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Policy options to transform food systems for affordable healthy diets in South Africa

by

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DECLARATION

I, Lukhangele Mgweba hereby declare that this mini-dissertation, which I hereby submit for the degree of Master of Agriculture in Rural Development at the University of Pretoria, is my work and where someone's work was used, it was cited and referenced. I have not previously submitted this mini-dissertation at this or any other institution of higher learning for a degree purpose.

Signature

Date

26 November

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DEDICATION

This dissertation is dedicated to my family, whose unwavering support and love have been my foundation, my friends, who have provided endless encouragement and joy, and my mentors, whose guidance and wisdom have shaped this journey. This work is a testament to your belief in me. Thank you.

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ABSTRACT

Topic: Policy options to transform food systems for affordable healthy diets in South Africa

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Current food systems fail to deliver nutritious and affordable diets, making healthy diets unaffordable for many South Africans. Moreover, South Africa does not have a food system policy but different policies that address specific components of food security. The study investigated cost-effective, feasible and adaptable policy options ('no-regrets') to transform South Africa's food system for affordable healthy diets in South Africa. A systematic review using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to identify publications addressing food systems' transformation towards affordable healthy diets. This was followed by another systematic review, which focused on extracting potential policy options to address South Africa's food system. Lastly 62 food system stakeholders were purposively sampled to participate in an online survey to vote for policies they perceived as essential for transforming the food system. Thematic analyses was used to analyse the qualitative data collected.

Twenty food systems transformation reports were found and seventy percent of the reports focused on a global level, while 30% focused on Africa. In the online survey most participants preferred agricultural policy options accounting for 25% of the no-regrets policy options. The supply chain and governance policy options were the second most preferred with 20% each, with regulatory and education policy options ranked third and fourth, with 15% and 10% respectively. The financial and research, technology and innovation policy options were the least preferred by the participants with 5% each. Ultimately, the study yielded 20 'no-regrets' policy options to transform South Africa's food systems. The study concluded the transformation of South Africa's food system to deliver affordable healthy diets has no simple solution. A complex, multi-dimensional strategy involving all food system actors is required.

Keywords: Food systems, healthy diets, Food policy

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ACRONYMS

4IR	Fourth Industrial Revolution
AU	African Union
AUC	African Union Commission
BHFB	Basic Healthy Food Basket
BWS	Bewst Worst Score
CAADP	Comprehensive Africa Agriculture Development Programme
CGCSA	Consumer Goods Council of South Africa
CGIAR	Consultative Group on International Agricultural Research
DALLRD	Department of Agriculture, Land Reform and Rural Development
DTI	Department of Trade and Industry
FAO	Food and Agricultural Organisation
FBDG	Food-Based Dietary Guidelines
FOPL	Front of Package Labelling
GFSI	Global Food Security Index
GHS	General Household Survey
GHS	General Household Survey
GLOPAN	Global Panel on Agriculture and Food Systems for Nutrition
HLPE	High-Level Panel of Experts
IFPRI	International Food Policy Research Institute
IFSS	Intergrated Food Security Strategy
IPAP	Industrial Policy Action Plan
LMIC	Low and Middle Income Countries
MDG	Millenium Development Goals
NAMC	National Agricultural Marketing Council
NCD	Non-Communicable Diseases
NDP	National Development Plan
NFNSP	National Food and Nutrition Security Plan
NGO	Non-Governmental Organisation
NGP	New Growth Path
PMBEJDG	Pietermaritzburg Economic Justice and Dignity Group
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RSA	Republic of South Africa

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SAYB	South African Year Book
SBC	Social and Behavior Change
SDG	Sustainable Development Goals
SMMEs	Small, Medium and Micro Enterprises
SOFI	State of Food Security and Nutrition in the world
Stats SA	Statistics South Africa
THFB	Thrifty, Healthy Food Basket
UN	United Nations
UNDP	United Nations Development Programme
UNFSS	United Nations Food Systems Summit
WHO	World Health Organisation

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CHAPTER ONE: INTRODUCTION

1.1 Background of the study

The COVID-19 pandemic and the economic crisis exposed the fragility of local, national, and global food systems. They shed new light on their vulnerabilities and challenges in enhancing the affordability of healthy diets for everyone (Brouwer et al., 2020). According to Neufeld et al. (2023), "a healthy diet is health-promoting and disease-preventing. It provides adequate, without excess, nutrients and health-promoting substances from nutritious foods and avoids the consumption of health-harming substances". Unhealthy diets and the frequent consumption of less nutritious foods are the primary causes of morbidity and mortality (Herrero et al., 2023). According to the Food and Agricultural Organisation (FAO et al.,2022), 3.2 billion could not afford a healthy diet in 2021. In the same period, Africa's costs increased by more than 5 per cent. Furthermore, between 691 and 738 million people worldwide faced hunger in 2022 (FAO et al., 2023).

Over the last 50 years, global food systems have transitioned from primarily rural to industrialised and consolidated systems, affecting many people's diets, nutrition, livelihoods and health (Ambikapathi et al., 2022). Furthermore, food systems have been evolving in ways that undermine the affordability of healthy diets. Cheap, ultra-processed foods have become widely available and fresh, nutritious foods are less affordable and less accessible to many, especially people experiencing poverty in low- and middle-income countries (Brouwer et al., 2020). According to the High-Level Panel of Experts (HLPE) (2017), a food system is defined as all the elements (people, environment, inputs, processes, infrastructures, institutions) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the consequence of these activities. Enhancing the affordability of healthy diets will require transforming food systems with no -one-size-fits-all policies and different trade-offs and leverages for countries (FAO, 2020). The need for the transformation of food systems has also been identified in the Global Sustainable Development Report 2019 to accelerate the achievement of the 2023 Agenda for Sustainable Development (Guijt et al., 2021).

The South African food system is highly contested and is characterised by a paradox and remains shaped by inequalities rooted in colonialism and apartheid policies (FAO, 2023). Despite this, the country has a positive food balance and well-developed food security and nutrition policies (Adeniyi et al., 2021). However, the food system produces under and over-nutrition, unsustainable production and slow transformation outcomes (FAO et al., 2022). As a

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result, large commercial farmers coexist adjacent to many smallholder farmers. Over 7,000 commercial farmers account for over 80 per cent of agricultural production, while over 2 million smallholder farmers operate in South Africa (Wegerif, 2022). The growing health impacts of transitioning from traditional diets rich in cereals and fiber to those high in sugars, fats, and animal-based proteins are placing additional pressure on the already strained public healthcare system. South Africa's increasingly industrialised and concentrated food system makes addressing these food-related health risks even more difficult. Highly processed, nutritionally poor, energy-dense foods high in saturated fats, sodium, added sugars, synthetic additives, and preservatives are readily available, affordable and socially acceptable (Von Bormann, 2019).

Regarding the transformation of food systems, Hawkes (2020) states that policymakers can take many actions to enable and incentivise food systems to deliver healthy diets and tackle wasting, stunting, underweight, obesity or non-communicable diseases. These options actions are 'no-regrets' policy options that are cost effective, feasible to implement and adaptable in various contexts (Hawkes et al., 2020). Furthermore, Laderchi et al. (2024) emphasise recognising the interests and institutions that shape a food system to give policymakers and other stakeholders a higher chance of designing transformation strategies adopted by key actors and implemented. In this study, the selection of 'no-regrets' policy options to transform the South African food system in this study is suitable because, according to Dercon (2020), they are cost-effective, do not involve hard trade-offs with other policy objectives and are feasible regardless of any scenario that plays out under a range of scenarios. For example, South Africa has implemented urban agriculture and community gardens programmes across municipalities in Johannesburg and Cape Town to increase access to fresh produce for over 100 000 households annually (Kanosvamhira, 2024). Moreover, Mexico's front-of-pack labeling (FOPL) policy led to *20% of consumers* reporting that they changed to healthier food options due to the labeling (Colchero et al., 2017).

1.2 Problem statement

South Africa faces challenges ranging from high unemployment and poverty to the ongoing energy crisis and rising living costs (Statistics South Africa, 2021). These impact South Africa's food security negatively by making food expensive and therefore, unaffordable with 5 percent (2,6 million) and 6 percent (1,1 million) surveyed households stating that they have inadequate and severe inadequate access to food, respectively (Stats SA, 2021). Regarding the

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affordability of healthy diets in South Africa, using national data collected by Stats SA and National Agricultural Marketing Council in 2023, Vermeulen et al. (2023) found that the cost of basic healthy eating, consisting of 24 food items that are based on the nutritional guidelines for a household of 4 members, amounted to $262 per month. They further stated that this cost of basic healthy eating excludes 60% of the population from being able to afford a basic healthy food basket. A shift to more plant-based foods, which means less meat, fish, eggs, and legumes, has reduced the cost of healthy eating by 15%.

