Application of a Social Accounting Matrix (SAM) Fixed-Price Multiplier Model to Analyze SADC Regional Trade Outcomes for Zimbabwean Household Nutrition and Food Security

Submitted by Chido Rutendo Wamambo

Erasmus Mundus Joint Master's Degree in Global Development Policy

(GLODEP 2021-2023)

Supervised by: Professor Martin Schlossarek

Assistant Lecturer at the Department of Development Studies

Palacký University Olomouc

GLODEP 2023

Declaration of Authorship

I, Chido Rutendo Wamambo, declare this Master Thesis entitled - Application of a Social Accounting Matrix (SAM) Fixed-Price Multiplier Model to Analyze SADC Regional Trade Outcomes for Zimbabwean Household Nutrition and Food Security is my original work completed for the Erasmus Mundus Joint Master's Degree in Global Development Policy under the supervision of Professor Martin Schlossarek, Palacký University Olomouc. I confirm that all the sources and datasets used in this research have been duly cited and referenced. This paper has not been published or submitted for any other degree or qualification except as specified.

Acknowledgement

I want to thank my mother and sister for their invaluable material and emotional support, as well as my supervisor and the GLODEP Consortium for giving me this opportunity to deepen my understanding of development.

UNIVERZITA PALACKÉHO V OLOMOUCI

Přírodovědecká fakulta

Akademický rok: 2022/2023

ZADÁNÍ DIPLOMOVÉ PRÁCE

(projektu, uměleckého díla, uměleckého výkonu)

Jméno a příjmení:	**Chido MAKATA**
Osobní číslo:	**R210654**
Studijní program:	**N0588A330004 Global Development Policy**
Téma práce:	**Food Security and Regionalism: Analysis of SADC Trade Outcomes for Zimbabwe**
Zadávající katedra:	**Katedra rozvojových a environmentálních studií**

Zásady pro vypracování

Food insecurity in the Southern African Region (SADC) continues to be an urgent issue. Some of the main contributing factors in Zimbabwe, specifically, have been the covid-19 pandemic, increasing charges for fintech and drought (SADC, 2002, 35). One of the long-term solutions proposed by the Regional Vulnerability Assessment Analysis Programme is to „keep trade open and prioritize intra-SADC trade for food and other commodities" (SADC, 2002, 28). Even though regionalism is a second-best liberalization policy (Maasdrorp, 1998, 505), it is a useful tool for loosening and eliminating the economic and structural dependence of developing countries. The SADC has the potential to be self-sufficient in staple foods (Tanyanyiwa & Hakuna, 2014), and free trade in the region can encourage efficient producers to take advantage of economies of scale (Maasdrorp, 1998, 507). Evidence shows that the SADC free trade area positively impacts regional trade (Pasara & Diko, 2020). However, it is still unclear whether individual member nations are taking full advantage of their comparative advantage and agricultural potential to reap the benefits of their memberships.

Aim

Identify how Zimbabwe can maximize the economic contributions of its agricultural sector to ensure long-term food security at domestic and regional levels.

Research Questions

What are the potential economic contributions of the Zimbabwean agricultural sector as it applies to its domestic food security needs?

Sub 1: How can Zimbabwe optimize intra-SADC trade in food and agricultural commodities?

Methodology

A literature review will address the theoretical and empirical backgrounds of this topic. Finally, a standard input-output model will be computed to measure the contributions of Zimbabwe's agricultural sectors in domestic and regional markets (Ncube & Tregenna 2021 and Watson et. al. 2007).

Rozsah pracovní zprávy:	**10-15 000 works**
Rozsah grafických prací:	**as needed**
Forma zpracování diplomové práce:	**tištěná/elektronická**
Jazyk zpracování:	**Angličtina**

Seznam doporučené literatury:

Maasdorp, G. 1998. Regional Trade and food security in SADC. *Food Policy*, *23*(6), 505–518.

Ncube, P., & Tregenna, F. 2021. Input-output linkages and interdependence between countries in Southern Africa. *Development Southern Africa*, *39*(6), 1021–1035.

Pasara, M. T., & Diko, N. 2020. The effects of AFCFTA on Food Security Sustainability: An analysis of the cereals trade in the SADC region. *Sustainability*, *12*(4), 1419.

Southern African Development Community (SADC) 2022. *Synthesis Report on the State of Food and nutrition Security and Vulnerability in Southern Africa.* The Regional Vulnerability Assessment and Analysis (RVAA) Programme.

Tanyanyiwa, V. I., & Hakuna, C. 2014. Challenges and Opportunities for Regional Integration in Africa: The Case of Sadc. *IOSR Journal of Humanities and Social Science*, *19*(12), 103–115.
Watson, P. & Thilmany, D. & Wilson, J. & Winter, S. 2007. Determining Economic Contributions and Impacts: What is the difference and why do we care? *Journal of Regional Analysis and Policy, 37*, 140-146.

Vedoucí diplomové práce: **Mgr. Martin Schlossarek, Ph.D.**
Katedra rozvojových a environmentálních studií

Datum zadání diplomové práce: **27. ledna 2023**
Termín odevzdání diplomové práce: **31. května 2023**

L.S.

doc. RNDr. Martin Kubala, Ph.D.
děkan

doc. Mgr. Zdeněk Opršal, Ph.D.
vedoucí katedry

V Olomouci dne 27. ledna 2023

Abstract

African regional integration is an emerging concept in the context of globalization and socio-economic convergence. The Southern African Development Community (SADC), of which Zimbabwe is a founding member, plays both an advisory and regulatory role in policy design and recommendations for regional food security, and increasing inter-regional trade has been proposed by the SADC as a part of the solution to reaching zero hunger in Southern Africa. This study aims to describe the disaggregated effects of SADC trade on Zimbabwean households. Using a Social Accounting Matrix Fixed-Price Multiplier Model, the full impact of SADC imports on crucial food commodities was computed. The result showed that SADC inflows have a more significant impact on smallholder farming than large-scale, are more interlinked with dairy, processed food goods, and maize than other agricultural commodities and have a more substantial multiplier effect on rural households than urban households. The findings also show that, through import prices, inter-regional trade directly impacts the four pillars of food security (access, availability, utilization, and stability) but has an unclear effect on the nutritional status of Zimbabweans facing the double burden of malnutrition (obesity and stunting). Policymakers can implement similar methodologies to map out the beneficiaries of trade policies and identify the distributional impacts of such policies on welfare indicators such as health and nutrition. This understanding can assist decision-makers in tailoring macroeconomic policy design for meso socio-economic outcomes.

Keywords: Food and Nutrition Security, Inter-Regional Trade, Nutrition Transition, Regional Integration, Social Accounting Matrix, Southern African Development Community, Zimbabwe

Table of Contents

List of Figures

List of Tables

List of Abbreviations

AfCFTA: African Continental Free Trade Agreement
ARII: African Regional Integration Index
DRC: Democratic Republic of Congo
EA: Enumeration Areas
ECOWAS: Economic Community of West African States
EU: European Union
FAO: United Nations Food and Agricultural Organization
FEWS NET: Famine Early Warning Systems Network
FNC: Food and Nutrition Council
FNS: Food and Nutrition Security
FNSS: Food and Nutrition Security Strategy
FS: Food Security
FTA: Free Trade Area
GDP: Gross Domestic Product
GMM: Generalized Method of Moments
IMF: International Monetary Fund
ITC: International Trade Centre
KRA: Key Results Area
NVAC: National Vulnerability Assessment Committee
PICES: Zimbabwe Poverty, Income, Consumption, Expenditure Survey
REC: Regional Economic Community
RISDP: Regional Indicative Strategic Development Plan
RoW: Rest of the World
RVAA: Regional Vulnerability Assessment and Analysis Programme
SADC: Southern African Development Community
SAM: Social Accounting Matrix
SDG2: Sustainable Development Goal 2: Zero Hunger
TO: Trade Openness
UN: United Nations
URT: United Republic of Tanzania
USA: United States of America
USD: United States Dollar
VAA: Vulnerability Assessments and Analysis
WB: World Bank
WFP: World Food Programme
WHO: World Health Organization
ZIMSTAT: Zimbabwe National Statistical Agency
ZIMVAC: Zimbabwe Vulnerability Assessment Committee
ZWL: Zimbabwean Dollar

Internship Presentation

This Master's Thesis was authored during an internship with the United Nations World Food Programme (WFP) in the Thematic Team of the Public Partnerships and Resourcing Division. WFP is a humanitarian organization that operates in more than 120 countries and territories. Under its "saving lives" mandate WFP's mission is to provide food and assistance to people affected by emergencies such as conflicts, natural disasters, and pandemics. While under its "changing lives" mandate WFP provides transformative and sustainable resilience-building solutions. In 2023, the organization provided aid to 160 million people across the globe. WFP is focusesed on emergency response and sustainable development, addressing immediate needs while supporting long-term food security.

Here are some important facts about WFP:

- WFP relies entirely on voluntary donations and raised a record-breaking $14.1 billion in 2022.
- More than half of the people WFP serves are women and girls.
- WFP has over 23,000 staff members, with 87% of them working in the field.
- In 2020, WFP was awarded the Nobel Peace Prize for its efforts to combat hunger, promote peace in conflict-affected areas, and prevent the use of hunger as a weapon of war and conflict.
- WFP Aviation manages the United Nations Humanitarian Air Service, which is the only United Nations (UN) mandated air transport service.

WFP's main areas of focus include emergency response and preparedness, climate action, nutrition, school-based programs, support for smallholder farmers, resilience-building, cash assistance, and capacity building. The organization uses innovative technologies and solutions to achieve its goal of zero hunger by 2030.

In summary, the World Food Programme is a vital organization that provides life-saving assistance and works towards sustainable solutions to combat hunger and food insecurity worldwide. (WFP, 2023b)

The Public Partnerships and Resourcing Division is responsible for leading and organizing WFP's efforts to mobilize resources from public donors at the capital, regional, and country office levels. During my time as an intern with the Thematic Team under this division, I had several important responsibilities. One of my main duties was to conduct research on funding trends and thematic policies related to nutrition and school feeding. My research helped to enrich WFP's donor intelligence through the update of donor deep dives. Additionally, I conducted research on WFP's programming to identify any gaps or overlaps that existed between WFP's corporate strategies and donor priorities. I also assisted Government Partnership Officers in managing cross-functional relationships with other departments. During high-level multinational meetings and events, I took detailed notes to ensure that important information was captured accurately. To support the Thematic Team's efforts, I designed creative solutions in a goal-oriented, multi-functional environment. Through my work, I gained expertise in fundraising strategies, policy analysis, and SDG 17 (Partnerships for the Goals).

This thesis is closely linked to the crucial objective of achieving zero hunger, the mission of priority for WFP. Furthermore, it aligns with the Thematic Team's current emphasis on partnerships and changing lives. My initial interaction with the organization occurred during a seminar that formed part of the Food Economics and Agricultural Development course, which I completed while studying in Italy during the GLODEP Joint-Master's program.

CHAPTER 1. INTRODUCTION

This first introductory chapter provides an overview of the state of food and nutritional security (FNS) in Zimbabwe and the Southern African Development Community (SADC). The research objectives and contributions of this study are then discussed. The concluding section outlines the different chapters of the thesis.

1.1 Overview

The Southern African Development Community (SADC) is a free trade area (FTA) comprised of sixteen countries[1] and approximately 380 million people (SADC, 2020 and WorldData, n.d.). According to the World Bank Data (WDI, 2023) classifications, most SADC countries are low-income and lower-middle-income economies. However, the region is diverse with endowments and also holds the upper middle-income countries of Botswana, Mauritius, Namibia, and South Africa. The latter is the second largest African economy after Nigeria, the largest in the SADC and the most important inter-regional trading partner for all other SADC Member States.

However, according to the SADC's Regional Vulnerability and Analysis Programme (SADC, 2022), the region has a high prevalence of child malnutrition which is of particular concern, especially considering that stunting rates exceed 25% in most Member States. Each country in the SADC has a high or very high prevalence of stunting based on the World Health Organization's (WHO) definition. Stunting in children refers to their impaired growth and development caused by poor nutrition, frequent infections, and insufficient psychosocial stimulation. It is identified when their height-for-age falls more than two standard deviations below the WHO Child Growth Standards median (WHO, 2015). Approximately 18.6 million children suffer from stunting in the SADC, constituting a third of the stunted children in Africa.

[1] Angola, Botswana, Comoros, Democratic Republic of Congo (DRC), Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, United Republic of Tanzania (URT), Zambia and Zimbabwe

Additionally, the prevalence of iron deficiency anemia among women of reproductive age is at levels of public health concern. At the same time, the occurrence of overweight children in upper-middle-income economies is high (SADC, 2022). The double burden of malnutrition, where obesity and stunting co-occur, is a reality in many Member States. Hence, the SADC is not on track to reach Sustainable Development Goal 2: Zero Hunger (SDG2).

Persistent and widespread poverty in the region is exacerbated by low economic growth rates, high unemployment, rising inequality, frequent and intense shocks, weak social protection systems, and inadequate provision of essential services, including healthcare, water, hygiene, and sanitation. These factors contribute to the chronic nature of food and nutrition insecurity in Southern Africa. The region also experiences climate-related challenges such as rainfall variability, locusts, and disease outbreaks in combination with increased inflation and cost of living spikes, which have been worsened by disruptions in the supply chain for essential goods caused by the Covid-19 pandemic and the war in Ukraine (SADC, 2022). These multiple shocks have only increased the toll of food insecurity on an already fragile region. Yet, food security (FS) is critical to achieving overall human development and reaping the benefits of economic growth (Adil et al., 2020).

The RVAA has outlined some short-term and long-term recommendations for ensuring regional FS. In the short term, the first priority is assisting food-insecure populations through food or cash transfers while aligning with national social protection programs. A second priority is to monitor and address transboundary pests and diseases affecting livestock and crops using sustainable and effective integrated pest management approaches. Furthermore, high-impact nutrition interventions targeting children under five, adolescent girls, and women of reproductive age are recommended to accelerate stunting reduction. These target groups must also be active participants in the decision-making process in FNS programming. A crucial objective is to expand safety net programs that assist the most vulnerable. Additionally, it is essential to prioritize supporting food production capacity by providing seeds and agricultural inputs to improve agricultural productivity in upcoming seasons. (SADC, 2022).

In the longer term, addressing the issues of food security and climate change requires implementing a different range of strategies. These include promoting crop and dietary diversity by encouraging the cultivation and consumption of diversified diets, including indigenous foods, and

diversifying livestock production with a focus on small ruminants adapted to harsh weather conditions. As well as, promoting irrigation and rainwater harvesting, constructing dams, and rehabilitating flood and cyclone-damaged infrastructure to ensure year-round agricultural production and enhance access to markets, health, and social facilities. In addition to, keeping trade open, prioritizing intra-SADC trade for food and other commodities, developing resilience-building initiatives such as employment creation in rural areas and incorporating climate-smart technologies in subsidized and conservation agriculture. Lastly, strengthening the integration of agriculture and food security in national adaptation and mitigation plans to promote conservation agriculture, ecosystem management, and community resilience to climate change (SADC, 2022).

1.2 Research Objective and Contribution

This study will analyze the long-term solution of prioritizing intra-SADC trade for food and other commodities through a country-specific evaluation of the interlinkages between SADC trade and Zimbabwean household food security.

FNS is a key and pressing issue in Zimbabwe. Not only is it one of the seventeen priority countries identified by the WHO Africa intercountry support team for East and Southern Africa (Bekele et al., 2023), but the Zimbabwe Vulnerability Assessment Committee (ZIMVAC, 2022) Rural Livelihoods Assessment Report projected that 3.8 million rural individuals would face food insecurity during the peak of the 2022/23 lean season, which is a 9.8% upturn from the 5-year average and a 29.8% increase from the previous consumption year. The main contributing factors ZIMVAC (2022) identified were drought, dry spells, floods, crop and livestock diseases, and the long-term effects of the Covid-19 pandemic. These shocks have diminished the ability of vulnerable households to employ coping strategies to meet their nutritional needs.

In fact, according to the Famine Early Warning Systems Network (FEWS NET, 2022), the intra-seasonal dry spell from February to March 2022 affected agricultural production, especially in non-surplus-producing areas of the country. However, the Zimbabwean government proactively launched the Food Deficit Mitigation Programme in collaboration with the World Food Programme (WFP), which targeted 3.8 million vulnerable beneficiaries in 2022. This short term-measure is a type of absorptive coping mechanism. However, FNS requires that long-term solutions be applied in tandem

to fully adapt and transform the food system into a resilient and sustainable one that meets a population's dietary needs.

Thus, this research paper **aims to describe the interlinkages between intra-SADC trade and Zimbabwean household consumption patterns**. Using a Social Accounting Matrix, the main research question, **what are the disaggregated and distributional effects of inter-SADC trade on Zimbabwean household nutrition and food security**, will be answered. Contributing to the literature on the welfare effects of regional integration.

1.3 Outline of Chapters

The chapters included in this thesis are the following: Chapter 2 is a literature review covering the theoretical and empirical basis for a trade-based solution to FNS, and literature justifying the use of a Social Accounting Matrix (SAM) in the context of this study is also presented. Then, Chapter 3 covers the country and regional context in more detail, describing how FNS is tackled regionally and nationally. Chapter 4 provides a breakdown of the SAM methodology and data used in this research paper. While Chapter 5 contains the results of the study, Chapter 6 discusses those findings, and Chapter 7 is the concluding section, wherein recommendations and further research areas are described.

