



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

The effect of food price shocks on poverty in South Africa

by

Nonjabulo C. Sambo

A dissertation submitted in partial fulfilment of the requirements of the
degree MSc Agric (Agricultural Economics)

Department of Agricultural Economics, Extension and Rural Development

Faculty of Natural and Agricultural Sciences

University of Pretoria

South Africa

Supervisor: Dr Odirilwe Selomane

Dr Wegayehu Fitawek

February 2025

DECLARATION

I declare that the dissertation, which I hereby submit for the degree MSc in Agriculture Economics at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary university.

Name: Nonjabulo Sambo

Signature

Date

Approved by

Name:

Signature

Date

DEDICATION

I dedicate this thesis to all those who are studying and working full time; I want you to know that even though you started well, with your heart and mind in all the right place, things can happen along the way. Don't let the 'in-between' keep you from your end. It does END well!

ACKNOWLEDGEMENTS

Firstly, I would like to thank God for carrying and sustaining me throughout the period of my study.

To my supervisors, Dr Odirilwe Selomane and Dr Wegayehu Fitawek, I would like to express my gratitude for your never ending patience with me throughout. I'm forever grateful for your unlimited support, guidance, and contributions; this study would not have been achieved without both your contribution and guidance.

And to my formidable force, my parents, mama and papa, thank you for always encouraging me to do better, this one is for you. To my brothers, Urban and Khaya, because I came first, I always think of you when I'm tempted to give up. Thank you for giving me a reason to set a standard.

Finally, to my friends, you are my pillars, you know this wouldn't be possible without your love and support. In no particular order, Khali, Queen, Kat, Sethu, Sewe, Aza, Slim, Riri and Lai. Thank you for keeping me focused and motivated. I appreciate you so much!

ABSTRACT

The effect of food price shocks on Poverty in South Africa

by

Nonjabulo C. Sambo

Degree: MSc. Agriculture Economics

Department: Department of Agricultural Economics, Extension and Rural Development

Supervisor: Dr Odirilwe Selomane and Dr Wegayehu Fitawek

Poverty alleviation, inequality and unemployment have been focal points of South African government policy since 1994 through multiple programmes such as the New Development Plan (NDP) and Reconstruction and Development Programme (RDP). An important area of intervention in the fight against poverty is addressing food prices, which have a major impact on overall poverty and across households. In South Africa, poverty and unemployment levels have been increasing, together with food prices. There are only a few studies that assess the impact that food prices have on the welfare of the people in South Africa, which creates a gap in the literature. Closing this gap could assist policy makers in South Africa to (1) quantify the extent to which food price shocks affect the poverty levels and (2) formulate policies that address the intermediate and long-term food price shocks.

The most recent study on this topic looked at the data for the period ranging between 1990-2015 (van Wyk and Dlamini, 2018). The current study extends this period and looks at the data for the period between 1990 – 2022, adding seven years which include the crucial *COVID-19* era. The current study used both descriptive and econometric analyses to address its objectives. The study employed trend analysis to analyse food prices in South Africa during periods of rapid food price inflation that occurred between 2015 – 2022 and employed the Vector Error Correction Modelling (VECM) technique to estimate a regression model which shows the relationship between food prices and poverty in the long run and short run for the period 1990 - 2022.

The trend analysis was done using graphic illustration whereby a comparison was made between the retail food prices for a selected food basket of a household in the urban areas and the selected food basket of a household in the rural areas. . The analysis also included the trend

for four main food groups, namely: bread, maize meal, poultry and sugar. The vector error correction model techniques used in this study made use of six variables to determine the short-run and long-run relationship between food prices and poverty: the independent variable being Household Disposable Income (HDI) as a proxy for poverty and the dependent variable unemployment, Population growth, Consumer Price Index(CPI), Gross Domestic Product (GDP) and the dummy variables that capture the effect in the years where there is a spike in food prices.

When looking at the price trends for staple foods in South Africa between the periods 2015 - 2022, prices trended upward between the period of 2015 and 2018 and between 2020 and 2021, but downwards in 2022. The upward trend between the period 2015 – 2022 coincided with the period of drought and *COVID-19* in South Africa which negatively impacted food supply systems and ultimate food prices. The results of the VECM estimation reveal that there is a short-run and long-run relationship between food prices and poverty levels in South Africa. The results indicated a negative long-run relationship between food prices and unemployment, CPI and household disposable income and a positive relationship between GDP and population growth. The negative relationship implies that a 1% increase would decrease household disposable income (HDI) by 1.18% (unemployment), 18% (food prices), 1.97% (CPI), 2.08% (GDP) and 0.52% (population growth). Food prices had the highest negative impact on poverty levels in South Africa. Further, in the years when there were food price spikes, poverty increased by 3.61%. Short-run implications of the study revealed that an increase in food prices resulted in reduced household welfare in South Africa. The results of the study confirmed the views of other studies regarding the negative relationship between food prices and poverty.

Policy options that the government has implemented to address the impact of food price shocks in the short run include providing food parcels to the needy and social grants and employee relief schemes targeted at cushioning household income. With regards to addressing the impact in the long-run, the Government can consider partnering with the private sector to bring about job creation and development finance institutions could provide access to finance and credit through food banks and feeding schemes.

Key words: *COVID-19*, Food price trends, Government policies, long run effects, VECM

TABLE OF CONTENTS

DECLARATION.....	i
DEDICATION	ii
ACKNOWLEDGEMENTS.....	iii
ABSTRACT.....	iv
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF ABBREVIATIONS AND ACRONYMS.....	x
CHAPTER 1	1
INTRODUCTION	1
1.1. Background	1
1.2. Food price shocks in South Africa	2
1.3. Problem Statement	3
1.4. Research Questions	4
1.5. Objectives.....	4
1.6. Significance of the study	4
1.7. Structure of the dissertation.....	5
CHAPTER 2	6
LITERATURE REVIEW.....	6
2.1. Introduction	6
2.2. The proxy for measuring poverty	6
2.3. The importance of studying food price inflation.....	7
2.4. Evidence related to food prices crisis.....	8
2.4.1. Global food price crisis.....	8
2.4.2. Food price hikes in Africa	9
2.5. The impact of food price hikes on poverty.....	11

2.6. Government economic policy to eradicate poverty in South Africa	13
2.7. Government regulation and its impact on food prices in South Africa.....	14
2.8. Methods.....	16
2.9. Summary	17
CHAPTER 3	18
RESEARCH DESIGN AND METHODOLOGY	18
3.1. Introduction	18
3.2. Study area.....	18
3.3. Study Design	19
3.4. Data Collection.....	19
3.6. Data analysis	20
3.5.1. Model specification	22
3.5.2. Estimation techniques.....	23
CHAPTER 4	27
RESULTS AND DISCUSSION.....	27
4.1. Food price trends in South Africa between 2015 – 2022	27
4.2. The relationship between food prices and poverty in South Africa	31
4.2.1. Unit root testing.....	31
4.2.2. Johansen Co-integration test.....	33
4.2.3. The VECM estimation result	34
5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	40
5.1. Summary of the study	40
5.2. Conclusions	41
5.3. Recommendations	42
5.4. Limitations of the study and recommendations for further research	43
REFERENCES	44

LIST OF TABLES

Table 3.1: Data used for time series econometric estimation	19
Table 4.1: Unit root test using ADF	32
Table 4.2: Results of unit root test after first difference.	33
Table 4.3: Trace test results.....	33
Table 4.4: Maximum Eigen-values results.....	34
Table 4.5: Long-run regression results: HDI	35
Table 4.6: Short-run regression results	36
Table 4.7: Long-run regression results: HDI	37
Table 4.8: Short-run regression results	38

LIST OF FIGURES

Figure 1.1: CPI for the years 2000 – 2021	3
Figure 3.1: Map showing South Africa, the study area.....	18
Figure 4.1: Food price trends of urban and rural food prices for the years 2015 – 2022..	29
Figure 4.2: Monthly food prices for the years 2000 -2021	30
Figure 4.3: General Impulsive Response Function.....	39

LIST OF ABBREVIATIONS AND ACRONYMS

ADF	Augmented Dicky-Fuller
AIC	Akaike Information Criteria
ASGISA	Shared Growth Initiative for South Africa
CASP	Comprehensive Agricultural Support Programme
CPI	Consumer Price Index
DAFF	Department of Agriculture, Forestry and Fisheries
FPE	Final Prediction Error
GDP	Gross Domestic Product
GEAR	Growth, Employment and Redistribution
HDI	Household disposable income
HQIC	Hanna and Quinn Information Criteria
IRFs	Impulsive Response Functions
KPSS	Kwiatkowski-Phillips-Schmidt-Shin
LR	Likelihood Ratio
NDP	National Development Plan
OECD	Organisation for Economic Co-operation and Development
RDP	Reconstruction and Development Programme
SBIC	Schwartz Bayesian Information Criteria
STATS SA	Statistics South Africa
VECM	Vector Error Correction Model

CHAPTER 1

INTRODUCTION

1.1. Background

In 2020, the world experienced the third food price shock in 15 years, which was caused by the combination of climate change, the COVID-19 pandemic and the Ukraine/Russia war and has slowed down the progress towards tackling the prevalence of hunger (von Grebmer et al., 2022). According to the State of Food Security and Nutrition in the World, the number of undernourished individuals, a sign of chronic hunger, increased to 828 million from 782 million in 2020 and 678 million in 2019 (FAO *et al.*, 2022). In addition, the Global Report on Food Crises reported that in 2021, approximately 193 million more individuals were experiencing severe hunger than in 2020 (IPC, 2022). According to the Global Hunger Index, underlying issues like state fragility, inequality, poor governance, and the level of chronic poverty have a significant impact on how well nations recover from food price shocks (von Grebmer et al., 2022).

In 2021, the pandemic resulted in approximately 22 million jobs being lost and about 30 million people to fall into extreme poverty in Africa (African Development Bank Group, 2022). The African Climate Foundation reported that high food prices in Africa were the outcome of broken food markets which failed to address the impacts of climate change and deliver increasingly unhealthy foods for households and communities. The report further indicated that food was expensive and that prices in African cities were found to be higher than in other developing regions of the world (The African Climate Foundation, 2022).

Poverty alleviation, alongside inequality and unemployment, has been a focal point of government policy by the South African government post-democracy. According to the National Development Plan, South Africa aims to eradicate poverty by the year 2030, implying that no one should be living below the food poverty line of R796 per month (National Planning Commission, 2012). This amount (adjusted to inflation annually) is the sum of money required for a person to afford the minimum required daily energy intake (National Planning Commission, 2012). The Poverty and Equity brief highlights that, despite South Africa made strides in lowering poverty after gaining democracy, the trajectory reversed between 2011 and 2015, with approximately 55.5% of the population living below the national upper poverty

level (World Bank, 2020). This coincides with the period of national food price hikes that were caused by a long period of drought and high temperatures experienced in South Africa.

Food price shocks have negatively impacted food security in South Africa, which in turn, contribute to poverty (van Wyk and Dlamini, 2018). A household is considered to be living in poverty when its income is below the poverty line. Currently, in South Africa, three poverty lines are defined. The lowest is the food poverty line, which is the sum of money required for a person to afford the minimum required daily energy intake, and is set at R796 per person per month (National Poverty Lines, 2024). The medium is the lower-bound poverty and is set at R1109 per person per month, and the highest is the upper-bound poverty line which is set at R1634 for an individual per month in May 2024. The Pietermaritzburg Economic Justice and Dignity group reported that about 55,5% of South Africans lived below the upper-bound poverty threshold of R1634 in 2024, and 25,2% lived below the food poverty line (PMBEJD, 2024). The Integrated Food Security Phase Classification reported that 9.34 million South Africans (16% of population) experienced severe food insecurity in December 2020 and attributed this to a combination of factors which included the COVID-19 pandemic, high food prices as well economic decline (IPC, 2021).

1.2. Food price shocks in South Africa

Prior to 1996, the South African government controlled and regulated the agriculture and food markets. Through several parastatals, the government performed various duties which include import control, price control, and issuing of licences, quotas, and permits. By early 1998, all control boards had ceased operation, this meant that there was no regulation over stakeholders operating within the food value chain (Kirsten, 2015). Post the period of deregulation, the country underwent various periods of food price spikes, in 2002/03, 2007/08, 2011/12, 2015/16 and 2020 - 2022.

The first shock in 2002/2003 resulted from the South African Rand experiencing a sharp depreciation against all major currencies in the world (Kirsten, 2015). The weak currency, coupled with staple food shortages in neighboring countries in Southern Africa led to food inflation increasing from a rate of between 4% and 10% to a high of about 20% in October 2002 (NAMC, 2018). Between 2006 and 2008, the price of major crops increased drastically; the price of wheat on world markets rose by 130%, rice by nearly 90% and maize by nearly a third. Prices for other foodstuffs, including vegetable oil and dairy products also increased (United Nations, 2008). This was due to the combination of rising oil prices and trade shocks

in the food market. Between 2011 and 2012, food prices rose again, although the impact was less severe than it was in 2008, mostly due to the fact that many developing countries had raised their production of cereal. (World Bank, 2013). Between November 2015 and mid-2018 food prices increased due to the prolonged drought and high temperatures experienced in South Africa (Battersby et al., 2019). According to Smith et al. (2017), food products that are predominantly consumed by low-income consumers increased by 16.1% since November 2015. Between 2020 and 2022 food prices increased due to the global pandemic coupled with the war between Ukraine and Russia (Faruk et al., 2024). Figure 1 below shows the movement of food prices in the last 20 years from the period of 2000 to 2021.