The Global Panel on Agriculture and Food Systems for Nutrition (2016), states that policy maker's emphasis on food quantity over food quality has led to present food systems failing to provide healthy diets. This does not assist consumers in making healthy and affordable food choices that would yield positive nutritional outcomes. Similarly, according to FAO (2018), traditional food security programs rely on production-focused approaches to achieve food security through increased food supply. As a result, other areas of the food system have been neglected. Reports that have focused on transforming food systems for affordable healthy diets, such as the GLOPAN (2016) and WHO et al. (2021) have focused their policy recommendations on a global level. These policies include improving agriculture and market systems, developing national policy and framework for food safety and quality, public-private partnerships, providing so.cial protection and imprivng data needed to support evidence0based policy decisions (Glopan, 2016)

South Africa has had numerous food policies that mainly focus on food security only, which is mainly concerned with food production and not specifically on the entire food system. This means that other aspects such such as supply chain and the food environments (Termeer et al., 2018). Additionally, overarching food policies such as the NDP, NGP ant the Reconstruction for Development Programme influence the food system (Adeniyi, Losch & Adelle, 2021). Other food-related policies, such as the Integrated Nutrition Programme introduced in 1994, target mostly the food availability component of the food system through initiatives like food fortification, nutrition education and food provision. The research gap lies in the fact that South African food policies have alimited focus on nutrition as they often emphaises food security in terms of quantity instead of the quality of diets. Furthermore, the fragmentation of food policies which also have overlapping goals, means the implementation of coherent food policies is lacking. Hence, South Africa has no holistic food system policy that would address dietary access issues. Therefore, there is a knowledge gap in exploring how food policies can enhance access to affordable healthy by focusing on the entire food system (Adeniyi et al., 2021).

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Additionally, this study will potentially provide a stepping stone towards South Africa having a holistic food system policy that all relevant stakeholders, including the private sector, NGOs, Academia, and Civil society champion.

1.3 Research questions

The study identifies potential policy options for transforming food systems in South Africa to deliver affordable and healthy diets by addressing the following research questions:

- What food system policy options exist to enhance the affordability of healthy diets in South Africa?
- What are the potential no-regret policy options to transform food systems towards affordable and healthy diets in South Africa?
- How can no-regrets policy options be prioritised by food systems stakeholders to enhance the affordability of healthy diets?

1.4 Study objectives

The study's overall objective was to identify the policy options to transform food systems towards affordable healthy diets in South Africa. The specific objectives are:

- To investigate the existence of food system policies to enhance the affordability of healthy diets in South Africa
- To extract the potential no-regret policy options to transform food systems towards affordable and healthy diets in South Africa.
- To determine the prioritisation of 'no-regrets' policy options to transform food systems

1.5 Significance of the study

This study is significant for South Africa's food system transformation because the food system faces a significant policy gap in ascertaining the affordability of healthy diets for its population. Firstly, despite policies addressing food security and nutrition, there is a lack of cohesive strategies that integrate these policies effectively across different sectors. This policy gap results in fragmented efforts that fail to address the root causes of poor nutrition, such as inadequate access to diverse and affordable healthy food. Secondly, the country's food policy does not focus on the food system as a whole but mostly on food security, which is one outcome of the food system (Termeer et al., 2018). Lastly, according to Adeniyi et al. (2021) and FAO et al. (2022), South Africa's food policies have been implemented in siloes as over eight

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government departments implement their food security projects. Therefore, this study will contribute by appraising the policy options proposed in the literature to transform food systems in the South African context

1.6 Outline of the dissertation

Chapter one of the study presents the background of the affordability of healthy diets and food system transformation, followed by the problem statement, research questions and objectives and the significance of the study. Chapter two of the study discusses the nature of food systems, global, continental and national perspectives, and a review of relevant studies. Chapter three details the research methodology of the study. In chapter four, the results and discussion of the various approaches used are presented. The study ends with chapter five, reiterating the research objectives, recapping the main findings and providing a conclusion and recommendations.

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CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This section presents the theoretical and conceptual background of food systems, a review of the definition of a healthy diet, the cost of healthy diets and dietary patterns in South Africa. It also reviews related studies on transforming food systems for healthy diets and examines the global, continental, and national insights on food systems transformation, as well as the existing knowledge gaps in pursuing this transformation.

2.2 Background to food systems transformation towards healthy diets

2.2.1 Food systems approach

The world is currently confronted by the challenge of ensuring affordable healthy diets for many people globally, a crucial necessity in achieving the hunger and nutrition targets of Sustinable Development Goal 2 which is universal access to safe and nutritious food (Stats SA, 2023). The situation has been exacerbated by the Covid-19 pandemic (FAO et al., 2020). According to Hendriks et al. (2023), this reduces the affordability of healthy diets while increasing the need for a nutritious diet. Most people (87%) who cannot afford a healthy diet are primarily in low-income countries, and 72% are in middle-income countries (Center for Strategic and International Studies, 2020). The high cost and unaffordability of healthy diets are linked with increasing food insecurity and various forms of malnutrition, including child stunting and adult obesity. Furthermore, unhealthy diets are a leading cause of deaths related to non-communicable diseases (FAO et al., 2020).

The concept of the food systems approach has emerged in response to the ever-changing landscape of food policy. This approach recognises that achieving food and nutrition security needs a comprehensive understanding of the interconnected factors, from food production to consumption (Pereira, 2014). It considers all significant causes of a problem and the social, environmental, and economic repercussions of potential solutions, aiming for transformative systemic changes. Unlike many conventional methods focused on specific sectors or narrow fixes within the purview of a single ministry, the food systems approach adopts a holistic perspective, addressing the limitations of reductionist or siloed approaches. It promotes efforts among multiple stakeholders and coordinated policies at various levels, fostering a more balanced approach to tackling food system problems. Despite the inevitable trade-offs among key priorities such as poverty reduction, agricultural productivity, nutrition, and trade within

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food systems, this approach presents opportunities to achieve multiple objectives simultaneously (Dekeyser et al., 2020).

2.2.2 Food systems conceptual framework

According to HLPE (2020), "Food systems consist of all the different activities and components related to the production, distribution, processing, preparation, and consumption of food, as well as the outcomes of these activities, which include socio-economic and environmental effects". The food system conceptual framework shown in Figure 2.1 identifies five primary categories of drivers of food system changes. These include biophysical and environmental factors, innovation, technology, infrastructure, political and economic influences, and socio-cultural and demographic drivers (Bene et al., 2019). The biophysical and environmental drivers include natural resources, ecosystem services, and climate change. The political and economic drivers include leadership, globalisation, trade, food prices and volatility, conflicts, and humanitarian crises. The socio-cultural drivers encompass culture, religion, rituals, social traditions, and women's empowerment (Hendriks et al., 2023). Demographic drivers include population growth, changing age distribution, urbanisation, migration and forced displacement. The effect of each driver varies based on the specific food system, the involved actors and the adopted policy options (HLPE, 2017).

Moreover, Figure 2.1 includes elements like food supply chains, food environments, and consumer behaviour, all of which are influenced by various drivers. These elements shape diets and determine the final nutrition, health, economic, and social outcomes of food systems (Djimeu et al., 2022). The food supply chain involves activities and actors that move food from production to consumption and ultimately to waste disposal. Moreover, the steps of the food supply chain encompass production, storage and distribution, processing and packaging, as well as retail and markets (Hawkes and Ruel, 2012).

Food environments encompass the physical, economic, political, and socio-cultural factors that influence individuals' dietary preferences, choices, and nutritional well-being (Glopan, 2017). It serves as the medium through which individuals access food within the broader food system. For many communities, their food environment encompasses both the foods they produce and those they purchase from local markets. The primary factors in the food environment that impact consumer food choices, food acceptability, and diets include physical and economic food accessibility, food promotion, advertising and information, and food quality and safety (Hawkes et al., 2020).

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As illustrated in the conceptual framework on figure 2.1, firstly, the systematic review conducted involves a comprehensive review of current literature and data sources, focusing on the transformation of food systems reports. The aim is to gather food system transformation reports detailing how various policy options can impact food systems in different contexts. This evidence-based approach will help identify effective strategies and gaps in knowledge. Secondly, the extraction of potential policy options from the identified reports, will assist refine actionable policies from a broad array of food systems reports. Lasty, the reviews' findings will support "no-regret" policy options that can be applied to the food system drivers resulting in outcomes such as affordable healthy diets.