CHAPTER 2. LITERATURE REVIEW

The following chapter presents an overview of relevant literature related to this thesis. While also contextualizing the literature, relating specific findings to the principal areas of study, the Southern African Development Community and Zimbabwe. Section 2.1 discusses the concept of food and nutrition security, highlighting its main pillars and their significance. Section 2.2 presents theoretical and empirical evidence which describes how food security and regional trade are linked. Concluding the chapter with an explanation of the gap in the literature and this paper's projected contributions, reiterating the aim and research question.

2.1 Food and Nutritional Security (FNS): A Multidimensional Perspective

The SADC utilizes the 2012 Committee on World Food Security's definition of FNS, which is endorsed throughout the literature and is,

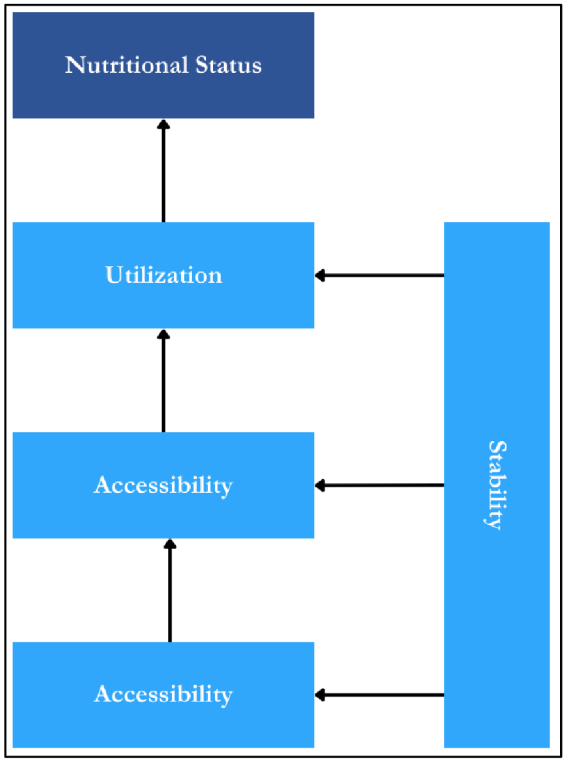
> When all people at all times have physical, social, and economic access to food which is safe and consumed in sufficient quantity and quality to meet their dietary needs and food preferences and is supported by an environment of adequate water and sanitation, health services and care, allowing for a healthy and active life.

The SADC further subscribes to the four pillars that demonstrate the multidimensional aspects of FNS: availability, accessibility, utilization, and stability. Sufficient availability means food supplies are appropriately distributed through domestic production or imports to meet a population's consumption needs (Abdulai and Dithmer, 2017). Access refers to the ability of households and individuals to have the sufficient purchasing power to secure adequate quantities of nutritious foods in the context of evolving food prices and real incomes and varying legal, political, and social resources (Van Wyk, 2001). Utilization describes households' and individuals' ability to secure safe food, which provides sufficient energy and nutrition when metabolized by the human body (Adil et al., 2020). Lastly, stability refers to a situation where countries, individuals or households can always ensure

sufficient food supplies, especially in severe food shortages (United Nations Food and Agricultural Organization

(FAO, 2006). These four pillars complement each other and contribute to achieving FNS, Figure 1. Maps the concepts and their relations. Note that the light blue boxes represent elements of food security, and with the inclusion of nutritional status (in the dark blue), this model depicts food and nutrition security. FS and FNS can be used interchangeably or distinguished by nutrition specific analysis.

Figure 1. The Relationship Among the Categorical Elements Within the Framework of FNS



(Source: Gross et al., 2000)

However, note that FNS is a consistently expanding concept. Many authors have advocated for additional pillars such as affordability, sovereignty, and sustainability to be included in food security analysis and research. It is, therefore, recommended to recognize these other concepts as they are often contrasted with the current pillars. This thesis will include key elements derived from these other pillars to complement the literature review on FNS.

Food affordability is especially relevant since most SADC countries are low-income developing nations with high to moderately high poverty rates. As a direct result of the covid-19 pandemic, the World Bank (2022) found that 49% of Zimbabwe's population lived in extreme poverty in 2020, which decreased to 43% in 2021. The importance of the multidimensional aspects of FNS is further reinforced by other realities like the rise in agricultural input prices due to the Russia-Ukraine conflict (FAO et al., 2022) and continued climate variability (WB, 2022). Yet, research regarding all four pillars and their interconnectedness within SADC countries is lacking in the literature.

Despite recognizing the relevance of multidimensionality FS policy, research in other regions has indicated that traditional program design and academic approaches studying FNS mainly focus on food availability and access. Furthermore, the FS pillars are inconsistently defined and used, making the multidimensional method challenging to apply and evaluate (Boege and Carson, 2020). After conducting an intensive literature review and conceptual analysis based on a broad spectrum of scholarship and research on food security in the United States of America (USA), Boege and Carson (2020) found that food availability is not highly connected with FS or improved health and that it had a greater correlation with access, cost, and quality (utility). Therefore, they argued that availability alone could only guarantee FS without access to and affordability of healthy foods.

This aligns with the agreed-upon notion in the literature; that poverty alleviation and economic empowerment are essential components for addressing food insecurity in the SADC and other regions (Van Wyk, 2001). Although note that since Boege and Carson (2020) relied on data from studies done in the USA, a high-income developed country in North America, their findings are only partially transferrable to the SADC region. Yet, a trend is apparent. Adil et al. (2020) also determined that most of the research on FS in India, Pakistan and Bangladesh focuses on agricultural productivity and food availability issues. In contrast, issues related to stability and utilization still need to be explored.

Considering that most empirical studies linking trade to food security conclude that trade acts on availability, this paper will go beyond that level of analysis and seek to address this gap by analysing how trade affects all four pillars and households' nutritional status. Furthermore, grounding the Zimbabwe case study in a regional context will allow a multilayered analysis of the effectiveness of macro and meso food systems policies and value chains in reinforcing FS.

Note that Brinkman et al. (2020), in their paper on the distribution of food security impacts of biofuel in Ghana, outlined proxy indicators that can be used to measure all four main pillars. Household income, food price index and share of food in total expenditure can be used to evaluate access. Food energy consumption per capita, protein consumption per capita, fat consumption per capita, carbohydrates consumption per capita, supply of protein from animal sources and the average value of food product per capita can be used to evaluate availability. The share of calories from fruit, vegetables, cereals, roots, and tubers can be used to assess utilization. Lastly, the cereal import dependency ratio and percentage of food in total consumption imports can be used to evaluate stability. This approach is common with FS analysis; proxy indicators are often used to capture data on the various pillars and are the systematically interpreted.

Moyo (2007, 104) highlights the necessary characteristics of a food system perspective while discussing integrated food security strategies for South Africa and the food security status in Africa with South African diplomatic representatives and representatives from the FAO. These characteristics are "(1) the capacity to produce, store, distribute and if necessary, to import sufficient food to meet the basic food needs of people; (2) a maximum level of robustness to reduce vulnerability to market fluctuations and political pressures; and (3) minimal seasonal, cyclical and other variations in access to food".

Furthermore, the approach to food security in the South African context consists of two dimensions which address macro and micro-level issues. On the one hand, policies must be created to meet FS needs from native agricultural resources; imported foods that cannot be produced effectively domestically; and commodities that are exported with a competitive advantage. On the other hand, inequalities, and poverty, manifested in unstable food supplies, an absence of purchasing power, fragile institutional support networks, poor nutrition, inadequate safety nets, and insufficient food emergency warning and management systems, must be eliminated at the household level. Moyo (2007) found that in 2007 South Africa was food secure at the national level, producing its main staple foods, exporting surplus, and importing what was needed to meet its food requirements, such as livestock products and cheese from SADC and EU countries.

Lee (1936) defines nutrition as the process through which the body tissues are nourished by consuming food and water. The six essential classes of food constituents are proteins, fats,

carbohydrates, accessory factors, minerals, and water. Each class has its own specific functions and requirements. The first three groups provide energy when metabolized by the body. However, proteins not only provide energy, but they also contain crucial compounds necessary for tissue growth, repair, and replacement. Fats carry "accessory" factors, including vitamins that promote growth and facilitate bodily mechanisms. Minerals (e.g. salt) are important for bony growth, maintaining correct blood composition, regulating acid-base balance, and distributing water within the body. Water is a fundamental component of life processes, comprising roughly sixty percent of the body and acting as a vital medium for these processes. However, it faces depletion through excretion and evaporation, requiring continuous replenishment.

Lee (1936) also explains that malnutrition can occur due to various factors, including insufficient total food supply (under-nourishment), inadequate supply of specific nutrients (mal-nourishment), impaired digestion, and reduced tissue assimilation. It is important to note that malnutrition can occur even when the food supply is adequate in both quantity and quality if one of the food constituents is missing in an individual's diet.

It is important to note that not all food groups provide the same quantity and quality of constituents. In fact, the WHO notes that, dietary patterns have shifted, with people consuming more processed foods high in energy, fats, sugars, and salt, while not consuming enough fruits, vegetables, and dietary fiber. Yet, a healthy diet includes fruits, vegetables, legumes, nuts, and whole grains. For adults, it is recommended to consume at least 400g of fruits and vegetables daily, limit free sugar intake to less than 10% of total energy, limit fat intake to less than 30% of total energy, and limit salt intake to less than 5g per day. For infants and young children, exclusive breastfeeding for the first 6 months is advised, followed by a variety of nutrient-dense foods without added salt or sugars. Hence the quantity of fruits and vegetables in individuals' diet is an important marker for their nutrition status.

Nutrition analysis is moving away from food group discussions and is instead focusing on consumption patterns. Archary et al. (2022) conducted a study in Zimbabwe that examined the relationship between three distinct dietary patterns - modern, low animal source, and traditional - and various factors related to childhood, parental, and household nutrition. These patterns were characterized by the specific food items consumed and their diversity. The modern pattern consisted

mostly of "westernized" foods such as unprocessed red meats, chicken, potato chips, salads, pizza, and ice cream. The low animal source pattern had a limited range of food items with low meat and animal source product consumption. The traditional pattern consisted of a high intake of fruits (mostly wild fruits), meat, milk, milk products, insects, and worms. The study revealed that overall dietary patterns had a greater impact on stunting than specific food items. In this study, the traditional pattern, which is defined by seasonal and locally available foods, did not exhibit any association with childhood stunting and neither did the modern diet but the low animal source one did.

Unlike the results from a prospective cohort study conducted by Changoma et al. in 2019, which revealed that traditional diets in Kenya provided protection against negative nutrition outcomes. This was attributed to the diverse range of food items that were readily accessible to the local community. The study found that children who followed a dietary pattern consisting of locally available foods had a lower risk of stunting compared to those who followed a "western diet" pattern.

The nutrition transition observed when countries transition from low-income to middle-income goes in hand with individuals accessing high-calorie foods with increased sugar and fats (processed foods). This puts populations at risk of obesity and noncommunicable diseases (NCD) such as high blood pressure, and diabetes that co-occur with being overweight (Mapfumo et al. 2022).

Using Multivariable logistic regression models, Mude et al. (2023) found that Zimbabwe had the highest prevalence of obesity among women (35.13%) and children (5.9%) when compared to its SADC counterparts, Malawi, and Namibia, with urban residence having a positive and significant relationship with obesity. Bekele et al. (2023, 1) made a similar conclusion, finding that "regional stunting and wasting prevalence were higher among children living in the poorest households, with mothers with the lowest educational level and in rural areas. In contrast, regional overweight (including obesity) prevalence was higher among children living in the richest households, with mothers with the highest educational level and urban areas."

Another study by Mapfumo et al. (2022) conducted through a structured questionnaire in select Harare (urban) high schools, found that nutritional knowledge in and of itself was not a

determining factor when it came to healthy food choices, rather other factors, such as cultural norms around being overweight linked to status and attractiveness, also play a role in the food consumption choices and habits of Zimbabweans. Adolescent girls were determined to have a higher prevalence of obesity than boys and obesity and stunting were the leading forms of malnutrition in the schools that were evaluated in the study.

Therefore, it is tempting to make the causal link between the higher intake of processed foods in urban areas and obesity. However, a study by Bernstein et al. (2019, 1) found that "calorie- and nutrient-dense foods exist across different levels of processing, suggesting that food choices and dietary recommendations should be based primarily on energy or nutrient density rather than processing classification". Additionally, all studies found that physical activity had to be incorporated into daily life to prevent the risk of contracting NCDs through obesity.

The literature clearly indicates that to evaluate FNS one must consider not only the four pillars but the nutritional patterns which accompany them. Research in the area has already identified a prevalence of modern diets in Zimbabwean household. Although no significant nutrition deficits are linked to this pattern, the prevalence of obesity remains problematic. The source of the food which increases this problematic has yet to be clearly defined. However, the Zimbabwean is heavily reliant on trade to meet its population's food requirements.

2.2 The Impact of Trade on Food Security

According to Wacziarg and Welch (2008), trade openness enables access to larger markets, creates opportunities for specialization in production and creates dynamic efficiency gains like economies of scale, technology transfers, and knowledge spillovers. Hence it is a good economic condition for enabling overall welfare.

In the same vein of literature, using Computable Generalized Modelling, the FAO (2000, 2005) has made robust findings on trade's impact, specifically on food availability, finding that greater market liberalization reduces price distortions, bringing about improved incentives for market participants. Trade can thus lead to an increase in the total amount of food available to a given population. In addition, export revenue can be used to import production inputs like machinery, fertilizers, and pesticides. Although, debt service requirements and deteriorating terms of trade may limit the ability

to finance food imports in countries where agricultural commodities are the primary source of foreign exchange.

Similarly, Abdulai and Dithmer (2017) cite Pardey et al. (2003), who also found that the global market impacts availability by acting as an essential source of food supply when agro-climactic and other factors constrain domestic markets. This perspective has become even more relevant owing to increased climatic variability in the SADC, where 70% of the population relies on rainfed agriculture (United Nations Convention to Combat Desertification, 2022).

Using a model of trade cost minimization built within a bio-economic optimization framework of cropland allocation, Atewemba et al. (2017) investigated the role of intra-regional trade on food availability in the Economic Community of West African States (ECOWAS). The authors found that countries in the Sothern Hemisphere are more susceptible to experiencing negative externalities due to climate change affecting agricultural production than countries in the Northern Hemisphere. Even though rain pattern variability differs from country to country in the ECOWAS, one viable coping strategy to ensure FS in these countries is to continue and expand food trade dynamics based on climate-induced comparative advantage where some countries are temporary net exporters of goods in some years and net importers in other years. However, accounting for various trade scenarios and population growth-driven demand, the authors found that unless ECOWAS nations can double crop yields by 2050, they would be unable to reduce dependence on outside food imports from the Northern Hemisphere. Atewemba et al. (2017) note that more adaptation methods, other than trade, must be considered in future research.

Critics argue that inter-regional trade unions are the second-best option to global trade since the most optimal policy for any country is to unilaterally liberalize trade on a most-favourable nation basis (Maasdorp, 1998, 505). Ncube and Tregenna (2021) agree with this perspective. Analyzing the input-output linkages and interdependence between countries in the SADC, the authors found that while intra-SADC trade exports increased between 2000 and 2018, they still comprised only 20% of total SADC trade. Furthermore, regional trade is concentrated in a few sectors and with one country-South, Africa, which is also the largest country in terms of GDP. Therefore, the SADC is only a partial case of regional integration.

However, the authors also found that the region's food and beverages sector had the most significant linkage effect. Yet, "due to similar production structures in the region, the highest levels of protection are found among the agriculture and agro-processing sectors" (Ncube and Tregenna, 2021, 14). As a result, policy misalignment and restrictions on the trade of certain food products within the SADC undermine the possibility of scale and the ability of the agro-processing markets to be catalysts for economic growth. Therefore, the authors suggest targeting export markets beyond the region to take advantage of larger, more diversified markets and economies of scale.

Although, note that even orientation towards larger external markets has its critics. One paper analyzing the politics of food, resources and development in Africa found that joint and cross-border management of natural resources to achieve economies of scale can create new forms of land alienation (Van Wyk, 2001) in addition to external global hegemony and control over resources and their use through private cross-border investment by multinational corporations supported by regional governments, global governance treaties, trade, and aid conditionalities (Van Wyk, 2001, 16).

Furthermore, Diko and Pasara (2020), in evaluating the effects of the African Continental Free Trade Agreement (AfCFTA) on food security sustainability by analyzing cereal trade in the SADC, using the World Integrated Trade Solution, Software for Market Analysis and Restrictions on Trade, found that the AfCFTA would only lead to positive outcomes for four out of the fifteen SADC countries with the rest remaining unaffected. However, their analysis only considered cereals, and they argued that including other sectors may show more gains. The authors conclude that African countries should seek to deepen their integration levels to that of common markets where production factors like labour and capital are mobile, to have a multiplier effect on improving regional food security sustainability from a trade perspective.

The authors also present Viner's conceptualization of trade diversion, which is when member countries shift their trade from efficient non-member States to inefficient member States. Notably, diversion occurs in tandem with trade creation, which is when trade shifts from inefficient producers to efficient ones that are part of the FTA. Therefore, it is essential to compute the net welfare effects to determine whether a particular trade agreement is beneficial. This requires country and sector-specific analysis of the impact of trade agreements to draw robust results, conclusions, and recommendations. Food security sustainability, in this instance, refers to maintaining a net positive

welfare effect through targeted FS economic, legal, and political policies. This is an essential notion, as any model computed to analyze how trade may impact FS should include trade diversion effects.

