressions were estimated, one for each community, due to differences in food price regimes, rainfall (which affects farming activities), distances and transportation costs to the nearest retail outlets. The income variable is expected to have a negative relationship concerning food price perceptions. Households with high income levels can afford food (Gouge *et al*., 2009; Temple and Steyn, 2011; Temple *et al*., 2011) and the expectation is that they have low

perceptions of food prices. Male-headed households are expected to have lower perceptions of food prices compared to female-headed households. Male-headed households tend to be well-off, compared to female-headed households (Kumar and Quisumbing, 2013; Ndhleve *et al*., 2012; de Cock *et al*., 2013; Patel, 2012). Due to the fact that they are more likely to have higher total incomes, they would not perceive food prices to be as high as female-headed households.

The transport costs and distance to get to the nearest retail outlets variables are also expected to be positively related to households' perceptions of food price levels. There is a lack of retail outlets within rural communities (Pereira *et al*., 2014; Temple *et al*., 2011) and consumers have to travel long distances and pay high transport fares to purchase food. The search costs associated with the distance travelled and the time spent in order to buy food would most likely lead to a household having higher perceptions of food prices (Zeithmal, 1988).

Household size is expected to have a positive relationship with perceived price levels because of the higher food expenditure associated with a larger household size (Sturm *et al.*, 2013; Gummerson and Schneider, 2013). A household with a higher number of permanently employment people is expected to have lower food price perceptions. An educated household head is more likely to have knowledge about food pricing and exposure to information and therefore would have a better idea of price levels (DiSantis, 2013), and is expected to have lower perceptions of food prices.

A household involved in farming activities is expected to have lower perceptions of food prices (as they produce food and depend less on retail outlets), compared to households that are not involved in farming. The perceptions they have would be on prices of items that they purchase, and would generally perceive that the prices of the food items they produce are low, particularly

if they sell their produce. Thus their overall perception of food prices is expected to be lower than that of households that are not involved in farming.

3.4 Determinants of Rural Household Perceptions of Food Prices Results

3.4.1 Descriptive Statistics of Household Socio-Economic Characteristics

Table 2 shows the paired t-test results to determine whether or not there was a difference between perceived price levels of groups within the sample. The test compared Food Price Perception (FPP) score means between male-headed and female-headed households, welfare grant receipt status, the household's involvement in farming activities and lastly, between households in Jericho, where prices of food are higher and those in Swayimane, the lower food price area. The null hypothesis is that perceived food price levels are the same between two household groups included in the sample.

Table 2: Paired t test comparison of means of price perceptions across different descriptors

Variable	Mean	Standard Deviation	t-significance
FPP Jericho	60.15	(13.05)	**
FPP Swayimane	52.95	(3.92)	**
FPP Male	53.71	(9.15)	**
FPP Female	61.65	(12.48)	**
FPP Welfare	61.82	(14.15)	**
FPP No Welfare	52.41	(7.35)	**
FPP Farming	58.01	(12.92)	NS
FPP Non-Farming	58.03	(9.58)	NS

** Significant at the 5% level of confidence, NS-Not statistically significant
Source: Household Survey (2014)

The results presented in Table 2 show that households in Jericho had higher food price perception scores, compared to those in Swayimane, suggesting that consumers in the higher

price area have, on average, higher perceptions of food prices. Female-headed households have higher food price perceptions than male-headed households. This is because women generally have lower incomes and higher unemployment rates (Hassim, 2005). Households with lower incomes spend a large portion of their total income on food (Steynhuis *et al*., 2011) and therefore would perceive that food is expensive. Households that receive welfare grants have higher food price perceptions than households that do not receive welfare grants. Social grants are a way of alleviating poverty (Armstrong and Burger, 2009), implying that households that receive welfare grants are not well-off and have low incomes (Maitraa and Ranjan, 2003). It therefore makes economic sense for households that do not receive welfare grants to have, on average, lower perceptions of food prices. Farming households have higher food price perceptions. However, the difference in food price perceptions between the groups is not statistically significant.

3.4.2 Econometric Results of the Determinants of Rural Households' Perceptions of Food Prices

Regression diagnostic procedures were carried out to test for multicollinearity, namely the Variance Inflation Factor post-estimation and the Pairwise correlation test. The pairwise correlation coefficient between total household income and the number of permanently employed people in Jericho is 0.51 and 0.53 in Swayimane, both less than 0.8, with a Variance Inflation Factor (VIF) of 1.35 and 2.17(< 10) for Swayimane and Jericho, respectively. This is an indication that multicollinearity is not prevalent between the variables.

Table 3 presents the PCA results computed before generating the FPP index. Using the Eigenvalue screeplot (Figure 1), to determine the number of PCs to be retained (Gujarati and Porter, 2009), the first three principal components were retained.

Table 3: Generation of the Food Price Perception (FPP) index: PCA results

Variables	Principal Components		
	PC1	PC2	PC3
Maize meal	0.075	0.257	0.117
Rice	0.260	0.254	0.204
Flour	0.266	0.167	0.203
Bread	0.272	-0.07	0.194
Chicken	0.229	0.356	-0.121
Beef	0.247	0.252	-0.225
Tinned Fish	0.263	-0.091	0.072
Mutton	0.257	0.289	-0.202
Pork	0.082	0.062	-0.301
Eggs	0.286	-0.08	0.011
Milk	0.293	-0.094	-0.119
Margarine	0.260	-0.296	-0.277
Vegetables	0.263	-0.286	-0.127
Fruits	0.252	-0.303	-0.156
Beans	0.259	-0.236	0.165
Cooking oil	0.264	0.179	0.026
Sugar	0.062	0.321	0.359
Salt and Spices	0.126	0.284	0.613
Eigenvalue	8.019	1.544	0.129
% of variance	44.5	8.5	6.3
Cumulative % of variance	44.5	53.1	59.4

Source: Household survey (2014)

The first principal component (PC1) has a higher explanatory power, accounting for 44.5% of the variation in the overall household perceptions of food prices. PC2 and PC3 explain 8.5% and 6.3%, respectively. The three PCs explained about 60% of the variation in the data. The PC vector of the first component is economically meaningful, as all its coefficients are positive. Each variable represents the price perception of that particular food item. Therefore the positive

coefficient estimates prove that PC1 represents the aggregate household perception of food prices.

The large percent that is accounted for by the first PC shows that it can be used alone, without a large loss in information (Muchara *et al*., 2014). PC1 is dominated by the bread, milk, eggs, flour, oil and rice variables, showing that households that have higher perceptions of food prices generally find these food items expensive. The Cronbach's Alpha (level of internal consistency of scale) for the index used for this study was 0.77, higher than the rule of thumb value of 0.7 (Man *et al*., 2008). This shows that the price perception of all the 18 food items reliably contribute to the households' overall perceptions of food prices. The eigenvectors (factor scores) of the first PC were used to compute the FPP index. The index was then used as a dependent variable representing household perceptions of food prices.
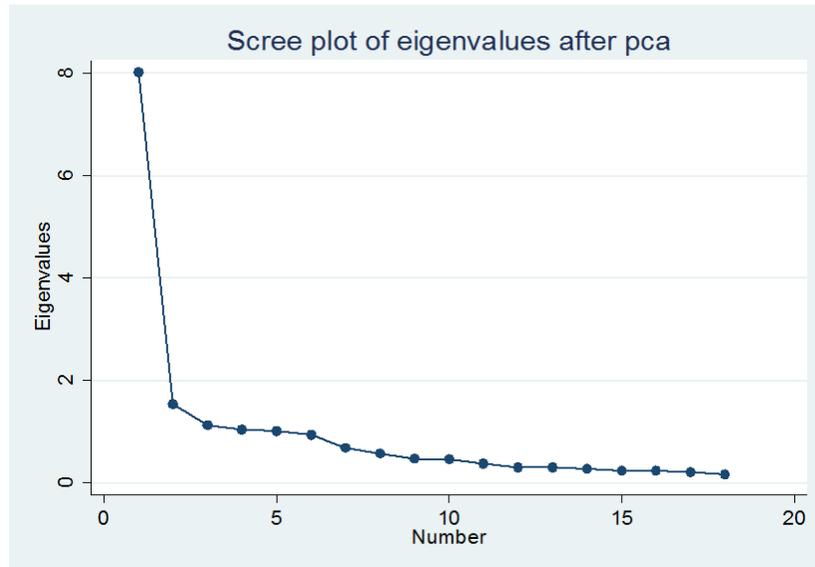
Figure 1: Eigenvalue scree plot after PCA

Source: Stata output

Table 4: Determinants of rural household perceptions of food prices: Tobit regression

Variables	Jericho		Swayimane	
	Coefficient Estimates	Std Error	Coefficient	Std Error
Income	-0.001***	0.00006	-0.001***	0.00005
Farming	-0.01	0.052	-0.02	0.051
Households size	0.14***	0.014	0.08***	0.013
Household-head gender	-0.07	0.063	-0.06	0.061
Household-head age	-0.03	0.031	0.01***	0.002
No. employed people	-0.01**	0.002	-0.07*	0.037
Distance	0.02***	0.002	-0.03***	0.002
Fare	0.15***	0.001	-	-
Education	-0.14**	0.065	-0.10	0.06
Welfare	0.63***	0.060	0.55***	0.058
F statistic	412		248.17	
Prob>F	0.000***		0.000***	
Pseudo R^2	0.87		0.79	
Uncensored observations 299	147		148	
Left-censored observations	1(minimum; -0.8)		1(minimum; -2.84)	
Right-censored observations	2(maximum; 3.89)		1(maximum; 1.25)	
Total observations	150		150	

*Note: ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.*
Source: Household Survey (2014)

The results show that at least one of the explanatory variables are not equal to zero, indicating that they should be retained in the estimation. Two regressions were estimated, one for each community, due to differences in food price regimes, rainfall (which affects farming activities), distances and transportation costs to the nearest retail outlets. Table 4 presents the Tobit regression results, under the null hypothesis that the explanatory variables included in the model do not have an influence on household food price perceptions. The Likelihood Ratios chi^2 are significant at the 1% level for both Jericho and Swayimane. The farming activities and household head gender variables are not statistically significant for both models. Age of household head is not significant in the model representing Jericho, while the household head education level coefficient estimate is not statistically significant in the Swayimane model. The following are the explanatory variable coefficient estimates interpretation, as presented in Table 3.