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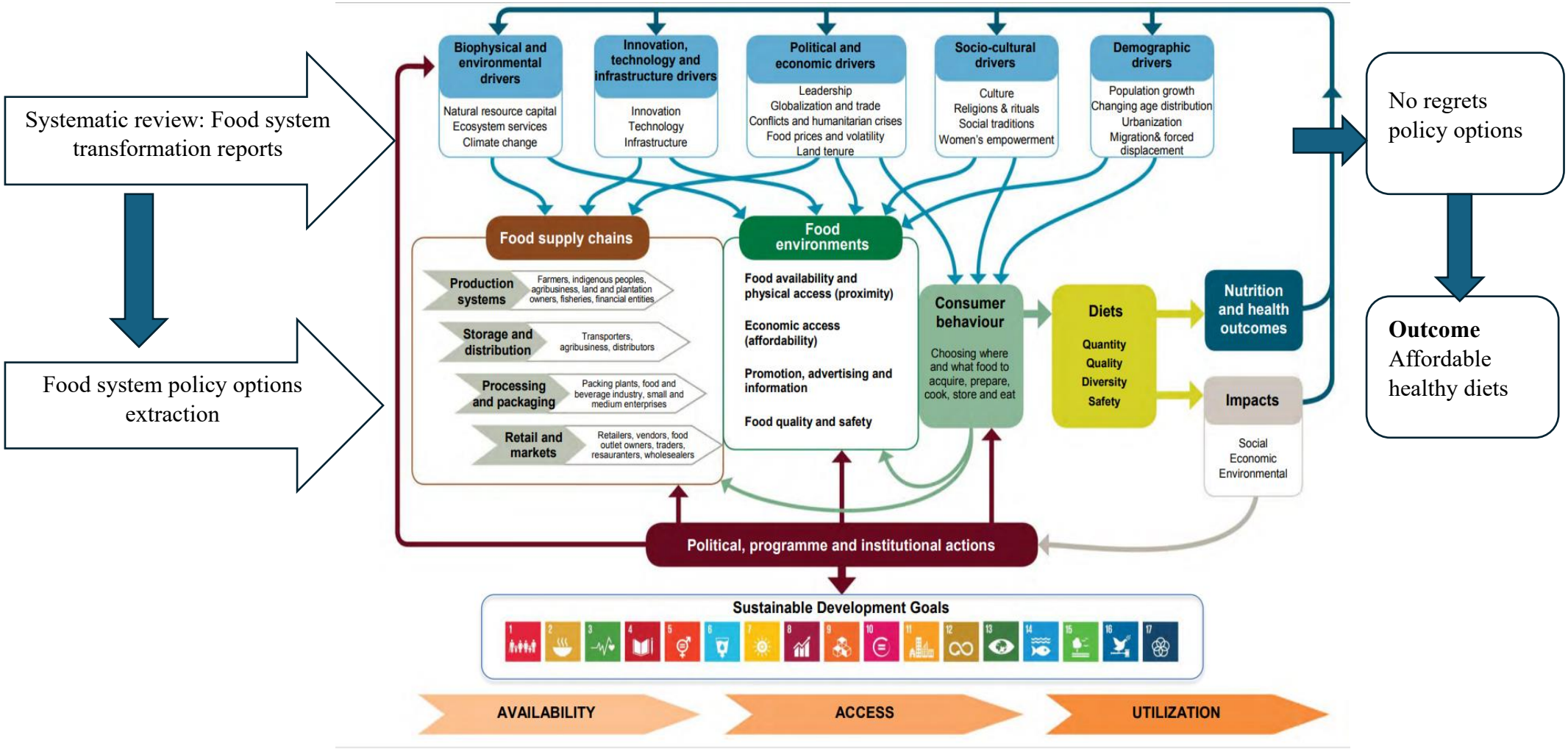

Figure 2.1: Food system conceptual framework
Source: Adapted from (HLPE, 2017)

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According to Njuki et al. (2023), “Consumer behaviour reflects all the choices and decisions made by consumers, at the household or individual level, on what food to acquire, store, prepare, cook and eat and on the allocation of food within the household. Consumers' actions and choices regarding acquiring, storing, preparing, and consuming food are influenced by their personal preferences”. Understanding consumer behaviour is crucial for identifying the factors that influence consumers' choices and their various drivers in the context of local food environments (Turner et al., 2022). Ultimately, food systems, through diets, result in a variety of outcomes. These relate not only to nutrition and health but also to all the dimensions of sustainability, which include economic, social and environmental outcomes (Fanzo et al., 2022). According to HLPE (2017), these outcomes link back to the food system drivers.

Due to the food system’s complexity and interconnectedness of the various elements, this study's theoretical framework is based on the System theory. The systems theory is an established concept that is relevant for conceptualising food systems (Von Braun et al., 2021). Within the systems theory, a food system can be considered complex, as each of its components can be classified as independent (Alacron et al., 2021). The drivers and components of the food system interact with each other, and policies to influence any element of the food system may result in unintended outcomes (Kwabata et al., 2020).

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2.3 Diets and dietary patterns

Diets refer to the specific food items that an individual consumes, while dietary patterns refer to the amounts, ratios, and varieties of different foods and beverages included in those diets, as well as the frequency of their consumption (Dietary Guideline Committee, 2020). There is no single, universally accepted "perfect" diet, and diets are often adjusted to fit local contexts and cultures (GLOPAN, 2020). Nonetheless, basic guidelines can be used to establish the criteria for what constitutes a healthy diet. According to Fanzo (2019), the ICN2 Rome Declaration notes that "nutrition improvement requires healthy, balanced, diversified diets, including traditional diets where appropriate, meeting nutrient requirements of all age groups and all groups with special nutrition needs while avoiding the excessive intake of saturated fat, sugars and salt/sodium, and virtually eliminating trans fats, among others".

WHO (2015) states that a diversified, balanced, and healthy diet's exact composition depends on individual needs, such as age, gender, lifestyle, degree of physical activity, cultural context, locally available foods, and dietary customs. The classification of foods as "healthy" or "unhealthy" based on their nutrient content remains a debated topic, with no consensus on how to categorise foods in this manner (Lobstein and Davies, 2008). Tribole and Resch (2020), suggest that there are no inherently "healthy" or "unhealthy" foods, and all foods can contribute to a balanced diet if consumed moderately. Rather than focusing solely on specific nutrients or foods, there is a growing trend towards adopting more comprehensive approaches that consider overall dietary patterns (Mozaffarian and Ludwig, 2010). In 2019, the Lancet Commission formulated a reference diet intended to be healthy for the global population. Their universal healthy reference diet primarily comprises vegetables, fruits, whole grains, legumes, nuts, and unsaturated oils, with moderate amounts of seafood and poultry, and minimal to no red meat, processed meat, added sugar, refined grains, and starchy vegetables (Willet et al., 2019). This diet closely aligns with the WHO recommendations but further specifies the daily quantities of food groups to be consumed in a 2 500 kcal/day for men and 2 000 kcal/day for men, ensuring basic human nutrient needs are met. However, Hivonen et al. (2020) argue that there are several criticisms of this global diet, including its affordability issues for millions, questions about its sustainability, reliance on potentially inaccurate data modelling and concerns about the water usage of tree nuts and groundnuts.

It is essential to acknowledge the diverse cultural and ethnic dietary patterns within the South African population. Understanding these differences can aid in developing more tailored and

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effective food policies, interventions, and dietary guidelines (Chakona and Shackelton, 2019). The white population's typical Western diet, which includes high protein, pre-packaged foods and low carbohydrate intake, is reflective of many Western countries' dietary habits (Suarez et al., 2023). The Indian and coloured populations may share some similarities with the white population's diet but also incorporate their own traditional and popular foods, which likely include spices, legumes, and specific dishes unique to their cultures. The rural black African population tends to follow a conventional diet that is high in carbohydrates and low in fats (Pretorius and Silwa, 2011).

The debate about what constitutes a healthy diet is ongoing (Barnhill and Matteo, 2021). South Africa introduced the Food-Based Dietary Guidelines which seek to address food and nutrition issues, but disadvantaged urban populations do not always readily achieve compliance with recommendations. Vorster et al. (2013) state that the South African FBDGs contain seven food groups to be "eaten regularly: starchy foods; vegetables and fruits, dry beans, peas, lentils and soya; chicken, fish, meat and eggs; milk, *maas*, yoghurt; fat and oil; and water". Furthermore, The FBDGs consist of 10 short, clear messages targeted at different ethnic groups in rural and urban areas. According to Vorster et al. (2013), the guidelines are:

- "Enjoy a variety of foods.
- Be active!
- Make starchy foods part of most meals.
- Eat plenty of vegetables and fruit every day.
- Eat dry beans, split peas, lentils and soya regularly.
- Have milk, maas or yoghurt every day.
- Fish, chicken, lean meat or eggs can be eaten daily.
- Drink lots of clean, safe water.
- Use fats sparingly. Choose vegetable oils rather than hard fats.
- Use sugar and foods and drinks high in sugar sparingly.
- Use salt and food high in salt sparingly"

2.4 Cost of a healthy diet in South Africa

The cost of a healthy diet is a relatively new measurement that involves measuring people's access to a range of safe and nutritious foods. This cost is defined as "the least expensive combination of locally available items, including fruits, vegetables, and other nutrient-dense

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foods that align with food-based dietary guidelines" (IFPRI, 2024). Furthermore, food affordability is a critical determinant of food choices, which affects many consumers in South Africa, where food purchased from supermarkets is becoming the prominent source of food for households (Vermeulen, 2020). As of the 2022 Global Food Security Index, South Africa has an overall score of 61.7 ranking 59th out of 113 countries and a food affordability score of 63.4 ranking 70th out of 113 countries (Economist Impact, 2022). Vermeulen (2020) states that South Africa has no national-level tool to quantify the cost of healthy eating and the one of the current tool such as the Stats SA Consumer Price Index for food only looks at selected food items. This argument is further supported by Vermeulen et al. (2023), who also argue that South Africa has limited existing food baskets. There is no evidence of existing examples of nationally representative, regularly updated, healthy and balanced food baskets in South Africa.