In contrast to these critical voices, some researchers have found evidence for the positive relationship between trade and food security. Utilizing a Generalized Method of Moments (GMM) estimator model, Abdulai and Dithmer (2017) demonstrated empirical support for the hypothesis that, indeed, trade openness improves national food security where FS is represented by dietary energy consumption expressed in kilocalories (kcal) per day available per individual in the total population. More specifically, an increase in trade openness of one standard deviation would increase dietary energy consumption by 93 kcal, where trade openness (TO) is computed as real imports plus exports (trade volume) over real Gross Domestic Product (GDP). These findings are highly relevant to this study as eleven of sixteen SADC countries were part of the baseline regression used by Dithmer and Abdula in their analysis.

Additionally, Jensen and Sandrey (2011) used the Global Trade Analysis Project model to analyse the impacts of a regional trade policy on FS across 26 African countries in the Tripartite Free Trade Agreement. They found that it was overall beneficial to Member States, with South Africa and Mozambique as the top beneficiaries, seeing respective welfare increases of USD 1321 and USD 57 million.

Coluccia et al. (2020) also used the GMM approach to evaluate the effect of trade openness on food security in the European Union (EU). Finding that commercial openings have a statistically significant and positive effect on food security in European countries and that economic development and the agricultural sector also play a crucial role in improving FS levels. This study is important as it distinguishes the significance of the impact of interregional trade on FS from international trade.

Thus, it is essential to further consider the direction of trade flows and how they may impact FS. Cardoso and Sowman (2010) do so by analyzing the small-scale fisheries sector in SADC countries within the Benguela Current Large Marine Ecosystem. The authors found a growing trend of fisheries export orientation in South Africa and Namibia in contrast to Angola, which prioritizes domestic food security. Notably, these fisheries contribute to global trade, food security, and poverty alleviation in coastal regions.

However, the drive to export toward Northern markets, rooted in structural adjustment programmes and neo-liberal policies emphasizing export-led growth and exchange rate liberalization, is evidence that developing countries are still caught in a colonial pattern of primary natural resource exports reinforced by technical barriers (labelling and certification) and tariff peaks and escalations in industrialized countries. The authors note that it is essential for governments to disentangle themselves from this post-colonial trap and instead support initiatives by small-scale fishers engaged in national and regional trade; otherwise, economic opportunities will increase for those already privileged by the established system undercutting artisanal livelihoods (Cardoso and Sowman 2010).

Their evaluation of the legal frameworks in the selected countries showed that post-colonial restructuring of the fisheries sector in Namibia and South Africa had prioritized industrial and recreational fishers with benefits accruing to the State and private companies, neglecting poor coastal communities and fishers. Ultimately Cardosa and Sowman (2010) find that legal frameworks recognizing and protecting small-scale fishers; in addition to a commitment to using marine resources for coastal livelihoods and food security to prioritize national and regional interests and needs, are the determining factors for how this sector can contribute to FS in South Africa, Namibia, and Angola.

This paper highlights the notion of food sovereignty, which was defined at the 2007 Forum for Food Sovereignty as:

> The right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts those who produce, distribute, and consume food at the heart of food systems and policies rather than the demands of markets and corporations. It defends the interests and inclusion of the next generation. It offers a strategy to resist and dismantle the current corporate trade and food regime, and directions for food, farming, pastoral and fisheries systems determined by local producers. Food sovereignty prioritises local and national economies and markets and empowers peasant and family farmer-driven agriculture, artisanal fishing, pastoralist-led grazing, and food production, distribution and consumption based on environmental, social, and economic sustainability. (La Via Campesina, 2007)

This conceptualization of FNS requires the State to actively balance economic, social, and ecological objectives. All SADC Member States must consider how their post-colonial legal frameworks and economic linkages impact key sectors for nutrition and food security. A balance must be attained between local, national, regional, and global interests. A key gap in the FNS literature is apparent regarding critical analysis of the laws and post-colonial systemic designs that directly and/or indirectly affect the FNS pillars in SADC counties. This paper will not delve deeply into sovereignty; however, it will address post-colonial institutions and designs as they present themselves as critical historical influences in the development and performance of key sectors linked to FNS.

2.3 Social Accounting Matrix as a Methodology for Describing Disaggregated Trade Flows

Powell and Round (2000) conducted a SAM income multiplier analysis to examine how additional export income from cocoa affected Ghana. Their findings showed that unskilled male workers and mixed-income workers benefited greatly from the increase in global demand for cocoa. The primary cocoa production industry received the largest portion of export income, which resulted in significant benefits for specific urban and rural households. The impact of an income boost in the cocoa industry was like that of the construction industry, but less pronounced than in mining income. The study also revealed limited interdependency or income interrelationships among endogenous accounts in the Ghanaian economy.

Bautista et al., (1998) studied Zimbabwe's macroeconomic, trade, and agricultural reforms. Through the SAM-income multiplier analysis, they discovered that the GDP increased, foreign trade improved, and household income distribution experienced positive changes. The removal of price and exchange rate controls was credited for these improvements, as it gave smallholder farmers better access to land and competitive world commodity prices, thus enhancing their production. However, the study noted that the reforms led to a decline in trade tariff revenue, which is a crucial income source for Zimbabwe. This decline could potentially affect government revenue and its ability to provide public goods. The authors recommended major fiscal and monetary reforms, trade liberalization, and comprehensive land reform to benefit smallholders. They emphasized the need to avoid disruptive land distribution that could harm large-scale farmers' production and employment.

They also encouraged promoting complementary infrastructure, education, water, and input supply policies.

The third study by Arndt et al. (2000) analyzed Mozambique's economy using SAM income multiplier analysis. The study revealed that the country's GDP was primarily driven by the agricultural sector, followed by services, industry, and commerce. Income injections into primary agriculture resulted in the highest demand for factors such as labour and capital, compared to industry and services. Agricultural labour benefited the most from primary agriculture, while non-agricultural labour saw the most gains from the services sector. Income injections in primary agriculture helped improve the welfare of rural households, while urban households saw similar benefits in both agriculture and services. Primary agriculture and the services sector exhibited similar demands for capital, while industry lagged.

The study emphasized the importance of developing and supporting the agricultural sector, which would create broader benefits for the rural population in Mozambique. Rice, other grains, raw cashew, raw cotton, forestry, livestock, and fishery production were found to have the highest production linkages in Mozambique, providing the country with essential export commodities. These activities also generated significant demand for factors, particularly agricultural labour.

In summary, the reviewed studies highlight the effects of income injections in different sectors of the economies of Ghana, Zimbabwe, and Mozambique. They demonstrate the importance of export income from cocoa in Ghana, the benefits, and challenges of macroeconomic and trade reforms in Zimbabwe, and the significance of primary agriculture in Mozambique's economy. These findings contribute to understanding income multiplier effects and the interplay between various sectors and factors in these countries. They also demonstrate the utility of a SAM model to analyze trade linkages and their impact on the whole economy and individual economic accounts.

Although this study will utilize a similar methodology focusing specifically on linkages between SADC trade, households, farmers and critical FNS commodities, the literature review reveals a gap in understanding of how SADC member States implement trade-led food security strategies with positive, multidimensional, and disaggregated impacts.

Furthermore, most research regarding the effects of regional trade integration on FNS is focused on measuring the monetary or physical gains, but research is lacking regarding country-specific distributional effects. Finally, mport-based analysis is lacking within SAM studies as most focus on export-led growth policy evaluations.

Thus, the aim of this research paper is to **describe the interlinkages between intra-SADC trade and Zimbabwean household consumption patterns**. Using a Social Accounting Matrix to answer the main research question: **what are the disaggregated and distributional effects of SADC regional integration on Zimbabwean household nutrition and food security?**

CHAPTER 3. REGIONAL AND COUNTRY CONTEXT

This chapter examines how the SADC addresses the problem of food and nutrition security on a regional level. Additionally, it explores the status of FNS in Zimbabwe and the country's regional integration efforts and approaches to resolving food insecurity through trade within the region.

3.1 The SADC Approach to Food Security

The SADC was founded on April 1st, 1980, by nine States: Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, the United Republic of Tanzania (URT), Zambia, and Zimbabwe (SADC, 2022). It is a Free Trade Area, the second level classification of six regional economic community (REC) types. A regional economic community or bloc is a type of integration between countries generally sharing a common geographical area (see Table 1 for further clarification). It aims to establish economic agreements to facilitate trade between member countries and external economies. Members have access to free trade within the block, market access and trade creation, economies of scale, jobs, economic protection, consensus, and cooperation.

Table 1. Regional Economic Communities Descriptions and Levels of Integration

Level of Integration	**REC Types**	**Description**
Level I	Preferential Trade Area	The weakest form of integration, where member countries within a geographical region lower or abolish tariff barriers on certain items imported from other members of the area. This is the first step to a regional trading bloc.
Level II	Free Trade Area	With the aim of expanding trade among themselves, countries in a region agree to decrease or abolish trade barriers (tariffs) on all goods originating from other

		members. However, members are free to set their own import tariffs with non-member countries.
Level III	Customs Union	Trade barriers between countries are abolished and there is acceptance of a common unified external tariff. Members can negotiate with third parties as a single bloc. To form a customs union, it is essential for Member States to co-ordinate their trade policies.
Level IV	Common Market	Member countries freely trade in all economic resources (not just tangible goods). All trade obstacles in commodities, services, capital, and labour are removed. There is an important level of macroeconomic policy harmonization. There is a single external tariff policy for commerce with non-member countries. Citizens in the common market can unrestrictedly work and invest in any member country.
Level V	Monetary Union	Countries agree to abolish trade barriers and embrace common economic policies. A currency-related trade treaty establishes a monetary union. There is fiscal union, full monetary union, and total economic unity.
Level VI	Political Union	The most advanced integration step with no trade barriers and total economic unity. Countries have common decision-making bodies and policies.

(Source: Gürler, 2000)

Currently, the SADC has sixteen Member States: Angola, Botswana, Comoros, the Democratic Republic of Congo (DRC), Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, URT, Zambia and Zimbabwe, with a combined population of approximately 380 million peoples (SADC, 2020 and WorldData, n.d.). Figure 2 illustrates all the Member Countries' locations on the African continent. The SADC distinctly occupies the entire southern portion of the African continent and comprises a mixture of landlocked, coastal and island countries.

Figure 2. Map of the SADC

(Source: Author's own elaboration using MapChart, 2023)

According to SADC Vision 2050, the bloc aims to become "a peaceful, inclusive, competitive, middle to high-income industrialized region, where all citizens enjoy sustainable economic well-being justice and freedom" (SADC, 2023). Vision 2050 has three main pillars: industrial development and market integration, infrastructure development supporting regional integration, and social and human capital development (see Figure 3).

Figure 3. SADC Vision 2050 Outline

(Source: SADC, 2020)

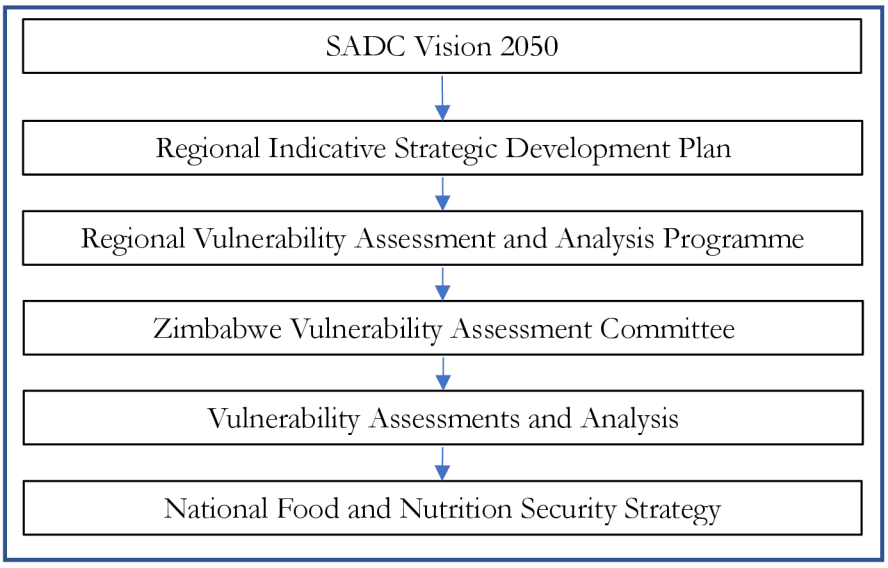
The SADC Regional Indicative Strategic Development Plan (RISDP) 2020-2030 outlines concrete steps and milestones toward Vision 2050. It is the framework for implementing the SADC's regional integration agenda for the upcoming decade. The strategic objectives and outcomes of RISDP 2020-2030 are broken down into six pillars: Peace, Security, and Good Governance (foundational pillar), I. Industrial Development and Market Integration, II. Infrastructure Development in Support of Regional Integration, III. Social and Human Capital Development, IV. Cross-Cutting Issues: Gender, Youth, Environment and Climate Change, V. Disaster Risk Management and VI. Strategic Management of the RISDP. Steps towards improving FS in the region are detailed in the foundational pillars and pillars one and three. The SADC Regional Vulnerability Assessment and Analysis

Programme (RVAA) is a notable activity under Pillar I. Industrial Development and Market Integration.

The RVAA is implemented annually by Member States who undertake vulnerability assessments and studies. The assessments are guided by policies, strategies, and programmes aligned with the SADC Regional Integration Agenda and strategic priorities. National Vulnerability Assessment Committees (NVAC) share data about food security with SADC, which then publishes an annual Synthesis Report on the State of Food and Nutrition Security and Vulnerability in Southern Africa. Figure 4 maps out the influence of regional policy at the national level in Zimbabwe.

According to WFP's Joint Evaluation of the RVAA (Do Santos et al., 2022), the Zimbabwe Vulnerability Assessment Committee (ZIMVAC) is considered the most functional NVAC in the region. Therefore, ZIMVAC is encouraged to become a Centre of Excellence on Resilience and share lessons learned with other NVACs on topics such as integrated gender analysis and the mobilization of local resources for vulnerability assessments and analysis (VAA). Furthermore, in Zimbabwe, "VAA data was used to inform the geographical targeting of assistance and to provide baseline data for the National Development Strategy (2021-2025) and the Food and Nutrition Security Strategy" (Do Santos et al., 2022, 85).

Figure 4. Regional to National FNS Policy Flow



(Source: Author's own elaboration)

The 2022 RVAA Synthesis Report covers the period between April 1st, 2022, and March 21st, 2023, and contains data from 12 Member States representing 91% of the SADC population and approximately 346 million individuals. Their findings show that an estimated 55.7 million people are food insecure in these SADC countries, an increase from 50.8 million from estimates computed during the same period in the 2021/2022 season. The DRC, South Africa, Malawi, Zimbabwe, Madagascar, and Angola account for 93% of the estimated food-insecure population in the SADC region, meaning these seven countries are priority targets for increased FNS. Table 2 provides a snapshot of the quantity of food-insecure people in the region using the SADC population size for 2022 of 380 million (WorldData, n.d.).

Table 2. The Number of Food Insecure People in Southern Africa 2022/2023

Country	Total Population	% Share of SADC Population	Food Insecure Population 2022/23	% Share of SADC Food Insecure
Angola	34,500,000	10.0%	1,584,000	2.8%
Botswana	2,590,000	0.8%	37,000	0.1%
Comoros*	NA	NA	NA	NA
DRC	95,890,000	27.7%	25,900,000	46.5%
Eswatini	1,190,000	0.3%	258,800	0.5%
Lesotho	2,280,000	0.7%	521,000	0.9%
Madagascar	28,920,000	8.4%	2,064,000	3.7%
Malawi	19,890,000	5.7%	3,822,502	6.9%
Mauritius*	NA	NA	NA	NA
Mozambique*	NA	NA	NA	NA
Namibia	2,530,000	0.7%	750,000	1.3%
Seychelles*	NA	NA	NA	NA
South Africa	59,390,000	17.2%	14,400,000	25.9%
Tanzania	63,590,000	18.4%	592,000	1.1%
Zambia	19,470,000	5.6%	1,950,000	3.5%
Zimbabwe	15,990,000	4.6%	3,820,000	6.9%
SADC	346,230,037*[2]	100.0%	55,689,889*	100.0%

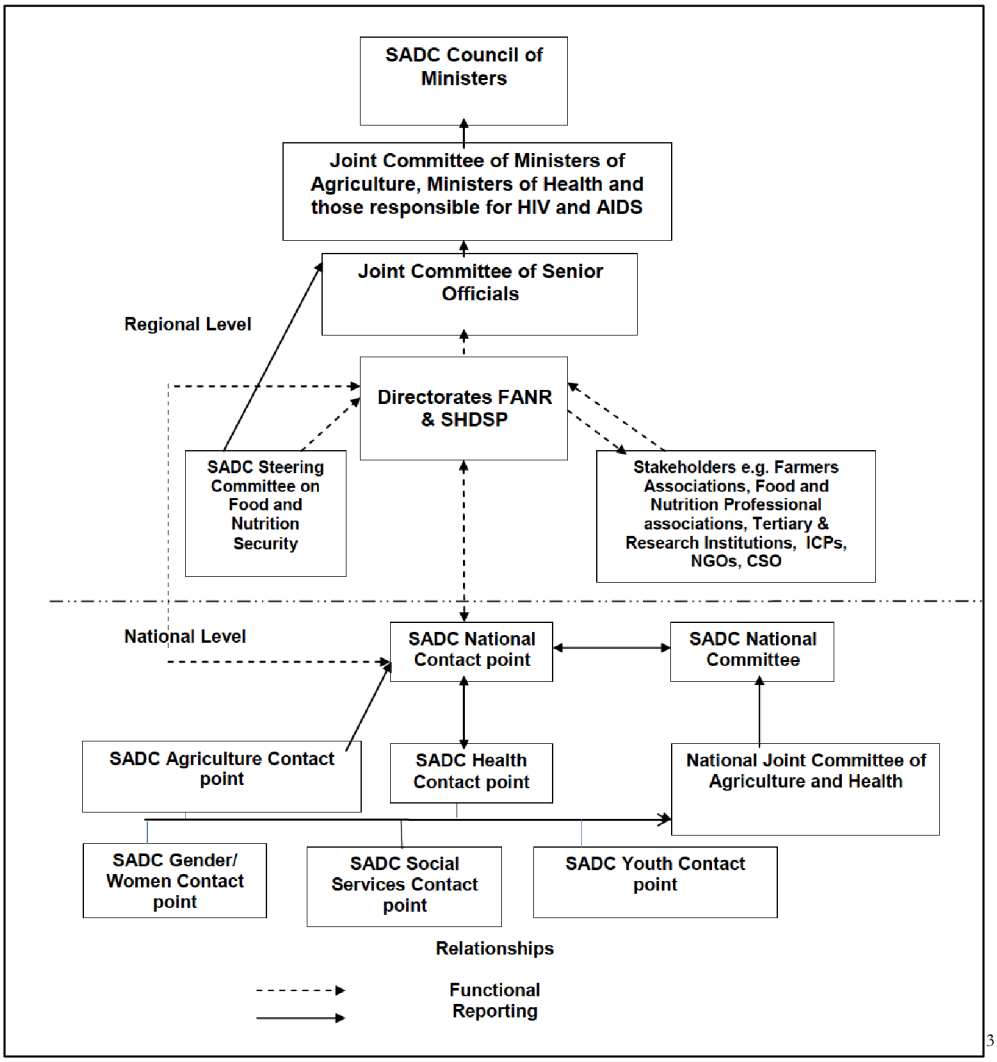
(Source: Author'scalculations using SADC, 2022)

The SADC Regional Agricultural Policy is another notable initiative under pillar I of the RISDP. The SADC Food and Nutrition Security Strategy (FNSS) implements this policy in a nutrition-sensitive, holistic, multi-sectoral manner. Notably, the FNSS recognizes the need to domesticate regional trade policy instruments to support women, the youth, rural masses, and vulnerable groups. Thus, highlighting the need to map the distributional effects of trade. Figure 5 maps the FNSS

[2] *Based on 12 Member States that submitted data.

framework and relationships between various actors involved in implementing regional food security programmes.