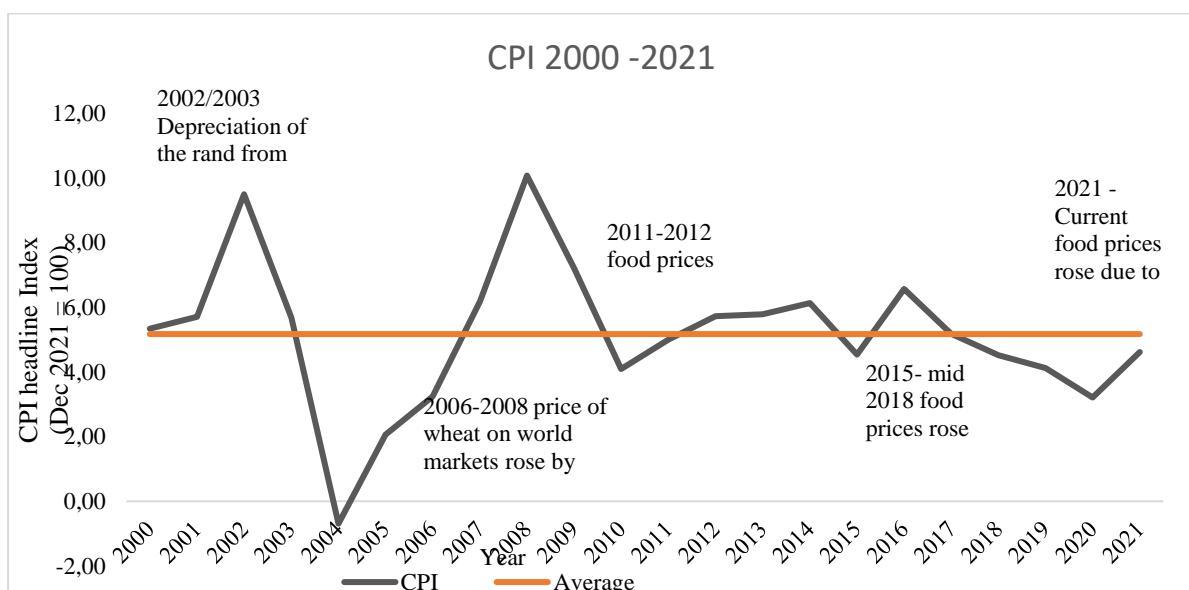


Figure 1.1: South African CPI for the years 2000 – 2021

Source: Own compilation using Statistics SA data.

1.3. Problem Statement

Poverty alleviation remains a priority for the government since it affects the majority of the people living in South Africa. However, achieving this goal has been cumbersome due to constant high food prices among other things. Studies in South Africa, Pakistan, Uganda, Tanzania and Iran have shown that an increase in food prices has a major impact on overall poverty across households (Ghashem et al., 2020; Muhammad et al., 2015; Simler et al., 2009; Van Wyk and Dlamini, 2018). Specifically, the studies concluded that the food price effects are worse on poor households than on middle-income and rich households. The studies also highlighted that the ability of households to substitute food items for cheaper alternatives in the long run has contributed to the decline of the poverty headcount ratio (Ghasem et al.,

2020; Mbegalo and Yu, 2016). The IMF reported that between 2020 and 2022, staple food prices in sub-Saharan Africa increased by an average of 23.9%, the most since the global financial crisis of 2008 (IMF, 2022).

In South Africa, poverty levels and unemployment have been increasing together with food prices, this was exacerbated by the recent COVID-19 pandemic (Hart et al., 2022). There have been limited studies that assess the effect of food prices on the welfare of the people living in South Africa. The lack of sufficient literature in this areas creates a gap which could assist policy makers in South Africa to (1) quantify the extent to which food price shocks affect the poverty levels and (2) formulate policies that address the intermediate and long-term food price shocks. Further, addressing these challenges will also contribute to the global, regional and national goals such as the sustainable development goals (SDGs) and Agenda 2063 whose aim is to eliminate poverty in all its forms by 2030 (Sustainable development goals country report, 2023). This research seeks to assess the effect of food price shocks on poverty levels in South Africa which could assist in contributing to these goals.

1.4. Research Questions

- i. What was the food price trends in South Africa during the periods of rapid food price inflation that occurred between 2015 – 2022
- ii. What is the relationship between food prices and poverty in South Africa?

1.5. Objectives

The main purpose of this study is to assess the impact of food price hikes on poverty in South Africa, between 1990 and 2022. This will be achieved through:

- i. To assess the food price trends in South Africa between 2015 – 2022, focusing on trends in rural and urban areas, as well as trends for key staple foods.
- ii. To assess the relationship between poverty and food prices in South Africa

1.6. Significance of the study

In view of the empirical literature, this research has two key contributions. Firstly, few studies in South Africa looked at the effect of food price shocks on the welfare of South African households. The study by (van Wyk and Dlamini), looked at the data for the period ranging between 1990- 2015 and recommended that future studies should consider the impact that food prices have on the welfare of South African households using data extending beyond that

period. This study looked at the data for the period between 1990 – 2022, which includes the period of regulated agriculture and food markets as well as post regulation. Further, South Africa experienced five food price shocks during this period.

As mentioned above, South Africa has experienced two food price shocks between the period 2015 and 2022, between November 2015 and mid-2018, food prices increased due to the long period of drought and high temperatures experienced in South Africa and between March 2020 and 2022, food prices increased due to the COVID-19 pandemic and the war between Russia and Ukraine (Battersby et al., 2019; Faruk et al., 2024). This study establishes the effect of food price shocks on the welfare of the poor living in South Africa. Although this study has a limited contribution to make in terms of theoretical literature, its empirical contribution is substantial. It is expected that the findings and recommendations generated from this study could help policy makers in decision making and implementation related to food security and poverty alleviation.

1.7. Structure of the dissertation

This dissertation is organised into five chapters. Chapter two gives an overview of past studies globally, in Africa and in South Africa. The third chapter discusses the methodology employed to analyse food price trends in South Africa as well as the relationship between food prices and poverty in South Africa. The fourth chapter describes the results. Chapter five focuses on the conclusion and recommendations.

CHAPTER 2

LITERATURE REVIEW

2.1. Introduction

Food price inflation has been a topic of interest in the past years, various studies globally have studied the impact of food prices on poverty (see e.g., Headey and Hirvonen, 2023; Mbegalo and Yu, 2016 van Wyk and Dlamini, 2018). These studies have reached differing conclusions, with some concluding that high food prices have an adverse effect on poverty levels and some concluding that high food prices can both alleviate poverty and encourage the production of more food. Over the years there have been various causes for domestic food price shocks ranging from international food price shocks transmitting to local food price shocks, economic turbulences and climate related causes. These shocks have become frequent, creating a gap in understanding how these changes in food prices affect the poor in different regions. In addition, Badolo and Traore (2015) indicated that higher food prices' impact on poverty extends beyond changes in consumption and income, as it also affects income inequality and requires consideration of the other implications this may have on other socioeconomic factors.

This section will be divided into two parts and will provides a review of international and local evidence related to food prices. It emphasises the importance of studying food price inflation and government regulation and their impact on food prices, which other studies have also reviewed. The second part discusses the empirical literature on the methodology employed in analysing the effect of food prices on poverty and welfare.

2.2. The proxy for measuring poverty

Stats SA (2011) indicates that income and/or expenditure are the most commonly used proxies for measuring poverty. The report indicates that income reflects consumers' opportunities and access to resources and not just use (Stats SA, 2011). The report further indicates that most analysts argue that consumption expenditure is a better poverty measure than income since the ability to meet current basic needs can be better reflected by actual consumption than income which represents potential consumption (Stats SA, 2011). Nalan and Whelan (2009) indicated that poverty has many dimensions beyond just being about money and highlighted that when individuals are asked to classify themselves in terms of their poverty status, they take into account factors such as education, employment status, health status, permanent income, etc. The report further indicates that individuals' perceptions of their well-being greatly depend on their own functioning in comparison to other individuals in their societies. South Africa

currently uses poverty lines to measure poverty. Poverty lines are defined as the sum of money (adjusted to inflation annually) required for a person to afford the minimum required daily energy intake, which is estimated at R796 (Stats SA, 2024).

Maytree (2017) indicated that being in “poverty” is understood as lacking the resources to meet your basic needs, though “resources” and “basic needs” mean different things to different people. The report highlighted that whilst household income may not be the only proxy for measuring poverty as other resources like savings and assets along with human capital such as skills and education may be used, an income-based poverty measure is best for the following reasons (i) income is easily quantifiable and data is readily available to measure it (ii) Secondly, it is the main way we access the goods and services required to meet our basic needs (iii) Finally, income measures of poverty have been found to closely (but not perfectly) correlate with other indicators of poverty such as food insecurity and material deprivation.

2.3. The importance of studying food price inflation

In the context of this research, food price inflation is defined as the increase in food consumer prices resulting from a given food price shocks. Food price inflation is generally measured using the Consumer Price Index (CPI), which tracks the price of a basket of goods and services that includes food (Ngidi, 2015). Food inflation is important to the welfare of the poor as studies have shown that food price shocks have a greater impact on the poor as they spend a significant portion of their income (20 – 50%) on food products (Ghashem et al., 2020; Muhammad et al., 2015; Phali, 2015; Stats SA., 2014; Simler et al., 2009). Food price shocks reduce household disposable income and in turn, increase poverty levels, leading to food insecurity which has a ripple effect in other sectors such as the health sector.

Over the years, studies have linked food price inflation to an increase in poverty. For instance, Aikins and McLachlan (2022) revealed that the emergence of the pandemic exacerbated the poverty levels in Africa, increasing the number of Africans living in extreme poverty by 30 million. This coincided with rising food prices during that period. Food inflation is also important in understanding the extent and how it affects poverty levels. andand

Further, the significance of understanding food inflation and its impact on poverty is that the frequent increase of food prices contribute to malnutrition, food insecurity, and the exacerbation of existing health conditions, all of which lower household welfare overall. (Gustafson, 2013; Headey and Martin, 2016; Kakaei et al., 2022 and van Wyk and Dlamini,

2018). Thus, studying the importance of inflation could assist in formulating and implementing government policies to lessen the effect of food price inflation.

2.4. Evidence related to food prices crisis

2.4.1. Global food price crisis

The global food crisis remains a challenge, even though the pressures on global food markets have softened somewhat since the pandemic and the Russia/Ukraine war (IMF, 2023). The coronavirus pandemic and the war between Russia and Ukraine disrupted the food supply chain and export bans in some large producer countries of key cereal, energy and fertilizer markets, resulting in a 49 % increase in global food prices (International Monetary Fund, 2023). Global food price hikes significantly affect poverty and food security, especially in low-income countries. Literature shows that the number of impoverished households in developing countries rose as a result of the global food price spike, although the extent varied across countries (Badolo and Traore, 2015). According to the FAO, since the COVID-19 pandemic began and the steps taken to manage it, the number of people suffering from chronic hunger has increased by approximately 150 million (FAO et al., 2022). The FAO also reported that the measures to contain the pandemic contributed to food prices increasing in 2020 and 2021, which in turn led to an increase in food insecurity in every region of the world in 2021, including high-income regions, with approximately 30% of the global population experiencing moderate to severe food insecurity in 2022 (FAO et al., 2022).

The World Bank 2023 reported that acute food insecurity was projected to reach new peak in 2022, surpassing the food crisis in 2007/08. The reason for this was attributed to a combination of factors which included supply chain disruptions that resulted from the COVID-19 pandemic, the war in Ukraine, rising inflation, and high commodity prices which led to increased food prices. The report further reported that average global wheat, maize and rice prices were 18%, 27% and 10% respectively higher in October 2022 than it was in October 2021. Moreover, the report also indicated that food availability was declining for the first time in a decade with global cereal production being lower in October 2022 than it was in October 2021 (World Bank, 2023). This was in line with the report by the IMF that indicated that the world faces food crisis due to major price shocks exacerbating food insecurity. The report indicated that a combination of factors that include conflict between countries, climate shocks, and the impact of the COVID-19 pandemic contributed to the growing food insecurity. Moreover, the report

indicated that these factors negatively affect food production and distribution in turn driving up food prices (IMF, 2022).

2.4.2. Food price hikes in Africa

Poverty in Africa has worsened over the years, with statistics reporting that 445 million people lived in poverty before the coronavirus pandemic and an additional 30 million Africans were pushed to extreme poverty as a result of the pandemic (Aikins and McLachlan, 2022). Woodon, et al. (2008) assessed the short-term impact of poverty caused by an increase in the price of staple foods such as maize, milk, rice, vegetable oil and wheat in West and Central Africa. The study found that a 50 % increase in prices for the selected food items leads to an average increase between 2.5 and 2.4 % in people living in poverty. The study further indicates that in rural areas, the average impact would be between 2.2 and 4.1%, whereas in urban areas, it would be between 3.7 and 5.2%.

Magrini et al. (2015) analysed the effect of the international cereal price shock on the welfare of households in four sub-Saharan countries and one Asian country, Malawi, Tanzania, Niger, Ethiopia and Bangladesh utilizing nationally representative household surveys gathered over the period 2010-2011. The research found that an increase in the international cereal price by 35% led to a welfare loss of 3.81% for Malawi, 5.75% for Ethiopia, 6.16% for Tanzania, 7.86% for Bangladesh and 12.76% for Niger. The study also suggested that targeted policy interventions can be used as an effective tool to lessen the poorest quintiles' susceptibility to fluctuating cereal prices.

Hodgo et al. (2024) analysed the impact of millet and sorghum price shocks on the short-term welfare impacts across the Nigerian population as well as the impact of price shocks in the context of low agricultural output, rapid population growth, and area expansion of cereals. The study found that a rise in the price of millet lowers welfare in rural areas, while an increase in the price of sorghum primarily reduces households' welfare in urban areas. The study also indicated that future food price shocks will probably cause consumers to suffer greater welfare losses.

Headey and Martin (2016) found that the increase of food prices can either have a positive or negative effect on poverty. The negative impacts occurs due to the fact that when food prices increase, the spending capacity of households is reduced as a higher proportion of their income must now be food and food related expenditures. This in turn negatively affects their overall

standard of living. In contrast, an increase in food prices has a positive impact on the agricultural sector in the form of increased employment and wages.

According to the World Bank (2023) approximately 52.86 % of all employment in Sub-Saharan African countries was in agriculture. Therefore, the rise in food prices will lead to an increase in income and profit for employees in the agricultural sector. Mbegalo and Yu (2016) revealed that a household's net consumption or net food production significantly impacts welfare outcomes. The study indicates that households that are net producers tend to benefit from the increase in food prices, which strengthens their socioeconomic outcomes and reduces their risk of poverty. The inverse means that net consumers are more likely to be impoverished.