As such, the country needs an improved understanding of the cost of basic healthy foods at the national level. Closing this gap can provide insights into the nutritional implications of diets while contributing to the formulation of policy options to assist the nation in achieving the NDP goals and the UN SDGs (Vermeulen, 2020). The monthly monitored National Agricultural Marketing Council 28-item food basket (Vermeulen, 2020) is based on a selection of food items purchased frequently by South African households, not on a nutritional basis or family size or composition. Furthermore, the Pietermaritzburg Economic Justice and Dignity Group (2023) monitors a basic and nutritionally complete diet every month, focusing on several geographical locations in South Africa (Johannesburg, Cape Town, Durban, Springbok and Pietermaritzburg) where a selection of food prices is recorded monthly at 44 supermarkets and 30 butcheries targeting the low-income market. This tool, albeit not nationally representative shows that when the price of staple foods which are purchased first by households goes up, households remain with less money to buy other nutritious foods such as meat, dairy and eggs.

In their evaluation of the cost and affordability of basic healthy eating in South Africa and Kenya, using the Basic Healthy Food Basket (BHFB) modelling framework, Vermeulen et al. (2023) found that the cost of the BHFBs for the reference family of four amounted to US$ 270 per month in South Africa, potentially excluding more than half of households in the country from basic healthy eating from an affordability perspective. Vermeulen (2020) investigated the cost of a healthy food basket for a household of four in South Africa from January 2013 to January 2019. She found that the cost of the Thrifty Healthy Food Basket (THFB) for the four-member reference family increased by 32.6% to approximately US$152 /household/month, which is slightly higher than the 30.1% increase in disposable income per capita of households

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from 2013 to 2018 thus pointing towards a decreasing affordability of healthier food options over time.

2.5 Drivers of unhealthy foods consumption in South Africa

Low income leads to poor diets with limited diversity and unhealthy food options for those affected. A cereal-based diet is high in calories but inadequate in micronutrient value with low diversity and is low in animal products, vegetables, and fruit (Erokhin et al., 2021). The average national consumption of fruit and vegetables is 200 grams per person per day, half the of the WHO recommendation of 400 grams per day (WHO, 2020). In 2017, 36% of households were categorised as having a low dietary diversity score (Jonah and May, 2019). The portion of the population in rural areas living on communal land is most likely to have low dietary diversity (60%), followed by those in urban informal settlements, mostly slums (47%) (Jonah and May, 2019). Other drivers of unhealthy dietary consumption in South Africa are macro-level factors like climate change, which has affected food production and supply, global and national trade policies, which have led to increased imports of Westernised foods and inflation, which has made healthy foods less affordable (Erzse et al., 2023). Lastly, urbanisation is a key driver of food system dynamics, affecting consumer choices, spatial food demand patterns and households' ability to produce their food (De Bruin et al., 2021).

Unhealthy food consumption is driven by the comparatively high cost of healthy foods as compared to highly processed foods, which do not offer enough micronutrients but are high in energy (Lewis et al., 2023). These types of foods are readily available in local markets such as Spazzas (house shops), from street hawkers and sometimes even within schools. The cost of fresh produce has risen more rapidly than other food sources in South Africa due to the impact of drought (Auerbach et al., 2021). Figure 2.2 provides a comparison of the share of actual household expenditure on selected food groups to the share of expenditure recommended by the Economic Justice and Dignity Group for a balanced healthy diet. Consumers in urban areas typically pay more than their rural counterparts for the same basket of selected food products, largely due to transportation costs.

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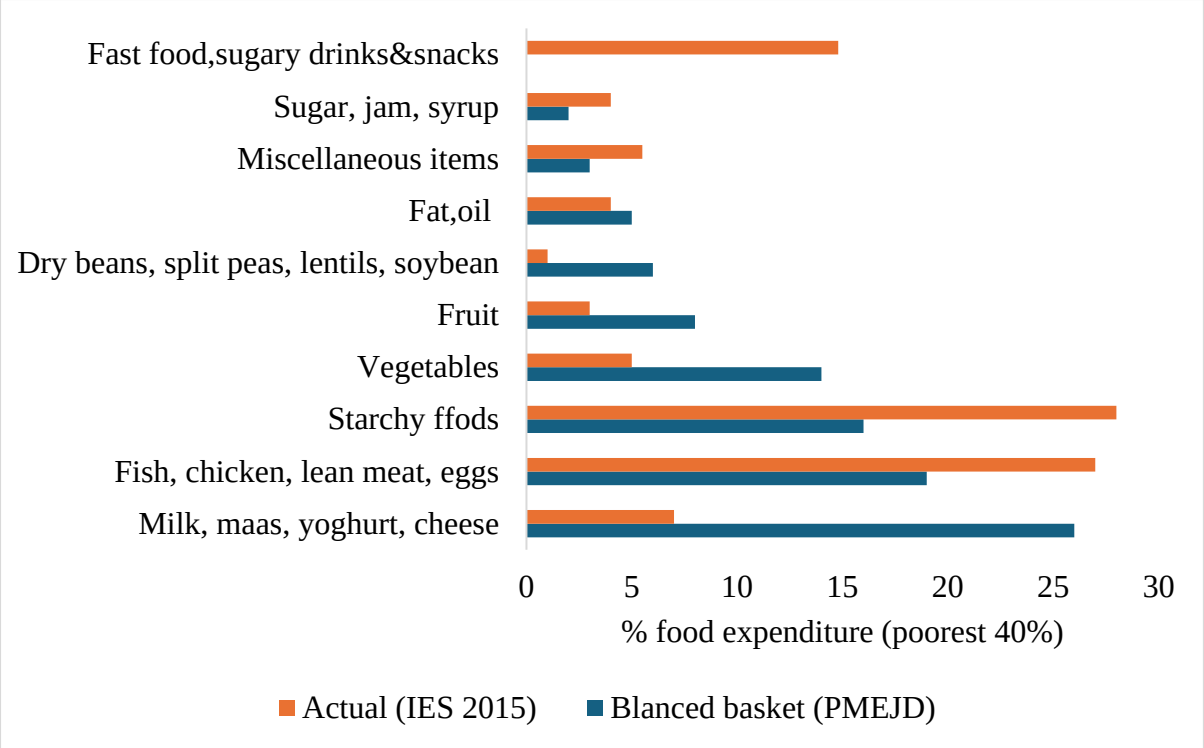

Figure 2.2: Comparison of household expenditure on selected food groups

Source: *Pietermaritzburg Economic Justice and Dignity, 2021. Household affordability index*

2.6 Commitments to addressing food systems transformation

2.6.1 Global sphere

The inadequate provision of healthy diets required for optimal health and well-being is a key factor driving the current nutrition situation. As a result, the international community has committed to addressing the challenges of malnutrition and food systems (FAO and WHO, 2018). Developing countries have adopted the Millennium Development Goals (MDGs), which aim to reduce the proportion of people suffering from hunger by half (WHO and FAO, 2018), reflecting this commitment. The transition from the MDGs to the Sustainable Development Goals (SDGs) reinforced this pledge. While poverty, hunger, and malnutrition are common themes in the MDGs and subsequent SDGs, the SDGs require policymakers to develop comprehensive and wide-ranging solutions to food and nutrition security issues (Charlton, 2016). The Sustainable Development Goals (SDGs) were officially launched in 2016 and were built upon the previous Millennium Development Goals (Hendriks, 2018). Consisting of 17 distinct goals and 169 associated targets, the SDGs "recognise that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development" (UN, 2015). SDG 2 'Zero hunger'

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aims to end hunger and ensure access to safe, sufficient and nutritious food by all people by 2030 (Atukunda et al., 2021). While progress has been made towards achieving the targets of the SDGs, South Africa's progress towards the achievement of SDG 2's targets is lagging. According to the Sustainable Development Country Report 2023, South Africa ranks 110 out of 166 countries in terms of its performance in the 17 SDGs and has an index score of 64.0 (Stats SA, 2023).