Figure 5. The Institutional Framework for Implementation of the SADC FNSS



(Source: SADC, 2014)

At the regional level, FNS priorities are to "(1) promote good practice and capacity building in farmer empowerment and (2) support initiatives geared at strengthening agribusiness linkages

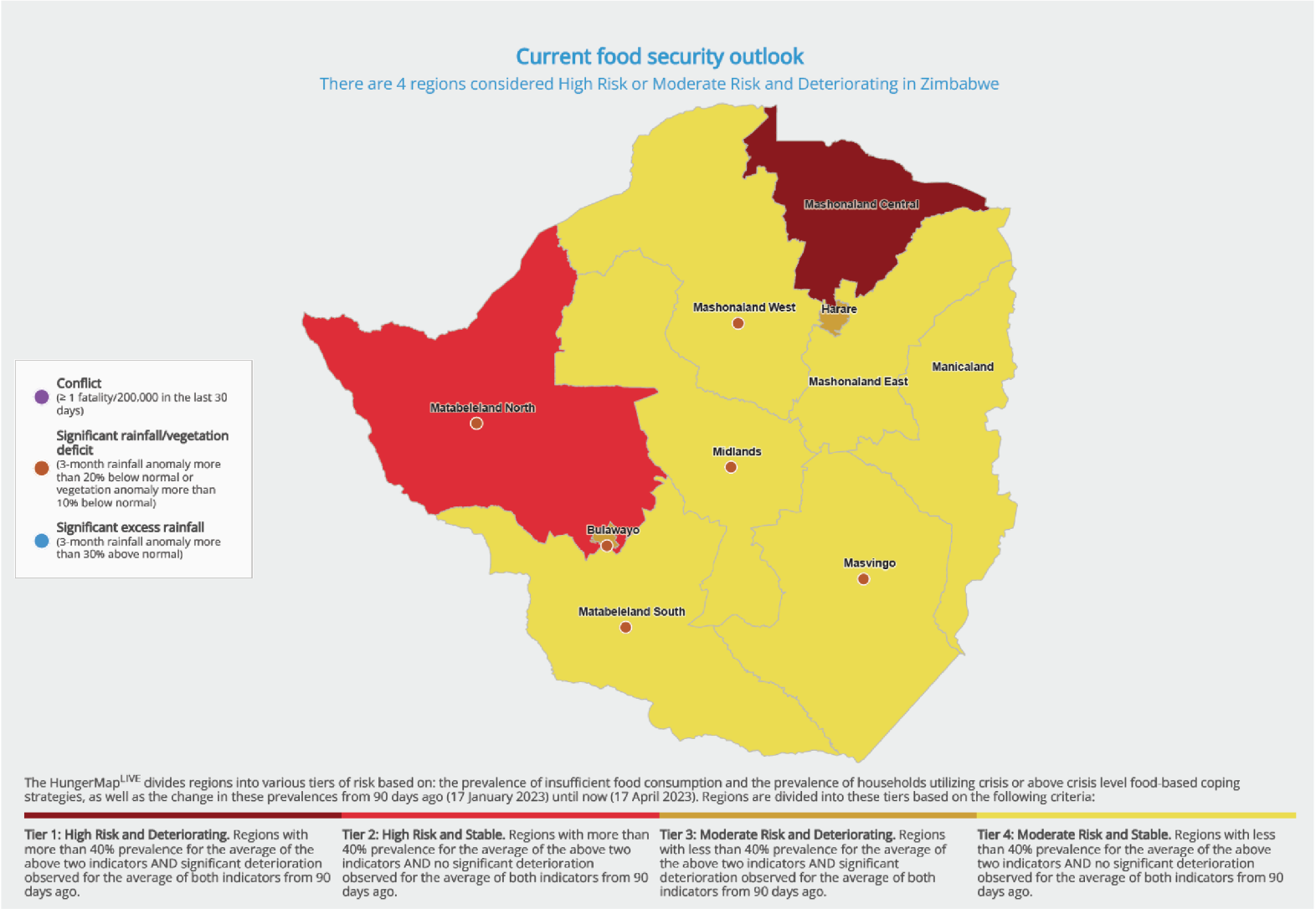
[3] Acronyms : FANR: Food Agriculture and Natural Resources Directorate, SHDSP: Social and Human Development and Special Programmes, ICPs: International Cooperating Partners, NGOs: Non-Governmental Organisations, CSO: Civil Society Organisation, HIV-AIDS: Human Immunodeficiency Virus- Acquired Immunodeficiency Syndrome

between smallholder farmers and the agribusiness sector" (SADC, 2008, 25). Ultimately, the SADC has minimal authority and relies heavily on the inputs given by Member States hence a country-specific analysis is necessary to understand the full context.

3.2 The State of Zimbabwean Food and Nutrition Security

Through its live Hunger Map, a tool that publishes live data collected using phone surveys and machine-learning-based predictive models, the WFP (2023) found that, at the national level, Zimbabwe is experiencing food insecurity at varying intensities throughout its territory. Figure 6 Shows hunger status in Zimbabwean in April 2023. Note that in June 2023, all ten provinces are now in tier 4: moderate risk. Hunger and famine are cyclical in nature; hence this live monitoring system is notably helpful for trend analysis.

Figure 6. Zimbabwe Hunger Map April 13th, 2023



(Source: WFP, 2023)

As of April 2023, 3.4 million individuals had insufficient food consumption, and 6.9 million were employing crisis or above crisis-level food-based coping strategies to survive (WFP, 2023). The total Zimbabwean population is 15.9 million; therefore, 21% of Zimbabweans are food insecure, and 43% employ coping strategies during the growing season. Many of the worst affected households are relying on humanitarian assistance provided by the government (10kg of cereal per beneficiary to 3 million beneficiaries/month in 52 out of 60 rural districts) and WFP, which is targeting 702,000 beneficiaries in 8 rural districts distributing 8.5kg of cereal, 1.7kg of pulses, and 0.6kg of vegetable oil per beneficiary per month (FEWS NET, 2022).

According to FEWS NET's (2022) Zimbabwe Food Security Outlook which made conclusions based on the Zimbabwe National Statistical Agency's (ZIMSTAT) eighth round Rapid Poverty, Income, Consumption and Expenditure Survey (PICES) report published in January 2023 and data collected from key informants; when unavailable locally, individuals must sometimes travel long distances, despite high transport costs, to business centers where goods are available to procure key food stocks. These food items are sourced both in the country and imported from neighbouring countries.

Due to the low domestic cereal output in 2022, import requirements for the 2022/23 marketing year (April/March) are expected to rise yearly but stay lower than the current five-year average. Maize imports are predicted to increase by 100,000 to 200,000 tons in 2022/23. Inventories, built up to above-average levels in the previous two years, will also help fulfill national consumption needs. Wheat exports are expected to be below average in 2022/23 due to an anticipated decline in domestic inventories. Rice imports, a commodity not produced in substantial amounts in the country, are expected to climb above the five-year average while international prices remain relatively stable (FAO, 2022).

Note that, imported staples are usually less costly than domestic ones. Yet, with the imposition of an import ban in November 2022 (later lifted for basic goods), these imported stocks were brought in by informal traders, resulting in numerous migrant workers sending cash remittances from South Africa to procure food rather than in-kind remittances like flour, cooking oil, sugar, pasta, maize meal, and beverages.

Although labor migration to Botswana and South Africa is an important source of food through remittances, the rate of such transfers is at below-normal levels due to liquidity issues and the termination of the Zimbabwe Exemption Permit Visa, which is currently being contested in South African courts but has nonetheless contributed to dampening the ability of Zimbabwean expatriates in South Africa to support their families who still live in Zimbabwe (FEWS NET, 2022). In this context, fluctuating in-country food affordability means that the most vulnerable households are extremely sensitive to domestic, regional, and international shocks.

Therefore, the impact of Zimbabwe's macroeconomic challenges cannot be overlooked when analyzing its food security. The country's food inflation rate reached 353% at its peak in November 2022 and has since remained in the three digits, with Zimbabwe having the highest food inflation rate in the world (WFP, 2022). According to the FAO (2022), this is due to the steep depreciation of the ZWL and increasing international prices for key food staples, agricultural inputs such as fertilizer and fuel, and energy.

To counteract this phenomenon, the government raised the benchmark interest rate and removed import duties on key food commodities such as cooking oil, maize meal and rice for six months starting in May 2022. Raising the interest rate improves inflation by reducing consumer borrowing and spending, reducing the demand for goods and services (Adrian and Gaspar, 2022). While removing import duties on key commodities leads to a decrease in the cost of imported raw materials, component parts and finished consumer goods causing a deflationary effect on the general price level.

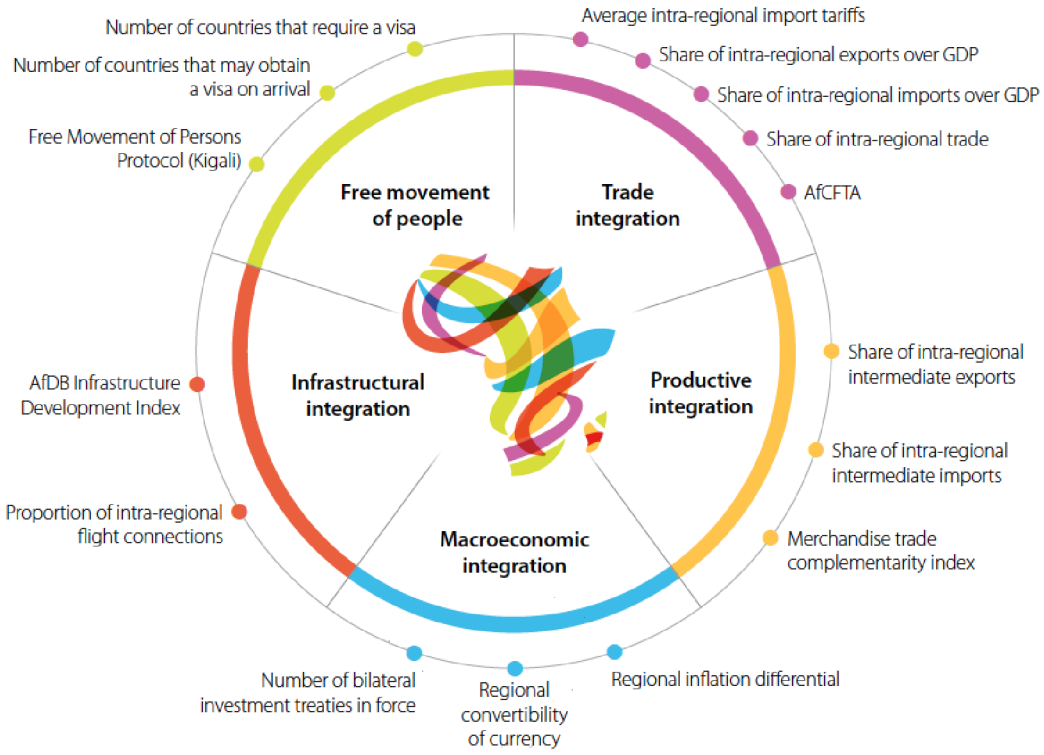
Despite these efforts, living costs still impose food access challenges for poorer households. Furthermore, PICES data shows that 78% of food purchases in Zimbabwe were made in USD, yet the prices of goods and services continue to increase even in USD terms. While some formal businesses and small and medium enterprises benefit from the current foreign exchange auction system, the demand for USD is high, fueling parallel market exchange rates (FEWS NET, 2023).
Zimbabwe is also prone to climactic shocks such as drought and prolonged mid-season dry spells, floods, water logging, crop and livestock pests, and hailstorms. As well as crop and livestock diseases. Therefore, the State must actively implement mitigation measures to ensure national FNS (ZIMVAC, 2022).

Zimbabwe's domestic FNS policy is currently centred on improving farmers' access to inputs through input supply schemes, expanding irrigation infrastructure to increase cropped areas, adopting climate-smart agriculture practices, promoting the cultivation of agro-ecologically adapted crop varieties in low potential areas, and implementing food swap arrangements for maize and traditional grains. Additionally, the government is maintaining a 500,000 metric ton Strategic Grain Reserve, which assists vulnerable households throughout the year. These efforts aim to enhance food security and ensure a reliable food supply for the population (ZIMVAC, 2022). Finally, a key objective of the national Food and Nutrition Council (FNC) overall is to "increase food self-sufficiency from the current level of 45% to 100% and reduce food insecurity from the high of 56% recorded in 2020 to less than 10% by 2025" (FNC, 2021, 9). Meaning that Zimbabwe is focused on increasing productivity and national food stores.

3.3 Zimbabwe's SADC Regional Integration

According to The African Regional Integration Index (ARII), Zimbabwe ranks among the most integrated SADC countries. However, the SADC in its entirety is not well-integrated. The ARII is an index with five indicators representing integration. The pillars are described in detail in Figure 7 below. Note that the SADC's strength is the free movement of people. Zimbabwe ranks 5th out of 54 African countries on trade integration (high performer). It is an average performer in productive integration, low performing in macroeconomic integration, average performing in infrastructure integration, and high performing in the free movement of people.

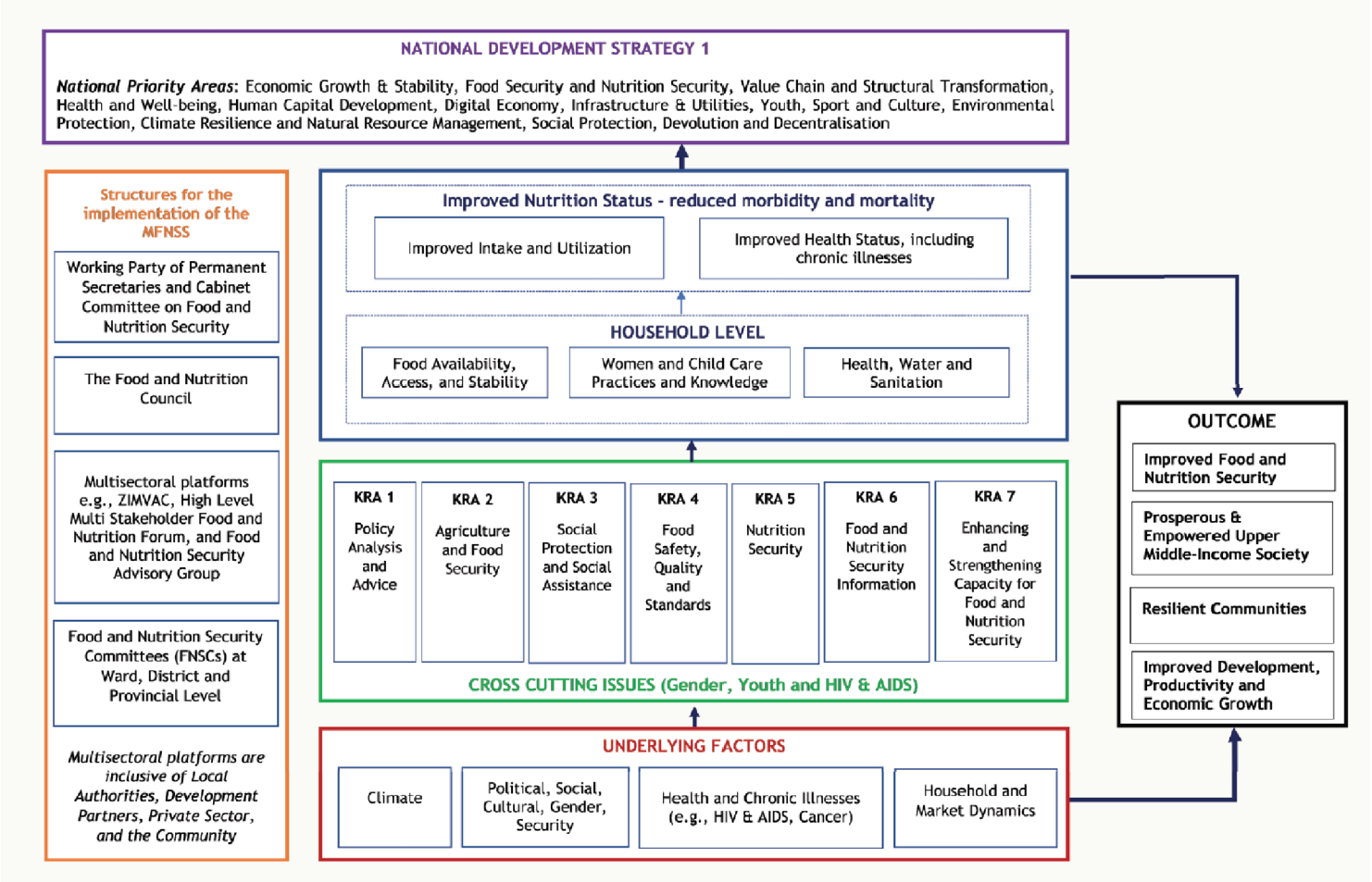
Figure 7. African Regional Integration Index Design



(Source: African Development Bank et al., 2019)

Zimbabwe's Food and Nutrition Council (FNC) Strategy Report for 2021-2025 outlines regionalism's role in Zimbabwe's current FNS strategy, and as seen in Figure 8, the overall strategy greatly reflects the established regional framework discussed in section 3.1.