2.4.3. Food price hikes in South Africa

South Africa has undergone various periods of food price spikes, in 2002/03, 2007/08, 2011/12, 2015/16 and 2020 – 2022(Battersby et al., 2019; Faruk et al., 2024; Kirsten, 2015; Smith et al., 2017; United Nations, 2008; World Bank, 2013). The first shock in 2002/2003 resulted from the South African Rand experiencing a sharp depreciation against all major currencies in the world (Kirsten, 2015). The weak currency coupled with staple food shortages in neighboring countries in Southern African led to food inflation increasing from a rate of between 4 and 10% to close to 20% in October 2002 (National Agriculture Marketing Council, 2017). Between 2006 and 2008, the price of major crops increased drastically, price of wheat on world markets rose by 130%, rice by approximately 90% and maize by approximately a third. Prices for other foodstuffs, including dairy products and vegetable oil also increased (United Nations, 2008).

While developed countries were able to easily absorb this price increase, developing countries were hit the hardest and experienced a dramatical increase in local food prices. Between 2011 and 2012, food prices rose again, although the impact was less severe than it was in 2008, mostly due to the fact that many developing countries had raised their production of cereal (World Bank, 2013). Between November 2015 and mid 2018 food prices increased due to prolonged drought and high temperatures experienced in South Africa. Smith et al. (2017) mentioned that the prices of food products consumed predominantly by low-income consumers increased by 16.1% since November 2015. The global pandemic, coupled with the rise in oil prices has led to an increase in all food commodities between 2020 and 2022.

Although South Africa has a lot of studies focusing on food security and food price inflation (Mkhawani et al., 2016; Phali, 2015; Pillay, 2024), very few studies have considered the effect

of food price shocks on the welfare of South African households (Ngidi, 2015; van Wyk and Dlamini, 2018). Ngidi (2015) examined how South Africa's food price inflation is measured and evaluated its relationship to the poor in South Africa. The research focused on the work of institutions concerned with the measurement of food price inflation in South Africa and found that demographic indicators of poverty are linked to higher food price inflation, although the traditional measure, the CPI, does not suggest that this is very extensive. Van Wyk and Dlamini (2018) investigated the effect of food prices on South African households and found that an increase of 1% in food prices can reduce household welfare effect by over 20%.

2.5. The impact of food price hikes on poverty

Studies on the impact of food price hikes on poverty have over the years reached differing conclusions, with some indicating a positive correlation between food price increase and poverty, whilst others have indicated a negative impact as they have found that food price spikes lead to an increase food supply increase from farmers which in turn increases employment opportunities and therefore income, reducing poverty (Arndt et al., 2022; Headey and Hirvonen, 2023; World Bank, 2019) among others.

Headey and Hirvonen (2023) indicated that an increase in food prices reduces disposable income for the poor as they spend a large share of their income on food. The study also indicates that whilst food is a large expense for the poor, many poor people also earn income from producing or marketing food, and higher prices should incentivize greater food production. In addition, the study indicates that short-run simulation models assume away production and wage adjustments, and probably underestimate food production by the poor. The study analysed annual data on poverty rates, real food price changes and food production growth for 33 middle-income countries from 2000 to 2019 based on World Bank poverty measures. This was done using panel regressions and the results indicated that year-on-year increases in the real price of food predicted a reduction in the poverty headcount US\$3.20-per-day in rural areas.

Lastly, the study highlighted several limitations which included the limitation in the data used as the World Bank does not yet report separate rural and urban poverty estimates for all countries and recommended that future research could separately analyse rural and urban price data, as rural and urban markets for food and non-food items could be poorly integrated in some settings. The other limitation was that the study found robust conditional association between changes in poverty and changes in food prices, but could not establish causation. The

study also highlighted that it focused on the welfare effects of food price increases, but not fertilizer or fuel price increases, which recent simulation analysis suggests could independently increase poverty. Lastly, the study focused on an annual definition of the ‘short run’, which appears to encompass sufficient time for food supply and wage responses to higher food prices and recommended for more work to be done on high-frequency income, wage and food price data.

World Bank (2019) studied the global impact of the 2011/12 food price spike on poverty and found that a hypothetical 10% increase in the price of rice, wheat and maize increases the number of poor individuals living on less than \$1,90 per day by 0.22% or 2.1 million. Specifically, a 10% increase in wheat prices will lead to a 0.01% increase in poor people, and a 10% increase in the price of rice will lead to a large increase in the number of poor people living in sub-Saharan Africa by 0.13% and a 10% in the price of maize meal had a lesser impact on the number of poor people.

Arndt et al. (2022) studied the impact of the food price spikes caused by the Russia-Ukraine war food security and poverty in developing countries. The study focused on the period between June 2021 to April 2022, on the countries Ethiopia, Ghana, Kenya, Mali, Malawi, Myanmar, Niger, Nigeria, Nepal, the Philippines, Rwanda, Senegal, Tanzania, Uganda, Zambia, Bangladesh, Cambodia, DRC, Egypt, and Ethiopia. The assessment was done using survey-based microsimulation models linked sequentially to the economywide models. Each country’s economywide model had 15 representative household groups, grouped into rural farm, rural non-farm, and urban households, and split by expenditure quintile. Sampled households in a household income and expenditure survey were mapped to the 15 representative household groups in the model. The modeled impacts of the global price shocks on consumption expenditure of the 15 representative household groups were then transferred to the individual households in the survey, and the microsimulation model computed associated changes in the poverty status of individual households.

The study found that the global price shocks raised national poverty headcount rates in all countries by up to 7.7 percentage points in Myanmar, and less than 1 percentage point in Ghana, Niger, Nigeria, Uganda, and Zambia. This indicates that 27.2 million more people in the 19 countries covered in the analysis fell below the poverty line. The study further indicated that 72% of the 27.2 million individuals living below the poverty line were rural residents. The study also concluded that increasing food prices are a major factor contributing to poverty in

both urban and rural areas. The study indicated that it did not take into consideration any government interventions designed to mitigate the effects of the food price shocks.

Contrary to the study by the World Bank (2019) and Arndt et al. (2022), some studies have found that poor people in the agricultural sector benefitted from higher wages as high food prices lead to an increase in demand for labour, which puts upward pressure on wages (Jacoby, 2016). Headey and Hirvon (2023) found that a majority of people residing in rural areas are poorer and more likely to be farmers and prospective net food producers. As a result, when food prices increase, it is met by a strong short-run supply response for crop production, which in turn induces increased demand for unskilled labour and causes wages to rise relatively quickly. According to the study, the rate and magnitude of salary adjustments in response to an increase in food prices will vary depending on the context and may also alter over time due to structural changes in the labour markets in rural and urban areas.

2.6. Government economic policy to eradicate poverty in South Africa

South Africa has been labelled as one of the most unequal countries in the world, with more than 50% of its population living in poverty (World Bank, 2020). The South African government has since 1994 implemented several initiatives to combat poverty, these include low-income housing subsidies, no fee schools, social grants and free basic services (Friedman and Bhengu, 2008). The government has, through multiple programs, aimed to reduce poverty and improve the standard of living for all South Africans.

“... improve the standards of living and quality of life for all South Africans and to create a sustainable democracy by prioritising poverty eradication, access to land and providing basic services to people within a peaceful and stable society, characterised by equitable economic growth” (Sithole, 2014, p.1).

The Reconstruction and Development Programme (RDP) was a South African socio-economic policy framework implemented by the African National Congress (ANC) government of Nelson Mandela in 1994. The RDP policy stated that the alleviation of poverty should include basic infrastructure (housing, sanitation, water, and electricity); fair resource allocation; public investment for economic security; appropriate resource coordination; and the necessity of a targeted rural development program that targets deprivation (South Africa, Office of the Presidency, 1994). As part of the implementation, the RDP's targets included achieving:

“ ... 2.5 million jobs over a ten year period; building of one million houses by the year 2000; connection to the national electricity grid of 2.5 million homes by 2000; provision of running water and sewerage to one million households; distribution of 30% of agricultural land to emerging Black farmers; development of a new focus on primary health care; provision of ten years of compulsory free education for all children; encouragement of massive infrastructural improvements through public works; and restructuring of state institutions by 1997 to reflect the broader race, class and gender composition of society.”
(Sithole, 2014, p.25).

The RDP policy was criticised for falling short of achieving the country’s macro-economic objectives. In order to address this, a macroeconomic policy framework called the Growth, Employment and Redistribution (GEAR) strategy was introduced by the government in 1996 in an effort to boost economic growth more quickly, which was necessary to supply funds for social investment demands (Fedderke, 2022). In addition to incorporating the majority of the RDP's social goals, the policy aimed to minimize budget deficits, lower inflation, preserve exchange rate stability, lower trade barriers, and liberalize capital flows (Fedderke, 2022). Although the GEAR strategy achieved the macroeconomic objectives, it could not contribute towards job creation and poverty alleviation (Streak, 2004). In 2005, the GEAR strategy was replaced by the Accelerated and Shared Growth Initiative for South Africa (ASGISA) as an extension of the first two developmental strategies that were followed post 1994. ASGISA’s objective was to reduce poverty by 2010 and reduce unemployment by half by 2014, from 28% to 14% by 2012 (Department of Basic Education, 2018).

The New Growth Path (GNP) policy, which succeeded ASGISA in 2010, aimed to increase economic growth in South Africa while lowering poverty, unemployment, and inequality (Department of Basic Education, 2018). In 2012, the government introduced the National Development Plan (NDP) which seeks to eradicate poverty and reduce inequality by 2030 (Department of Basic Education, 2018). Some of the key objectives of the NDP include reducing inequality as measured by the Gini coefficient, from 0.69 to 0.6 and lowering the percentage of people who live in households with a monthly income below R419 per person from 39 % to 0%.

2.7. Government regulation and its impact on food prices in South Africa

Studies have found that food price spikes tend to have a negative impact on vulnerable population groups (Badolo and Traoré, 2015; Kakaei et al., 2022; Magrini et al., 2017). The

World Bank (2019) reports that countries tend to use government policy interventions to dampen this impact. For example, following the 2002/03 food crisis, the South African government implemented the emergency scheme and agriculture starter pack in order to provide relief to the most vulnerable communities (Kirsten, 2015). In addition, the government also launched the food emergency scheme to provide emergency food parcels for a period of three months, following which, the agricultural starter packs would have allowed households to produce their own food (Kirsten, 2015). Internationally, net food-importing countries would lower trade protection on food items in the event of food price spikes, while export restrictions or bans are enforced by net food exporting nations. These policies are often used in conjunction with social safety net programs such as school feeding programs or social grants.

The government has various policies aimed at cushioning consumers from food price spikes based on the cause of the spike. If the food price spike arises from a weather shock, that is, the shock is assumed to generate production shortfalls and, in turn, raise domestic food prices. The government may implement some trade policies such as the introduction of export bans (food exporters) or the reduction of import duties (food importers) (World Bank, 2019). In addition, the government will provide support to local producers through grants and other farmer programs. For instance, in South Africa, following the drought during the period from 2015 to 2018, Farmers received support through the Comprehensive Agricultural Support programme (CASAP) and Iiima/Letsema programmes. The Department of Agriculture, Forestry and Fisheries (DAFF) collaborated with provincial departments of agriculture and allocated an amount of R381 million towards drought relief, focusing on providing animal feed and drilling and equipping boreholes for smallholder and subsistence producers (Department of Agriculture, Forestry and Fisheries, 2016).

The recent food price shock arose due to the combined effect of the unprecedented COVID-19, which was a global crisis and the war between Russia and Ukraine. The government had various policies implemented which were two-fold, policies aimed at containing the spread of the virus and policies aimed at protecting the population from the impact of food price shocks. These policies include the following (Blecher et al., 2022):

- i. The government implemented a social relief programme, which was initially 6-months long but was extended to three years, whereby Beneficiaries of child support grants received an additional R300 in May and an additional R500 each month from June to October. People who were unemployed at the time and did not get any other social grants

or UIF payments were given a special COVID-19 Social Relief of Distress grant of R350 per month (Blecher et al., 2022 ; Mlambo and Khuzwayo, 2021) .

- ii. 250,000 food parcels were distributed nationwide during the first two weeks by the Department of Social Development in collaboration with the Solidarity Fund, NGOs, and community-based organizations (Blecher et al., 2022; Solidarity Fund, 2020).
- iii. Regulatory bodies such as the Competition Commission investigated price gouging by companies on foods that were deemed essential items (Competition Commission of South Africa, 2020).

2.8. Methods

In literature, time series analysis usually uses the Autoregressive Vector (VAR) to explain the simultaneous variables that have influence on each other. The VAR model can be applied if all variables used are stationary, but in the case when variables are not stationary then the model used is the Vector Error Correction Model (VECM), provided that there is one or more cointegration relationships between the variables (Russel et al., 2020). VECM is very useful because it can estimate the short-term effects between variables and the long-term effects of time series data.

Van Wyk and Dlamini (2018) analyzed the impact of food prices on the welfare of households in South African using the the vector error correction model and found evidence of short-run and long-run causality between food prices and welfare. Headey (2018) uncovered evidence that increases in food prices are associated with reduction in poverty and not increases using both auto-distributed lag (ADL) models and vector error correction models (VECM). This was done through investigating whether changes in food prices influence agricultural production and input use and unskilled wages. Specifically, the study used available monthly data on rural and urban wages in Bangladesh to test whether rice prices differentially influence rural and urban labor markets. The results revealed that around three-quarters of the world's poor are still rural and are therefore either directly dependent on farm income or on non-farm incomes that are likely to be strongly influenced by agricultural production decisions, particularly the demand for labor. Secondly, the study found that higher food prices appear to have produced a positive, large, and relatively quick agricultural supply response in developing countries.

Sijabat (2023) examined the causal relationship of economic growth, poverty, unemployment, and inflation in Indonesia from 2000 to 2019 using the Vector Error Correction Model (VECM). The study found a significant short term and long-term relationship between inflation, economic growth, the poverty rate and the unemployment rate.