Hendriks (2018) noted that the SDGs extend beyond child nutrition and include hunger, poverty, and nutrition indicators. According to WHO (2016), the UN Decade of Action on Nutrition and the 2030 Sustainable Development Goal Agenda offer opportunities to reform food systems to deliver healthy diets. Furthermore, the Nutrition Decade aims to increase investment in nutrition, implement policies to enhance food security and nutrition and foster strong collaboration among actors in the food system (GLOPAN, 2016) highlighted that Goal two of the SDGs explicitly aims to provide access to nutritious food for people experiencing poverty, recognising that nutrition is essential for an individual's capabilities. The food system must provide high-quality, nutritious and affordable diets to achieve this.

2.6.2 Continental sphere

The Comprehensive Africa Agriculture Development Programme (CAADP) was endorsed in 2003 as the flagship programme of the African Union (AU) for agriculture and food security. The CAADP aimed to maximise agriculture's contribution to achieving a self-reliant and productive Africa goal and delivering economic growth and sustainable development (Sibanda and Mwamakamba, 2021). The CAADP set four priority areas to achieve food security, namely: extending the area under sustainable land management and reliable water control systems, improving rural infrastructure and trade-related capacities for market access, Increasing food supply, reducing hunger, and improving responses to food emergency crises and improving agriculture research, technology dissemination and adoption (Gosling, 2022).

After ten years of implementing the CAADP, in 2014, African states endorsed the Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods (2014-2025) to accelerate the achievement of the CAADP goals. The Malabo Declaration aimed to achieve transformation via the pursuit of seven broad commitments, which include upholding the principles and values of CAADP, enhancing investment finance in agriculture, ending hunger in Africa by 2025, reducing poverty by half by 2025 through inclusive agricultural growth and transformation, boosting intra-African trade

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in agricultural commodities and services, enhancing the resilience of livelihoods and production systems and ensuring mutual accountability for actions and results by conducting a Biennial Review continent-wide to monitor progress in achieving these seven commitments (Guthiga and El-Taha, 2022). According to the 4th CAADP biennial review report, as of 2024, South Africa has a score of 4.11 out of 10 and is not on track to implement the Malabo Declaration on agricultural transformation.

In January 2015, African Heads of State adopted Agenda 2063, a shared strategic framework for inclusive growth and sustainable development in Africa. In September of the same year, the AU aligned the 2063 Agenda to the 2030 Agenda for Sustainable Development (AU, 2016). The 2063 Agenda has three key components: the vision, the transformation framework and the first Ten Year Implementation Plan. It is anchored by seven aspirations that are supported by corresponding goals, priority areas, targets and strategies. Regarding food security and nutrition commitments, aspiration one (a prosperous Africa based on inclusive growth and sustainable development). Agenda 2063 commits to modernising agriculture for increased production, productivity and value addition, ultimately ensuring food security in Africa. One of the identified strategies to achieve food security includes the promotion of policies that will ensure access to affordable and quality food for all (AUC, 2015).

2.6.3 National sphere

South Africa implemented its initial extensive food security policy in 2002, known as the Integrated Food Security Strategy (IFSS). The primary goal of this strategy was to eliminate food insecurity, malnutrition, and hunger by 2015 (Koch, 2011). It aimed to achieve this through strategies such as promoting household food production and trade, enhancing income generation, and creating more job opportunities. Additionally, the policy sought to improve nutrition and food safety while also facilitating dialogue among stakeholders and enhancing their capacities (McLachlan and Thorne, 2009). South Africa implemented the New Growth Path (NGP) policy in 2010 to enhance growth, create employment opportunities and promote equity (Nattrass, 2011). The NGP policy acknowledges food insecurity and mentions land, agricultural, and trade policies in the context of food security. However, the policy fails to address the critical need for a food security policy, although does recognise food production and consumption aspects of the food system (Hendriks, 2014).

In 2012, South Africa launched the National Development Plan (NDP) to eliminate poverty and reduce inequality by 2030 (National Planning Commission, 2013). One of the key focus

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areas of the NDP is agriculture and is of the view that the ability to access food affects household food security (Pereira and Drimie, 2016). One of the critical features of the NDP is its advocacy for collaboration between government, the private sector, and civil society to establish local food systems that support food access and utilisation and the broader food system. The NDP "provides an innovative framework to begin to inform action required across society to deal with pervasive hunger" (Drimie and McLachlan, 2013). The NDP advocates for the engagement of stakeholders within the entire food system along with numerous linkages throughout multiple sectors and various governmental departments (National Planning Commission, 2013). Furthermore, Delport (2019) argues that the NDP policy aligns with the food systems approach, which subsequently calls for collaboration among all relevant stakeholders. Even six years after the NDP's implementation, food insecurity persisted until 2018, with the majority of the population unable to access consistent, nutritious food (Hendriks, 2018).

Additionally, the Industrial Policy Action Plan (IPAP) 2016/17 also introduced a policy that highlighted the importance of improved coordination between various government departments, particularly the Departments of Agriculture, Forestry and Fishing, Rural Development and Land Reform (DRDLR), the Department of Small Business Development, the Economic Development Department (EDD) and the Department of Trade and Industry (DTI) (Delport, 2019). The most recent food security policy, the National Food and Nutrition Security Plan (NFNSP), was introduced in 2017 to enhance food security and nutrition. Led by the Office of the Deputy President and the Department of Planning, Monitoring and Evaluation (DPME) within the Presidency, it marked a significant departure from previous policies by involving multiple government departments and non-state actors (Adeniyi et al., 2021). Key objectives included forming a multi-sectoral food and nutrition security council to coordinate policies and implementation, establishing inclusive local food chains to improve food access, expanding social protection and livelihood programs, and increasing efforts in nutrition interventions (Mosehla et al., 2019).

2.7 Reflections on the 2021 United Nation Food Systems Summit

The UN Secretary-General convened the UN Food Systems Summit from 23 to 24 September 2021 in recognition that transforming food systems provides one of the most powerful ways to realise the vision of the 2030 Agenda. Some of the policies and commitments that emerged are as follows:

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- Strengthening food safety frameworks to ensure high-quality and safe food supplies globally
- Scaling up initiatives to reduce global food losses and waste by 50% by 2030.
- Development of a comprehensive monitoring framework to track progress on national and global food system transformation (Caprile, 2021)
- Climate change mitigation and adaptation, including climate smart agriculture for production, resilience and reducing greenhouse gas emissions
- Assistance for small and family farmers and rural populations through investments, technological support and extension services were identified as priorities, with science, technology, research, innovation and investment highlighted oftenly (FAO et al., 2021)
- Promotion of equitable trade policies to protect the livelihoods of producers and workers.
- Pledges to mobilise financing for food system transformation initiatives

The UN Food Systems Summit had various shortcomings and contradictions in its strategy for transforming food systems. A primary concern was the lack of legally enforceable commitments, which raises issues regarding accountability and the likelihood of effective implementation. Furthermore, the summit encountered power dynamics that allowed corporate interests to overshadow discussions, potentially sidelining smallholder farmers and local communities (Canfield et al., 2021). The financial commitments presented at the summit were also viewed as insufficient to meet the ambitious objectives set for food system reform. A notable policy conflict arose between the advocacy for industrial agriculture, which governments and large agribusinesses promote to enhance productivity and the summit's endorsement of agroecology and regenerative farming, which emphasise biodiversity and indigenous knowledge. Industrial agriculture's dependence on monocultures, synthetic fertilizers and pesticides not only contradicts the principles of agroecology but also jeopardizes the livelihoods of smallholder farmers and threatens the sustainability of local food systems (O'keefe 2021).

2.7.1 Global reflections on the UN food system summit

Following the UN food systems dialogues, the first UN Food Systems Summit +2 Stocktaking Moment (UNFSS+2) was held in Rome, Italy from 24 – 26 July 2023. The purpose of the UNFSS +2 was to continue the progress made during the UNFSS and provide a platform for

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countries to review their advancements on their commitment, identify challenges and priorities to solve the implementation gap. According to (Aredes, 2023) the convention yielded the following commitments or actions:

- Incorporating food systems strategies into all national policies for sustainable development,
- Establishing food systems governance that engages all sectors and stakeholders
- Investing in research, data, innovation and technology capabilities
- Promoting increased engagement of the private sector, through public-private partnerships to shape the sustainability of food systems and strengthen accountability mechanisms
- Ensuring access to short and long-term concessional finance, investments, budget support and debt restructuring.

Additionally, the UN Food Systems Coordination Hub was established as an immediate outcome of the UN Food Systems Summit to sustain the Summit's follow-up. The Hub articulates its work around six key functions: facilitation of national pathways implementation, organising global ecosystem of support, strengthening the means of implementation, communication, and advocacy for food systems transformations (FAO and Rojas, 2023).