Figure 8. The National FNS Development Strategy



(Source: FNC, 2021)

[4]

[4] Acronym: KRA: Key Results Area

Under KRA 3, the FNC has a budget of 15 million ZWL between 2021 and 2025 to ensure the visibility of Zimbabwe in global and regional platforms, including the SADC, with the main output being policy reports on FNS. Therefore, on this level, Zimbabwe views regional integration as a centre for sharing and developing knowledge on best practices for nutrition policies. They have also budgeted 10 million ZWL to increase awareness of food and nutrition issues on national and regional levels.

CHAPTER 4. METHODOLOGY

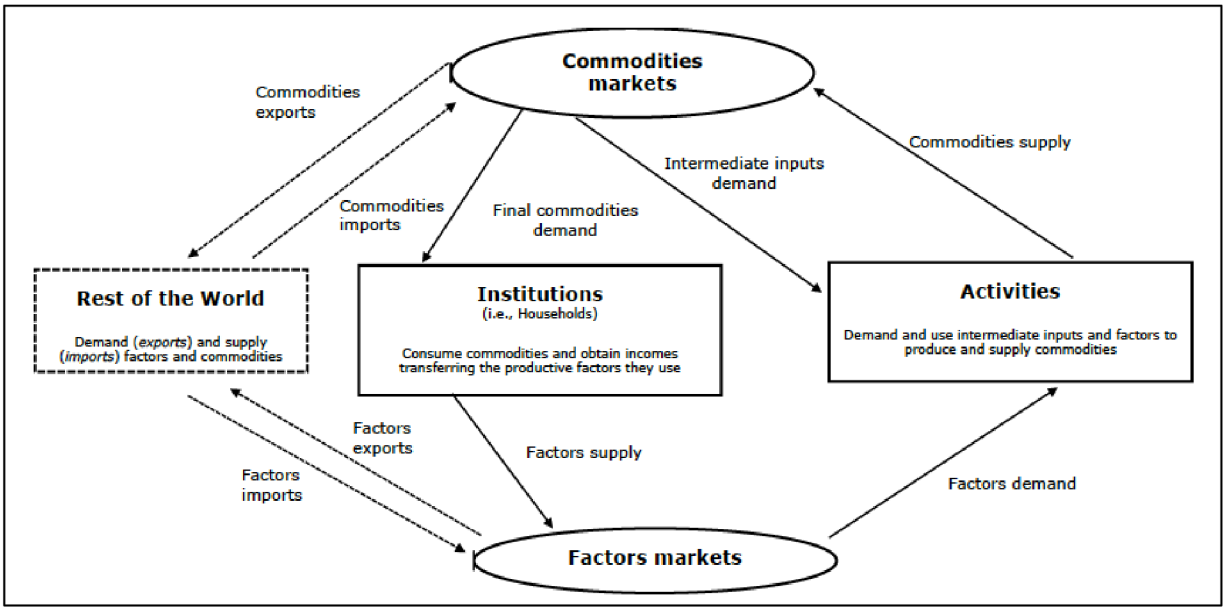
This chapter describes the two-step methodology which was utilized to generate results addressing the research question. The first part provides an overview of the Social Accounting Matrix (SAM) framework, the accounts selected for analysis, and the multiplier model's design. In addition, a data analysis section describing how the SAM will be interpreted and how data from the 2017 Poverty, Income, Consumption and Expenditure Survey (PICES) 2017 will be included in the methodology to capture the full spectrum of FNS in Zimbabwean households.

4.1 Overview of a Social Accounting Matrix Framework

A SAM is a square matrix whose corresponding columns and rows present economic actors' expenditure and receipt accounts. Each cell represents a payment from a column account to a row account. Following the conventions of double entry, each actor must have balanced bookkeeping, meaning the same total receipts (income) and expenditures. For a SAM, every row sum must equal the corresponding column sum (Ferrari et al., 2018).

The starting point for computing a Social Accounting Matrix is an input-output (IO) framework. IO models supply detailed information on the flow of goods and services and on the structure of production costs of an economy in a matrix format, with final uses shown in breakdowns by product group. However, IO does not consider the interrelations between value-added and final expenditure. A more detailed matrix reveals economic flows at a level that enables an analysis of the interrelations between various economic actors. This is the extension process into a social accounting matrix. The SAM shows the complete circular flow of income at the meso-level, emphasizing the role of individuals in the economy by breaking down final consumption expenditures by institutional sectors like types of households (Stahmer, 2004). Figure 8 presents a simple rendition of a circular economic flow.

Figure 9. Simple Circular Flow of the Economy



(Source: Ferrari et al., 2018)

The six accounts typically contained in the SAM framework are activities, commodities, factors (labour and capital), institutions (divided into households, firms, and governments), the capital account (or savings and investments), and the rest of the world account. Note that the SAM, on its own, is not a model but a representation of a set of macro-meso data from the economy (Round, 2003, 5). However, it can be used to compute a multiplier model from which the total effects of exogenous or external shocks can be determined (Round, 2003, 7).

Therefore, the key in computing the SAM-multiplier model is to partition the accounts into endogenous and exogenous accounts, assuming that the column coefficients of the endogenous accounts are all constant. Endogenous accounts are those where any change in income directly results in changes in the level of expenditure. Exogenous accounts are those for which expenditures are established independently from income (Round, 2003). Table 3 provides the accounts classification used in this study.

Table 3. Exogenous and Endogenous Classification of SAM Accounts

Type	**Account**
Endogenous	Activities
	Commodities
	Factors
	Households
	SADC
	RoW
Exogenous	Government
	Taxes

(Source: Author's own elaboration based on Round, 2003)

Overall, the SAM-Multiplier Model provides a condensed view of the production and consumption activities of certain groupings in a population. Thus, for a socio-economic analysis, the breakdown of final consumption expenditures by product group and (sub) sectors, represented in a SAM provides sufficient information to analyze the links between SADC trade and food security in Zimbabwe. Furthermore, owing to the circular flow captured by the SAM, the assumption is that a policy change or shock, like tariff cuts for commodities in a sector, not only affects the sector in question but also other activities, commodities, and households (Sarris, 1997). Table 4 illustrates the basic structure of a SAM and its accounts.

Table 4. Basic Structure of a SAM

Expenditure Columns

Income Rows	Activities C1	Commodities C2	Factors C3	Households C4	Government C5	Investment C6	Rest of World C7	Total C8
Activities R1		Domestic Supply						*Activity Income*
Commodities R2	Intermediate Demand				Recurrent Spending	Gross Capital Formation	Export Earnings	*Total Demand*
Factors R3	Value Added							*Total Factor Income*
Households R4			Factor Payments to Households		Social Transfers		Foreign Remittances	*Total Household Income*
Government R5	Net Taxes on Production	Sales taxes and import tariffs		Direct Taxes			Foreign Grants and Loans	*Government Income*
Savings R6				Household Savings	Fiscal Surplus		Current Account Balance	*Total Savings*
Rest of World (RoW) R7		Import payments						*Payment to RoW*
Total R8	*Gross Output*	*Total Supply*	*Total Factor Spending*	*Total Household Spending*	*Government Expenditure*	*Investment*	*Income from RoW*	

(Source: Author's own elaboration based on Breisinger, 2009 and Ferrari et al., 2018)

4.2 Description of SAM Accounts

I. Activities

Economic activities refer to the production processes of commodities, such as goods and services. They are categorized into sectors like agriculture, mining, or services. When constructing a SAM, data for activities can be collected at any disaggregated level. For example, instead of simply "maize production," activities can be broken down into "growing raw maize" and "processing maize." Various mechanization techniques, like hoe, oxen, or tractor, can also distinguish the maize production activity. In the first case, the two activities produce separate commodities, raw maize, and processed maize. In the second case, different activities produce one commodity, maize (Gronau and Winter, 2018). Referring to Table 4, it is essential to note that activities computations appear in a SAM as the value-added entry in the activity and factor rows [R3-C1], intermediate demand as a payment from activities to commodities [R2-C1], and gross output as the sum of value-added and intermediate demand (Breisinger et al., 2009).

II. *Commodities*

Commodities refer to the products resulting from various activities, which can be either goods or services. The reason for separating activities and commodities is that an activity may produce multiple commodities, such as a dairy activity producing milk and cheese, or intercropping producing maize and beans. On the other hand, a commodity can be produced by different types of activities, such as small-scale and large-scale maize production (Gronau and Winter, 2018). Note that commodities computations appear as such in a SAM; again, referring to Table 4 commodities can be supplied domestically [R1-C2] or imported [R7-C2]; Indirect sales taxes and import tariffs are paid on commodities [R5-C2]; Commodity values are measured at market prices; Activities buy commodities as intermediate inputs for production [R2-C1]; Final demand for commodities includes household consumption spending [R2-C4], government consumption or recurrent expenditure [R2-C5], gross capital formation or investment [R2-C6], and export demand [R2-C7]; The commodity row represents payments by different entities for commodities. Commodity rows and columns together form the "Supply-Use Table," representing the total supply of commodities and their different uses or demands (Breisinger et al., 2009).

III. *Factors*

Factors are assigned to production accounts and depict receipts from activities. They are usually covered by labour and capital but can also relate to natural resources such as land and water. In addition, single factors may be further differentiated, for instance, labour according to gender or quality (Gronau and Winter, 2018). Note that factor computations appear as such in a SAM; The national GDP at Factor Cost, which is inputted in [R4-C3] (refer to Table 4) (Breisinger et al., 2009).

IV. *Institutions*

Institutions in the SAM context mean economic agents and typically comprise households, companies (small and large businesses), NGOs and the government. Institutions are the economic agents undertaking production and consumption activities within the economy, reflecting either human or legal entities (Gronau and Winter, 2018, 7). Note that institution computations appear as such in the SAM (refer to Table 4); Households receive incomes earned by factors of production during the production process [R4-C3]; Households receive transfer payments from the government [R4-C5] and the rest of the world [R4-C7]; Households pay taxes directly to the government [R5-C4] and purchase commodities [R2-C4]; The remaining income is saved or dis-saved [R6-C4]; Government receives transfer payments from the rest of the world [R5-C7]; Total government revenues include different tax incomes and transfers; The government uses revenues for recurrent consumption spending [R2-C5] and transfers to households [R4-C5]; Fiscal surplus or deficit is determined by the difference between total revenues and expenditures [R6-C5] (Breisinger et al., 2009).

V. *Capital account*

The capital account (saving-investment or accumulation account) records the allocation of resources for capital formation. In addition, it describes the use of resources for purchasing investment products and building up stocks of goods (Gronau and Winter, 2018).

VI. *Rest of the World (ROW) account*

The RoW account describes transactions beyond the country's economic border. The row records payments by the RoW from the economic system (e.g., imports), and the column records the payments to the RoW towards the economic system (e.g., exports) (Gronau and Winter, 2018). This account can be disaggregated to consider region-specific transactions. In this case, SADC

transactions will be distinguished from the rest of the world. Note that the capital and RoW accounts computations appear as such in the SAM (refer to Table 4); Investment or gross capital formation equals total savings [R6-C8]; Private savings are represented by [R6-C4]; Public savings are represented by [R6-C5]; The current account balance is the difference between total savings and total investment demand [R6-C7] and equals the difference between foreign exchange receipts and expenditures (Breisinger et al., 2009).

4.3 2013 Macro SAM for Zimbabwe Including SADC Account

Once the relevant data has been acquired, a Macro SAM can be computed using the above-mentioned concepts. The Macro SAM can then be used for macroeconomic descriptive analysis. This paper will rely on the Matrix computed by Davies et al. (2018) to run a fixed price multiplier model and make relevant findings. Note that the SAM requires data from various sources of origin, such as input-output tables, national accounts, and trade data. Some of this data is published on an infrequent basis. Hence, computing a new SAM for 2023 was considered, but relying on a previously published dataset was more time efficient, and the computation results could be easily checked for errors. Table 5 Below is the original macro-SAM with SADC accounts, used as the basis of this methodology.

Table 5. 2013 Macro SAM for Zimbabwe (USD Million)

	Activities	Commodities	Labour	Capital	Mixed Income	Enterprises	Households	Government	Net Activity	Net Product Taxes	Import Duties	Income Taxes	Accumulation	Change in Inventories	SADC	RoW	Total
Activities		19,333															19,333
Commodities	7,779						12,903	2,866					1,753	5	1,112	3,730	30,148
Labour	7,091															22	7,113
Capital	3,443															93	3,536
Mixed Income	831																831
Enterprises				3,064													3,064
Households			7,048		831	1,124		-163								1,263	10,103
Government						66	274		189	1,575	362	1,309				126	3,901
Net Activity Taxes	189																189
Net Product Taxes		1,575															1,575
Import Duties		362															362
Income Taxes						647	662										1,309
Accumulation						1,227	-3,756	398								3,889	1,758
Change in Inventories													5				5
SADC		1,112															1,112
Rest of the World		7,766	65	472			20	800									9,123
Total	19,333	30,148	7,113	3,536	831	3,064	10,103	3,901	189	1,575	362	1,309	1,758	5	1,112	9,123	

(Source: Author's own elaboration based on Davies et al., 2018 and ITC, n.d.)

4.4 Selected Accounts

SAMs have inherent structural flexibility based on the data and accounts that are needed and used. Each category is split into more detailed accounts, which enables a comprehensive disaggregation of the SAM, for example, by subdividing household groups (urban and rural). Different accounts can be aggregated or further disaggregated based on the research objectives (Gronau and Winter, 2018).

The accounts selected for this analysis are presented in Table 6. Note that the RoW account was disaggregated to include the SADC, and then the commodity related columns and rows were rebalanced using the proportional scaling method. The data used to disaggregate the RoW account is from the International Trade Centre (ITC) Trade Map. The ITC has the option to view trade between countries, the world, and regional blocs.

Table 6: Selected SAM Accounts

Activities
Large-scale farming
Smallholder farming
Food Manufacturing
Commodities
Maize
Other grains
Horticulture and Vegetables
Cattle
Poultry
Other livestock
Dairy
Manufactured Foods
Institutions
Rural households
Urban households
Southern African Development Community
Rest of the World

(Source: Author's own elaboration)

4.4 SAM-Based Multiplier Model

To compute the total output multiplier effect for the increase in imports from the SADC, the study will rely on the methodology developed by Breisinger et al. (2009). Starting from the original SAM, the methodology involves six steps, (1) calculating the inverted coefficient matrix, (2) creating an identity matrix, (3) subtracting the inverted coefficient matrix from the identity matrix (4) inverting the resulting matrix using the MINVERSE formula in Excel, (5) computing the exogenous shock vector, and (6) computing the multiplier effect. The following equations outline the econometric process used to create the multiplier model.