The coefficient estimates indicate that a rand increase in income would result in a 0.001 unit decrease in the overall household FPP index in Jericho and Swayimane, *ceteris paribus*. The coefficient estimate for transport fares to the market place is statistically significant (p<0.01) for households in Jericho, suggesting that transport fares are one of the determinants of a household's perception of food prices. The estimate shows that a rand increase in transport fare leads to a 0.15 increase in the FPP index. Households in Swayimane travel to the same areas to purchase food and pay the same fares. As a result, the transport fare variable coefficient estimate was omitted from the model due to multicollinearity.

An increase in household size increases the FPP index by 0.14 in Jericho and 0.08 in Swayimane, *ceteris paribus*. The coefficient estimate is statistically significant (p<0.01).

Consistent with *a priori* expectations, households with a larger number of people have high perceptions of food prices, meaning that the larger the household, the higher the perceptions of food prices. A household with a higher number of permanently employed people is unlikely to perceive food to be expensive. The coefficient estimates for the permanently employed people variable are statistically significant, at the 5% and 10% confidence levels, for Jericho and Swayimane, respectively. An increase in the number of permanently employed people decreases the FPP index by 0.01 for the Jericho households and by 0.07 for households in Swayimane, suggesting that households that have a higher number of permanently employed people do not have high perceptions of food prices.

The coefficient estimates for the education variable are statistically significant ($p<0.05$) for households in Jericho. The negative sign indicates that a household led by an individual that completed high school will have a lower FPP index than a household headed by an individual that has not been to high school. It shows that a household headed by an individual that has been to high school will have a 3.68 and 3.54 point lower FPP score, in Jericho and Swayimane, respectively, compared to households headed by an individual that has never attended high school, implying that household head education level influences a household's perception of food prices. Household heads that have attended high school do not perceive food to be as expensive as households that are headed by individuals that did attend high school.

3.5 Discussion

The negative relationship between household incomes and FPP imply that people with higher incomes perceive food prices to be low. Such people spend a smaller portion of their income on food, and are more likely to afford the basic food products (Gouge *et al*., 2009; Temple and Steyn, 2011; Temple *et al*., 2011) and are more likely to perceive that food is not expensive.

Households that incur higher transport costs would generally perceive prices of food to be high. This is because a higher monetary outlay to purchase food exists, due to the higher additional costs, thus implicitly affecting their perception of the food prices (Zeithmal, 1998). Households factor in transport and other costs in deciding the affordability of food.

Larger households have higher perceptions of food prices, as indicated by the coefficient estimate. This is because they are most likely to consume more food and have higher food expenditure (Sturm *et al.*, 2013; Gummerson and Schneider, 2013). The number of family members and the expenditure on food determines one's perceptions of food price levels. A household with a higher number of permanently employed people is more likely to have higher income levels and, therefore, increased food affordability (Emond *et al.*, 2012; Ward *et al.*, 2013; Mason *et al.*, 2011). They would thus be likely to have lower perceptions of food prices. An educated household head is more likely to know about food pricing and other market mechanisms that lead to price increases (DiSantis, 2013) and would not have higher perceptions of food prices than an uneducated counterpart.

3.6 Conclusions and Policy Implications

The present study aims to evaluate the relationship between household socio-economic characteristics and perceived food price levels in two rural areas in South Africa. Households in Jericho pay higher prices for food and have, on average, higher perceived food price levels, than those in Swayimane. It can be concluded that the food prices incurred in an area affect how households perceive food prices; households that pay more for food will have higher food price perceptions. Another finding of the study is that higher transport fares increase perceived food price levels. It can be concluded that higher transport fares influence a household's perceived food price levels, as they increase the cost of purchasing food. Household head education level

and gender, as well as household size, are also factors that influence a household's perceived food price levels. Households with higher incomes do not perceive that food is expensive. The implication of this study is that households have varied perceptions about food prices and that different household socio-economic characteristics have an influence on the overall perceived food price levels.

Households incur higher transport fares in order to get to surrounding urban areas, because of a lack of retail outlets in rural communities. Therefore food retail store availability in rural areas needs to be improved; if retail outlets are available within the areas, then households will not have to travel long distances and incur high transport costs to purchase food. This will lead to a decrease in total costs of purchasing food, resulting in lower household perceptions of food prices. New employment opportunities and increase in wages would benefit rural households through increased food affordability, subsequently decreasing households' perceived food price levels. In this way, households will be able to spend more on non-food items such as health care and education. In South Africa, social upheavals are usually associated with service delivery, low wages and the cost of living. It is therefore important that people hold realistic perceptions about food prices.

CHAPTER 4 COMPARATIVE ANALYSIS OF THE IMPACT OF FOOD PRICES ON RURAL HOUSEHOLD FOOD SECURITY: EVIDENCE FROM NORTH-WEST AND KWAZULU-NATAL PROVINCES, SOUTH AFRICA

4.1 Introduction

According to Engel's Law, the proportion of income spent on food declines as income increases. The proportion of food expenditure on income falls, resulting in a lower food expenditure/income (FEI) ratio. In this chapter, the empirical findings of the impact of food prices on rural households' food security in two rural areas in South Africa, namely Jericho and Swayimane, are examined, addressing the second and third objectives of the study. The background to the study is presented in section 4.2, followed by the conceptual and theoretical framework in section 4.3. The research methods are presented in section 4.4, followed by the empirical findings of the study, in section 4.5. The results of the study are discussed in section 4.6 and the chapter is concluded in section 4.7, where policy recommendations and conclusions are presented.

4.2 Background

Since the World Food Summit in Rome in 1996, where heads of states and government met to discuss food security and release the Millennium Development Goals (MDGs), poverty reduction has been an important policy goal in developing countries (Sinyolo, 2013). So far, there has been an improvement in the reduction of poverty in South-Eastern Asia, Eastern Asia, the Caucases, Central Asia and in Latin America (FAO, 2013). However, in Southern Asia and sub-Saharan Africa, the pace of poverty reduction remains slow to meet the MDG targets (UNDP, 2014). These disparities exist between different regions because of varying levels of vulnerability and

different capabilities to deal with economic shocks (Karfakis *et al*., 2011). In South Africa, the government set a target of halving poverty between 2004 and 2014 (Altman, 2009). While the government provides social grants, reaching 31 percent of the population, to contribute towards meeting that objective, over 40% of South Africans live in poverty (StatsSA, 2014). The Income and Expenditure Survey for 2005/2006 showed that only one in five households meets their average dietary energy costs (Jacobs, 2009).

In low income countries, most poor people are net consumers of food (as opposed to producers) and food price increases adversely affected them (Son and Kakwani, 2009; Ravallion, 1990; Wood *et al*., 2009). In addition to the immediate impact of higher food prices, of increasing the food budget of households, there is evidence that higher overall inflation negatively affects the poor the most (Wodon and Zaman, 2008). Commonly known as the global food crisis, the food price surge in 2007–2008 caused an increase of more than 60% in two years (Huh and Park, 2013). The effects of the global food price crisis led to a rise in the proportion of hungry South African households over the same period (Altman *et al*., 2009). Within a year the proportion of hungry families had risen by two to three percent (HRSC, 2012). In response to the food price crises, countries adopted a number of different policy measures, such as trade restrictions and price controls. Others have tried to increase self-sufficiency and some have reduced reliance on global food trade. The latter resulted in some countries acquiring farmland in foreign countries to ensure national food security (IFPRI, 2011). Since 2008, China banned rice and maize exports, Argentina raised export taxes on soybeans, maize, wheat and beef, Ethiopia and Tanzania have banned exports of major cereals and Peru removed import taxes on wheat and maize (IFPRI, 2008). Within domestic markets, however, the higher food prices do not always affect consumers in the same way, since retailers often vary the prices for the same goods sold to different

consumers. Several studies give evidence of price dispersion in many countries (Chung and Myers Jr, 1999; Engel and Rogshows, 2004; Minten and Kyle, 1999. The causes of price dispersion include poor flow of market information (Anania and Nisticò, 2010) and limited availability of retail stores (Chung and Myers Jr., 1999), which gives sellers the power to charge high prices. Variable and high transaction costs, largely due to high transport costs and related to the state of the road infrastructure also cause price dispersion (Minten and Kyle, 1999).

At the household level in South Africa, food access is the main determinant of food security. When most people were subsistence producers, rural households produced most of their own food. However, recent studies show that there has been an increase in the dependence on food purchases by rural households. Some rural households are known to rely on markets for 90% of their food supplies (Baiphethi and Jacobs, 2009). Such households are worse off after food price increases compared to those less reliant on markets. Apart from reducing a household's disposable income and purchasing power (Ravallion, 2000), high food prices negatively affect household welfare in several ways. Households end up consuming less food or fewer meals per day (Wood *et al.*, 2009), while some resort to food with lower nutritional value, which generally costs less (Hyun and Kakwani, 2009). This, in turn, negatively affects the health status of members, reduces children's cognitive powers and reduces labor productivity (Alaimo *et al.*, 2001). As a result, to reduce the burden on rural households there is a high probability that children drop out of school to participate in agricultural production, people resort to criminal activities and others migrate to urban areas.