2.9. Summary

It can be concluded that literature shows opposing views on the impact that food price shocks have on poverty levels with some indicating a positive relationship whilst others have indicated a negative relationship. The study notes that the limitation in the availability of data for factors (variables) that influence poverty levels may be the reason for the different conclusions. The study also notes that majority of the research suggests that food price have a positive relationship with poverty. Therefore, the hypothesis can be formulated that food price shocks contribute to the increasing poverty levels in South African households.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1. Introduction

This section of the study describes the research methodology which is divided into five sub-sections. These include the study areas, which depicts the location where the study was conducted, the study design, data description and collection broken down into the type of data, period and data source. Finally, it describes the data analysis and analytical methods used in this research.

3.2. Study area

The study area for this research was focused on South African households (Figure 3.1). South Africa is located at the Southern tip of the continent of Africa and is bordered by the Atlantic Ocean and the Indian. South Africa comprises of nine provinces with varying population densities in each province. Statistics South Africa estimated the population size to be 62 million people at the end of 2022 (Statistics South Africa, 2023).



Figure 3.1: Map showing South Africa, the study area.

Source: <https://www.worldatlas.com/maps/south-africa>

Approximately 55,5% of the population lived in poverty at the national below poverty line between 2011 – 2015 (World Bank, 2020). This coincided with the period of national food price

hikes caused by long drought and high temperatures experienced in South Africa. More recently in 2022, approximately 50% of the population lives below the poverty line (Statistics South Africa, 2022). As mentioned in chapter one, South Africa experienced multiple food price shocks between the period 1994 – 2022. Factors such as the weaker rand, persistent and escalating load shedding, the effect of climate change in key production areas, geopolitical unrest (war in Ukraine), supply chain disruptions and animal diseases contribute to food price shocks experienced in South Africa (BFAP, 2022).

3.3. Study Design

The research uses two forms of secondary data to answer the two research questions. Firstly, the secondary data was collected from the South African Reserve Bank, the World Bank, Statistics South Africa (Stats SA) and the Organisation for Economic Co-operation and Development (OECD) covering the period 1990 – 2022. Secondly, the effect of food prices was estimated using household disposable income, unemployment, CPI, GDP, population growth, food prices and a dummy variable (Table 3.1 below).

3.4. Data Collection

The study used historical time series data obtained from secondary sources such as the South African Reserve Bank, the World Bank, Statistics South Africa (Stats SA) and the Organisation for Economic Co-operation and Development (OECD), covering the period 1990 – 2022. Due to the data on poverty levels in South Africa not being available, the study used household disposable income as a proxy for poverty. As mentioned above, poverty is defined by using a poverty line, which is the amount of money that an individual needs to afford the minimum required daily energy intake.

3.5. Description of variables

Household disposable income is the best proxy for estimating poverty levels. In addition, the study incorporates variables such as household Gross Domestic Product (GDP), food prices, consumer price index, population growth and unemployment. All the variables were collected in percentages and only food prices were subjected to natural logarithm to ensure that the results do not yield biased estimation. The study's variables and their sources are summarized in Table 3.1 below.

Table 3.1: Summary of variables used for time series econometric estimation

Variable	Indicator name	Variable description	Time period	Source
HDI	Household disposable income	Household disposable income is the income available to households such as wages and salaries, income from self-employment and unincorporated enterprises, income from pensions and other social benefits, and income from financial investments (less any payments of tax, social insurance contributions and interest on financial liabilities).	1990 - 2022	South African Reserve Bank
UN	Unemployment	Unemployment refers to the share of the labour force that is without work but available for and seeking employment.	1990 -2022	World bank data
FP	Food prices	A measure of annual South African food prices for a basket of food commodities.	1990 -2022	OECD
GDP	Gross Domestic Product	GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products	1990 -2022	World bank data
POP	Population Growth	Annual population growth counts all the South African residents regardless of legal status or citizenship.	1990 -2022	World bank data
CPI	Consumer price index	The consumer price index reflects changes in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	1990 - 2022	Stats SA
Dummy	Dummy variable	Captures the effect of food prices on years when there is a food price shock	N/A	N/A

Note: Food prices were converted into log form

Source: Author's own compilation

As mentioned in Chapter 1, South Africa has experienced multiple periods of food price spikes between the period of 1990 and 2022, in 1992/2, 1994/5, 2002/3, 2008/9, 2015-2018 and 2020 – 2022. This study also aims to capture that and to achieve this, a dummy variable was used in both co-integration and the vector error correction model (VECM).

3.6. Data analysis

The research used both descriptive and econometric analyses to address its objectives. Trend analysis was employed to analyse the first objective, which is the food price trends in South Africa during periods of rapid food price inflation that occurred between 1990 – 2022. In

addition to the trend in food prices, trends for four main food groups were plotted, namely: bread, maize meal, poultry and sugar. The choice of food products was motivated by the findings of Steyn et al. (2015), who found that bread, maize meal and sugar were the most consumed foods in South Africa and chicken was the most preferred source of protein. This is also in line with the report by the BFAP (2022) outlook report that indicated that maize meal, followed by rice and brown and white bread, were the most widely consumed grain-based staple food in South Africa.

To address the second objective, the relationship between food prices and poverty in South Africa by determining how real household welfare responds/reacts to shocks in food prices and the vector error correction model (VECM) was used.

VECM is an error correction model (single equation) that has been adapted from multiple equations which is based on a restricted VAR. For the analysis to be correctly deployed, certain requirements need to be met, namely, variables ought to be non-stationary and have a unit root. It is also important to determine the order of integration of the variables at first differences. The order of integration is either $I(1)$, indicating an order of 1 or $I(0)$, indicating an order of zero. Johansen and Juselius (2002) indicated that for co-integration to exist between non-stationary variables, at a minimum two of the variables of all those used in the co-integration test must be integrated to the order of one $I(1)$. The ADF tests below was used to assess unit roots and the results used to ensure that the condition was met for the VECM to be estimated.

The econometric analysis used the following steps:

- i. The study adopted the Augmented Dicky-Fuller (ADF) unit root test to test the stationarity of the variables. This step is also necessary to enable the appropriate selection of methodology.
- ii. To determine the co-integration relationship between the variables, the study employed the Johansen maximum eigenvalue and trace tests. At least one co-integration relationship between the variables is required in order to adopt the VECM methodology.
- iii. Lag length selection criteria was used to establish the number of lags.
- iv. The vector error correction model (VECM) was used to explore the long-run and short-run relationship between poverty and income in South Africa.

- v. Diagnostic and stability tests were employed to assess the goodness of fit of the selected residuals or if the residuals estimated in the VECM are symmetrically distributed.
- vi. The impulse response function test was used to explain how responsive a dependent variable is to a shock in an independent variable.

3.5.1. Model specification

This research follows the model specification by Van wyk and Dlamini (2018) and develops a regression model as follows:

$$HDI = f(UN, LNFP, HFCE, POP, CPI) \dots\dots\dots (1)$$

Where:

- HDI – household disposable income as a proxy for poverty
- UN – unemployment
- LNFP – food prices in a logarithm form
- GDP – Gross Domestic Product
- POP – population growth
- CPI – consumer price index

The model transforms into a linear form as follows:

$$HDI_t = \beta_0 + \beta_1 UN + \beta_2 LNFP + \beta_3 GDP + \beta_4 POP + \beta_5 CPI + \mu_t \dots\dots\dots (2)$$

Where:

- β_0 – Constant
- $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ – Coefficients
- μ_t – Error term

The following is the specification for the stochastic model of regression crucial in the regression analysis using the VAR framework:

$$HDI_t = \delta_0 + \delta_1 UN_t + \delta_2 LNFP_t + \delta_3 GDP_t + \delta_4 POP_t + \delta_5 CPI_t + \mu_t \dots\dots\dots (3)$$

The following is how the model can be converted into a VEC form:

$$\Delta HDI_t = \delta_0 + \delta_1 \Delta UN_{t-1} + \delta_2 \Delta LNFP_{t-1} + \delta_3 \Delta GDP_{t-1} + \delta_4 \Delta POP_{t-1} + \delta_5 \Delta CPI_{t-1} + \varepsilon_{t-1} + \mu_t \dots\dots\dots (4)$$

Where:

Δ – Difference operatives

ε_{t-1} – Lagged significance of error term derived from the long-run co-integration relationship and is utilised to apprehend the short-run dynamics.

3.5.2. Estimation techniques

As indicated above, the study used the VECM econometric approach to analyse the relationship between food prices and poverty in South Africa. The VECM method requires that the following steps be followed:

(i) Unit root test - Augmented Dickey Fuller Test

The first step in almost all time series econometric analysis is testing stationary or non-stationary variables. Non-stationarity occurs when the data generating process has a unit root and or trend. This test can be done through various methods such as Augmented Dickey Fuller (ADF), Phillips-Perron (PP) test, Kwiatkowski-Phillips-Schmidt-Shin (KPSS). The stationarity of the variables was evaluated using the Augmented Dickey Fuller (ADF) test. If the variables are non-stationary at levels, the study proceeds to test it at first difference. If variables become stationary after taking their first difference, then it is called I (1) processes or integrated at order 1 (Wooldridge, 2009). So, in general, a variable is an integrated order of q or I (q), if it gets stationary at the q^{th} difference.

The ADF test was applied using the following:

$$\Delta Y_t = \alpha + \beta t + \delta \beta t + \sum_{i=1}^n \lambda \Delta Y_{t-1} + \varepsilon_t \dots \dots \dots (5)$$

Using the AR (ρ) process, the hypothesis for the ADF test is quantified as follows:

$H_0: \delta = 1$ implies that the variable has a unit root (non-stationary), and

$H_0: \delta < 1$ implies that the variable does not have stationary (stationary)

In addition, when testing for stationarity, we are required to calculate the t-statistics that can be found by applying the following: $\tau = \frac{\alpha}{\sqrt{var(\alpha)}}$ and once the t value has been determined, it must be compared to the critical value based on various significant levels in order to verify whether the null hypothesis has been accepted or rejected. The stationarity of the series can be verified if the null hypothesis is either rejected or not accepted.

(ii) Lag length selection criteria

When employing the VECM method, it is important to conduct a lag length selection criterion in order to determine the number of lags to use. Final Prediction Error (FPE), Akaike Information Criteria (AIC), Schwartz Bayesian Information Criteria (SBIC), and Hanna and Quinn Information Criteria (HQIC) can all be used to conduct the lag selection process.

(iii) Co-integration Test

The co-integration test was used to investigate the existence of co-integrating relations among integrated economic variables before a formal inference was conducted. Granger and Newbold, (1987) indicated that co-integration is an econometric approach that is used in testing the correlation between two or more non-stationary time series over a specific period of time. If co-integration is found within the data, vector error correction models can be used for estimation. This study employed the Johansen Maximum Likelihood Estimation process since it is the preferred process due to its ability to test for multiple co-integrating vectors. The Johansen procedure also permits for testing of both restricted and unrestricted forms of co-integrating vectors and the speed of adjustment parameters.

Asteriou and Hall (2011) indicated that the Johansen approach is concerned with two assessments, namely the Trace test and the Maximum Eigen Value. The tests represent the probability ratio test for the proposition that there are at most “r” co-integrating vectors. The trace test and the maximum Eigen value test can be conducted using the following formula:

$$J_{trace} = -T \sum_{i=r+1}^n \ln(1 - \lambda_i)$$

$$J_{maxEigen} = -T \ln(1 - \lambda_r + 1)$$

Where T is the sample size and λ is the i^{th} largest canonical correlation.

(iv) Vector Error Correction Model

The Vector Error Correction Model (VECM) was developed by Johansen (1991) to determine the existence of co-integration between variables and to also determine if variables are in an equilibrium type of relationship in the long-run. The VECM method requires that there should at least be one co-integrating association between the variables under study. The importance of the VECM is that it considers both the long-run and short-run adjustment and it also provides evidence on the causal factors that can affect variables. The VECM is classified under the VAR

framework, and it takes into consideration the results from the Johansen co-integration test, hence it is important to perform the Johansen co-integration test before the VECM.

(v) Diagnostic and stability tests

The data employed in the model were tested to see if the data that has been selected follows a normal distribution. Normal distribution refers to the goodness of fit of the selected residuals or if the residuals estimated in the VECM are symmetrically distributed. The study used the Jarque-Bera test to conduct the normality test in the model. This was done by calculating the p-value against a level of significance at 5%. The null hypothesis of this test is if the estimated p-value ≤ 0.05 , the null hypothesis is rejected, and the residuals are not normally distributed. The alternative hypothesis is the p-value is > 0.05 (Gujarati, 2003).

(vi) White heteroskedasticity test

Gujarati (2003) defined heteroskedasticity as when the residuals calculated in the VECM are unequal over a range of measured values. The residuals of having residuals with heteroskedasticity are that OLS estimation assumes all residuals are drawn from a population that has a constant variance. This study used the White heteroskedasticity tests. The White heteroskedasticity calculates a p-value compared to a 5% significance level. Like the normality test, if the estimated p-value is less than 5%, the null hypothesis is rejected, and the model has heteroskedasticity. The null hypothesis for the test is that there is no heteroskedasticity if p-value is > 0.05 and the alternative is that if $p \leq 0.05$ there is heteroskedasticity.

(vii) Serial correlation test

The study uses the Breusch-Godfrey LM to test for serial correlation. The reason why the Breusch-Godfrey LM test was chosen is that it provides reliable results and considers the higher orders of serial correlation. The test can be applied using the following equation:

$$\gamma_t = \beta_1 + \beta_2\chi_{2t} + \beta_3\chi_{3t} + \dots + \beta_k\chi_{kt} + \mu_t \dots \dots \dots (6)$$

and

$$\mu_t = p_1\mu_{t-1} + p_2\mu_{2t} + \dots + p_p\mu_{t-p} + \varepsilon_t \dots \dots \dots (7)$$

The Breusch- Godfrey LM test combines two equations in one as follows:

$$\gamma_t = \beta_1 + \beta_2\chi_{2t} + \beta_3\chi_{3t} + \dots + \beta_k\chi_{kt} + \mu_t p_2\mu_{2t} + p_p\mu_{t-p} + \varepsilon_t \dots \dots (8)$$

The tested hypotheses are:

$H_0 \rho_1 = \rho_2 = \dots = \rho_p = 0$ no autocorrelation.

H_a = at least one of the ρ is not zero, therefore serial correlation.

If it is found that the P-value is less than the level of significance α (0.05), the null hypothesis of no autocorrelation is rejected.