2.7.2. South African dialogue on food systems

On 11 June 2021, the National Food Systems Dialogue was hosted by the Minister of the Department of Agriculture, Rural Development and Land Reform (DALLRD) under the theme of "Leveraging public-private partnerships towards scaling up food systems solutions in South Africa during and beyond COVID-19" to generate innovative solutions to food systems challenges. The African Union and the FAO were among the key stakeholders and partners who attended these dialogues. The participants observed that South Africa is considered the breadbasket of Africa even though about 25% of all households, or approximately three million households, experience devastating food insecurity, chronic poverty, endemic hunger, and malnutrition (DALLRD, 2021). Furthermore, the South African dialogues emphasised partnerships for equality, and the stakeholders highlighted that there is no clear food production and consumption mandate, with responsibilities divided among various departments and levels of the governance system. According to Gossling et al. (2022) some of the proposed policy options from the South African Dialogues to transform the food system included:

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- The maintenance and improvement of infrastructure related to water, electricity and roads should be prioritised.
- Provision of robust support services to farmers, including extension services, and to ensure effective land reform and tenure security.
- Encouraging research in food systems, food safety, and nutrition.
- Revisiting food security programmes, evaluation and scaling up.
- Education of agricultural practitioners and agro-processors on sustainable practices.
- Policy considerations should be made for digital agriculture, including embracing the fourth industrial revolution (4IR), advanced technologies and big data to expand smart farming practices.
- Improved dietary data collection, school feeding programs and the integration of nutritional education into school curricula.

Diversifying food production for more balanced diets and improving processing and fortification are essential. Following the national dialogues in South Africa and Africa, the African Union Development Agency-NEPAD has created a common African position ahead of the 2021 Food Systems Summit in line with the African Union's Agenda 2063 and the SDGS, for Africa to pursue solutions in its priority areas. The subsequent dialogue following these dialogues was the UN Food Systems Summit during the UN General Assembly in September 2021.

2.8 Studies on food systems transformation for healthy diets

Reducing the costs of nutritious foods while enhancing the affordability of healthy diets requires reorienting the global food systems (FAO et al., 2020). Several studies (Lee et al., 2021; Hawkes et al., 2023; FAO et al., 2023; Laderchi et al., 2024; von Baun et al., 2024) have recommended policy options to transform food systems to promote affordable and healthy diets. Regarding food systems transformation, Kennedy et al. (2020) highlight the need for empirical evidence to guide policy decisions on nutrition. Sanders et al. (2016) highlighted the existing policy incoherence in South Africa. One such example is the contradiction between the national trade, investment policy and the national health policy, with trade and foreign direct investment encouraging the influx of large quantities of processed foods and sugary drinks (Spires, 2016).

Brouwer et al. (2020) studied differences in the frameworks used for food systems analysis and discrepancies in the procedures to identify strategies for food system transformation. They

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found that most food systems reports continue to adopt a generic view of supply-demand networks and focus on incentives for supporting food producers, neglecting the role of consumer choices as potential drivers for food systems transformation. Furthermore, Brouwer et al. (2020) further state that only a few food systems reports focus on the power dynamics between stakeholders and the feedback loops that may hinder or facilitate the transformation of food systems (Swinburn, 2019; Adeniyi et al., 2021). Lastly, food systems reports focus on foods vital to human diets, such as fruits and vegetables, cereals, pulses and animal-based products or food groups that are potentially detrimental to human health. However, the focus should shift from single food groups to a whole diet approach to address the complexity and connectedness of food system outcomes (Herrero et al., 2023).

Consensus exists on the core policy action that can promote healthy diets based on research. Hawkes et al. (2013) divided these policy actions into three domains: the food system, food environment, and behaviour change. Hawkes et al. (2013) suggested that nutrition label standards should be implemented in the food environment domain to help consumers make healthy food choices. Jacobs et al. (2011) conducted a study in the North-West province of South Africa and found that 70% of the surveyed consumers found it difficult to understand nutritional information. Policymakers usually prioritise the promotion of food-based dietary guidelines to define healthy eating in a country-specific context (Kennedy et al., 2021). South Africa has also adopted these guidelines to promote healthy diets. However, it is unclear whether the simplification of South Africa's diverse diets, as applied in the guidelines, is an effective educational tool for promoting healthy eating (Claseen et al., 2016).

2.9 Analysis approaches to selecting ‘no regret’ policy options

A study by Hawkes et al. (2020) used a systematic review to select no-regret policy options to transform food systems for healthy diets. This review used the PRISMA approach to identify the relevant literature that provided policy actions to transform food systems for affordable, healthy diets. The study recommended 42 policies and actions with a clear pathway to impact that can be implemented to reorient food systems for affordable, healthy diets for all. Following reviewing and extracting these policy actions, Walton et al. (2023) convened food system stakeholders to priorities the policy actions as ‘most’ or ‘least’ important by voting on them based on the ‘no-regrets’ definition. The resulting list of policy actions would be a final list of ‘no-regrets’ policy options to transform food systems. Lee et al. (2021) conducted another study that sought to develop a list of policy actions to transform food systems. This

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study also used the PRISMA to identify relevant literature. However, the emerging policy actions identified were categorised using the Nourishing policy framework developed by Hawkes (2013), which separated the policy actions into food environment, food system and behaviour change communication.

2.10 Knowledge gap on food systems transformation for affordable healthy diets in South Africa

Several studies have made policy recommendations to transform food systems for affordable, healthy diets. Examples of these studies include FAO et al. (2022), which provides policy recommendations to catalyse the sustainable and inclusive food system transformation in South Africa, the economics of the food system transformation by Laderchi et al. (2024) and the exploration of food systems's practitioners' opinions on transforming food systems (Hawkes et al., 2023). Some studies on the transformation of food systems focused on certain components of the food systems, such as food production, to address the unaffordability of diets. For example, Drimie and Pereira (2016) argue that the insufficient understanding of the systemic and complex challenges embedded in the food system has hindered policy response to address the failing food system and leaves a question of which approaches are suitable to remedy the challenges facing the South African food system. Further gaps in addressing food systems for healthy diets include the need for more research on the diverse nutritional needs of different populations and up-to-date data on the nutritional content of diverse foods, including traditional and locally consumed foods, is often lacking (Laderchi et al., 2024).

2.11 Summary of the chapter

This chapter addressed the global and South African challenges of ensuring accessibility to healthy diets, essential for meeting the hunger and nutrition targets of SDG 2. Furthermore, the literature review reflected on identified analysis approaches employed to address food systems. The food systems approach has emerged as a comprehensive framework to tackle these issues by considering the interconnected factors from food production to consumption and promoting coordinated policies among multiple stakeholders. Commitments to address failing food systems have been observed in global, continental and national spheres through initiatives like the SDGs, CAADP, and NDP.

Food systems and local contexts influence diets and dietary patterns. There is no universally accepted healthy diet, but various guidelines such as the FBDGs and the WHO guidelines emphasise balanced, diversified diets meeting nutrient requirements while avoiding excessive

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intake of unhealthy foods. The debate on what constitutes a healthy diet continues, with South Africa's FBDGs aiming to address nutrition issues, but compliance and lack of data is proving to be a challenge. Moreover, in South Africa, the high cost of healthy diets poses a significant barrier to food security. Food affordability affects consumer choices and the country lacks a national-level tool to quantify the cost of healthy eating. The chapter concludes with prevailing knowledge gaps that hamper South Africa's efforts in addressing food system challenges. These include existing food baskets not necessarily reflecting nationally representative nutritional diets and inadequate up-to-date data on the nutritional content of diverse foods. There is a need for a comprehensive understanding of the cost of basic healthy foods to inform policy and achieve national nutritional goals.

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CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter is structured according to the three research objectives of the study. Each objective is supported by the relevant methods to achieve it. The chapter introduces the description of the study area, approaches to conducting the systematic review, sampling of food system stakeholders to participate in the study's online survey, data collection methods for both the systematic review and online survey, data management and ethical considerations and guidelines followed when conducting the study. Since the study includes using a systematic review, the steps taken to identify food system transformation reports and the extraction of potential policy options are deliberated on, as well as the method of analysing the data collected. The chapter concludes with a summary of methods used to achieve each objective.

3.2 Description of the study area

South Africa is located at the southern tip of the African continent. It has a long coastline spanning over 3,000 km, extending from the desert border with Namibia on the Atlantic coast to the border with subtropical Mozambique on the Indian Ocean, with a northward bend around the tip of Africa (Figure 3.1). The country covers an area of 1,219,602 square kilometres, stretching from 22°S to 35°S latitudinal and 17°E to 33°E longitudinally. South Africa is known for its relatively dry climate, with an average annual rainfall of about 500 millimetres (GCIS, 2021). According to Stats SA (2022), the population of South Africa is 62 million people, with 17.8 million households. Agriculture is essential to the country's economic development and significantly impacts its food security. Stats SA (2022) has revealed that 19.6% of the households surveyed have limited food access, while the figure stands at 22% for individuals. Additionally, 37% of individuals benefitted from social grants in 2022.