Most studies on the impact of food price increases measure the effect on food security, welfare or poverty, by simulating the effect of the price or income change, over time (de Janvry and Sadoulet, 2008). This is done to evaluate the changes in food security that are presumed to come

about after the observed change in price or income (Valero-Gil and Valero, 2008; Arndt *et al.,* 2008; Ivanic and Martin 2008).   The present study systematically quantitatively analyzes the impact of food prices on household food security by comparing two rural areas in South Africa that exhibit different food price regimes. The study seeks to assess the household welfare, more specifically rural household food security in the two communities.

4.3 Theoretical and Conceptual Framework

Food prices affect both demand and supply in the food market. Their importance stems from the fact that "the price cue is present in all purchase situations and, at a minimum, represents to all consumers, the amount of economic outlay that must be sacrificed in order to engage in a given purchase transaction" (Lichtenstein *et al*., 1993: 234). It represents the amount of money that needs to be given up in order to purchase goods or services. Therefore higher prices negatively affect purchase probabilities. The poor are the first to suffer from a price increase and the last to benefit from a price fall, due to poor access to information (Prabu, 2011). They are affected more negatively by higher prices because they spend a larger portion of their income on food (Ravallion, 2000). Changes in food prices affect poverty and inequality through consumption and income channels (De Hoyos and Medvedev, 2009). As food prices increase, the monetary cost of achieving a fixed consumption basket increases, decreasing disposable income and hence reducing consumer welfare.

Household income is one of the important factors that determine household food stability and access, which are two of the four components of household food security. In order for households to have adequate disposable income to handle other household expenditure following food price increases, rural households decrease the quantities of food consumed and decrease the number of meals consumed per day (Wood *et al*., 2009). Households also tend to move to

inferior food (Son and Kakwani, 2009). Households' reduction of dietary diversity or energy intake to counter the effect of reduced income and higher prices have a negative effect on nutritional status (Brinkman *et al.*, 2010). Consequently, the health status of household members suffers. The health status of individuals in a household affects food utilization. If a person is unhealthy, food may not be metabolized properly and therefore the person does not acquire the necessary nutrients to lead a healthy life (Vozoris *et al.*, 2003).
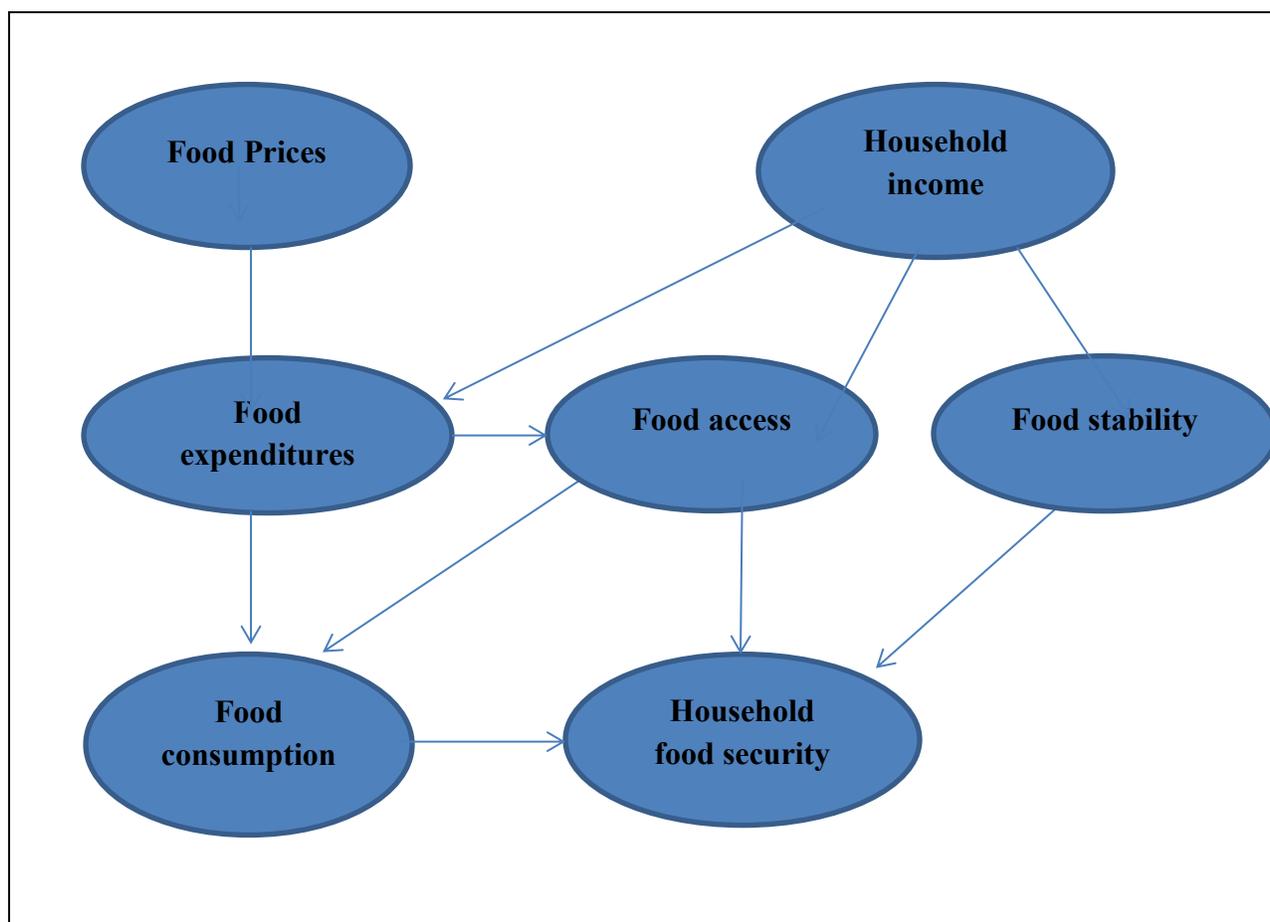
Figure 2: Conceptual framework of the impact of high food prices on household food security
Source: Adapted from IFAD (2014)

As depicted in Figure 2, the quantity of food purchased and the total expenditure is dependent on the prices paid for the food. A household's food expenditure also depends on its income, which

directly influences food access and stability. Food access, stability and food consumption are factors that play a role in a household's food security level.

For each household, the net welfare effect of high food prices will depend on the combination of a loss in purchasing power (consumption effect) and a gain in monetary income (income effect), if they sell their produce (Sekhampu and Dubihlela, 2012). According to Engel's Law, the proportion of income spent on food declines as income increases. The proportion of expenditure on food becomes less. The poverty indicator, i.e., the Food Expenditure to Income (FEI) ratio, indicates the proportion of income spent on food.

Nieftagodien and Van Der Berg (2007) used the FEI ratio to examine the living standards and consumption patterns of black households, compared to that of a representative South African sample. The study found that, at given incomes, the poorer the household, the greater the proportionate impact on purchasing power of a relatively higher price of food. A study by Ravallion (2000) used the FEI ratio and found a positive relationship between poverty and food prices for average rural expenditures, from year to year. This indicator was adopted for the present study, as it captures the amount spent on food, which is directly influenced by the prices paid for the different food items in the different study locations. The advantage of the FEI ratio is that it counters the problem of different household size and composition.

4.4 Empirical Methods

4.4.1 Sampling Techniques and Data Collection Methods

A systematic sampling procedure was used in selecting the respondents. A sample of 150 households was collected in each area as this is a large enough sample to yield unbiased results. Each area has 10 sections and 15 households were interviewed from each. The systematic

random sampling procedure was used as it is simple and allowed a degree of system into the random selection of households (Cochran, 1946). Every fifth household was selected. Primary data were collected using structured questionnaires administered by eight enumerators, who were conversant with the local language in each area. The same questionnaire was used for both areas. The study areas were described in detail in Chapter 3.

4.4.2 Analytical Methods

The study employed both descriptive and econometric techniques. Descriptive analysis was performed using the chi-square test of association. Households were categorized according to their FEI ratio. The Ordered Logit Regression model was employed to evaluate the impact of food prices on household welfare. The location variable is a proxy for price, where one area represented the high food price area and the other represented the low price area.

4.4.2.1 Food Expenditure to Income ratio

The FEI ratios for the sampled households were placed into four categories; "very poor", "poor", "moderate" and "well-off" households. The median FEI ratio for the sample is 0.3 and represents the households categorized as "moderate". Households with a ratio of less than 0.3 are considered as well-off, while those with FEI ratios above 0.3 are categorized as poor. Households with a ratio of more than 0.6 are categorized as very poor. The households in the "well-off" category have the lowest ratios, as the portion of income spent on food is low and the "very poor" households have higher ratios because they spend a large proportion of their income on food. The FEI ratio is a proxy for household food security, as it reflects the ability of households to cope with price increases of commodities in their food basket. The "well-off" households are food secure, the "moderate" households are mildly food secure, the "poor" households are food insecure and the "very poor" households are very food insecure.

4.4.3 Econometric Model

4.4.3.1 Ordered Logit Regression

The focus of most poverty modelling exercises is to identify the main factors which determine poverty outcomes (Fissuh and Harris, 2007). A household with certain identifiable characteristics has a probability of falling under a specific poverty category. Considering that such categories are a ranked dependent variable, the Ordered Logit Regression (OLR) was the most suitable model for the study, because the households are categorized into a definable ordinal category according to their FEI ratio. The OLR can be used to explain or predict a polychotomous, ranked dependent variable as a function of explanatory variables that describe the characteristics of a unit, individual or economic agent (Gujarati and Porter, 2009). In order to run an OLR, the "well-off" category was selected as the base category, as it is of most interest.

The model is based on the cumulative probabilities of the dependent variable. The logit of each cumulative probability is assumed to be a linear function of the covariates, with regression coefficients constant across the categories. The OLR retains inherent ordinality in the data and the parameter that is estimated is a type of odds ratio that is recognizable and readily interpreted (Scott *et al.*, 1997). Cut-off points are used in the OLR model, with an underlying assumption that the homogeneity of effect exists across cut-off points. Another assumption underlying the model is the proportional odds assumption, which assumes that the explanatory variables' effect on the cumulative odds does not change from one cumulative odds to the next. The only term that varies is the constant term (Williams, 2006). The test of parallel lines was examined, using the Brant test to determine whether or not the proportional odds assumption was satisfied.