(viii) The impulse response function test

Impulse response functions were used to explain how responsive a dependent variable is to a shock in an independent variable. In addition, plotting the impulse response functions assists in visualizing the magnitude, length and direction of the variable after having a shock on either itself or from other endogenous variables within the system, *ceteris paribus* (Lutkepohl, 2005).

CHAPTER 4

RESULTS AND DISCUSSION

This section reports the findings of the study. The first sub-section presents the results of the food price trend analysis for food prices in South Africa between the years 2015 - 2022 in the first sub-section. The second sub-section presents the findings of the short-run and long-run relationship between food prices and the poverty levels of households in South Africa for the period 1990 to 2022.

4.1. Food price trends in South Africa between 2015 – 2022

4.1.1. Trend in average food prices

Firstly, the study shows the food price trend for an average food basket for a South African household. Then a comparison is made between the retail food prices for urban areas and the retail food prices for rural areas. This basket consists of full-cream milk – long life (1ℓ), a loaf of brown bread (700g), a loaf of white bread (700g), special maize meal (2.5kg), super maize meal (2.5kg), margarine spread (500g), peanut butter (400g), rice (2kg), sunflower oil (750ml), ceylon/black tea (62.5g), and white sugar (2.5kg) as selected by the NAMC food cost review report. Lastly, the trends of the individual staple foods are shown over the same period.

Figure 4.1. below shows that food prices have been moving upward between the periods 2015 and 2022. In addition, there is a food price spike in 2017, 2020 and 2022. The food price spikes resulted from the droughts, the COVID-19 pandemic and the Ukraine/Russia war that took place during those periods (Battersby et al., 2019; Faruk et al., 2024). This is in line with expectations as there were immediate consequences for food supply and prices in South Africa due to the drought experienced in 2015 – 2018 and 2020, for example, overall food price inflation surged by almost 15 per cent following the drought in 2015 -2018 (Smail, 2022). A report by Business Tech highlighted that prices of several food items often found in shopping baskets across income brackets increased by over 60% since 2017, with some even doubling inflation over the same period (Business Tech, 2024). The National Agricultural Marketing Council (2022), reported a slightly lower increase for their food basket, whereby the value of the food basket in April 2022 cost 23 percent more in value compared to the same basket in 2017.

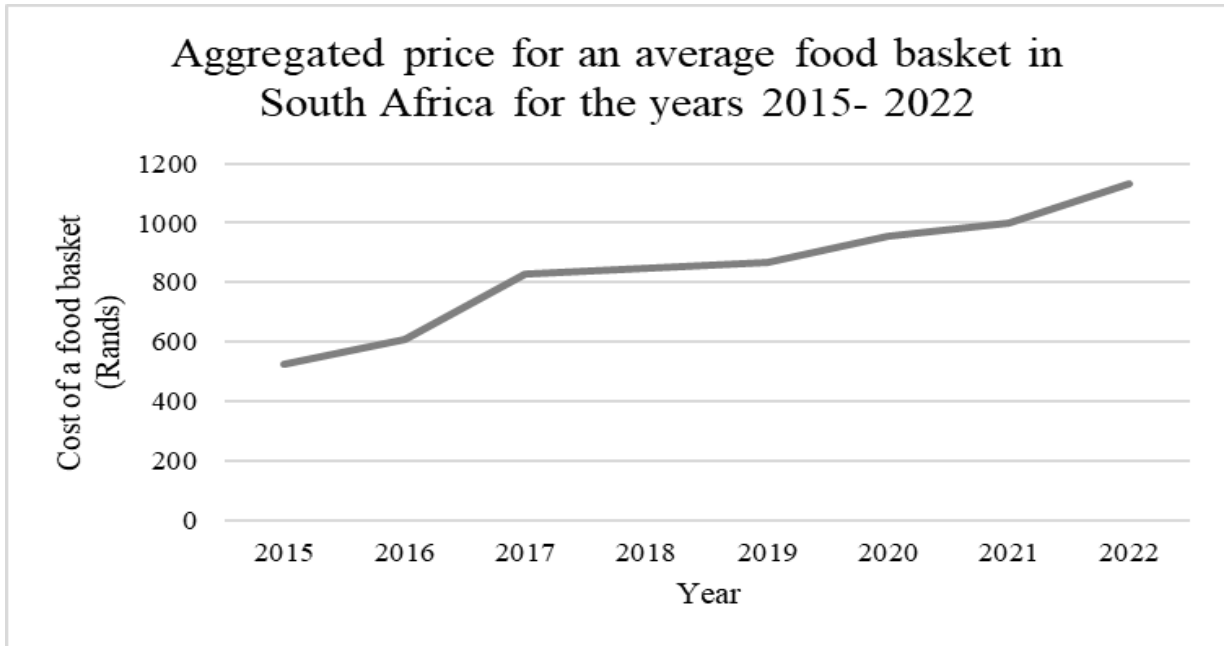


Figure 4.1: Food price trends for an average food basket in South Africa for the years 2015 – 2022.

Source: Own compilation using Statistics SA data

4.1.2. Trend in average food prices in rural versus urban areas

There was a steady upward trend in both the rural and urban food basket between 2015 and 2022 (Figure 4.2). In addition, an urban food basket costs slightly more than the rural food basket between the period 2015 and 2018. This could be caused by urban consumers allocating more of their budget to products that exhibited a more substantial price increase in the food basket during period of 2015 – 2018 (Oxfam Research, 2014; Shelembe, 2018; Statistics SA, 2013). The rural prices were slightly higher between 2021 and 2022. According to the National Agricultural Marketing Council (2008), the reason for the disparity in food prices between the rural and urban food prices can be attributed to transport costs, which include maintenance, fuel and the frequency of trips to and from suppliers. In addition, rural outlets tend to receive low or no volume discounts, 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 (NAMC, 2008; Pereira, 2014; Phali, 2015). Figure 4.2 also suggests between 2020 and 2022, the food prices in urban were slightly lower than the rural areas.

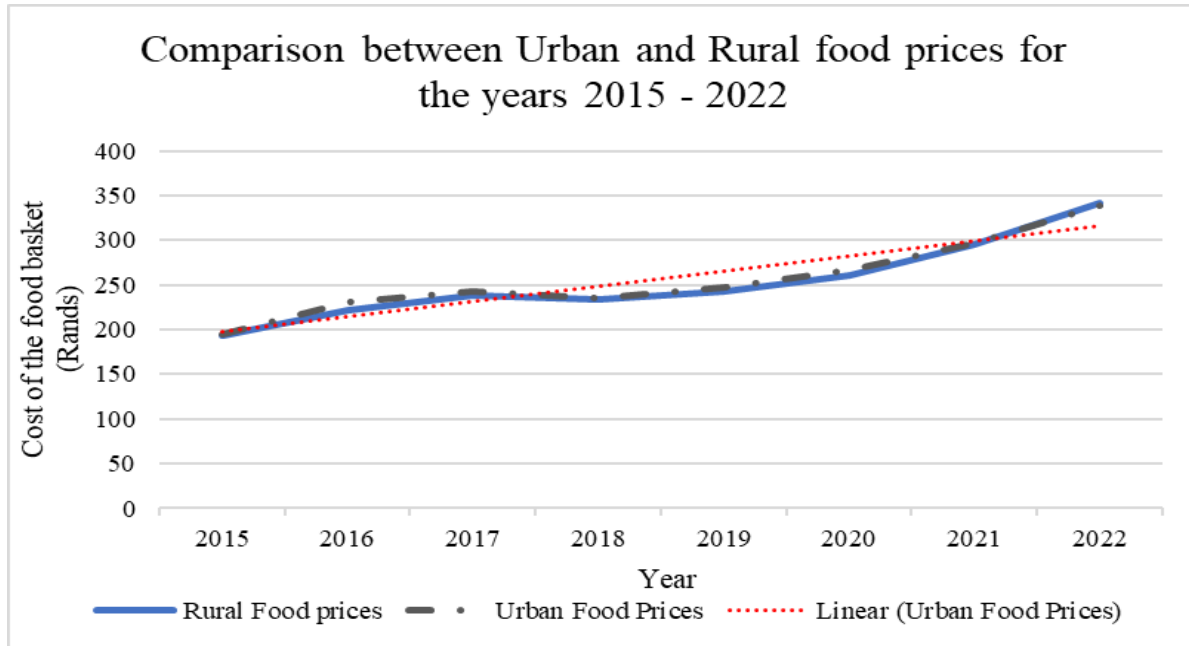


Figure 4.2: Food price trends of urban and rural food prices for the years 2015 – 2022.

Source: Own construct based on Statistics SA data.

The NAMC (2022) also reported that when expressed as a share of the average monthly income of the poorest 30% of the population, the cost of the food basket increased from 65.3% in April 2021 to 70.3% in April 2022. The food basket cost increased from 3.5% in April 2021 to 3.7% in April 2022 when expressed as a share of the average monthly income of the wealthiest 20% of the population. This implies that the food price shock affected the poorest population the most as a large portion of their income is spent on food. This indicated that food price increase results in disposable income decreasing as the spend on food increases. Figure 4.3 shows the price trends for four selected staple food prices in South Africa.

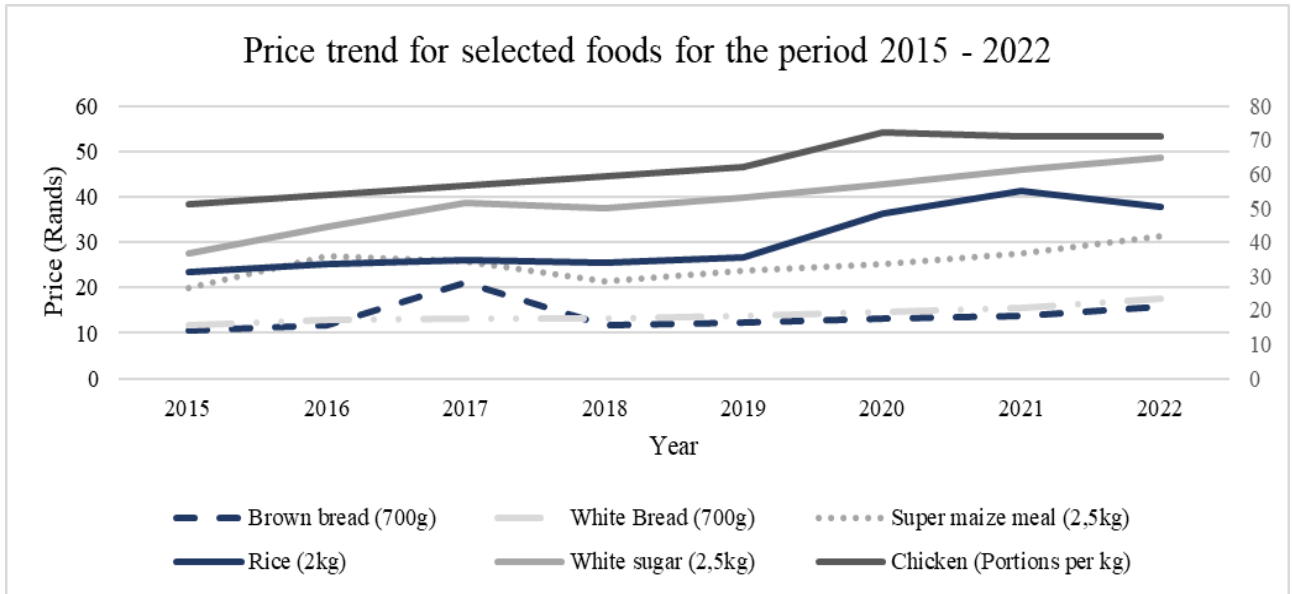


Figure 4.3: Monthly food prices for staple food products in the years 2000 -2021

Source: Own compilation based Statistics SA data.

4.1.3. Trends in individual staple foods

Based on Figure 4.3, the food prices for the chosen products have been increasing and showing an upward trend between the period 2015 to 2021. The price of brown and white bread has increased by 48%, maizemeal by 57%, rice by 60%, white sugar by 76% and 39% between the periods of 2015 and 2022 (Figure 4.3). In 2022, the prices for the selected product started showing a downward trend, this was due to a combination of factors which included the elimination of all COVID-19 lockdown measures around the world, the easing of the blockade by Russia on Ukrainian ports in August 2022 and the drop in international oil prices amongst others (Stanlib, 2023). The upward trend in 2017 can be explained by the spike in food prices caused by the drought that was experienced during that period and the spike between the period 2020 and 2021 can be explained by the shock in food prices that *COVID-19* caused during that period which led to lockdown regulations worldwide (Smail, 2022; Faruk et al., 2024).

Statistics South Africa (2022) reported that the drought experienced in 2015, which was described as the worst drought South Africa has experienced in 23 years, led to a steep decline in agriculture activities for field crops such as maize, sunflower and sugarcane. In addition, Statistics South Africa further reported that the drought forced South Africa to import maizemeal to make up the shortfall, coupled with the rand weakening during that period, this led to prices of other imports such as wheat increasing, negatively affecting overall food prices (Statistics South Africa, 2022). The Bureau for Food and Agriculture Policy reported that the

drought led to an increase of 29% in staple foods for low-income households between the period of January 2015 to April 2016 (Bureau for Food and Agriculture Policy, 2016). It is also important to note the disruptions in various value chains after the *COVID-19* lockdown through transport challenges, the availability of products, and extreme weather conditions which affect production. These factors combined negatively affect consumers as they lead to increased retail prices (NAMC, 2022).

4.2. The relationship between food prices and poverty in South Africa

This section examines the short-run and long-run relationship between food prices and the poverty levels of households in South Africa for the period 1990 to 2022. The Vector Error Correction Modelling (VECM) was employed to answer objective two outlined in Chapter one. Co-integration testing, VECM estimations and Impulsive Response Functions (IRFs) were employed to establish the short-run and long-run relationship between food prices and household welfare.