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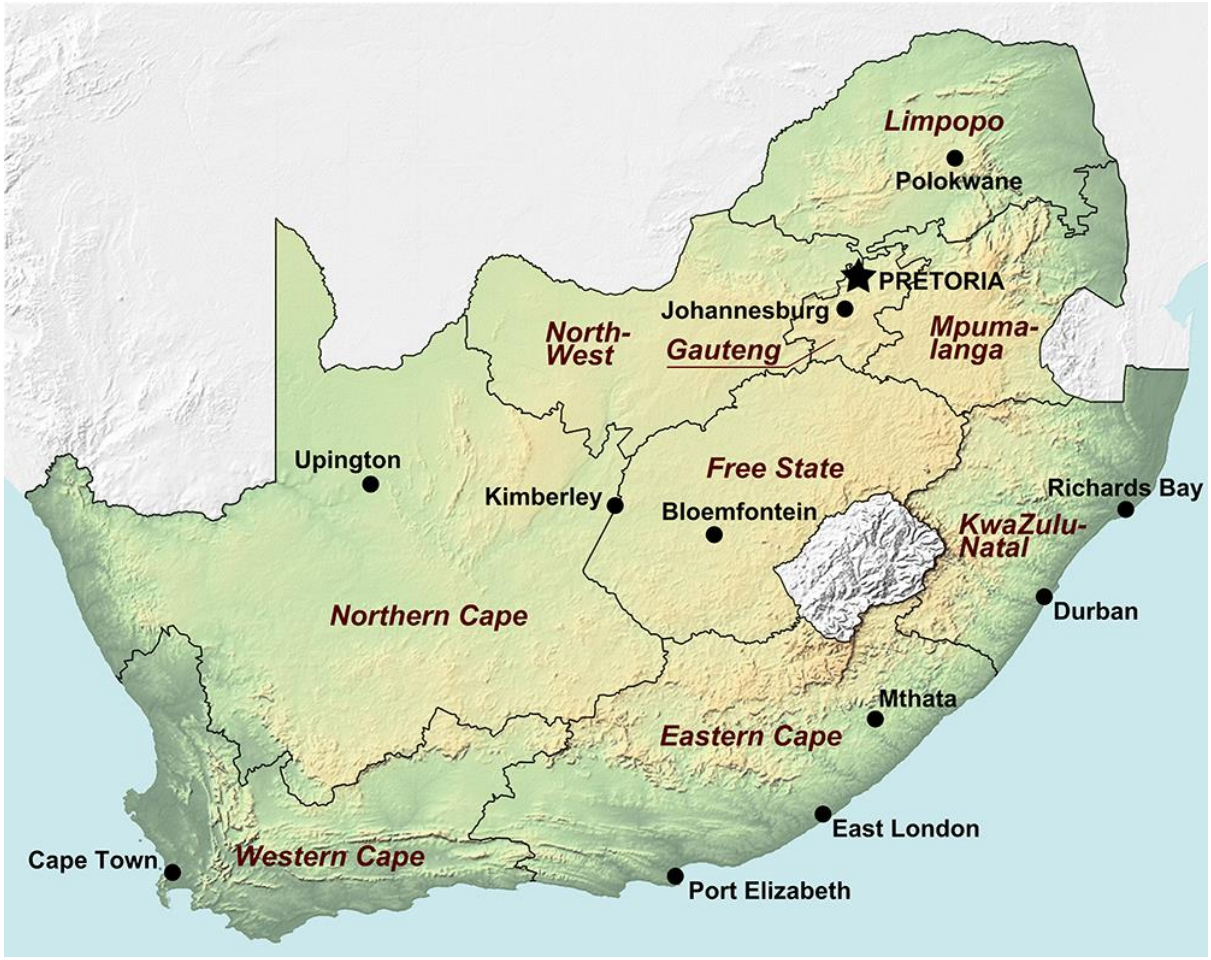

Figure 3.1: Map of South Africa

Source: Greatest Africa (2014)

3.3 Research design

The methodology in this chapter is presented in three steps. Firstly, a systematic review using the Preferred Reporting Items for Meta-Analyses (PRISMA) (Page et al., 2020) was conducted to identify food systems publications that prescribe policy options to transform food systems. Secondly, a systematic literature review adopted from Hawkes et al. 2020 was used to extract policy options to transform food systems from the publications. Lastly, an online survey containing the selected policy options was administered to various stakeholders in the South African food system to rank the prioritise identified policy actions to ultimately form a list of no-regrets policy options to transform South Africa's food system for affordable healthy diets. This online survey was conducted in November 2023 to March 2024.

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3.4 Data collection for the systematic review

A structured, systematic review was conducted using the PRISMA developed by Page et al. (2020) to identify publications focusing on transforming food systems for affordable and healthy diets. The PRISMA guidelines provide a structured approach to reviewing literature. The review process included developing a search strategy, identification of food system publications, screening and eligibility criteria and downloading the selected publications for inclusion in the study.

3.4.1 Search strategy and identification of publications

A search strategy was developed to search for relevant publications using the keywords and boolean operators in Table 3.1. According to Munn et al. (2018), the goal of using keywords for a scoping review search is to retrieve all publications that are relevant to one's topic while eliminating irrelevant results. Because scoping review searches can be extensive and retrieve large numbers of publications, an important aspect is limiting the number of irrelevant results that need to be screened. Lastly, only publications written in English were considered and those published from 2013 onwards.

The study selected the Scopus, PubMed, Web of Science and Google Scholar databases because of their extensive literature scope. The first search was conducted in August 2023 on words related to the transformation of food systems. In addition, a manual search was conducted on other web sources to access grey literature, defined as "literature that is produced on all levels of government, academics, business and industry in electronic and print formats not controlled by commercial publishers" (Nawaz et al., 2024). Only the first four pages were read, and articles were selected only if they were documents (Adeniyi et al., 2021). After merging the databases, the duplicates were removed using Excel.

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Table 3.1: May 2023 search strategy to identify food systems reports

Keywords	**Hits from databases**			
Policy* **OR** strateg* **AND** transform* **OR** reform **OR** reorient* **OR** reshap* OR shift **AND** "food systems" **AND** afford* **OR** cheap* OR access* **AND** "health* diet*" **OR** "nutri* diet*" **OR** "health* food" **AND** "South* Africa*" **OR** "SA"	Pubmed	Scopus	Web of Science	Google Scholar
	142	63	95	16
Filters				
Limit to English Language Limit to 2013 – 2023				

Source: Author's computation

3.4.2 Screening and eligibility criteria for inclusion of the records

The second stage involved screening the titles and abstracts of the records by applying the inclusion and exclusion criteria. For the records to be included in the analysis, they must meet the following criteria:

- Focus on holistically transforming food systems
- Focus on enhancing the affordability of healthy diets
- Provide policy recommendations to transform food systems for affordable healthy diets
- Must have been published between 2013-2023 since. This term was chosen in light of the 2010s, the food systems approach gained momentum momentum in the early 2010s and with reports like the FAO et al. (2014) State of Food and Agriculture beginning to discuss food systems more holistically

After identifying the records from the databases, the title, abstract, keywords, authors' names and year of publication of the identified sources were exported to an MS Excel spreadsheet for screening. Atlas. ti was used for the analysis (Lewis et al., 2018). The researcher independently screened the records' titles and abstracts, applying the inclusion and exclusion criteria. The full texts of studies that passed the screening process were downloaded. The full text of the remaining records was screened and the researcher's supervisors resolved uncertainties or disputes regarding data collection.

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The PRISMA flow diagram adapted from (Page et., 2020) shows the identification of reports (n=282) that provide policy recommendations to transform food systems for affordable healthy diets from three databases and other sources such as Google scholar (Figure 3.2). The screening of the documents factoring in the predetermined eligibility criteria and finally ending with 20 eligible reports that meet the eligibility criteria follows this.