To estimate the effects of household characteristics and food price on the probability of a rural household being "well-off", "moderate", "poor" or "very poor", the OLR model is defined by the regression equation.

$$Y* = x'\beta + \varepsilon. \qquad\qquad (2)$$

Where $Y*$, the latent variable in equation (2), is not observable. What is observable is the polychotomous Y, defined by the following:

$$Y=0 \text{ (well-off) if } y* \leq 0,$$
$$=1 \text{ (moderate) if } 0 < y* \leq \mu_1,$$
$$=2 \text{ (poor) if } \mu_1 < y* \leq \mu_2,$$
$$=3 \text{ (very poor) if } \mu_2 < y* < \mu_3$$

The μs are unknown parameters to be estimated with β. The ε in equation (2) is normally distributed across observations. With a constant mean and zero variance. The probabilities derived from equation (2) and (3) are:

$$\text{Prob}(y = 0 \mid x) = \phi(-x\beta),$$
$$\text{Prob}(y = 1 \mid x) = \phi(\mu1 - x\beta) - \phi(-x\beta),$$
$$\text{Prob}(y = 2 \mid x) = \phi(\mu2 - x\beta) - \phi(\mu1 - x\beta),$$
$$\text{Prob}(y = 3 \mid x) = \phi(\mu3 - x\beta) - \phi(\mu2 - x\beta),$$

Marginal effects show the change in probability of being a certain category when the explanatory variable increases by one unit. They are approximations of how much the dependent variable is expected to increase or decrease for a unit change in an explanatory variable. For continuous variables this represents the instantaneous change given for a unit increase and for dichotomous variables the change is from zero to one (Williams, 2006). The marginal effects of the regressors

(xs) on the probabilities are not equal to the coefficients. For the four probabilities, the marginal effects of changes in the explanatory variables are:

$$\frac{\partial \operatorname{Prob}(y = 0 \mid x)}{\partial x} = -\varphi(x\beta)\beta$$

$$\frac{\partial \operatorname{Prob}(y = 1 \mid x)}{\partial x} = [\varphi(-x\beta) - \varphi(\mu - x\beta)]\beta,$$

$$\frac{\partial \operatorname{Prob}(y = 2 \mid x)}{\partial x} = \varphi(\mu - x\beta)\beta.$$

$$\frac{\partial \operatorname{Prob}(y = 3 \mid x)}{\partial x} = \varphi(\mu - x\beta)\beta.$$

The base group is the "well-off" welfare category. The higher categories are "moderate", "poor" and "very poor". Table 5 presents the *a priori* expectations for the explanatory variables in the model.

Table 5: Description of variables included in the Ordered Logit Model

Variable	Variable Description	Expected coefficient signs
Income	Total household income in rands (R)	-
Gender	Household head gender. (Male=1; Female=0)	-
Location	Location of the household (North-West=1; KwaZulu-Natal=0)	+
Farming	Household's involvement in farming activities. (Yes=1; No=0)	-
Household size	Number of persons permanently residing in the household	+
Age	Age of the household head (years)	+
No. of permanently employed	Continuous: Number of people that are permanently employed in the household	-
Education	Household head education level (1=high school 0= Never been to high school)	-
Distance from the stores	Distance between the household and the market place (Km)	+
Fare	Transport cost to get to the market place (rands)	+
Welfare grants	Access to government welfare grants (Yes=1, No=0)	+

Based on a priori expectations

4.5 Results of the Impact of Food Prices on Rural Household Food Security

4.5.1 Socio-economic characteristics of the sampled households

Table 6: Food expenditure/Income ratio

Poverty Category	Frequency	Percent	Frequency	Percent
		Jericho		Swayimane
1.Well-Off	27	17.6	49	32.5
2.Moderate	43	28.1	31	20.5
3.Poor	26	17.6	49	32.5
4.Very Poor	54	35.3	21	13.9
5.Total	150	100.0	150	100.0

Source: Household Survey (2014)

The results in Table 6 show that 35.3% of the households sampled in Jericho are "very poor", according to the FEI ratio, while only 13.9% of the households in Swayimane are in the same category. Of the households in Swayimane, 32.5% are "well-off", compared to 17.6% in the Jericho sample. The statistics show that households in Swayimane are better off in terms of their FEI ratio. There are more "well-off" households in Swayimane, where food prices are lower. This shows that high food prices negatively affect household welfare.

Table 7: Association between household head gender and welfare

Food exp/Income ratio	Female n= 190	Male n= 110	χ^2 Sig level
	Percentages	Percentages	
Well-off	6.8	57.3	
Moderate	24.2	25.5	0.001
Poor	34.3	9	
Very Poor	34.7	8.2	

Source: Household Survey (2014)

Table 7 shows that 6.8% of the households that are female-headed and 57.3% of the male-headed households are "well-off", with 34.7% "very poor" female-headed households and 8.2% male-headed ones being "very poor". The chi-square statistic estimates are significant, showing that the gender of the household head has an effect on welfare. Male-headed households are more likely to be "well-off" compared to female-headed households. Women generally have lower incomes and higher unemployment rates (Hassim, 2005) and households with lower incomes spend a larger portion of their total income on food (Steynhuis *et al*., 2011), resulting in higher FEI ratios.

Table 8: Association between farming and household welfare

Food exp/Income ratio	Non-farming households (n= 122)	Farming households (n= 178)	χ^2 Sig level
	Percentages	Percentages	
Well-off	26.2	24.7	
Moderate	16.5	30.4	0.001
Poor	23.7	25.8	
Very Poor	33.6	19.1	

Source: Household Survey (2014)

The association between FEI ratio and farming activities is presented in Table 8. Results show that 33.6% of the non-farming households are "very poor" and 24.7% of the households that are involved in farming activites are "well-off". The chi-square statistic significance shows that involvement of households in farming is associatred with welfare. Households involved in farming activities are less likely to be "very poor". Apart from off-farm income, they also receive farm income and consume home produce, therefore depending less on the market. They thus have lower food expenditure and lower FEI ratios.

Table 9: Association between welfare grants and household welfare

Food exp/Income ratio	No Access (n= 111)	Welfare Access (n= 189)	χ² Sig level
	Percentages	**Percentages**	
Well-off	39.6	16.9	
Moderate	28.9	22.2	0.001
Poor	18.9	28.6	
Very Poor	12.6	32.3	

Source: Household Survey (2014)

Table 9 shows the association between FEI ratio and welfare grants. It shows that 39.6% of the households that do not receive welfare grants are "well-off" and 32.3% of the households that receive welfare grants are "very poor". The chi-square statistic is significant, suggesting that access to welfare grants is associated with welfare. Households that receive government grants are more likely to be "very poor". Low income households receive welfare grants to alleviate poverty (Armstrong and Burger, 2009). Due to the fact that low income households spend a large portion of their income on food, they would more likely have high FEI ratios.

Table 10: Paired t-test comparison of means of household income and FEI ratios between Jericho and Swayimane households

Variable	Mean	Standard error	Standard Deviation
Household Income Jericho (R)	6520**	400.1	490.5
Household Income Swayimane (R)	6012**	482.1	5902.3
FEI Jericho	0.43**	0.03	0.31
FEI Swayimane	0.30**	0.016	0.21

*** Significant at 5% level*
Source: Household Survey (2014)

Table 10 presents results from a paired t-test comparison of means between household incomes and FEI ratios in Jericho and Swayimane. The results show that an average household in Jericho earns R509 more than one in Swayimane. The average FEI ratio in Jericho is 0.43 and 0.30 in Swayimane. This indicates that households in Jericho have higher food expenditure, resulting in higher FEI ratios, even though, on average, they earn higher incomes. The average FEI of 0.43 shows that the average household is categorized as "poor", according to the FEI, and the average household in Swayimane is categorized as "moderate".

4.5.2 Econometric results

The Variance Inflation Factor and the Pairwise correlation tests were carried out to test for multicollinearity. The pairwise correlation coefficient between the household income and the number of permanently employed people is 0.49 (<0.8), and the Variance Inflation Factor is 1(< 10), showing that multicollinearity is not a serious concern for the data. The tests also found that the location, involvement in farming activities and transport fare variables are not collinear. The Brant test of parallel regression assumption yielded an insignificant statistic of 49.57, showing that the assumption was not violated.

Table 11: Ordered Logit results of the factors influencing household welfare status

Independent variables	Coefficient estimates	Standard Error
Income	-0.001***	0.001
Gender	-1.28***	0.37
Location	3.4***	0.63
Farming	0.2	0.31
Households size	0.13	0.08
Age	0.01	0.3
No. employed people	-0.48**	0.21
Welfare grants	0.22	0.33
Distance	-0.03**	0.01
Fare	0.02**	0.01
Education	-0.5	0.35

LR chi2(11)= 478* **   Log likelihood = -176.77

*Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.*
Source: Household Survey (2014)

Table 11 shows the results of the factors influencing household welfare. The model is a good fit, and its associated p-value for the Log Likelihood ratio is less than 0.001, indicating that at least one of the explanatory coefficients estimates is not equal to zero in the model. The signs of most of the explanatory variable coefficients are consistent with *a priori* expectations. Households with higher incomes have low FEI ratios and the log-odds of a household being in the poorer states decrease with an increase in the number of permanently employed people. The location variable, which represents the low price and high price region, shows that the log-odds of a household being poorer is higher for a household based in the high price region. The log-odds of

being poorer increases with an increase in transport fare, showing that households that incur higher transport costs to the market place are more likely to be poorer. The log-odds of being "well-off" are higher for male-headed households.