4.2.1. Unit root testing

The variables selected for the assessment are macroeconomic variables that generally tend to exhibit non-stationery properties (Phillips and Perron, 1988). The study used the Augmented Dicky Fuller (ADF) test to assess the unit root. The ADF tests checked whether the variables were stationery or non-stationery. The results are shown in the tables below at level and at the first difference to test for unit roots where $I(1)$. The results of the test at the level and at first difference were tested at a p-value of 0.01 or 1% level of significance. The term at level $I(0)$, indicates that the variables contain a unit root before any transformations have been conducted on the variables, such as differencing or logarithmic adaptations. The lag length of the test has been automatically determined by EViews using the SIC criterion for the ADF test. The ADF requires identification of the lag structure of a particular variable, the Likelihood Ratio (LR), the Akaike Information Criterion (AIC), the Hannan Quinn Information Criterion (HQIC) and the Swartz Bayesian Information Criterion (SBIC) were used to determine the optimal number of lags for each variable before testing for stationarity. Tables 4.1 and 4.2 below present the results of the unit root tests.

The consumer price index and population growth were stationary at 5% critical value, gross domestic product was stationary at 1% and food prices were stationary at 10%. However, two variables, namely unemployment and household disposal income, were not stationary. The series was stationary at the first difference $I(1)$ integration. Unemployment and household

disposal income were stationary at 1% at the first difference. Since the series has a unit root, the alternative hypothesis was accepted after the null hypothesis, that the series is not stationary was rejected.

Table 4.1: Unit root test using ADF

Variable	Model	lags	ADF ($\tau_\mu, \tau_\tau, \tau$)
CPI	Intercept	1	-3.817***
	Trend and intercept	1	-3.868**
	None	4	-2.194**
HDI	Intercept	0	-1.588
	Trend and intercept	0	-2.114
	None	0	-0.437
LOGFP	Intercept	1	-1.838
	Trend and intercept	1	-3.327*
	None	1	0.063
GDP	Intercept	0	-4.742***
	Trend and intercept	4	-1.405
	None	0	10.331***
POP	Intercept	1	-3.514**
	Trend and intercept	1	-3.438**
	None	2	-2.028**
U	Intercept	0	-1.684
	Trend and intercept	0	-1.943
	None	0	0.523

Notes: *** denotes significance level at 1% level, ** at 5% level and * at 10% level

Source: Author's own computation, results from EViews program.

Tables 4.1 and 4.2 showed the outcome of testing stationarity. Four variables were stationary namely; food prices, gross domestic product, population growth and consumer price index, while two variables namely, unemployment and household disposal income had to be differenced in order to be stationary. This means that the null hypothesis (H₀) was rejected and the mean, variance and covariance are constant over time at first level.

Table 4.2: Results of unit root test after first difference

Variable	Model	lags	ADF ($\tau_\mu, \tau_\tau, \tau$)
Δ CPI	Intercept	3	-5.171***
	Trend and intercept	3	-5.753***
	None	3	-4.966***
Δ HDI	Intercept	0	-6.043***
	Trend and intercept	1	-5.537***
	None	0	-6.096***
Δ LOGFP	Intercept	0	-10.562***
	Trend and intercept	0	-10.408***
	None	0	-10.710
Δ GDP	Intercept	5	-0.736***
	Trend and intercept	0	-7.581
	None	1	0.787
Δ U	Intercept	0	-7.333***
	Trend and intercept	0	-7.293***
	None	0	-7.288***
Δ POP	Intercept	1	-6.119***
	Trend and intercept	1	-6.278
	None	1	-5.96

Notes: *** denotes significance level at 1% level, ** at 5% level and * at 10% level of significance

Source: Author's own computation, results from EViews program.

4.2.2. Johansen Co-integration test

The next step after confirming the stationarity of the variables at I (1) was the co-integration test. The Johansen co-integration test was employed to assess the time series data for co-integration. The Johansen co-integration test is based on the maximum likelihood (ML) estimation and two statistics: trace statistics and maximum Eigenvalues.

Table 4.3 below shows the trace test results. At a maximum rank of zero, the trace statistics (187.9299) are greater than the critical value (125.61), at a maximum rank of one, the trace statistics (109.5342) are greater than the critical value (95.75), at a maximum rank of two, the trace statistics (70.48847) is greater than the critical value (69.82). Therefore, the null hypothesis of no co-integrating equations was rejected. However, at a maximum rank of three, the trace statistics (41.78271) is lower than the critical value (47.85); hence, the null hypothesis that there is at least one co-integrating equation could not be rejected. It was determined that among the series, there are at least three co-integrating equations. Three co-integrating equations were therefore included in the specification of ECM.

Table 4.3 Trace test results

Hypothesised No. of CE(s)	Trace Statistics	0.05 Critical Value	Prob.
None	187.9299	125.61	0.0000***
At most 1	109.5342	95.75	0.0040***
At most 2	70.48847	69.82	0.0442**
At most 3	41.78271	47.85	0.1649
At most 4	23.74653	29.79	0.2113
At most 5	8.735720	15.49	0.3904
At most 6	1.832232	3.85	0.1759

Notes: *** denotes significance level at 1% level, ** at 5% level and * at 10% level

Source: Author's own computation, results from EViews program.

Table 4.4 below shows the maximum eigen-values test results. At a maximum rank of zero, the max-eigen statistics (78.39565) is greater than the critical value (46.23), thus the null hypothesis of no co-integrating equations was rejected. However, at a maximum rank of one, the max-eigen statistics (39.04576) is less than the critical value (40.08), hence the null hypothesis that there is at least one co-integrating equation could not be rejected. The conclusion was that there is at least one co-integrating equation among the series. Therefore, ECM was specified with the inclusion of one co-integrating equation.

Table 4.4 Maximum Eigen-values results

Hypothesized No. of CE(s)	Max-Eigen Statistics	0.05 Critical Value	Prob.
None	78.39565	46.23	0.0000***
At most 1	39.04576	40.08	0.0650
At most 2	28.70576	33.88	0.1828
At most 3	18.03619	27.58	0.4921
At most 4	15.01081	21.14	0.2881
At most 5	6.903489	14.26	0.5006
At most 6	1.832232	3.84	0.1759

Notes: *** denotes significance level at 1% level, ** at 5% level and * at 10% level

Source: Author's own computation, results from EViews program.

4.2.3. The VECM estimation result

The study follows the study that was done by van Vyck and Dlamini in 2018. It is similar in that it also looks at the effect of food prices on the welfare of households in South Africa. However,

the current study also differs from it in two ways (i) firstly in that the period of study extends beyond 2015 to 2022 and (ii) It considered additional variables, population growth and the dummy variables that capture the effect in the years where there is a spike in food prices. Firstly, we present the results containing only the variables that were considered in the study by van Wyk and Dlamini in 2018.

4.2.3.1. Long run effects of food prices

Table 4.5 below shows the long-run results of the VECM. The results show that the long-run relationship between food prices and household disposable income is significant at 1%. This implies that a 1% increase in food prices, other things equal, cause a 14% loss in household disposable income. The long-run relationship between unemployment and household disposable income is also significant at 1%. The findings show that a 1% increase in unemployment reduces household disposable income by 1,07%. This was also consistent with the general expectation and findings by Penrose and Lacava (2021) who indicated that households tend to adjust spending and consumption patterns in response to a predictable change in income (unemployment). That is, households with members who have lived through high unemployment are more likely to buy lower-end products and have been found to spend less on food products. According to Penrose and Lacava (2021) this fall in spending is largely explained by lower wage income, which is likely due to reduced hours worked in the lead-up to unemployment. The long-run relationship between CPI and household disposable income is significant at 1%. The finding of CPI shows that a 1% increase in CPI reduced household disposable income by 1,57%. Gross Domestic Product did not have a significant relationship with household disposable income. This means that the data did not provide evidence that GDP had any effect on household disposable income. This was consistent with findings by van Wyk and Dlamini (2018).

Table 4.5 Long-run regression results: HDI

Variable(s)	Coefficient	Standard Errors	t-statistics
UN (-1)	-1.0725***	0.192	-5.56
LOGFP (-1)	-14.9027***	1.763	-8.4
HFCE (-1)	-2.57***	0.639	-4.03
GDP (-1)	-4.51	3.707	-1.23
CPI (-1)	-1.57***	0.189	-8.27

Notes: *** Significant at 1% ** Significant at 5% * Significant at 10%

Source: Author's own computation, results from EViews program.

4.2.3.2. Short run effects of food prices

Table 4.6 below shows the short-run VECM results. The error correction term, which measures how quickly things adjust to long-term equilibrium, was statistically significant at 5%. The expected negative sign indicates that the model can revert to equilibrium after an economic shock. However, the study notes that the magnitude of the error correction terms is very small. The coefficient of error correction term was -0.11 which indicates that shocks to the system are corrected at a very slow rate, that is food prices move at 11% per period to correct for deviations from equilibrium. Most of the results in the short-run were statistically insignificant. This might be due to the volatile character of food prices in South Africa, people adjust accordingly through behavioural responses that have not been captured in this study either through substituting alternatives or adding streams of income.

Table 4.6: Short-run regression results

Variable(s)	Coefficient	Standard Errors	t-statistics
CointEq1	-0.11**	0.042	-2.54
D (HDI (-1))	-0.14	0.367	-0.38
D (UN (-1))	0.15	0.105	1.38
D (LOGFP (-1))	-0.48	0.515	-0.94
D (HFCE (FP (-1)))	0.30	0.350	0.85
D (GDP (-1))	-4.35	1.806	-0.24
D (CPI (-1))	-0.09*	0.382	-1.95

Notes: *** Significant at 1% ** Significant at 5% * Significant at 10%

Source: Author's own computation, results from EViews program.

The current study considered additional two variables (to expand on van Wyk and Dlamini's model): population growth, and dummy variables to assess the impact that food prices have on poverty in South African households.

The long-run food price was statistically significant at 1% with a coefficient (-18.00) and carrying the expected negative sign (Table 4.7). This indicates that a 1% increase in food prices, other things equal, cause an 18% loss in household disposable income. These results are consistent with the general expectation that as food prices increase, household disposable income should decrease (Headey and Hirvonen, 2023). Similar results were found by Phali (2015) and van Wyk and Dlamini (2018).

The long-run unemployment was statistically significant at 1% with a coefficient of (-1.18) (Table 4.7). This indicates that a 1% increase in unemployment reduces household disposable income by 1.18%. This finding is consistent with the general expectation that unemployment results in the loss of household disposable income. These results are consistent with findings by (Penrose and Lacava, 2021 and Ngubane et al., 2023).

Long run CPI was statistically significant at 1% with a coefficient of (-1.97). This means that CPI has a negative impact on food prices. Furthermore, this indicates that household disposable income is reduced by 1.92% when CPI increases by 1% (Table 4.7).

The study incorporated a Dummy variable to capture the effect of poverty in the years when there was a spike in food prices. The Dummy variable was statistically significant at 10% and had a positive coefficient of 3.61. This indicates that in the years when there were food price spikes, poverty increased by 3.61% (Table 4.7)

The long-run results indicated that population growth and Gross Domestic Product did not significantly relate to household disposable income. This means that the data did not provide evidence that population growth and GDP had any effect on household disposable income.

Table 4.7 Long-run regression results: HDI

Variable(s)	Coefficient	Standard Errors	t-statistics
POP (-1)	0.52	1.511	0.34
UN (-1)	-1.18***	0.240	-4.92
LOG (FP (-1))	-18.00***	1.607	-11.20
GDP (-1)	2.08	3.707	0.55
CPI (-1)	-1.97***	0.270	-7.29
DUMMY (-1)	3.610*	1.49	2.41

Notes: *** Significant at 1% ** Significant at 5% * Significant at 10%

Source: Author's own computation, results from EViews program.

The model's ability to return to equilibrium following an economic shock is indicated by the expected negative sign of the error correction term, which assesses the rate of adjustment to long-run equilibrium. This term was statistically significant at 1%. (Table 4.8). However, the study notes that the magnitude of the error correction terms is very small. Food prices move by approximately 9% every period to adjust for deviations from equilibrium, indicating that shocks to the system are corrected at a fairly slow rate, as indicated by the coefficient of error correction term of -0.091. When comparing the results to the study by van Wyk and Dlamini

(2018), who found an ECM of -0.071 and concluded that the adjustment to restore long-run equilibrium is weak at 7% per annum.

Population growth, food prices and the dummy variable were statistically insignificant (Table 4.8). This might be due to the volatile character of food prices in South Africa, people adjust accordingly through behavioural responses that have not been captured in this study either through substituting alternatives or adding streams of income. Following shocks from the explanatory variables, household disposable income will adjust accordingly until equilibrium is restored.

Table 4.8: Short-run regression results

Variable(s)	Coefficient	Standard Errors	t-statistics
CointEq1	-0.091***	0.025	-3.53
D (HDI (-1))	0.136**	0.222	2.64
D (POP (-1))	-0.78	0.483	-1.62
D (U (-1))	0.20**	0.095	2.09
D (LOG (FP (-1)))	-0.47	0.404	-1.15
D (GDP (-1))	1.08***	1.606	-3.69
D (CPI (-1))	-0.13**	0.088	-2.49
D (DUMMY (-1))	-0.75	0.437	-1.73

Notes: *** Significant at 1% ** Significant at 5% * Significant at 10%

Source: Author's own computation, results from EViews program.

4.2.4. General Impulsive Response Function

Along with the co-integration test, the impulse response function analysis was an additional check for the co-integration relationship. The impulse response function traces out the impacts of any shocks among variables or any shocks to the error term. Specifically, we can identify the responsiveness of our dependent variables to the shocks from the explanatory variables. The black line is the impulse response function, whilst the red lines are the 95% confidence interval. The impulse response function must always be within the 95% confidence interval. Results below indicate that unemployment is the only variable that responds positively to the shock from HDI, all the other variables respond negatively to shocks from HDI (Figure 4.4).