Beginning with a simple demand equation:

$$Z_1 = a_{11}X_1 + a_{12}X_2 + c_1Y + E_1$$
$$Z_2 = a_{21}X_1 + a_{22}X_2 + c_2Y + E_2 \quad \text{(A1)}$$

Total demand = intermediate demand + household demand + exogenous demand

Consider that production X is only part of total demand Z.

$$X_1 = b_1Z_1 \quad \text{and} \quad X_2 = b_2Z_2$$

Consider that household income Y depends on the share each factor earns in each sector.

$$Y = v_1X_1 + v_2X_2 \quad \text{or} \quad Y = v_1b_1Z_1 + v_2b_2Z_2$$

Replace Xs and Vs in Equation A1.

$$Z_1 = a_{11}b_1Z_1 + a_{12}b_2Z_2 + c_1(v_1b_1Z_1 + v_2b_2Z_2) + E_1$$
$$Z_2 = a_{21}b_1Z_1 + a_{22}b_2Z_2 + c_2(v_1b_1Z_1 + v_2b_2Z_2) + E_2$$

Move everything except for E onto the left-hand side.

$$Z_1 - a_{11}b_1Z_1 - c_1v_1b_1Z_1 - a_{12}b_2Z_2 - c_1v_2b_2Z_2 = E_1$$
$$-a_{21}b_1Z_1 - c_2v_1b_1Z_1 + Z_2 - a_{22}b_2Z_2 - c_2v_2b_2Z_2 = E_2$$

Group Zs together.

$$(1 - a_{11}b_1 - c_1v_1b_1)Z_1 + (-a_{12}b_2 - c_1v_2b_2)Z_2 = E_1$$
$$(-a_{21}b_1 - c_2v_1b_1)Z_1 + (1 - a_{22}b_2 - c_2v_2b_2)Z_2 = E_2 \quad \text{(A2)}$$

Express Equation A2 in matrix format.

$$\begin{pmatrix} 1 - a_{11}b_1 - c_1v_1b_1 & -a_{12}b_2 - c_1v_2b_2 \\ -a_{21}b_1 - c_2v_1b_1 & 1 - a_{22}b_2 - c_2v_2b_2 \end{pmatrix} \begin{pmatrix} Z_1 \\ Z_2 \end{pmatrix} = \begin{pmatrix} E_1 \\ E_2 \end{pmatrix} \quad \text{(A3)}$$

The first term in Equation A3 is the identity matrix (I) minus the coefficient matrix (M).

$$\begin{pmatrix} 1 - a_{11}b_1 - c_1v_1b_1 & -a_{12}b_2 - c_1v_2b_2 \\ -a_{21}b_1 - c_2v_1b_1 & 1 - a_{22}b_2 - c_2v_2b_2 \end{pmatrix} = I - M$$

Rename the other two vectors Z and E to simplify Equation A3.

$$(I - M)Z = E \tag{A4}$$

Rearrange to get the final multiplier equation.

$$Z = (I - M)^{-1}E \tag{A5}$$

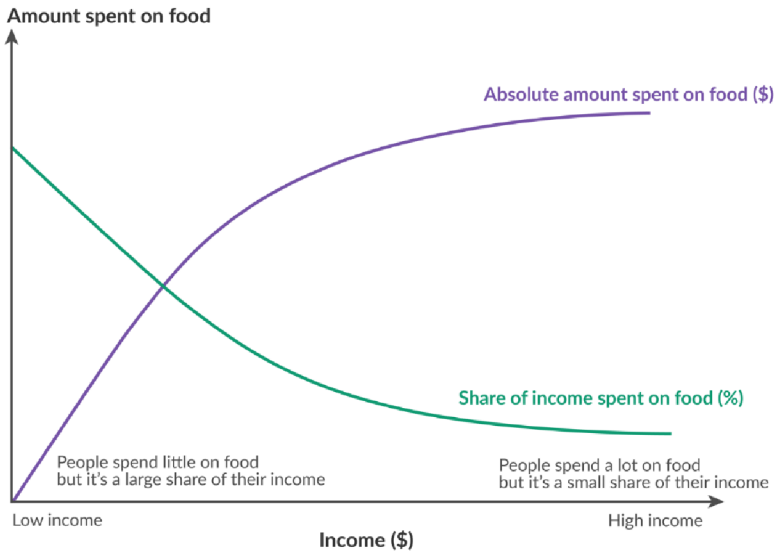
Total demand = multiplier matrix × exogenous demand

When exogenous demand [E] rises, the final increase in total demand equal to Z is calculated after taking into account all direct and indirect multiplier effects [(I-M)-1] (Breisinger et al., 2009).

4.5. Data Analysis

From the baseline SAM, the share of expenditure for food consumption per household will be computed to assess household access. The share of total household expenditure (as a proxy of income) spent on food indicates household food security because it is widely documented that the poorer and more vulnerable a household, the larger the household income spent on food. As shown in Figure 10, Engel's law demonstrates that as incomes rise within and across countries, expenditure on food increases while expenditure on other goods increases even more, so the share of total income spent on food declines (Ritchie, 2023).

Figure 10. Engel's Law Curve



(Source: Ritchie, 2023)

This observation is particularly useful in comprehending how fluctuations in food prices affect the quality and quantity of household food consumption. If food prices increase and a larger portion of the household's total expenses is spent on food, the household may become more resource constrained. Consequently, poorer households that already consume the least expensive foods may have to spend more on basic staples, downgrade the quality of their meals, or even reduce the amount of the foods they consume. This may also lead to a decrease in non-food expenses, such as health and education, which are equally necessary (International Dietary Data Expansion Project, 2022).

To gauge a country's food availability, food production per capita will be used as a measure. This will help understand the country's capacity for producing food based on their current production technology. The FAO defines food as all edible commodities that contain nutrients and are domestically produced, with the exception of fish. When it comes to meat production (net exports), indigenous animals are taken into account, whereas tea and coffee are not factored into the food production per capita calculation. The process involves two steps: First, determine the overall food production by multiplying the food production vector with the average international commodity prices from 1999 to 2001, expressed in international dollars. Second, divide the resulting total food production by the national population to obtain food production per capita, also measured in international dollars. To account for external factors that may impact the data, such as weather conditions, a four-year average to smooth out the results. (International Food Policy Research Institute, n.d.).

Third, analyzing the percentage of calories derived from fruits, vegetables, cereals, roots, and tubers will be used in measuring nutrition utilization. This directly reflects dietary diversity, which is a vital indicator of nutritional outcomes, such as the number of underweight children. (Brinkman et al., 2020).

Fourth, it is possible to calculate the cereal import dependency ratio using the baseline SAM. The dependency ratio is a crucial measure of stability because it reveals the effect of price fluctuations in global and local markets on domestic food prices. A high dependency ratio indicates a more vulnerable national food system. This can affect the food security of individuals and households.

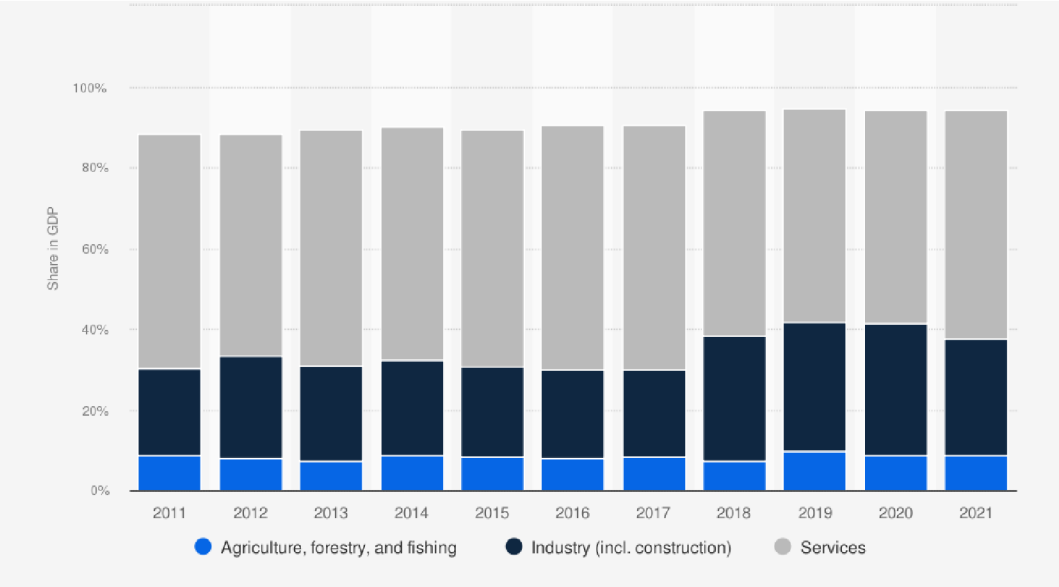
Countries with high import dependency are more susceptible to price changes and other shocks (Brinkman et al., 2020).

Finally, the Zimbabwe Poverty, Income, Consumption, and Expenditure Survey (PICES) of 2017 collected by ZIMSTAT is the main dataset used to complete and compare the results of the SAM. The survey targeted all private households in all ten provinces of Zimbabwe and used a stratified two-stage sampling design. The first stage involved selecting sample Enumeration Areas (EAs) using random systematic sampling with Probability Proportional to Size from the ordered list of EAs in each administrative district. The second stage involved selecting 36 EAs in each district and 14 households using systematic random sampling, resulting in a total of 504 households per district. Overall, 2,304 primary sampling units were selected based on the 2012 Population Census data. There are 32,256 households in the final sample. To ensure that the sample is representative of all household heads in Zimbabwe, sampling weights were constructed (ZIMSTAT, 2018).

4.7 Limitations

The study is based on secondary data and assumes that the Zimbabwean economy's structure has not changed sufficiently since 2013 to influence the results of a SAM-based model. In fact, the latest 2021 data on sectoral contributions to GDP shows consistency in the economy's structure (see Figure 11).

Figure 11. Zimbabwe Share of Economic Sectors in GDP from 2011 to 2021



(Source, Statista, 2023)

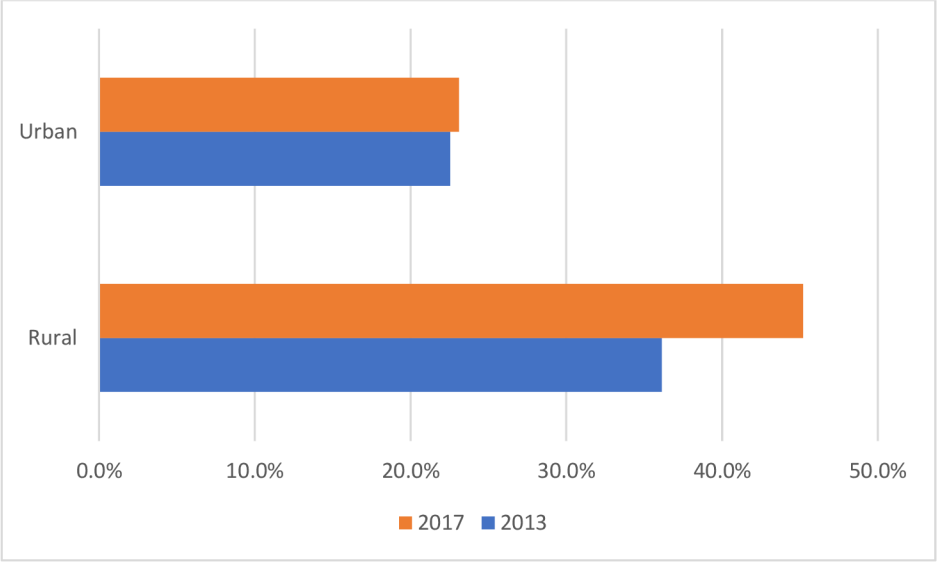
Another limitation of the SAM is that it is a stagnant measure, only providing a snapshot of one year. Furthermore, this SAM is not computed in physical units, so various elements linked to FNS, which require measuring physical units, are missing, and analysis must be paired with household statistic.

Despite these limitations, using a social accounting matrix and multiplier model will allow the impacts of regional trade to be mapped and linked to households and enable the research question to be answered.

CHAPTER 5. RESULTS

5.1 Results for Access

Figure 12. SAM (2013) and PICES (2017) Share of Household Expenditure on Food and Agricultural Goods[5]



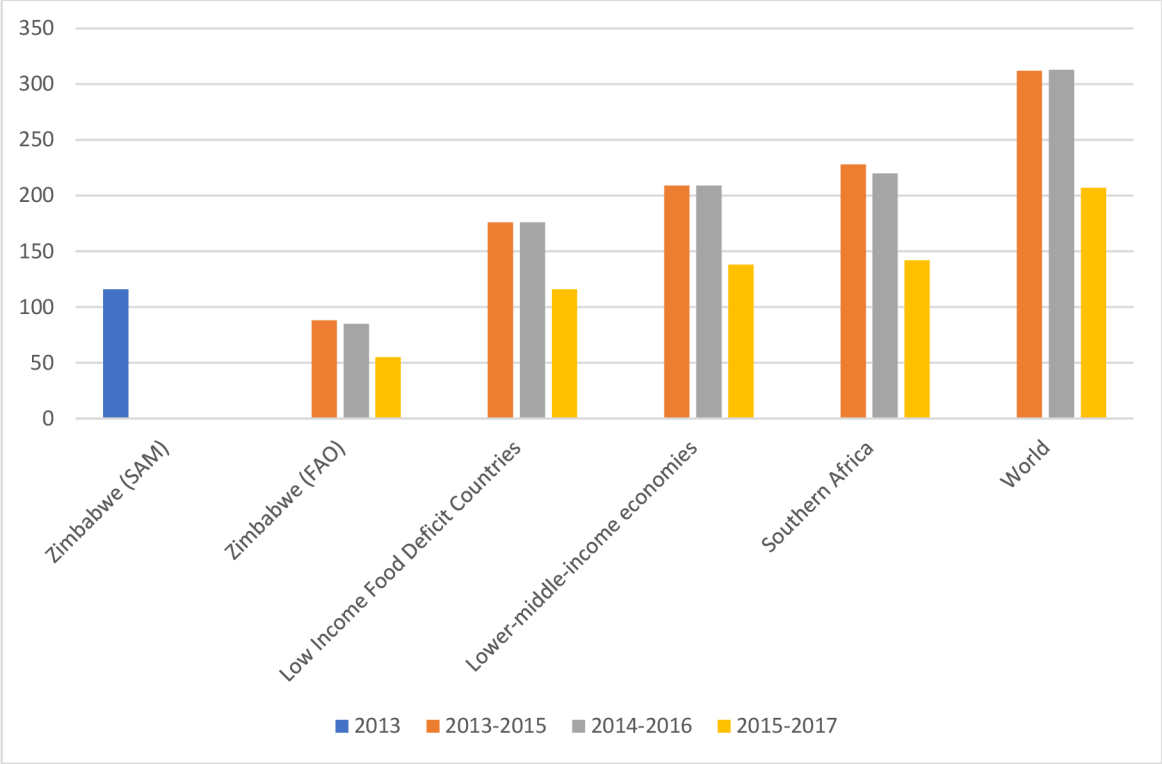
(Source: Author's Calculations based on Davies et al., 2018 and ZIMSTAT, 2021)

Figure 12 shows that in 2013 (using SAM data), urban households used on average 22.5% of their household consumption on food and agricultural goods, while rural households used on average 36.1%. This implies that rural households had lesser access to food than urban households during that time, since the percentage of their expenditure on food was much higher. Meanwhile, in 2017, the PICES data uncovered that households in urban areas spent 23.1% on food and non-alcoholic drinks, while households in rural areas spent 45.2%. This demonstrates that there was a significant decline in food accessibility for rural households, unlike their urban counterparts during the same period.

[5] Formula: Share of Household Expenditure on Food and Agricultural Goods = (Expenditure on Food and Agricultural Goods / Total Household Expenditure) * 100

5.2 Results for Availability

Figure 13. SAM (2013) and FAO (2013-2017) Value of Food Production Per Capita



[6]

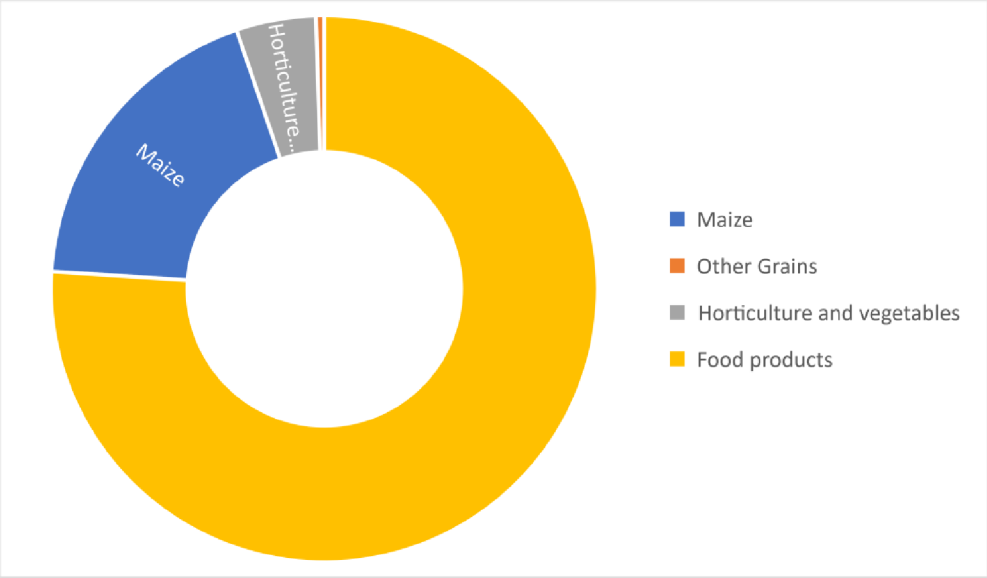
(Source: Author's Calculations based on Davies et al., 2018 and UN Data, 2023)

Figure 13 shows that regardless of whether the annual value of food production per capita is computed through the SAM for Zimbabwe in 2013 or the FAO's average for 2013-2015 is used, the outcome remains the same. Zimbabwe's average food production per capita value is lower than that of low-income food deficit countries. Despite being classified as a lower-middle-income country, Zimbabwe's food production systems are underperforming compared to other economies in the same category. However, the Southern African region is slightly outperforming in terms of food production per capita compared to lower-middle-income economies.

[6] 2013 SAM data is in USD/cap, while 2013-2017 FAO data is in International Dollar constant 2004-2006 I$/cap. SAM Value of food production per capita = (Sum of agricultural sector value added + Sum of manufacturing sector value added = total of food produced)/Total 2013 Zimbabwean population.