Table 12 represents the results from the Ordered Logit marginal effects that were used to estimate the household food security status. The probability of a household being "well-off" increases by 0.04% after a rand increase in total household income. A rand increase in total household income results in a 0.01% increase in the probability of a household being classified as "moderate" and decreases the probability of a household being "poor", by 0.01%. A rand increase in income decreases the probability of a household being classified as "very poor" by 0.011%. An increase in the number of permanently employed people increases the probability of a household being "well-off" by 2.1% and increases the probability of a household moving from being in the "moderate" category to the "well-off" category by 0.5%. The probability of a household being "poor" decreases by 7% for an increase in the number of permanently employed people. An increase in the number of permanently employed people decreases the probability of being "very poor" by 0.4%. This is because an increase in the number of permanently employed people leads to an increase in total household income.

Table 12: Marginal effects of the Ordered Logit Model results of the factors influencing household food security status

Variable	"Well-off"		"Moderate"		"Poor"		"Very Poor"	
	Dy/dx(1)	Sig	Dy/dx(2)	Sig	Dy/dx(3)	Sig	Dy/dx(4)	Sig
Income	0.0004	0.001***	0.0001	0.001***	-0.0001	0.001***	-0.0001	0.003***
Gender	0.058	0.018***	0.088	0.01***	-0.136	0.001***	-0.0102	0.02**
Location	-0.173	0.006***	-0.286	0.001***	0.414	0.001***	0.05	0.02**
Farming	-0.007	0.518	-0.017	0.486	0.023	0.492	0.002	0.501
Households size	-0.005	0.156	-0.011	0.155	0.015	0.138	0.001	0.17
Age	0.004	0.417	-0.001	0.417	0.001	0.411	0.0001	0.42
No. employed people	0.02	0.057*	-0.042	0.041**	-0.056	0.029**	-0.004	0.06*
Welfare grants	0.01	0.51	-0.019	0.490	0.026	0.494	0.002	0.45
Distance	0.001	0.07*	0.003	0.062*	-0.004	0.046**	-0.001	0.09*
Fare	-0.0008	0.058*	-0.002	0.049**	0.003	0.033**	0.0002	0.081*
Education	0.018	0.198	0.045	0.161	-0.06	0.155	-0.004	0.187

*Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively*
Source: Household Survey (2014)

Male-headed households are 5.8 % more likely than female-headed households to be "well-off" and are 8.8 % more likely than female-headed households to be "moderate". A male-headed household is 13.6% less likely than a female-headed household to be "poor" and 1.1% less likely than a female-headed household to be "very poor". The probability of a household being "well-off" increases by 0.13% and the probability of a household being "moderate" increases by 0.3% per increase in kilometers between the household and the marketplace. A kilometer increase in

distance travelled to the market place decreases the probability of a household being in the "poor" category by 0.4 %. This variable is statistically significant but is not consistent with *a priori* expectations. A possible explanation is that households that would travel longer distances to purchase food would probably do so in the hope of purchasing food at lower prices. If this is so, they spend less on food and therefore have lower FEI ratios.

The probability of a household being "well-off" decreases by 0.08% and decreases by 0.2% for a household to be classified as "moderate", for a rand increase in transport fare to the markets *ceteris paribus*. A rand increases in transport fare increases the probability of a household being "poor" by 0.3% and increase the probability of a household being "very poor" by 0.02%. This is as expected, because the increased costs of purchasing food increases total expenditure, resulting in lower disposable household incomes. For this sample, households that incur lower transport costs are more likely to be "well-off". Households in Jericho are 17% less likely to be "well-off" than households in Swayimane and are 28% less likely to be "moderate" than households in Swayimane. The Jericho households are 41% more likely to be "poor" than households in Swayimane and are 5% more likely to be "very poor" than households in Swayimane. This is because households in Jericho pay higher prices for food and would therefore have higher food expenditure. This shows that households that pay higher prices for food are less likely to be "well-off".

4.6 Discussion

Households with higher incomes spend a lower proportion of their total income on food (Steenhuis *et al*., 2011; Nieftagodien and Van Der Berg, 2007) and are more likely to be food secure. As income increases, the proportion of food expenditure decreases, resulting in a lower FEI ratio. Therefore households with a higher number of permanently employed people are more

likely to be "well-off", as they would have higher incomes (Loopstra and Tarasuk, 2013). Consistent with the findings of Kassie et al. (2014), there is still a gap between household food security of female and male-headed households. Women generally have lower incomes and higher unemployment rates (Fuwa, 2000; Hassim, 2005; Martin and Lippert, 2012). Therefore female-headed households are more likely to spend a large portion on their income on food, resulting in a higher FEI ratio and higher chances of them being poor. Male-headed households are more likely to earn higher incomes and are more likely to be "well-off".

Rural households face additional costs in order to get to retail outlets, compared to their urban counterparts (Smith et al., 2012), leaving them with less disposable income. The lower disposable income means that the proportion of income spent on food increases, thus increasing the probability of a household being food insecure. High food prices have a negative impact on household food security (Valero-Gil and Valero, 2008; Arndt et al., 2008; Ivanic and Martin 2008; de Janvry and Sadoulet, 2008), as shown in the present study. Households in the high price area have, on average, higher incomes, but due to the high prices they incur, they end up spending a large proportion of their income of food. There are thus more "very poor" households in Jericho, where prices of food are higher. Households in Jericho have higher FEI ratios due to the fact they pay more for food and would have, on average, higher food expenditures (Lannotti et al., 2012, Ferreira et al., 2013; Anríquez et al., 2013;). Food prices incurred by households in the two areas are the main difference between the two study areas. However, transport costs, which are higher in the high food price area and included in the model, together with the differences in food prices, could explain the significant difference in household welfare status of households between the two areas. Lack of access to irrigation access is one of the challenges

facing households in Jericho. This could be another factor contributing to the differences in household welfare between the two study areas.

4.7 Conclusions and Policy Recommendations

This study concluded that the food prices incurred in an area, which are one of the factors that determine total household food expenditure, affect household welfare. The number of people permanently employed and the level of income increases the probability of a household being "well-off". An increase in wages and new employment opportunities for rural households will improve the welfare of a household through increased purchasing power and would help mitigate the effect of price increases. Increased wage rates will also allow households to meet transaction costs of interacting on the market. Households involved in farming activities are more likely to be food secure compared to households that are not. Therefore agriculture should be supported as a way of achieving food security. Factors that affect subsistence production, such as access to water, should be improved, in order to encourage food production. More retail food outlets should be established to reduce transaction costs for accessing the food markets.

CHAPTER 5 CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1 Introduction

Chapter 5 presents the conclusions drawn from the study. The chapter recommends possible policy strategies, as well as directions for future studies.

Most rural households are low income, net consumers of food. Over the past years there has been an increase in rural households' dependence on the market for food, making them vulnerable to price changes. In addressing this problem, this study evaluates the impact of high food prices on household food security of rural households in South Africa and determines the socio-economic factors influencing households' perceptions of food prices.

Two rural areas Jericho, North-West Province, and Swayimane in KwaZulu-Natal were chosen for the study as they pay different prices for food. Using a total sample of 300 households, which was generated through a systematic random sampling procedure, 150 households were selected in each area. The study employed descriptive statistical analysis and econometric techniques. In order to evaluate the impact of food prices on household food security, the households where categorized into four groups; "well-off", "moderate", "poor" and "very poor", according to their Food Expenditure-Income (FEI) ratio. The Ordered Logit Regression (OLR) model was employed to empirically model the four welfare outcomes and the Tobit regression was used to determine the relationship between the explanatory variables and household perceived food price levels.

The explanatory variables included in the model are household head, gender, age and education level. Variables at household level are size, total income, number of permanently employed

households, access to welfare grants, transport fare to the market, distance between homestead and market, and household involvement in farming activities and location. The location variable was used as a proxy for price, where Jericho, North-West area, represents the high price area and Swayimane, KwaZulu-Natal area, the low price area.

The objective of the study was to identify household socio-economic characteristics which influence household perceived food price levels in South African rural areas and to determine the relationship between household food price perceptions and food purchase patterns. Households' perceived price levels were derived from the households' individual food price scores of 18 food products included in a modified food basket, collected using the Likert scale. The paired t-test was used to compare the household food price perception means between groups within the sample. The paired t-test showed that there is a statistically significant mean difference between perceived food price levels of households in Jericho and those in Swayimane, indicating that food prices influence perceived price levels. The Tobit regression models indicated that transport fares and household size are significant factors that affect FPP scores in Jericho, suggesting that higher transport costs, which increase the total monetary outlay of obtaining food, have an influence on the perceived food price levels. In addition, the results showed that households involved in farming in Swayimane have lower FPP scores, whereas those in Jericho have higher FPP scores. This is because the cost of farming is higher in Jericho, due to low rainfall and lack of irrigation systems. Households with higher incomes, education levels and number of permanently employed people in both areas are more likely to perceive food price levels to be low.

The results showed that household food security in the low food price region of Swayimane, KwaZulu-Natal, was better than that of households in the high price region of Jericho, North-

West. The Chi-square tests of association showed that there are more "very poor" households in Jericho. The paired t-test comparison of means tests showed that the average household in Jericho earns more, but because they spend more on food due to higher prices, the average FEI ratio is higher. The Ordered Logit Model indicated that households in the low price area are more likely to be "well-off" than to be "poor". This suggests that the food prices incurred in an area, which are one of the factors that determine total household food expenditure, affect household welfare. Furthermore, the number of people permanently employed and total household income variables increase the probability of a household being "well-off".

5.2 Conclusions

The paired t-test comparison of means tests showed that households in the North-West have higher perception scores of food price levels than those in KwaZulu-Natal, indicating that food prices incurred have a direct effect on household food price perceptions. Different households have varied perceptions of food prices. Household head education level and gender, household size and income, and the number of permanently employed people, were found to be statistically significant determinants of households' perceptions of food prices. Therefore the study concludes that household socio-economic characteristics influence a household's perception of food prices.