Response to Cholesky One S.D. (d.f. adjusted) Innovations
 ± 2 analytic asymptotic S.E.s

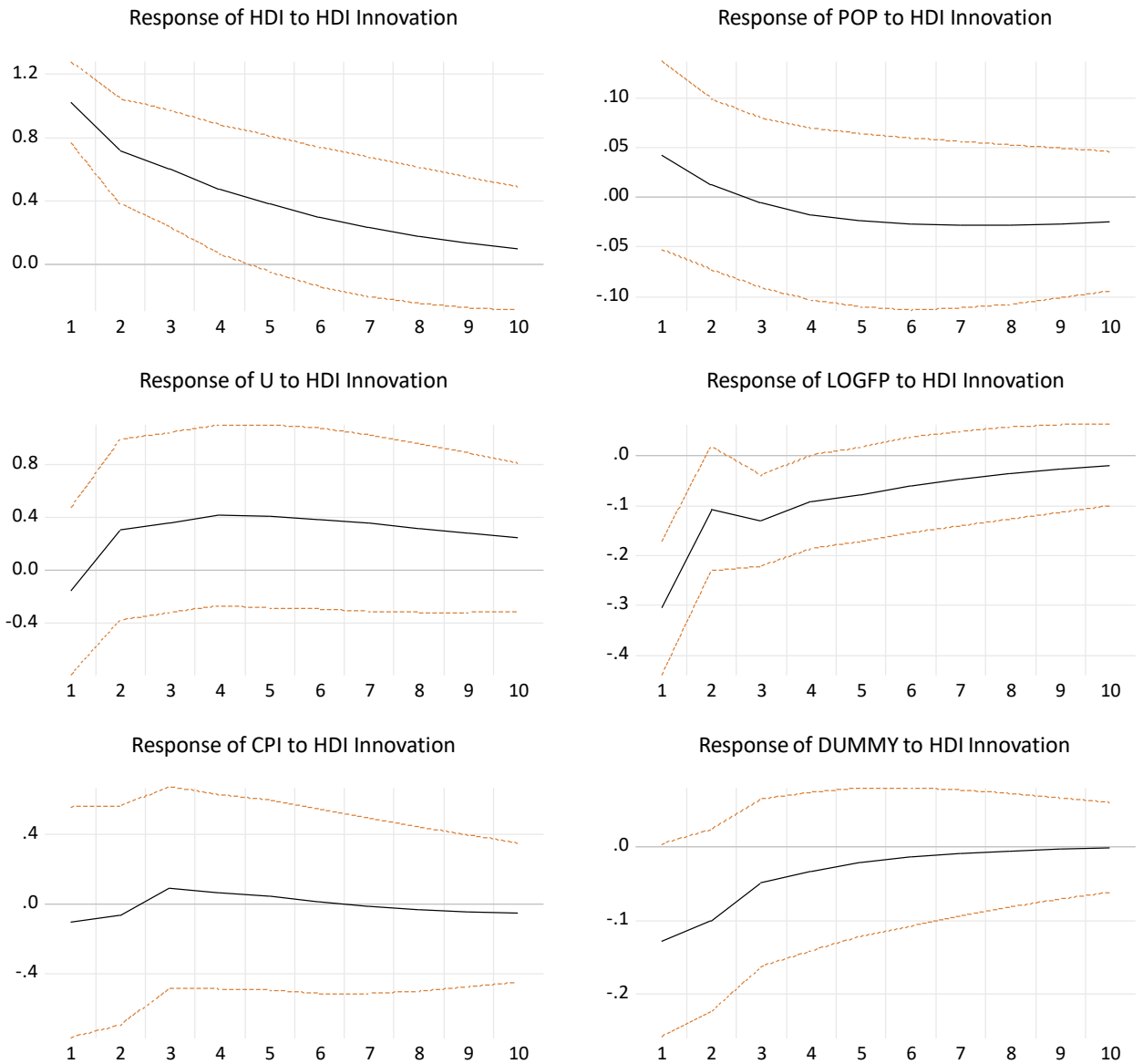


Figure 4.4: General Impulsive Response Function

Source: Author's own computation from EViews program.

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary of the study

The aim of the study was to examine the impact of food price hikes on poverty in South Africa, with a specific focus on the period from 1990 to 2022. The study used two methods namely, trend analysis, to analyse food prices in South Africa during periods of rapid food price inflation that occurred between 1990 – 2022 and Vector Error Correction Modelling (VECM) to estimate a regression model which shows the relationship between food prices and poverty in the long run and short run.

The data used in the study was obtained from the World Bank, Statistics South Africa (StatsSA), South African Reserve Bank (SARB) and the Organisation for Economic Co-operation and Development. The estimation techniques employed in this research made use of six variables to assess the short-run and long-run relationship between food prices and poverty: Household Disposable Income (HDI), unemployment, Population growth, Consumer Price Index (CPI), Gross Domestic Product (GDP) and the dummy variables that capture the effect in the years where there is a spike in food prices.

The first objective of the study was to analyse food price trends for selected staple foods in South Africa between the period of 2015– 2022. Overall, food prices were trending upwards throughout this period, with notable spikes in 2015 -2018 and 2020 – 2022. When comparing prices for a food basket in rural areas versus urban, the cost of an urban food basket was more than that of the rural food basket. This could be caused by urban consumers allocating more of their budget to products that exhibited a more substantial price increase in the food basket during period of 2015 – 2018 (Oxfam Research, 2014., Shelembe, 2018; Statistics SA, 2013). The rural prices were slightly higher between 2021 and 2022. The reason for the disparity was attributed to transport costs, which include maintenance, fuel and the frequency of trips to and from suppliers. In addition, rural outlets tend to receive low or no volume discounts, 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. The study noted that both rural and urban prices were moving closely to one another between 2015 and 2022. When looking at the price trends for staple foods (sugar, bread, maize meal, rice and chicken) an upward trend was observed between the period 2020 and 2021, and a downward trend in 2022. The upward trend between 2020 and 2021 might be because of the shock in food

prices that was caused by COVID-19 during that period, which led to lockdown regulations worldwide.

The second objective of the study was to assess the short-run and long-run relationship between food prices and poverty in South Africa. This was achieved through determining the response of poverty (household disposable income) to shocks in food prices in South Africa. The results indicate a negative long-run relationship between food prices and poverty in South Africa. The study also incorporated a dummy variable, which indicated that in the years when there were food price shocks, poverty increased by 3.61%. The results of the study were consistent with findings by other studies regarding the negative relationship between food prices and poverty Phali (2015) and van Wyk and Dlamini (2018).

The results of the VECM estimation reveal that there is a short-run and long-run relationship between food prices and poverty levels in South Africa. The results indicated a negative long-run relationship between food prices and unemployment, CPI and household disposable income and a positive relationship between GDP and population growth. The negative relationship implies that a 1% increase in each of the independent variables, would decrease household disposable income (HDI) by 1.18% (unemployment), 18% (food prices), 1.97% (CPI). The positive relationship means that a 1% increase in each of the independent variables would increase household disposable income by 2.08% (GDP) and 0.52% (population growth). Food prices had the highest negative impact on poverty levels in South Africa. Further, in the years where there were food price spikes, poverty increased by 3.61%. The short-run implications of the study revealed that food price shocks lead to reduced household welfare in South Africa. Specifically, a 1% increase in each of the independent variables, would decrease household disposable income (HDI) by 0,78% (population growth), 0,47% (food prices), 0,13% (CPI). The coefficient of the error correction term in the short-run, which measures the speed of adjustment to long-run equilibrium was -0.091 which is an indication that the rate at which shocks are corrected to the system is slow, that is, food prices moving almost 9% per period to correct for deviations from equilibrium.

5.2. Conclusions

The research aimed to assess the effect of food price shocks on poverty in South African households. The research found that there is a short-run and long-run relationship between the variables used (household disposable income, unemployment, CPI, food prices, GDP, population growth and a dummy variable). The short-run results confirmed a negative

relationship between food prices and disposable income which means that high food prices negatively affect welfare and in turn increased poverty levels in South Africa. The results of the study coincide with previous studies that have conducted with regarded to the short-run relationship between food prices and poverty.

The long-run confirmed a negative relationship between food prices and disposable income which means that food price shocks reduces welfare and in turn increase poverty levels in South Africa. The results confirmed that poverty responds to food prices shocks. The long-run results are also consistent with the literature.

The study was an extension of the research conducted by (van Wyk and Dlamini, 2018) who recommended for future research to consider the data for the period ranging between 1990-2015 in analysing the impact that food prices have on the welfare of South African households. Whilst the study was similar in that it also looked at the effect of food prices on the welfare of households in South Africa, it differed in two ways (i) firstly in that the period of study extended beyond 2015 to 2022 and (ii) It also considered additional variables, population growth and the dummy variables that capture the effect in the years where there is a spike in food prices. The findings of the study were similar to the findings by van Wyk and Dlamini (2018) as both studies revealed that there is a negative relationship that exists between food prices and the welfare of South African households. Specifically, both studies confirmed that a rise in food prices resulted in the decline of household welfare (contributed to an increase in poverty levels) in South Africa.

5.3. Recommendations

Food price shocks have a major impact on poverty in South African households. The government ought to consider both short-run and long-run solutions when implementing policies to address this problem. Policy options that the government may explore when addressing the impact of food price shocks in the short run include providing food parcels to the needy and social grant and employee relief schemes (subsidizing companies during a time of distress to enable the retention of employment by such companies in a manner which has little costs to the employer and which ensures employees continue to receive an income) targeted at cushioning household income. With regards to addressing the impact in the long run, the Government can consider partnering with the private sector to facilitate job creation and ensure the development financial institutions which can provide access to finance and credit through food banks and feeding schemes.

In addition, the government may consider subsidizing staple food baskets for households in South Africa. In instances where the price spike is caused by a shortage of food supply (resulting in importing), the government ought to consider reducing import tariffs during that specific period.

5.4. Limitations of the study and recommendations for further research

The study focused on the impact of food price shocks on poverty in South Africa. The estimation techniques used considered variables such as food prices, household disposable income, unemployment, Population growth, CPI and GDP and a dummy variable that captures the effect in the years where there is a spike in food prices. However, the study did not assess behavioural responses by households in the event of food price shocks, whereby households substitute between food products and create ways to generate other streams of income. Therefore, it is recommended that future studies analyse the behavioural effect of food price shocks on poverty levels in South Africa.

REFERENCES

- African Development Bank Group. 2022. African Economic Outlook: Supporting Climate and Just Energy Transition in Africa. Available at: <https://www.afdb.org/en/documents-publications-african-economic-outlook-2023-previous-african-economic-outlook-african-economic-outlook-2022#:~:text=The%20theme%20of%20the%202022,of%20the%202022%20Annual%20Meetings.> [Accessed at 12 July 2023]
- Aikins, E. and McLachlan, J. 2022. Africa is losing the battle against extreme poverty. *Institute for security studies*. Available at: <https://issafrica.org/iss-today/africa-is-losing-the-battle-against-extreme-poverty>. [Accessed 11 August 2023] .
- Arndt, C., Diao, X., Dorosh, P., Pauw, K. and Thurlow, J. 2022. Russia-Ukraine war and the global crisis: Impacts on poverty and food security in developing countries. *Global Crisis Country Brief* 20. Washington, DC: International Food Policy Research Institute (IFPRI) .
- Asteriou, D. and Hall, S. 2011. Applied econometrics, New York: Palgrave Macmillan.
- Badolo, F. and Traore, F. 2015. Impact of rising world rice prices on poverty and inequality in Burkisa Faso. *Development Policy Review*, 33(2), pp. 221 - 244.
- Batterby, J., Devereux, S., Aurbach, J., Piek, H. and Oliver, N. 2019. The likely impact of the 2015 - 2018 Drought in South Africa: Lessons from the 2008 food price crisis and future implications.
- Blecher, MS., Dave, J., Meyer-Rath, G., Silal, SP., Makrelov, K. and van Niekerk, M. 2022. The South African Government's COVID-19 response: Protecting lives and livelihood. Available at https://www.hst.org.za/publications/South%20African%20Health%20Reviews/Chapter1_SAHR21_04022022_OD.pdf [Accessed on 06 February 2025]
- Bureau for Food and Agriculture Policy (BFAP). 2022. BFAP Baseline - Agriculture outlook 2022 -2031. Available at: <https://vinpro.co.za/wp-content/uploads/2022/08/BFAP-BASELINE-2022-ONLINE-FINAL.pdf>. [Accessed at 11 August 2023].
- Bureau for Food and Agriculture Policy (BFAP). 2016. Socio-Economic impact of drought on agricultural production and food security. Available at: <https://www.dalrrd.gov.za/images/Branches/AgricProducHealthFoodSafety/ClimateChangeDisasterMangmnt/DisasterManagmnt/National%20Drought%20Indaba%20BFAP.pdf>. [Accessed at 22 July 2024]
- Business Tech. 2024. These food prices have shot up over 60% in South Africa [Online] Available at: <https://businesstech.co.za/news/lifestyle/748724/6-food-items-with-prices-that-have-rocketed-by-over-60-in-south-africa/> [Accessed 19 September 2024].
- Competition Commission of South Africa. 2020. Guide for business compliance with price gouging regulations. Available at <https://www.compcom.co.za/wp->

- content/uploads/2021/09/Business_Price-Gouging-Flyer.pdf. [Accessed on 07 February 2025]
- Department of Agriculture, Forestry and Fisheries. 2016. Budget vote speech. Agriculture, Forestry and Fisheries. Available at <https://ilifalabantwana.co.za/wp-content/uploads/2016/06/Agriculture-2016.pdf> . [Accessed at: 06 February 2025]
- Department of Basic Education, n.d. South African Economic Growth and Development Policies and Approaches, Pretoria: s.n.
- FAO, IFAD, UNICEF, WFP, and WHO. (2022). The State of Food Security and Nutrition in the World 2022: Repurposing food and agricultural policies to make healthy diets more affordable. Food and Agriculture Organization of the United Nations. Available at: <https://openknowledge.fao.org/server/api/core/bitstreams/67b1e9c7-1a7f-4dc6-a19e-f6472a4ea83a/content> [Accessed: 12 September 2024].United Nations, 2008. *Africa Struggles with soaring food prices*, s.l.: s.n
- Faruk, U., Abdulbaki, B., Wojciech, JF. and Gurkan, B. 2024. Confluence of COVID-19 and the Russia-Ukraine conflict: Effects on agriculture commodity prices and food security. *Borsa Instabul Review*,24, pp. 506 - 519.
- Fedderke, J. 2022. A case of polarization paralysis: the debate surrounding a growth strategy for South Africa, s.l.: s.n.
- Friedman, I and Bhengu, L. 2008. Fifteen year review of income poverty alleviation programmes in the social and related sectors. Available at <https://www.hst.org.za/publications/HST%20Publications/Fifteen%20Year%20Review%20of%20Income%20Poverty%20Alleviation%20Programmes%20in%20the%20Social%20and%20Related%20Sectors.pdf> [Accessed at 06 February 2025]
- Ghashem, L., Bakhsodeh, M., Aghabeygi, M., Kurtsal, Y and Viaggie, D. 2020. The impact of food price shocks on poverty and vulnerability of urban households in Iran. *Bio-based and Applied Economics*, 9(1), pp. 109 - 125.
- Granger, C. and Newbold, P. 1987. Spurious Regressions in Econometrics. *Journal of Economics*, Volume 2, pp. 111 - 120.
- Gujarati, D. 2003. Basic Econometrics. 4th edition ed. s.l.:Singapura: McGraw-Hill.
- Gustafson, D. 2013. Rising food costs and global food security: key issues and relevance for India. *Indian J Med Res*, 138(3), pp. 398 - 410.
- Hart, T. Davids, Y. Rule, S. Tirivanhu, P. and Mtyingizane S. 2022. The Covid-19 pandemic reveals an unprecedented rise in hunger: The South African government was ill-prepared to meet the challenge. *Scientific African*, 16(4).
- Headey, D. and Hirvonen, K. 2023. Higher food prices can reduce poverty and stimulate growth in food production. *Nature food*, 4(8), pp. 699-706.