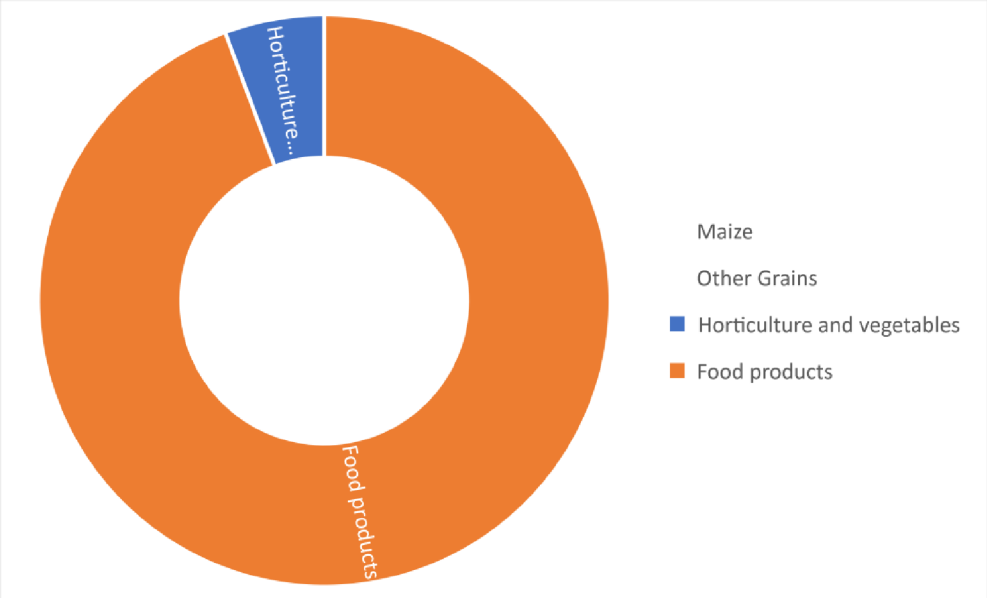
5.3 Results for Utilization

Figure 14. 2013 SAM Rural Composition of Household Food Outlays



(Source: Author's Calculations based on Davies et al., 2018)

Figure 15. 2013 SAM Urban Composition of Household Food Outlays

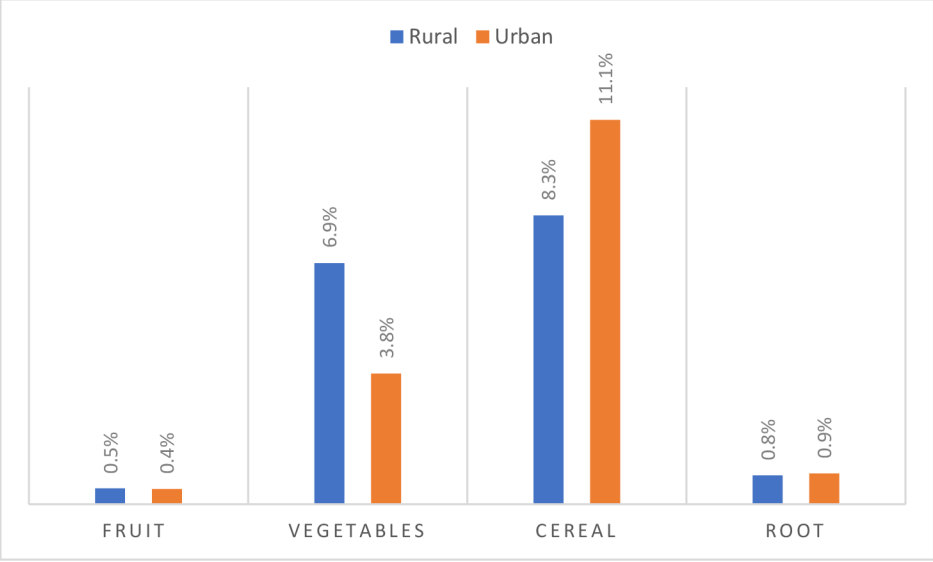


(Source: Author's Calculations based on Davies et al., 2018)

The findings presented in Figure 14 and Figure 15 align with the research conducted by Davies et al. (2018), indicating that food consumption in rural areas mainly comes from self-produced sources such as subsistence agriculture. On the other hand, urban areas rely heavily on processed foods supplied by the manufacturing sector, which explains the higher expenditure on manufactured food products by urban households. Furthermore, it appears that rural households benefit from their own production through a more varied food basket.

Figure 16 shows an expense breakdown for the shares of fruits, vegetables, cereal, roots, and tubers in total food purchases by rural and urban households. When comparing the 2013 SAM data to the 2017 PICES data, it appears that both rural and urban households spend similarly on these food groups. However, urban households spend more on cereals and roots than their rural counterparts, while rural households spend more on vegetables and fruits than urban dwellers. It is important to note that these figures only reflect the expenditure and not the actual consumption of these goods. It is possible that Zimbabweans consume more fruits, roots, vegetables, and cereals, but the cost is low or even free if they grow the produce themselves. Therefore, this indicator captures the financial resources used to obtain these essential goods.

Figure 16. 2017 PICES Key Food Expenditure Shares



(Source: Author's Calculations based on ZIMSTAT, 2021)

5.4 Results for Stability

Table 7. 2013 SAM: Structure of Commodity Destinations and Sources (%)[7]

	Exports	Imports	Export dependence	Import penetration	
Agricultural products	9.2	33.2	2.7	47.1	15.0
Mining products	3.0	37.7	0.1	75.6	2.2
Manufactured products	16.3	18.8	85.0	22.0	75.5
Other industrial products	9.8	0.2	0.9	0.6	5.2
Services	61.8	10.1	11.3	3.8	9.8
National	100.0	100.0	100.0	19.7	37.2

(Source: Davies et. al, 2018)

Commodity flows related to the Zimbabwean economy are presented in Table 7. In 2013, the import penetration for agricultural products was high while that for manufacturing products was moderate. These two sectors are crucial for ensuring food security. However, the country's export dependence on manufactured goods is even higher than its import penetration. Therefore, the only concerning factor is the import penetration ratio for the agricultural sector, which stands at 47.1%. This makes the agricultural sector highly vulnerable to external shocks in the world and regional markets.

[7] Export dependence is the share of domestic production at market prices that is exported. Import penetration is the share of sales in the domestic market that is imported.

5.5 Multiplier Model Results

Table *8*. Multiplier Output in Millions of USD

	Multiplier Effect	
Activities	SADC	RoW
Large Scale Farming	0.22	1.60
Small Holder Farming	**0.25**	**1.54**
Food Manufacturing	**0.31**	**1.63**
Commodities		
Cattle	0.24	1.57
Poultry	0.24	1.58
Other Livestock	0.34	1.61
Other Grains	0.41	1.57
Horticulture and Vegetables	0.44	1.58
Maize	**0.54**	**1.62**
Manufactured Food	**0.54**	**1.69**
Dairy	**0.55**	**1.72**
Institutions		
Urban Households	0.33	2.18
Rural Households	**0.41**	2.01

(Source: Author's own calculations based on Davies et al., 2018 and ITC, n.d.)

Table 8 presents data on selected accounts from the fixed price multiplier model, showcasing the impact of an extra unit of imports from SADC and RoW on various activities, commodities, and institutions in millions of USD. The findings reveal that smallholder farming benefits marginally more from SADC imports, with a difference of approximately 30,000 USD compared to large-scale farming. The highest multiplier effect from SADC and RoW imports is observed in food manufacturing, which correlates with the national agro-processing sector's significant interlinkage with intra-SADC trade (Ncube and Tregenna, 2021).

Poultry and cattle exhibit the lowest multiplier effect, while dairy has the highest multiplier effect, followed by manufactured food and maize, with a difference of 10,000 USD.

In addition, rural households are found to benefit significantly more from regional integration, with a greater positive impact on their incomes compared to urban households, which translates into a difference of almost 80,000 USD. Conversely, urban households seem to benefit more from international imports, by a difference of 170,000 USD. Overall, trade with the rest of the world still has a more significant impact on all households and plays a crucial role in providing essential activities and commodities for food security, as opposed to intra-SADC trade.

CHAPTER 6. DISCUSSION

This chapter provides a summary of the key findings, an answer to the research question and an interpretation of the findings.

6.1 Key Findings

This paper's results support the theory that regional trade has some multiplier effect on essential food commodities, which should increase caloric intake. However, owing to household consumption patterns favouring processed foods, a detailed evaluation and analysis taking this fact into account must be conducted to appropriately conclude that intra-regional trade indeed has a net positive impact on Zimbabwean nutrition and food security. Some processed foods can be high in calories but low in nutrients, contributing to the "double burden" of malnutrition - a combination of undernutrition and obesity - at the individual, household, or community level (Mapfumo, 2022).

6.1.1 Access

Regarding access, rural households still expend a much larger share of their resources on food than urban households. This may be counter-intuitive since urban households rely more on purchasing manufactured food goods than rural households. However, although rural households tend to purchase less manufactured food, what they expend is a larger portion of their earnings. Therefore, although rural households have a more diversified food basket through subsistence agriculture, according to the SAM data, which is a good indicator of food utilization, they still cannot offset the high price of purchasing some essential food commodities. Simply put, rural Zimbabweans are poorer than urban-dwelling Zimbabweans, and their more diverse food consumption patterns may indicate reliance on land-based subsistence agriculture coping strategies.

Zimbabwe has many indigenous fruits and vegetables, constituting a significant part of traditional meals and which grow easily in the more fertile areas of the country. Subsistence farming is the practice of farmers and their families consuming nearly all their agricultural and animal products and only bringing a small amount to market. In Zimbabwe people who live in rural

areas tend to have access to land whether or not they are farmers and are able to supplement their meals with garden agriculture as well.

6.1.2 Availability

Nationally, Zimbabwe is lagging behind the SADC and low-income food-deficit countries regarding food availability. Underproductivity in the agricultural and food manufacturing sectors is a significant reason for this. Leaving Zimbabwe overly reliant on food produced outside of the country. This result is reinforced by the finding that Zimbabwe is in a position where it has an exceedingly high import dependence ratio for agricultural commodities, which is an undesirable position to ensure national FNS as it leaves the sector vulnerable to various external shocks.

The IMF (2022) has reported that a decrease in agricultural productivity has weakened the Zimbabwean value chain, leading to reduced production volumes and the closure or downsizing of many agribusiness companies. Cereal production has consistently declined, and cash crops like tobacco have also significantly declined. These issues have been exacerbated by smaller farm sizes, restricted credit access, and decreased farmer expertise. Additionally, the decline in agricultural production and macroeconomic instability has discouraged private investments in the sector.

The Zimbabwean government recognizes the crucial importance of agriculture and has prioritized it through initiatives like Command Agriculture. However, the IMF (2022) argues that current interventions primarily provide financial aid and subsidies, falling short of the long-term investments necessary to enhance productivity. Therefore, sustainable reforms are essential to reverse the decline in agricultural productivity by addressing structural, regulatory, and financial barriers. These reforms should also foster an environment that promotes private investment, policy stability, adequate access to finance, improved land rights and transfer processes, and environmental resilience.

Figure 17. Zimbabwe: Agriculture Production and Inputs, 1990-2017

(Source IMF, 2022)

Note that, the national food availability in Zimbabwe is currently in a precarious position due to low productivity in both the agricultural and manufacturing sectors. Therefore, the Zimbabwean government aims to build up self-sufficiency, which is a well-informed decision given the current circumstances. However, various barriers need to be overcome.

Several factors hinder Zimbabwe's agricultural sector's growth and potential, despite the country's abundant fertile land, educated labour force, favourable weather conditions, and access to large export markets. One major obstacle is the limited economies of scale, caused by insecure property rights and difficulties in accessing financing. Another is land tenure reforms that have extinguished private property rights, and many beneficiaries struggle to access their allocated land. The 99-year leases provided to some landholders lack certainty, and the inability to transfer land titles hinders access to finance (IMF, 2022).

Additionally, the subdivision of seized farmland under the land reform program did not consider economic viability. Although access to credit for fertilizer and seed seems robust, it is primarily short-term, and government backed. As a result, medium-term capital for investment or land acquisition is scarce due to interest rate caps, risk perceptions, and unclear property rights (IMF, 2022).

Infrastructure deficiencies also pose challenges, with limited irrigated land and an inadequate transportation network for agricultural product distribution. Electricity shortages and damage caused by natural disasters further exacerbate these issues. The ineffectiveness of fertilizer in increasing output despite high usage is consistent with studies on fertilizer input schemes. Factors such as reliance on rainfed irrigation, learning-by-doing effects among less experienced farmers, and diversion and re-selling of fertilizer contribute to its limited impact. To address these determinants of low agricultural productivity, comprehensive reforms in property rights, access to finance, infrastructure development, and efficient use of inputs are required (IMF, 2022).

6.1.4 Utilization

Currently, Zimbabwe households must still depend on imports to meet their nutritional requirements. This means that inter-regional trade plays a significant role in influencing the food habits of households and individuals(utilization), as any shift in food supply or trends within the region can directly impact their food consumption. It is therefore commendable that the Zimbabwean government is investing in initiatives to raise awareness about food and nutrition issues at the national and regional levels, and the State should continue doing so with a focus on the processed food industry, which is emerging as a significant contributor to the Zimbabwean food basket.

6.1.5 Stability

Additionally, SADC trade influences stability due to the high import penetration of agricultural products and the moderate import penetration of manufactured products. However, the export dependence of 85% for manufactured goods (much above the import penetration of 22%) shows that Zimbabwe may be capable of manufacturing the foods that households prefer. Although, those capacities have not yet been tested, as demonstrated by

Zimbabwe's extremely low food production value per capita. Zimbabwe's productivity has steadily declined since its post-colonial land reform implementation in the 1990s (see Figure 17).

6.1.6 Multiplier

This study aims to establish the linkages between intra-SADC trade and Zimbabwean household consumption patterns while also addressing the question of the specific disaggregated and distributional effects of inter-SADC trade on household nutrition and food security in Zimbabwe. The results unequivocally demonstrate that inter-regional trade within SADC has a greater multiplier effect on imports to rural households and smallholder farmers. This implies that rural dwellers derive slightly higher benefits from regional integration than urban dwellers. While international trade seems to benefit urban households more. These findings are consistent with the notion that open trade benefits a wide range of economic agents and is the optimal policy for countries to embrace. Moreover, further regional integration may be a way to increase incomes for farmers in rural areas, who rely on imported inputs such as fertilizers and seeds to ensure viable harvests.

With regards to households' food security, the multiplier model demonstrated that dairy had the highest multiplier effect from imports originating in the SADC. This could mean that dairy is more heavily reliant on imported inputs than other food commodities. Hence, it is the most interlinked agricultural commodity from the selected accounts. Manufactured food and maize are also of not. Unsurprisingly, imports also have notable multiplier effect on these commodities. They both comprise an important part of the Zimbabwean food basket and are in the sectors that are the most interlinked within the SADC.

6.1.7 Summary

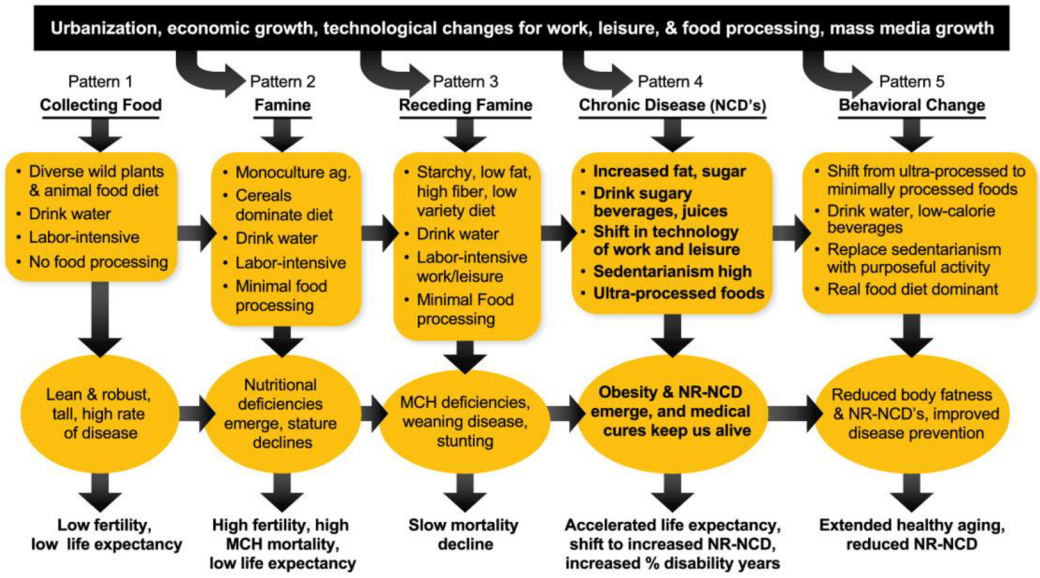
All pillars of FNS were addressed in the above analysis, which was derived through the course of this study thereby answering the research question. I summary, the significant expenditures that Zimbabweans make on processed food to fulfill their dietary requirements may not be beneficial for their overall health and nutrition. This pattern is also reinforced through regional linkages and import multiplier effects, which favor the agro-processing sector.

Zimbabwe's manufacturing industry, while productive, is unable to meet the food demands of the entire population, making the country heavily reliant on agricultural imports. This dependency on imports is necessary to ensure food security, but it is only feasible when prices are low, stable, and supply is abundant. Unfortunately, high prices and scarce goods make it difficult for poorer individuals to maintain their nutrition and dietary diversity, forcing them to choose between imported goods and nutrient rich produce like fruits, vegetables, cereals, and tubers. This dilemma primarily affects urbanites, as rural dwellers have access to fertile land and can grow their own produce.