Household head gender, transport fare, the number of permanently employed people and household income, significantly affect the probability of households being classified as "well-off". Therefore it can be concluded that household socio-economic characteristics influence household food security. The welfare of households in Swayimane was found to be better than that of those in Jericho, showing that price levels have an influence on household food security. Overall, households in Jericho are 44.7% more likely to be classified as "poor" than those in

Swayimane and are 5% more likely to be classified as "very poor" than those in Swayimane. It can thus be concluded that the food prices in the different study areas have an impact on household welfare, including food security. However, it should be noted that other factors such as irrigation access could possibly contribute to the differences in household welfare status across the two areas.

5.3 Policy recommendations

Agricultural production should be supported to enable households to rely less on the market for food. Water access should be improved through the establishment of irrigation schemes and awareness of rain-harvesting techniques to increase food production.

Increases in wages for the economically active and new employment opportunities for rural households will improve the welfare status of households. Household income will increase, resulting in increased purchasing power and disposable income. Households will therefore be able to afford food.

Efforts should be made to keep people in school in order to reduce educational gaps and to put them in a better position to access non-agricultural and agricultural employment opportunities, thus increasing their chances of being food secure.

Women participation in economic activities should be increased through communal gardens where land is accessible and through skills training in projects such as handicrafts production to increase income. This will help reduce the welfare gap between female and male-headed households.

Households incur higher transport fares to get to the urban areas because of a lack of retail outlets in rural communities. Retail outlet availability thus needs to be improved. With more

retail outlets in the communities, households will not have to travel long distances and incur high transport fares to reach the market to purchase food. Government should support entrepreneurs, through subsidized financing, in order to establish and expand food retail outlets in rural areas. This will boost economic activity and create employment.

5.4 Limitations of the Study and Directions for Further Studies

One of the limitations of this study is that it considered household food price perceptions for a set food basket, during a single period and not over time. Changes in price perceptions derived from price increases are thus not captured. Added to this, is that household food preferences, which could have an influence on household food perceptions, were not considered.

Another limitation of this study is that it does not consider marginal changes in household food security due to price increases. Future studies should look into the difference in household food security status over time, caused by changing food prices in South Africa. Future studies should evaluate the factors that affect food price dispersion in South Africa and investigate the degree to which it affects producer sales and household consumption in different areas of South Africa.

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APPENDICES

Appendix A: Determinants of rural household's perceptions of food prices in South Africa

. ttest percenw == percekzn

Paired t test

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
percenw	150	60.15333	1.065494	13.04959	58.0479	62.25876
percekzn	150	52.94667	.320205	3.921694	52.31394	53.5794
diff	150	7.206667	1.162282	14.23499	4.909982	9.503351

```
    mean(diff) = mean(percenw - percekzn)               t =    6.2004
Ho: mean(diff) = 0                          degrees of freedom =      149

Ha: mean(diff) < 0            Ha: mean(diff) != 0            Ha: mean(diff) > 0
Pr(T < t) = 1.0000       Pr(|T| > |t|) = 0.0000        Pr(T > t) = 0.0000
```

. ttest percepwel == percnowel

Paired t test

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
percep~l	113	61.81416	1.330947	14.14816	59.17706	64.45126
percno~l	113	52.40708	.6915872	7.351673	51.03679	53.77737
diff	113	9.40708	1.583967	16.8378	6.268653	12.54551

```
    mean(diff) = mean(percepwel - percnowel)            t =    5.9389
Ho: mean(diff) = 0                          degrees of freedom =      112

Ha: mean(diff) < 0            Ha: mean(diff) != 0            Ha: mean(diff) > 0
Pr(T < t) = 1.0000       Pr(|T| > |t|) = 0.0000        Pr(T > t) = 0.0000
```

. ttest percemen == percepwoma

Paired t test

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
percemen	111	53.69369	.8689562	9.155021	51.97163	55.41576
percep~a	111	61.65766	1.184841	12.48308	59.30958	64.00573
diff	111	-7.963964	1.575557	16.59952	-11.08635	-4.84158

```
    mean(diff) = mean(percemen - percepwoma)            t =   -5.0547
Ho: mean(diff) = 0                          degrees of freedom =      110

Ha: mean(diff) < 0            Ha: mean(diff) != 0            Ha: mean(diff) > 0
Pr(T < t) = 0.0000       Pr(|T| > |t|) = 0.0000        Pr(T > t) = 1.0000
```

. ttest percefarm == perenofarm

Paired t test

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
percef~m	113	58.00885	1.215191	12.91766	55.6011	60.4166
pereno~m	113	58.0354	.9016884	9.585079	56.24882	59.82198
diff	113	-.0265487	1.609247	17.10653	-3.215064	3.161967

```
    mean(diff) = mean(percefarm - perenofarm)           t =   -0.0165
Ho: mean(diff) = 0                          degrees of freedom =      112
```

```
. pca Maizemeal Rice Flour Bread Chicken Beef Tinnedfish Mutton Pork Eggs Milk M
> argarine Vegetables Fruits Beans Cookingoil Sugar SaltSpices
```

Principal components/correlation

Number of obs   =   300
Number of comp.   =   18
Trace   =   18
Rotation: (unrotated = principal)   Rho   =   1.0000

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	8.01958	6.4747	0.4455	0.4455
Comp2	1.54488	.416023	0.0858	0.5314
Comp3	1.12886	.0852158	0.0627	0.5941
Comp4	1.04364	.0326753	0.0580	0.6521
Comp5	1.01097	.068662	0.0562	0.7082
Comp6	.942307	.25828	0.0524	0.7606
Comp7	.684028	.109117	0.0380	0.7986
Comp8	.574911	.101616	0.0319	0.8305
Comp9	.473295	.0147189	0.0263	0.8568
Comp10	.458576	.0846547	0.0255	0.8823
Comp11	.373921	.0659587	0.0208	0.9031
Comp12	.307962	.00286488	0.0171	0.9202
Comp13	.305097	.0326461	0.0169	0.9371
Comp14	.272451	.0314668	0.0151	0.9522
Comp15	.240985	.00567422	0.0134	0.9656
Comp16	.23531	.0220714	0.0131	0.9787
Comp17	.213239	.0432583	0.0118	0.9906
Comp18	.169981	.	0.0094	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6
Maizemeal	0.0774	0.2580	0.1086	0.1164	0.8510	0.0604
Rice	0.2600	0.2553	0.2035	0.2241	0.0082	-0.1691
Flour	0.2662	0.1673	0.2030	0.1770	-0.0460	-0.0592
Bread	0.2724	-0.0773	0.1942	0.1968	0.0452	-0.0868
Chicken	0.2294	0.3558	-0.1181	0.0806	0.0467	-0.3285
Beef	0.2477	0.2517	-0.2224	-0.2734	-0.2003	-0.0874
Tinnedfish	0.2634	-0.0904	0.0717	0.0685	-0.0902	0.0645
Mutton	0.2571	0.2894	-0.2019	-0.2685	-0.0050	-0.0290
Pork	0.0820	0.0622	-0.3027	0.6193	-0.0928	0.5893
Eggs	0.2860	-0.0787	0.0106	0.0436	0.0169	0.1125
Milk	0.2935	-0.0938	-0.1178	-0.0246	-0.1025	-0.0555
Margarine	0.2602	-0.2964	-0.2809	-0.1621	0.2053	0.1085
Vegetables	0.2635	-0.2859	-0.1301	-0.1830	0.1207	0.1813
Fruits	0.2525	-0.3034	-0.1578	-0.1835	0.2260	-0.0283
Beans	0.2591	-0.2369	0.1697	0.2161	-0.1682	-0.0234
Cookingoil	0.2636	0.1788	0.0276	-0.0311	-0.2498	0.0112
Sugar	0.0618	0.3207	0.3558	-0.4195	-0.0572	0.6527
SaltSpices	0.1261	-0.2848	0.6132	-0.0711	-0.0043	-0.0332

Variable	Comp7	Comp8	Comp9	Comp10	Comp11	Comp12
Maizemeal	−0.0004	0.3401	−0.1137	−0.0127	0.1282	0.0609
Rice	−0.1459	−0.2030	0.1717	0.1500	−0.3756	0.1129
Flour	−0.0971	−0.2732	−0.3083	−0.4506	−0.1143	−0.1713
Bread	0.0822	−0.3501	0.1545	−0.2009	0.5092	−0.0609
Chicken	0.1287	−0.1135	0.3430	0.4749	−0.0421	−0.2378
Beef	0.2686	0.1848	0.1741	−0.2910	0.1563	−0.0509
Tinnedfish	−0.3741	0.4147	0.4609	−0.2679	−0.1796	0.2643
Mutton	0.2398	0.0577	−0.0935	−0.3172	−0.1136	0.1565
Pork	0.3705	−0.0126	0.0595	0.0067	−0.0313	0.0506
Eggs	−0.2856	−0.1642	−0.3534	−0.0060	−0.2122	−0.0864
Milk	−0.0106	−0.0697	−0.1943	0.3563	0.0610	0.5471
Margarine	−0.0197	−0.1023	0.0105	0.0392	−0.2212	0.1594
Vegetables	0.0323	0.0790	0.0871	0.0880	−0.2472	−0.6361
Fruits	0.0424	−0.2555	0.0512	0.0140	0.3241	0.0983
Beans	−0.1792	0.3318	0.0887	0.0931	0.3473	−0.1485
Cookingoil	−0.0048	0.3835	−0.5054	0.2667	0.1725	−0.1150
Sugar	−0.1515	−0.1972	0.1723	0.1811	0.1470	0.0268
SaltSpices	0.6318	0.1168	−0.0063	0.0472	−0.2490	0.1097