- Headey, D. and Martin, W. 2016. The impact of food prices on poverty and food security. *Annual review of resource economics*, 8(1).
- Hodgo, H., Dalton, T. and Naketse, T. 2024. Welfare effects from food price shocks and land constraints in Niger. *Journal of Agriculture and Food Research*, Volume 15.
- Integrated Food Security Phase Classification (IPC). 2021. *IPC acute food security analysis September 2020 - March 2021*. Available at: https://www.ipcinfo.org/fileadmin/user_upload/ipcinfo/docs/IPC_South_Africa_AcuteFoodInsec_2020Nov2021Mar_Report.pdf (Accessed: 11 March 2022).
- International Monetary Fund (IMF). 2022. Africa food prices are soaring amid high import reliance. Available at: <https://www.imf.org/en/Blogs/Articles/2022/09/26/africa-food-prices-are-soaring-amid-high-import-reliance#:~:text=Factors%20include%20the%20region's%20heavy,in%20food%20consumption%20and%20incomes.andtext=Staple%20food%20prices%20in%20sub,the%202008%20global%20financial%20crisis.> [Accessed: 22 May 2023]
- International Monetary Fund (IMF). 2022. Tackling the Global Food Crisis: Impact, Policy Response, and the Role of the IMF. Available at <https://www.elibrary.imf.org/view/journals/068/2022/004/article-A001-en.xml>. [Accessed on 10 February 2025].
- International Monetary Fund (IMF). 2023. *Global Food crisis update - recent developments, outlook and IMF engagements*, Available: <https://www.imf.org/en/Publications/IMF-Notes/Issues/2023/04/12/Global-Food-Crisis-Update-Recent-Developments-Outlook-and-IMF-Engagement-531948>. [Accessed: 14 January 2023]
- Integrated Food Security Phase Classification (IPC). 2022. Global Report on Food Crises. Available at: <https://www.ipcinfo.org/ipcinfo-website/featured-stories/news-details/es/c/1155583/#:~:text=Globally%2C%20levels%20of%20hunger%20remain,findings%20of%20the%20GRFC%202022.> [Accessed: 14 January 2023]
- Jacoby, H. 2016. Food prices, wages and welfare in rural India. *Economic Inquiry*, Volume 54, pp. 159 - 176.
- Johansen, S. 1991. Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregression Model. *Econometrica*, Volume 59, pp. 1551 - 1580.
- Johansen, S. and Juselius, K. 2002. Hypothesis testing for Cointegration Vectors - with an application to the Demand for money in Denmark and Finland, s.l.: Preprint University of Copenhagen.
- Kakaei, H. et al. 2022. Effect of COVID-19 on food security, hunger and food crisis. COVID-19 and the sustainable development goals, s.l.: s.n.
- Kirsten, J. F. 2015. The political Economy of Food Price Policy in South Africa', in per Pinstруп-Andersen(*ed.*). s.l.:Oxford Academic.
- Lutkepohl, H., 2005. New Introduction to Multiple Time Series Analysis. s.l.:Springer.

- Magrini, E., Balie, J. and Morales-Opazo, C. 2017. Cereal price shocks and volatility in sub-Saharan Africa: What really matters for farmers' welfare?. *Agriculture Economics*, 48(3).
- Magrini, E., Opazo, C. and Bali'e, J. 2015. Price shocks, volatility and household welfare: a cross-country inquiry. *Scientific paper*, Volume 11, pp. 1-51.
- Mbegalo, T. and Yu, X. 2016. The impact of food prices on household welfare and poverty in rural Tanzania, s.l.: s.n.
- Mkhawani, K., Motadi, Mabapa, NS., Mbhenyane, XG., and Blaauw, R. 2016. Effects of rising food prices on household food security on female headed households in Runnymede Village, Mopani District, South Africa, *South African Journal of Clinical Nutrition*, 29(2), pp. 69–74.
- Mlambo, VH. and Khuzwayo, NN. 2021. COVID-19, Food insecurity and a government response reflection from South Africa. *Technium social science journal*, 19, pp. 1 -14.
- Muhammad, R., Muqqadas, R., Chaudhary, A. and Muhammad, F. 2015. Food prices and its impact on poverty in Pakistan. *Pakistan Journal of Social Science*, 35(2), pp. 903 - 910.
- National Agricultural Marketing Council (NAMC). 2022. Food Cost Review, s.l.: National Agricultural Marketing Council. Available at: <https://www.namc.co.za/wp-content/uploads/2023/03/Food-Cost-Review-2022.pdf>. [Accessed: 16 January 2023]
- National Agricultural Marketing Council (NAMC). 2008. The South African Cost Review: 2008. Available at: <https://www.namc.co.za/wp-content/uploads/2017/09/South-African-Food-Cost-Review-2009.pdf>. [Accessed 15 April 2023]
- National Agriculture Marketing Council (NAMC). 2017. The South African Cost Review 2016. Accessed at: <https://www.namc.co.za/wp-content/uploads/2019/03/Food-Cost-Review-2017.pdf>. [Available: 22 May 2023]
- National Agriculture Marketing Council (NAMC). 2018. The South African Food Cost Review: 2017. Accessed at <https://www.namc.co.za/wp-content/uploads/2019/03/Food-Cost-Review-2017.pdf> . [Date: 22 December 2023]
- National Planning Commission. 2012. New Development Plan 2030: Our Future, Make it Work. *The Presidency*. Available at https://www.gov.za/sites/default/files/gcis_document/201409/ndp-2030-our-future-make-it-workr.pdf.
- Ngidi Bandile. 2015. Food price inflation and the poor. Available at <https://www.datafirst.uct.ac.za/dataportal/index.php/citations/5397> [Accessed: 19 November 2022]
- Ngubane, MZ; Mndebele, S., Kaseeram I. 2023. Economic growth, unemployment and poverty: Linear and non-linear evidence from South Africa. *Heliyon* 9 (10).

- Oxfam Research. 2014. Hidden Hunger in South Africa: The faces of hunger and malnutrition in a food secure nation. Available at: <http://www.Oxfamlibrary.openrepository.com/Oxfam/bitstream/10546/332126/1/rr-hidden-hunger-south-Africa-131014.pdf> [Accessed 06 February 2025]
- Pereira L.M. 2014. The future of South Africa's Food System: What is research telling us? South African Food Laborator.
- Pillay, Y. 2024. Stubbornly high food prices increases food insecurity in South Africa. Available at <https://supermarket.co.za/index.php/economic-factors/6837-stubbornly-high-food-prices-increases-food-insecurity-in-south-africa>. [Accessed on 06 February 2025]
- Penrose, G., Lacava G. 2021. Job Loss, Subjective Expectations and Household Spending. Research Discussion Paper. Reserve Bank of Australia.
- Phali, L. 2015. Comparative Analysis of the Impact of Food Prices on Household Food Security: Evidence from the North-West and Kwazulu-Natal Provinces, South Africa, *Masters Thesis*. South Africa: University of KwaZulu-Natal.
- Phillips, P. and Perron, P. 1988. Testing for Unit Roots in Time Series Regression. *Biometrika*, Volume 75, pp. 335 - 346.
- Pietermaritzburg Economic Justice and Dignity (PMBEJD). 2021. Household Affordability Index. Pietermaritzburg. Available at: <https://pmbejd.org.za/index.php/household-affordability-index/> (Accessed: 17 June 2023).
- Russel, E., Loves, L., Usman, M., and Widiarti, W. 2021. Modeling multivariate time series by Vector Error Correction Models (VECM). *Journal of Physics: Conference series*. 1751 012013.
- Shelembe, N. 2018. An analysis of the food baskets and their implications for household food security, uMsunduzi Local Municipality, *Masters Thesis*. South Africa: University of KwaZulu-Natal.
- Simler, K., Benson, T., Benfica, R. and Cord, L. 2009. The impact of higher food prices on poverty in Uganda, s.l.: s.n.
- Sithole, Nceba., 2014. Government intervention to alleviate poverty in South Africa, with a specific focus on poverty in the Eastern Cape. *Masters Thesis*. South Africa: University of the Western Cape.
- Smail, E. 2022. Relationship between climate change and increased food prices, s.l.: Green Economy Journal.
- Smith, J., Abrahams, M. and Chiya, N. 2017. PACSA Food Price Barometer - *Annual Report*., s.l.: s.n.

- Solidarity Fund. 2020. Food relief update. Available at https://solidarityfund.co.za/media/2020/05/News_Update_Solidarity_Fund_Food_relief_update_%E2%80%93_week_of_April_27.Final_.pdf . [Accessed on 07 February 2025]
- South Africa, Office of the Presidency. 1994. White Paper on Reconstruction and Development, s.l.: Government Gazette, No.16085.
- South African map and satellite images. 2000. South African map and satellite images. [Online] Available at: <https://www.worldatlas.com/maps/south-africa> [Accessed 17 April 2024].
- Stanlib. 2023. Food inflation is easing in the rest of the world but not in South Africa. Available at <https://stanlib.com/2023/07/20/food-price-inflation-is-easing-in-the-rest-of-the-world-but-not-in-sa/#:~:text=the%20easing%20of%20the%20blockade,is%20hit%20by%20other%20events>. [Accessed on 07 February 2025]
- Statistics South Africa. 2023. Census 2022 shows South Africa's population grew to 62 million. Department: Statistics South Africa. Available at: <https://www.statssa.gov.za/?p=16711>. [Accessed: 06 February 2025]
- Statistics South Africa. 2022. Department: Statistics South Africa. [Online] Available at: <https://www.statssa.gov.za/?p=6135> [Accessed: 19 September 2024].
- Statistics South Africa. 2022. National poverty Lines. Department: Statistics South Africa. Available at: <https://www.statssa.gov.za/publications/P03101/P031012022.pdf> [Accessed: 15 June 2024]
- Statistics South Africa. 2014. Poor households spend a third of their income on food. Department: Statistics South Africa. Available at: <https://www.statssa.gov.za/?p=2564#:~:text=poor%20households%20spend%20on%20average,average%20per%20annum%20on%20food>. [Accessed: 06 February 2025]
- Steyn, NP., McHiza, ZJ., Kruger, A., Schonfeldt, H. and Nel, J. 2015. A Review of dietary surveys in the adult South African population from 2000 to 2015. *Nutrients*, Volume 7, pp. 8227 -8250.
- The African Climate Foundation. 2022. High Food Prices in Africa: Causes, Consequences and Agenda for Action, s.l.: s.n.
- Sustainable Development Goals Country Report South Africa. 2023. Available at https://www.statssa.gov.za/MDG/SDG_Country_report.pdf [Accessed: 06 February 2025]
- van Wyk, R. and Dlamini, C. 2018. The impact of food prices on welfare of households in South Africa. *South African Journal of Economic and Management*, 21(1).
- von Grebmer, K., Bernstein, J., Wiemers, M., Reiner, L., Bachmeier, M., Hanano, A., Towey, O., Chéilleachair, R.N., Foley, C., Gitter, S. and Larocque, G. 2022. 2022 Global hunger index: Food systems transformation and local governance.

- Woodon, Q., Tsimpo, C., Backiny-Yetna, P., Joseph, G. 2008. Potential impact of higher food prices on poverty: Summary estimates for a dozen West and Central African countries., s.l.: World Bank.
- Wooldridge, J. 2009. Introductory Econometrics. A modern approach, *4th ed.*. or newer edition ed. s.l.: Thomson South-Western.
- World Bank. 2013. Global food crisis response program. Available at <https://www.worldbank.org/en/results/2013/04/11/global-food-crisis-response-program-results-profile>. [Accessed at 11 July 2022].
- World Bank. 2019. Poverty impact of food price shocks and policies. Available at <https://documents1.worldbank.org/curated/pt/863311549375011898/pdf/WPS8724.pdf> . [Accessed: 11 July 2022]
- World Bank. 2023. Africa's pulse: An analysis of issues shaping Africa's economic future, Available at: <https://www.worldbank.org/en/events/2023/10/26/world-bank-ticad-seminar-series-36-africa-s-pulse-an-analysis-of-issues-shaping-africa-s-economic-future-october-2023-ed#:~:text=Economic%20growth%20in%20Sub%2DSaharan,transportation%20bottlenecks%20continue%20to%20bite>. [Accessed 13 July 2022]
- World Bank. 2023. Recognizing and tackling a global food crisis. Available at <https://www.worldbank.org/en/news/feature/2023/01/05/recognizing-and-tackling-a-global-food-crisis#:~:text=Average%20global%20wheat%2C%20maize%2C%20and,in%202022%20relative%20to%202021>. [Accessed on 07 February 2025]
- World Bank. 2020. Poverty and Equity Brief: Sub-Saharan Africa (South Africa). Available at: https://databankfiles.worldbank.org/public/ddpext_download/poverty/33EF03BB-9722-4AE2-ABC7-AA2972D68AFE/Global_POVEQ_ZAF.pdf (Accessed: 22 August 2023).