6.2 An Interpretation of the Findings

The findings agree with the theory of nutrition transition. One key driver is increased urbanization, resulting in diet shifts, which is clearly illustrated by the results of this paper.

Figure 18. Nutrition Transition



(Source: Ng and Popkin, 2022)

This study shows that a nutrition transition exists and clearly distinguishes urban and rural consumption patterns. However, countries are not doomed to fall into the fourth phase. With the existing knowledge on nutrition, governments can create safeguards to ensure that their populations make informed and healthy decisions.

This may be a challenging task since there is a lack of data on the nutritional content of the manufactured foods consumed by the Zimbabwean population originating from the SADC, so it is difficult to precisely pinpoint the impact of intra-regional trade on nutrition. The implication is that some of these manufactured foods' nutritional content must be shared more transparently, and the Zimbabwean government should collaborate with the food manufacturers to offer appealing, culturally appropriate, affordable, and nutrient-rich food products in the SADC (Troesch et al, 2015).

CHAPTER 7. CONCLUSION

To summarize, this paper's findings support the idea that intra-regional trade can benefit food security if the food commodities imported from the region to Zimbabwe have good nutritional content. Specifically, it contributes to the discussion on the effects of regional trade in Southern Africa. The analysis is country-specific and distinguishes between urban and rural households, filling a gap in the literature on access, utilization, and stability of food and nutrition security.

The study falls under liberalization theory, which suggests that external trade can have a positive impact on food and nutrition security (a welfare gain). However, to fully benefit from open trade, countries must have optimal production in the goods and services for which they have comparative advantage. Zimbabwe is still to cement its comparative advantage and regain its position as the breadbasket of Africa. Hence currently trade is not optimised.

There are a few limitations to this study. Firstly, the findings are only descriptive and therefore limited in their scope. Additionally, there were no significance levels computed to reinforce the results. Furthermore, the data used in this analysis was obtained from different sources with varying measurement methods, so it may not be entirely robust.

Based on the findings of this study, it is recommended that ZIMSTAT create their own Social Accounting Matrix (SAM) by gathering information from national accounting and updating it regularly once all the data is available. They are the best placed to do so, since they are the publishing body for most of the key statistics needed to compute a SAM. This can be a valuable tool for analyzing the impact of different policies and forecasting the effects of upcoming policies before their implementation. Additionally, ZIMSTAT should incorporate the nutritional value of food and total household food intake into their PICES data, which will allow them and other researchers to calculate a SAM in physical (caloric) units. Lastly, it is suggested that ZIMSTAT break down the data on manufactured food intake to obtain a better understanding of the nutritional value of the manufactured foods consumed by individuals and households.

On another note, Zimbabwe should also improve the productivity of its national agricultural and food manufacturing sectors. Using its SADC membership to share and exchange knowledge

and resources linked to best practices in these sectors with other SADC nations, an approach greatly encouraged by the bloc and one under which innovative solutions may be found.

To better understand the impact of SADC regional trade on FS in Zimbabwe, further studies should be conducted using updated data. These studies should also consider further disaggregation according to gender, age, and employment of the household head, as well as specific districts. Additionally, exploring other linkages between Zimbabwe and the SADC, such as remittances and labour exchanges, would provide a more detailed analysis. Investigating the link between imported foods, diets, and obesity in Zimbabwe would be another interesting academic exercise to complement the findings of this paper. Furthermore, analyzing how governments and industries, such as the food industry, collaborate to promote consumer well-being in the SADC context could be a valuable topic for further study.

Finally, interning at WFP while authoring this thesis helped to inform my thinking on nutrition and expand my conceptualizations as evidenced by the literature presented in this paper.

References

Books and Book Chapters

Breisinger, C., M. Thomas, and J. Thurlow. 2009. *Social accounting matrices and multiplier analysis: An introduction with exercises. Food Security in Practice technical guide 5*. Washington, D.C.: International Food Policy Research Institute.

Powell M., Round, J. I. (2000) *Structure and linkage in the economy of Ghana: a SAM approach*, in: E. Aryeetey, J. Harrigan & M. Nissanke (eds) Economic Reforms in Ghana: Miracle or Mirage (Oxford, James Currey), pp. 68–87

Stahmer, C. 2004. Social Accounting Matrices and Extended Input-Output Tables. *Measuring Sustainable Development: Integrated Economic, Environmental and Social Frameworks.* Paris: OECD Publishing.

Jensen, H.G.; Sandrey, R. 2011. *The tripartite free trade agreement: A computer analysis of the impacts. In Cape to Cairo-An Assessment of the Tripartite Free Trade Area.*, in R. Sandrey, H.G. Jensen, V. Vink, T. Fundira, W. Viljoen (Eds.) Cape Town, South Africa: Trade Law Centre.

Round, J.I. 2003. *Social Accounting Matrices and SAM-based Multiplier Analysis.*

Journal Articles

Abdulai, A., Dithmer, J. 2017. Does trade openness contribute to food security? A dynamic panel analysis. *Food Policy* 69, 218–230.

Adil, S. A., Bashir, M. K., Farrukh, M. U., Hassan, S., & Kragt, M. E. 2020. Mapping the food security studies in India, Pakistan and Bangladesh: Review of research priorities and gaps. *Global Food Security* 26, 100370.

Archary, M., Mahomed, S., Marume, A. 2022. Dietary patterns and childhood stunting in Zimbabwe. *BMC Nutrition* 8, 111.

Arndt, C., Jensen, H. T., Tarp, F. 2000. Structural Characteristics of the Economy of Mozambique: A SAM-based Analysis. *Review of Development Economics* 4, 292–306.

Atewemba, C., Coulibaly, N., Egbendewe, A. Y. G., Lokonon B. O. K. 2017. Can intra-regional food trade increase food availability in the context of global climatic change in West Africa? *Climatic Change* 145(1–2), 101–116.

Bekele, H., Caleyachetty, R., Kumar, N. S., Manaseki-Holland, S. 2023. Socioeconomic and urban-rural inequalities in the population-level double burden of child malnutrition in the East and Southern African Region. *PLOS Global Public Health* 3(4), e0000397.

Bernstein, J. T., L'Abbé, M. R., Veira, Vergeer, L., P., Weippert, M. 2019. The Calorie and Nutrient Density of More- Versus Less-Processed Packaged Food and Beverage Products in the Canadian Food Supply. *Nutrients*, 11(11), 2782.

Brinkman, M., Faaij, A., Kuiper, M., Levin-Koopman, J., & van der Hilst, F., Wicke, B., Shutes, L. 2020. The distribution of food security impacts of biofuels, a Ghana case study. *Biomass and Bioenergy*, 141, [105695].

Cardoso, P., Sowman, M., 2010. Small-scale fisheries and food security strategies in countries in the Benguela Current Large Marine Ecosystem (BCLME) region: Angola, Namibia and South Africa. *Marine Policy* 34(6), 1163–1170.

Changoma, M. S., Hirayama, K., Kaneko S., Karama, M., Tanaka, J., Wanjihia, V., Yoshizawa, K. 2019. Relationship between dietary patterns and stunting in preschool children: a cohort analysis from Kwale, Kenya. *Public health*, 173, 58–68.

Coluccia, B., De Leo, F., Fusco, G. 2020. Effect of Trade Openness on Food Security in the EU: A Dynamic Panel Analysis. *International Journal of Environmental Research and Public Health* 17(12), 4311.

Gürler, O. 2000. Role and Function of Regional Blocs and Arrangements in the Formation of the Islamic Common Market. *Journal of Economic Cooperation.*

Maasdorp, G. 1998. Regional trade and food security in SADC. *Food Policy* 23(6), 505–518.

Mapfumo, P., Matsungo,T., Muderedzwa, T. 2022. Prevalence and determinants of overweight and obesity among in-school adolescents in Harare, Zimbabwe. *The North African Journal of Food and Nutrition Research* 6. 29-38. 10.51745/najfnr.6.13.29-38.

Mude,W., Mwanri, L., Nyanhanda, T. 2023. Double Burden of Malnutrition: A Population Level Comparative Cross-Sectional Study across Three Sub-Saharan African Countries—Malawi, Namibia and Zimbabwe. *Int. J. Environ. Res. Public Health* 20, 5860.

Ng S.W., Popkin B.M. 2022. The nutrition transition to a stage of high obesity and noncommunicable disease prevalence dominated by ultra-processed foods is not inevitable. *Obesity Reviews.*

Diko, N., Pasara, M. T. 2020. The Effects of AfCFTA on Food Security Sustainability: An Analysis of the Cereals Trade in the SADC Region. *Sustainability* 12(4), 1419.

Troesch, B., Biesalski, H., Bos, R., Buskens, E., Calder, P., Saris, W., Spieldenner, J., et al. 2015. Increased Intake of Foods with High Nutrient Density Can Help to Break the Intergenerational Cycle of Malnutrition and Obesity. *Nutrients*, 7(7), 6016–6037. MDPI AG.

Van Wyk, J. 2001. FOOD FOR THOUGHT? The politics of food, resources and development in Africa. *New Zealand International Review*, 26(2), 14-18.

Wacziarg, R., & Welch, K. H. 2008. Trade Liberalization and Growth: New Evidence. *The World Bank Economic Review*, World Bank Group, vol. 22(2), pages 187-231, June.

Working Papers

Cockburn, J., Fofana, I., Lemelin, A. 2013. Balancing a Social Accounting Matrix: Theory and Application. Partnership for Economic Policy.

Food and Agriculture Organization (FAO). 2006. Food Security Concept Note. *Policy Brief, Issue 2.* FAO.

FAO. 2000. Multilateral trade negotiations on agriculture: A resource manual. Agreement on agriculture. *Resource Manual.* FAO.

Ferrari, E.; Mainar-Causapé, A.J.; McDonald, S. 2018 Social accounting matrices: basic aspects and main steps for estimation, EUR 29297 EN, JRC *Technical Reports*. Luxembourg: Publications Office of the European Union.

Gronau, S., Winter, E., 2018 : Social accounting matrix: A user manual for village economies, *Hannover Economic Papers (HEP), No. 636*. Leibniz Universität Hannover, Wirtschaftswissenschaftliche Fakultät, Hannover

Moyo, D. 2007. The Future of Food: Elements of Integrated Food Security Strategy for South Africa and Food Security Status in Africa. *Proceedings of the ASIL Annual Meeting* 101, 103–108.

Ncube, P., & Tregenna, F. 2021. Input-output linkages and interdependence between countries in the Southern African Development Community (SADC). *Working Paper.* University of Johannesburg.

Sarris, A. H. 1997. Post GATT Agricultural Trade Liberalization and Growth in Developing Countries: The Case of the Philippines. University of Athens, Greece. *Paper Presented at the XXIII IAAE Conference, Sacramento, California, USA.*

Reports

African Development Bank (AfDB), African Union (AU), UN Commission for Africa (UNECA). 2019. African Regional Integration Report.

Bautista, R. M., Lofgren, H., Thomas, M. 1998. Does Trade Liberalization Enhance Income, Growth and Equity in Zimbabwe? The Role of Complementary Policies Washington, D.C, USA: . International Food Policy Research Institute (IFPRI).

Boege, S., Carson, J. 2020. The Intersection of Food Availability, Access, & Affordability with Food Security and Health. University of New Hampshire.

Do Santos C., Dzirikure M., Magezi V., Manda E, Mbori R, Foreign Commonwealth and Development Office (FCDO), Landell Mills (LM), Southern African Development Community (SADC), the Swiss Agency for Development and Cooperation (SDC), and the World Food

Programme (WFP). 2022. Joint Evaluation of the SADC Regional Vulnerability Assessment and Analysis (RVAA) Programme (2017-2022) Decentralized Evaluation Final Report

Gross, R., Schoeneberger, H., Pfeifer, H., & Preuss, H.-J. A. 2000. The Four Dimensions of Food and Nutrition Security: Definitions and Concepts. Economic Systems Research, Vol. 15, No. 2.

Famine Early Warning Systems Network (FEWS NET). 2022. ZIMBABWE Food Security Outlook February to September 2022: Poor and erratic rainfall likely to result in below-average harvests for the 2021/22 agricultural season.

FEWS NET. 2023. Zimbabwe Price Bulletin.

Food and Agricultural Organization (FAO). 2022. GIEWS Country Brief Zimbabwe.

FAO, International Organization for Migration (IOM) and World Food Programme (WFP). 2022. Impact of the Ukraine Crisis in Zimbabwe.

Food and Nutrition Council (FNC). 2021. Food and Nutrition Strategy Report 2021-2025.

International Monetary Fund (IMF). 2022. Unlocking Zimbabwe's Agricultural Potential

Pardey, P. G., Rosegrant, M. W., Runge, C. F., Senauer, B. 2003. Ending hunger in our lifetime: Food security and globalization. *International Food Policy Research Institute.*

SADC. 2020. Regional Indicative Strategic Development Plan (RISDP) 2020–2030. Gaborone, Botswana.

SADC. 2008. SADC Multi-country Agricultural Productivity Programme (SADC MAPP) Volume 1.

SADC. 2022. Synthesis Report on the state of food and nutrition security and vulnerability in Southern Africa, Regional Vulnerability Assessment (RVAA) Analysis Programme.

SADC. 2020. Vision 2050. Gaborone, Botswana.

United Nations Convention to Combat Desertification (UNCCD). 2022. Global Land Outlook, Regional Thematic Report for Southern Africa: Leveraging the Land, Water and Energy Nexus in SADC.

World Bank (WB). 2022. Reversing the Tide: Reducing Poverty and Boosting Resilience in Zimbabwe.

World Food Programme (WFP). 2022. Zimbabwe Food Security and Markets Monitoring Report.

Zimbabwe Vulnerability Assessment Committee (ZIMVAC). 2022. Rural Livelihoods Assessment Report.

Zimbabwe National Statistical Agency (ZIMSTAT). 2018. Poverty, Income, Consumption and Expenditure Survey 2017 Report.

Electronic News Articles

La Via Campesina. 2007. Declaration of Nyíregyháza. *La Via Campesina International Peasants' Movement,* 27th February. https://viacampesina.org/en/declaration-of-nyi/

Blogs

Adrian T.., G., Gaspar, V. 2022. How Fiscal Restraint Can Help Fight Inflation, IMF, 21st November. https://www.imf.org/en/Blogs/Articles/2022/11/21/how-fiscal-restraint-can-help-fight-inflation

Richie, H. 2023. Engel's Law: Richer people spend more money on food, but it makes up a smaller share of their income, *Our World in Data*, 19th January. https://ourworldindata.org/engels-law-food-spending

World Health Organization (WHO). 2020. Healthy Diet, *WHO*, 29th April. https://www.who.int/news-room/fact-sheets/detail/healthy-diet

WHO. 2015. Stunting in a nutshell, *WHO*, 19TH November. https://www.who.int/news/item/19-11-2015-stunting-in-a-nutshell

Websites

International Food Policy Research Institute (IFPRI). n.d. *Food Production.* https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwj_r--DlNn__uC9sQFnoECB4QAQ&url=https%3A%2F%2Febrary.ifpri.org%2Fdigital%2Fapi%2Fcollection%2Fp15738coll2%2Fid%2F284%2Fdownload&usg=AOvVaw3xwAetHEoYSMDshaKTKN3d&opi=89978449

International Trade Centre (ITC). n.d. *Bilateral trade between Zimbabwe and Southern African Development Community (SADC) Product: TOTAL All products.* https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c716%7c%7c%7c35%7cTOTAL%7c%7c%7c2%7c1%7c1%7c1%7c2%7c1%7c1%7c1%7c1%7c1

International Dietary Data Expansion Project (INDDEX). 2022. *Household food expenditure share % of total spending* https://inddex.nutrition.tufts.edu/data4diets/indicator/household-food-expenditure-share

Lee, D. H. K. 1936. Nutrition. *The Australian Quarterly*, *8*(32), 63–69. https://doi.org/10.2307/20629381

MapChart. 2023. *Africa.* https://www.mapchart.net/africa.html

Statista. 2023. *Zimbabwe: Share of economic sectors in gross domestic product (GDP) from 2011 to 2021.* https://www.statista.com/statistics/455310/share-of-economic-sectors-in-the-gdp-in-zimbabwe/

United Nations Data (UN Data). 2023. *Average value of food production (constant 2004-2006 I$/cap) (3-year average)* http://data.un.org/Data.aspx?q=Average+value+of+food+production+(constant+I%24+per+person)+(3-year+average)&d=FAO&f=itemCode%3A21011%3BcountryCode%3A5815

World Bank Data (WDI). 2023. *Upper Middle Income | Data - World Bank Data.* https://data.worldbank.org/

WFP. 2023. *Hunger Map Live.* https://hungermap.wfp.org/

WFP. 2023b. *WFP at a Glance.* https://www.wfp.org/stories/wfp-glance

WorldData. n.d., *Members of the SADC: Southern African Development Community.* Retrieved from https://www.worlddata.info/trade-agreements/sadc-southafrica.php#:~:text=of%20the%20SADC%3A-,Southern%20African%20Development%20Community,and%20about%20379.69%20million%20people

Datasets

Davies, R., Kwaramba, M., UNU-WIDER, Van Seventer, D. 2018. *A 2013 Social Accounting Matrix for Zimbabwe.* [Matrix] and [Working Paper. https://doi.org/10.35188/UNU-WIDER/2018/581-7

The Zimbabwe National Statistics Agency (ZIMSTAT). 2021. *Poverty, Income, Consumption and Expenditure Survey 2017* (Version V1) [Dataset]. International Household Survey Network. https://catalog.ihsn.org/catalog/9250