Variable	Comp13	Comp14	Comp15	Comp16	Comp17	Comp18
Maizemeal	−0.0803	−0.0363	−0.0304	0.0650	0.1117	0.0029
Rice	0.2048	−0.1119	0.0200	−0.4990	0.4119	0.0715
Flour	0.3202	−0.1911	−0.1354	0.4886	−0.0317	−0.0359
Bread	−0.4027	−0.2426	−0.0199	−0.2988	−0.2528	0.0514
Chicken	−0.0099	0.1969	0.0293	0.3327	−0.3295	0.0195
Beef	−0.2028	−0.0225	0.0696	0.1598	0.5162	0.3414
Tinnedfish	−0.0349	−0.1071	0.3060	0.1272	−0.2745	−0.0658
Mutton	0.0688	0.2913	−0.2359	−0.3514	−0.2818	−0.4251
Pork	0.0645	0.0438	0.0836	0.0171	0.0199	−0.0116
Eggs	−0.4749	0.5513	0.2581	0.0191	0.0612	0.1041
Milk	−0.2430	−0.2808	−0.1630	0.2749	0.1901	−0.3578
Margarine	0.1081	−0.0894	−0.3953	−0.0331	−0.2383	0.6038
Vegetables	−0.1087	−0.3269	−0.0230	−0.0669	0.1240	−0.3515
Fruits	0.5072	0.1760	0.4856	0.0087	0.1218	−0.1014
Beans	0.1971	0.3867	−0.4955	−0.0136	0.1855	−0.0504
Cookingoil	0.1682	−0.2516	0.2697	−0.2208	−0.2441	0.2123
Sugar	0.0506	0.0228	−0.0823	0.0668	−0.0154	0.0176
SaltSpices	−0.0221	0.1061	0.0845	0.0872	−0.0405	0.0605

Variable	Unexplained
Maizemeal	0
Rice	0
Flour	0
Bread	0
Chicken	0
Beef	0
Tinnedfish	0
Mutton	0
Pork	0
Eggs	0
Milk	0
Margarine	0
Vegetables	0
Fruits	0
Beans	0
Cookingoil	0
Sugar	0
SaltSpices	0

. summarize FPPIndex

Variable	Obs	Mean	Std. Dev.	Min	Max
FPPIndex	300	.0031224	2.723021	−4.823188	7.078355

Scree plot of eigenvalues after pca
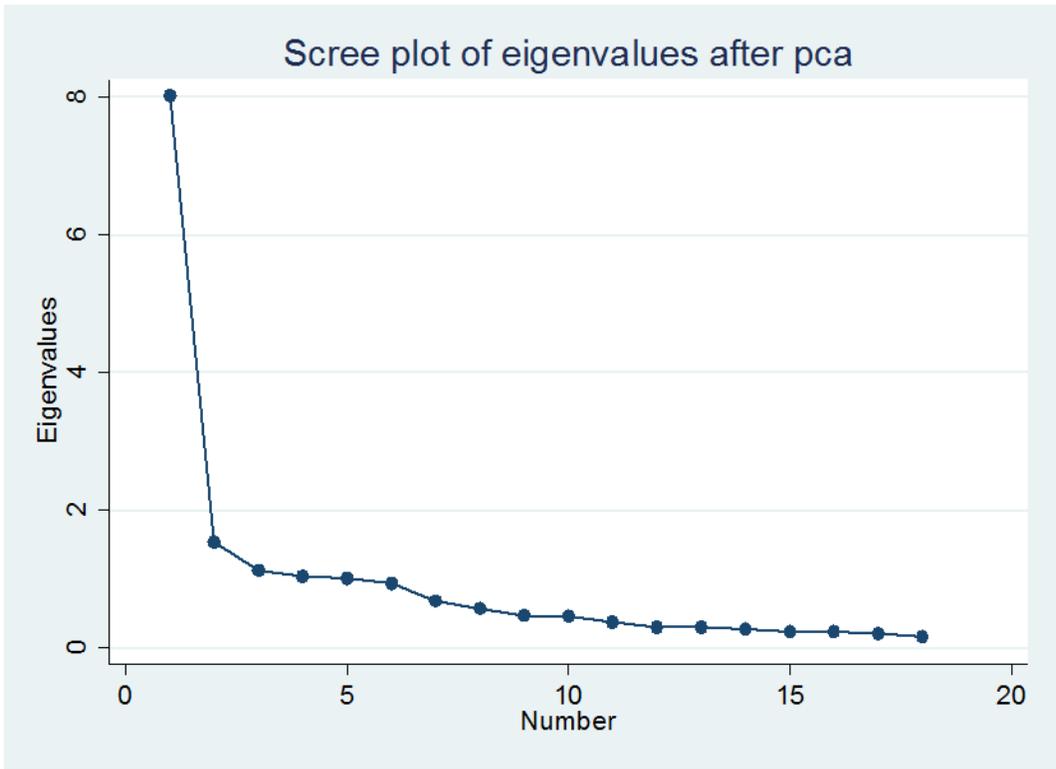
Case Processing Summary

		N	%
Cases	Valid	301	99.7
	Excluded[a]	1	.3
	Total	302	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.771	.914	18

```
. tobit foodincomrat FPPIndex income, ll ul

Tobit regression                                  Number of obs   =        300
                                                  LR chi2(2)      =     274.76
                                                  Prob > chi2     =     0.0000
Log likelihood =  95.583906                       Pseudo R2       =     3.2868

  foodincomrat |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+----------------------------------------------------------------
      FPPIndex |   .0400951   .0042537     9.43   0.000      .031724    .0484662
        income |  -.0000253   2.19e-06   -11.53   0.000    -.0000296    -.000021
         _cons |   .5204224   .0168841    30.82   0.000     .4871953    .5536495
---------------+----------------------------------------------------------------
        /sigma |   .1727805   .0071073                      .1587936    .1867674
--------------------------------------------------------------------------------
  Obs. summary:          1  left-censored observation  at foodincomrat<=.0247413
> 8
                       297       uncensored observations
                         2  right-censored observations at foodincomrat>=1.528111


. correlate foodincomrat FPPIndex
(obs=300)

             | foodin~t FPPIndex
-------------+------------------
foodincomrat |  1.0000
    FPPIndex |  0.6499   1.0000


. summarize foodincomrat

    Variable |      Obs       Mean    Std. Dev.      Min        Max
-------------+---------------------------------------------------------
foodincomrat |      300    .363208    .2717805   .0247414   1.528111


. tobit foodincomrat location education numberpermemployed FPPIndex, ll ul

Tobit regression                                  Number of obs   =        300
                                                  LR chi2(4)      =     184.47
                                                  Prob > chi2     =     0.0000
Log likelihood =  50.437062                       Pseudo R2       =     2.2067

  foodincomrat |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+----------------------------------------------------------------
      location |   .0577279   .0280654     2.06   0.041      .002495    .1129609
     education |   .0270058   .0286678     0.94   0.347    -.0294128    .0834244
   numberperm~d |  -.0626409   .0137133    -4.57   0.000    -.0896288    -.035653
      FPPIndex |   .0560357   .0050121    11.18   0.000     .0461719    .0658995
         _cons |   .3613352   .0297129    12.16   0.000     .3028599    .4198105
---------------+----------------------------------------------------------------
        /sigma |   .2005996   .0082603                      .1843433    .2168559
--------------------------------------------------------------------------------
  Obs. summary:          1  left-censored observation  at foodincomrat<=.0247413
> 8
                       297       uncensored observations
                         2  right-censored observations at foodincomrat>=1.528111
```

Appendix B: Comparative analysis of the impact of high food prices on household food security in South Africa: Evidence from the North-West and KwaZulu-Natal Provinces, South Africa

SPSS Output

Frequencies

Statistics

		FEI Jericho	FEI Swayimane
N	Valid	150	150
	Missing	0	0

Frequency Table

FEI Jericho

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	27	18.0	18.0	18.0
	2	43	28.7	28.7	46.7
	3	26	17.3	17.3	64.0
	4	54	36.0	36.0	100.0
	Total	150	100.0	100.0	

FEI Swayimane

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	49	32.7	32.7	32.7
	2	31	20.7	20.7	53.3
	3	49	32.7	32.7	86.0
	4	21	14.0	14.0	100.0
	Total	150	100.0	100.0	

```
151-user Stata network perpetual license:
        Serial number:  30110517083
          Licensed to:  Clark
                        University Of KwaZulu Natal

Notes:
        1.  (/m# option or -set memory-) 10.00 MB allocated to data
        2.  New update available; type -update all-

. use "E:\methodology 2\fake frank forsure.dta"

. *(1 variable, 150 observations pasted into data editor)

. tabulate foodexpratquantile gender, chi2 lrchi2


. tabulate foodexpratquantile gender, chi2 lrchi2
```

4 quantiles of foodincomr at	gender 0	1	Total
1	13	63	76
2	46	28	74
3	65	10	75
4	66	9	75
Total	190	110	300

```
          Pearson chi2(3) = 107.2175   Pr = 0.000
likelihood-ratio chi2(3) = 112.6438   Pr = 0.000



. tabulate foodexpratquantile farming, chi2 lrchi2
```

4 quantiles of foodincomr at	farming 0	1	Total
1	32	44	76
2	20	54	74
3	29	46	75
4	41	34	75
Total	122	178	300

```
          Pearson chi2(3) =  11.9874   Pr = 0.007
likelihood-ratio chi2(3) =  12.1528   Pr = 0.007



. tabulate foodexpratquantile welfare, chi2 lrchi2
```

4 quantiles of foodincomr at	grants 0	1	Total
1	44	32	76
2	32	42	74
3	21	54	75
4	14	61	75
Total	111	189	300

```
          Pearson chi2(3) =  28.8926   Pr = 0.000
likelihood-ratio chi2(3) =  29.5414   Pr = 0.000
```

98

```
. ttest jerincom == swaincomne
```

Paired t test

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
jerincom	150	6520.953	400.169	4901.049	5730.214	7311.693
swainc~e	150	6012.133	481.9237	5902.336	5059.846	6964.421
diff	150	508.82	577.6594	7074.854	-632.6426	1650.283

```
        mean(diff) = mean(jerincom - swaincomne)                    t =    0.8808
Ho: mean(diff) = 0                               degrees of freedom =       149
```

```
. ttest FEINW == FEIKZN
```

Paired t test

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
FEINW	150	.4322223	.0252494	.3092412	.3823291	.4821155
FEIKZN	150	.2941938	.0169322	.2073767	.2607355	.3276521
diff	150	.1380285	.0288929	.3538647	.0809357	.1951213

```
        mean(diff) = mean(FEINW - FEIKZN)                           t =    4.7772
Ho: mean(diff) = 0                               degrees of freedom =       149

Ha: mean(diff) < 0              Ha: mean(diff) != 0              Ha: mean(diff) > 0
Pr(T < t) = 1.0000            Pr(|T| > |t|) = 0.0000            Pr(T > t) = 0.0000
```

```
. findit spost9
```

```
. brant
```

Brant Test of Parallel Regression Assumption

Variable	chi2	p>chi2	df
All	49.57	0.231	22
income	10.41	0.005	2
gender	2.81	0.246	2
location	0.49	0.783	2
farming	1.28	0.528	2
households	2.37	0.306	2
age	5.56	0.062	2
numberper	4.01	0.135	2
welfare	1.25	0.536	2
distance	3.06	0.217	2
fare	9.33	0.009	2
education	3.98	0.137	2

A significant test statistic provides evidence that the parallel regression assumption has been violated.

Appendix C: Questionnaire

Please be informed that your participation in this study is strictly voluntary, and if you do not wish to answer any particular question, please feel free to say so. You are also assured that the information obtained from this study will be kept confidential and will only be used by Lerato Phali, for the purposes of her Masters study at the University of KwaZulu-Natal. Thank you for your participation in this study.

> **Name of Interviewer**……………………………………………………………………..
>
> **Date**……………………………………………………………………………………
>
> **Name of Household**………………………………………………………………….

1.1: <u>SOCIO-ECONOMIC DETAILS OF HEAD OF HOUSEHOLD</u>

1.1 Can you please tell me your age/ year of birth?

1.2. Is the household head male or female?

1.2 What is your employment status?

1. Unemployed	
2. Formal/permanent employment	
3. Informal / non-permanent employment	

1.3 What is the highest educational level that you attained so far?

1. Never been to school	
2. Primary education	
3. Secondary education	
4. College/University	

1.5 What is your marital status?

1. Married	
2. Single	
3 Separated	
4. Widowed	
5. Divorced	

1.2. Spouse Socio-economic details

1.2.1 If married, how old is your spouse?

1.2.2 What is the highest educational level that your spouse has reached so far?

1. Never been to school	
2. Primary education	
3. Secondary education	
4. College/University	

1.2.3 What is your spouse's employment status?

1. Unemployed	
2. Formal/permanent employment	
3. Informal / non-permanent employment	

1.3. Household information

1.3.1 What religion does your household follow?

1. Christianity	
2. Muslim	
3. Other	

1.3.2 How many people live in your household

1.3.3 How many people in your household are?

1.	Below 14	
2.	Have disabilities or chronic illnesses	
3.	Above 65	

1.3.4 How many members in your household are formally/permanently employed?

1.3.5 Does your household produce any crops?

1	Yes	
2	No	
If yes, Which crops do you produce?		
How long do you consume your produce for? (Eg. 1 week, half a month)		
For vegetables consumption How often do you harvest your produce for own consumption? 1=Rarely= Once or twice a month 2=Sometimes= Three to ten times a month 3=Often= More than ten times a month 4=Very Often= Almost everyday		
For summer crops: How many months do you consume the crops you produce?		

1.3.6 If yes, what is the main reason for engaging in farming, in general?

1.	As the main source of food	
2.	As an additional source of food	
3.	As the main source of income	
4.	As a source of additional income	

1.3.7 Rate the contribution of the following family members in providing agricultural labor? (Where; 0 = no contribution; 1 = little contribution; 2 = moderate contribution; 3 = much contribution; 4 = a lot of contribution)

1.	Yourself	
2.	Your Partner	
3.	Sons	
4.	Daughters	

1.3.8 Are any of your household members receiving a government grants? Yes=1, No=0

If yes on 1.16, how many are on the:	Old age grant?	
	Child grant?	
	Disability grant?	

2. Household expenditure patterns and income sources

2.1.1 Please indicate the food items your household bought and consumed in the last month? (*Complete table below*)

FOOD ITEMS		Quantities bought (in kgs)	Quantity consumed(in kgs)	FOOD ITEMS	Quantities bought (in kgs)	Quantity consumed(in kgs)
Maize meal				Eggs		
Rice				Milk 2lt		
Flour 10kg				Margarine brick (500g)		
Bread (White and Brown)				Vegetables		
Meat	Chicken			Fruits		
	Beef			Beans		
	Tinned Fish			Cooking Oil		
	Mutton			Sugar		
	Pork			Salt and Spices		

2.1.2 If the quantity bought is less than the quantity consumed, where do you get the rest of the food?

1= Own production	
2= Friends and relatives	
3= Employers	

2.2 Did your household ever experience food shortages during the past 12 months? Never=0 Sometimes=1 Always=2	

2.3 Answer questions 2.31-2.39 using the answers below. 0=Never 1=Rarely= Once or twice in the past four weeks 2=Sometimes= Three to ten times in the past four weeks 3=Often= More than ten times in the past four weeks	
2.31 In the past four weeks, did you worry that your household would not have enough food?	
2.32 In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of lack of resources?	
2.33 In the past four weeks, did you or any household member have to eat limited variety of foods due to lack of resources?	
2.34 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 lack of resources?	
2.35 In the past four weeks, did you or any household member have to eat less than you felt because there was not enough food?	
2.36 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?	
2.37 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?	
2.38 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	
2.39 In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	

2.5 What were the sources of your household income in the last 12 months? (Indicate approximately how much each source contributed and how often).

Sources of household Income	Amount per month	Frequency (eg. monthly,weekly)
Remittances		
Agricultural		
Arts and Craft		
Permanent Employment		
Temporary Employment		
Welfare Grants		
Others (specify)		

2.4 Please indicate the non-food items your household spends money on monthly, how much was spent and the frequency in the past month

Expenditure item/s		Total amount	Frequency
Educational	School fees		
	Stationary		
	School Uniform		
	Other (specify)		
Service Bills	Electricity		
	Water		
	Telephone		
	Other (Specify)		
Medical expenses			
Clothing			
Transport			
Toiletries			
Entertainment (eg, liquor, cigarettes, movies)			
Home (furniture, maintenance			
Other (Specify)			

2.5 What were the sources of your household income in the last 12 months? (Indicate approximately how much each source contributed and how often).

Sources of household Income	Amount per month	Frequency (eg. monthly,weekly)
Remittances		
Agricultural		
Arts and Craft		
Permanent Employment		
Temporary Employment		
Welfare Grants		
Others (specify)		

2.6. Land and other assets

2.6.1. What is the total area of land your household operates?	Dry land (ha)	
	Irrigated land (ha)	
2.6.2 Do you apply fertilizer to your land (yes=1 or no=0)		
2.6.3. Do you own livestock (yes=1, no=0		
2.6.4. If yes, how many?		
2.6.5.Do you have productive assets (yes=1, no=0). Eg. Tractors, ploughing machines		

2.8. Access to extension services

2.8.1. Do you have access to extension services (yes=1, no=0)	
2.8.2. How many times have you interacted with an extension officer over the past year?	

2.7 Access to loans

2.7.1. Do you have access to credit (yes =1, no=0)	
2.7.2 If you received some credit in your name, who provided you with such credit and how much? 1. Relatives & friends 2. Formal lending institution 3. Informal lending institution 4. Any other, specify……………	

2.9. Where do you buy your main groceries?)	
2.9.2. How far is the store you buy your main groceries from?	
2.9.3. How much do you pay to get to where you buy your main groceries?)	
2.9.4. What means of transport do you use to get to where you buy your main groceries?	
2.9.5. Do you buy food from the local spaza shops? (yes=1, no=0)	
2.9.6. If yes, When do you buy food from the local spaza shops?	
2.9.8. If yes (to 2.7.5) how often do you buy from the spaza shops in a week?	
2.9.9. What do you buy from the local spaza shops?	

3. Food Price Perceptions

Do u perceive the prices of the following food items very low=1, low=2, moderate= 3, high=4, or very high=5

FOOD ITEMS		Very low	Low	Moderate	High	Very high
Maize meal						
Rice						
Flour 10kg						
Bread (White and Brown)						
Meat	Chicken					
	Beef					
	Tinned Fish					
	Mutton					
	Pork					
Eggs						
Milk 2lt						
Margarine brick (500g)						
Vegetables						
Fruits						
Beans						
Cooking Oil						
Sugar						
Salt and Spices						
Total						

3.2 Value of buildings

Describe the size and material used to build your main houses? (Where; 0 = one roomed, muddy & thatched; 2 = one roomed brick & thatched; 3 = between 2-4 rooms & brick & tiles; 4 = more than 4 rooms & brick & tiles

Building number	Responses				
	0	1	2	3	4
1. Main house					
2. Second main house					

3.3 Water-use security for household uses

How do you rate your household's access to water in terms of the following indicators? (Where; 0 = very low/poor; 1 = low/poor; 2 = moderate; 3 = good/high; 4 = excellent/very high).

Indicator	Responses				
	0	1	2	3	4
Consistence of access					
Sufficiency of water					
Water quality					
Your capacity to pay					

3.4 Human capital empowerment

3.4.1 Health status

3.4.1 Do you have a chronic illness or disability? Yes

3.4.2 How do you rate your state of health over the past year on a five point scale (where; 0 = very poor; 1   = poor; 2 = moderate; 3 = fine; 4 = very fine).

3.4.3 How far is your household to the nearest health institution?