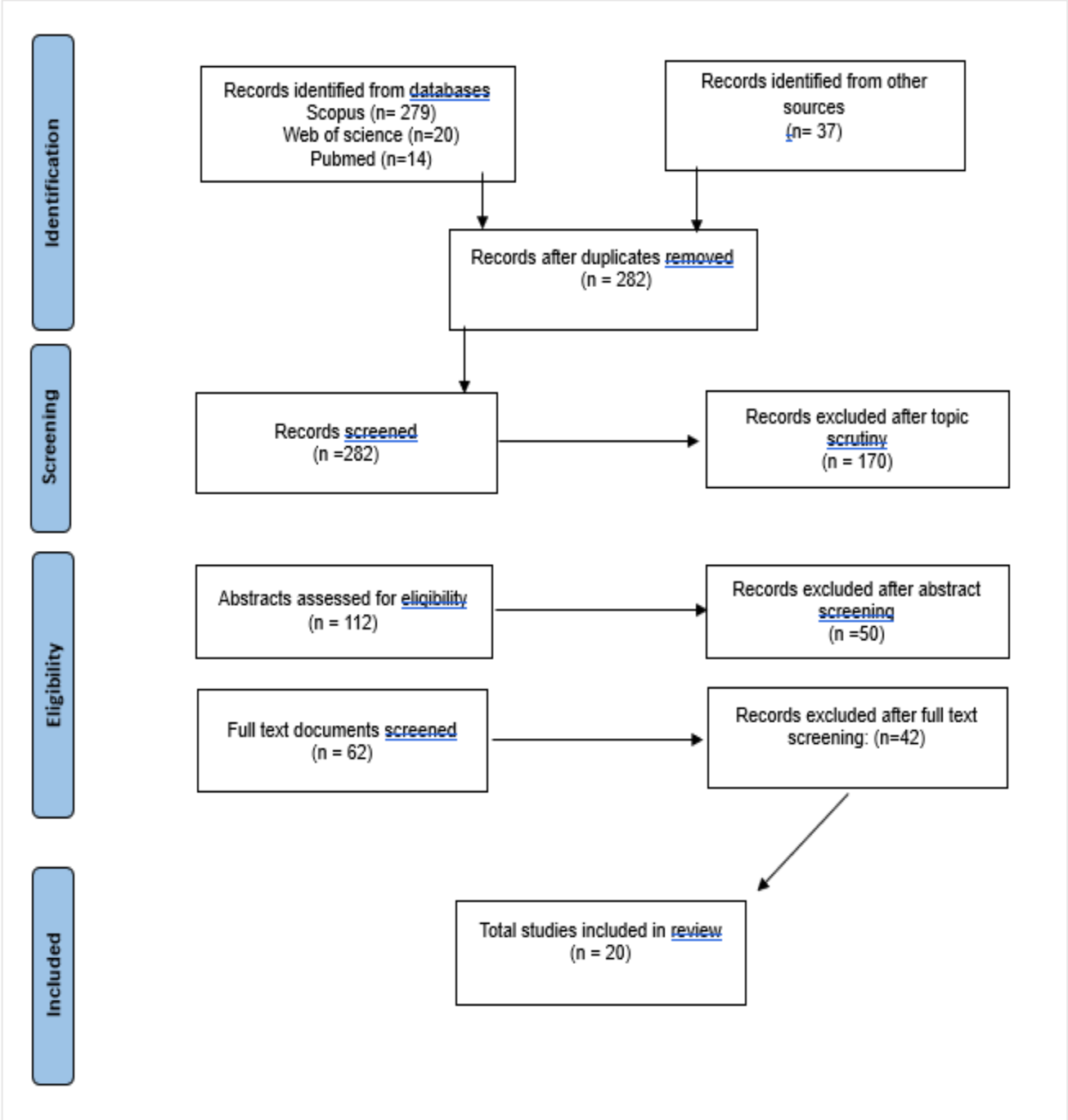

Figure 3.2: PRISMA flow diagram of the study
Source: Adapted from Page et al. (2020)

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The search yielded 350 across all databases. After removing the duplicates (n=68) 282 reports remained. Following the title and abstract screening for relevance, 220 reports were excluded for irrelevance, leaving 62 reports for full-text assessment. Of the 62 full text reports, 42 were excluded due to reasons such as the reports not providing policy recommendations. The remaining 20 reports were included, as they met all inclusion criteria and provided policy recommendations that address the research questions. To ensure that the systematic review was not biased the criteria were developed before starting the review process and were based on the research questions of the study. Secondly, the search strategy covered a wide range of relevant databases to minimise selection bias. Lastly, a step-by-step PRISMA checklist was applied as shown in figure 3.2 to ensure the process is transparent and repeatable.

Table 3.2: Details of the 20 documents included in the systematic review

No.	Citation of the food system reports	Title	Summary
1	Abdelradi et al. (2021)	Policy options for food systems transformation in Africa - from the perspective of African universities and think tanks	Local community engagement and traditional knowledge are essential for sustainable food system transformations in Africa. Collaboration between universities and policymakers is crucia
2	Brouwer et al. (2020)	Reverse thinking: taking a healthy diet perspective towards food systems transformations	Emphasizes shifting food system design to prioritize healthy diets and integrating health perspectives into agriculture policies.
3	Fang et al. (2023)	Sustainable and nutrition-sensitive food systems for healthy diets and prevention of malnutrition in Europe and Central Asia.	Calls for sustainable, nutrition-sensitive food systems to prevent malnutrition while ensuring environmental sustainability.
4	FAO et al. (2022)	The State of Food Security and Nutrition in the World Repurposing food and agricultural policies to make healthy diets more affordable.	Recommends repurposing food policies to make healthy diets affordable and accessible, emphasizing a multi-sectoral approach.
5	FAO (2017)	Nutrition-sensitive agriculture and food systems in practice. Options for intervention	Identifies nutrition-sensitive agriculture as a strategy to improve food system quality and suggests linking agriculture with nutrition outcomes.
6	GRPAST (2022)	Insights for food systems transformation from Southern Africa	Highlights challenges in Southern Africa, emphasizing policies that ensure equity and access to nutritious food
7	Haddad et al. (2016)	Food systems and diets: Facing the challenges of the 21st century	Argues for food systems to address both malnutrition and obesity, calling for coordinated cross-sectoral efforts.

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8	HLPE (2020)	Food security and nutrition building a global narrative towards 2030	Advocates for a global narrative prioritizing food security and nutrition, with multi-stakeholder collaboration
9	Kennedy et al. (2021)	Transforming Food Systems: The Missing Pieces Needed to Make Them Work	Identifies gaps in current food systems, calling for innovative policies and stronger synergies among health, agriculture, and nutrition
10	Lee et al. (2021)	Achieving Food System Transformation: Insights From A Retrospective Review of Nutrition Policy (In)Action in High-Income Countries	Highlights lessons from past nutrition policies, emphasizing consistent policy action to support healthy diets.
11	Mannar et al. (202)	*202*0 Global nutrition report: action on equity to end malnutrition	Emphasises addressing equity to end malnutrition and advocates for interventions that consider socio-economic disparities.
12	Panel (2021)	Connecting the dots: Policy Innovations for Food Systems Transformation in Africa	Suggests Africa-specific policy innovations and investment in sustainable agriculture to promote health and food security
13	Ruben et al. (2021)	Towards food systems transformation—five paradigm shifts for healthy, inclusive and sustainable food systems	Proposes paradigm shifts to integrate health, sustainability, and equity in food system policies and practices.
14	Ruel and Brouwer (2021)	Transforming Food Systems to Achieve Healthy Diets for All	Advocates for government-private sector collaboration to ensure accessible healthy diets for all population
15	Sibanda and Mwamakamba (2021)	Policy Considerations for African Food Systems: Towards the United Nations 2021 Food Systems Summit	Stresses inclusive dialogue in policy-making, aligned with the UN Sustainable Development Goals to improve food security
16	United Nations Economic Commission for Africa (2021)	Transforming food systems: regional policy brief	Emphasizes regional cooperation and investment in agriculture to enhance food security and nutrition.
17	Vermeulen et al. (2020)	Changing diets and the transformation of the global food system	Discusses the impact of diet changes on food systems, calling for environmental, health, and economic integration in policies.
18	von Braun, et al. (2023)	Science and Innovations for Food Systems Transformation	Stresses the role of science and innovation in transforming food systems to enhance nutrition and sustainability
19	Walton et al. (2023)	Searching for the essential: Exploring practitioners' views on actions for re-orienting food systems towards healthy diets.	Highlights practitioner views on the importance of community engagement and practical actions to reshape food systems
20	Willett et al. 2019	Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems.	Proposes the EAT-Lancet framework for healthful and sustainable diets, urging global cooperation to align food systems with health goal

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Source: Author's computation

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3.5 Identifying potential 'no- regrets' policy options to transform food systems

Following the PRISMA systematic review to identify policy options to transform food systems towards affordable healthy diets in SA, the researcher adopted the four steps Hawkes et al. (2020) to identify the 'no regrets' policy options. This method of identifying the policy options was conducted in 4 steps as described below:

Step 1: A systematic review identified evidence-based expert reports containing clear policy recommendations to transform food systems towards affordable healthy diets. A similar strategy was employed to identify policy options in SA, and it was employed to search databases, including PubMed, Scopus, Web of Science, and Google Scholar. Grey literature was also included. The reports were reviewed based on inclusion criteria, which required them to explicitly deal with transforming food systems towards affordable healthy diets, provide comprehensive recommendations on policy options, review evidence on affordable healthy diets, and provide action-oriented, problem-specific recommendations.

Step 2: The identified reports were thoroughly reviewed to extract policy options that recommended either enhancing the affordability of healthy foods or decreasing the affordability of unhealthy foods and beverages with high amounts of energy, sugar, fat, and/or salt. Recommendations that did not provide a clear pathway to enhancing affordable healthy diets were excluded. Each policy option was entered into an Excel spreadsheet, exactly as written in the original report.

Step 3: Policy options with similar impact were combined and consolidated into detailed measures. This produced a list of 'no regrets' policy options which had the potential to transform food systems for affordable healthy diets.

Step 4: The recommendations were refined and classified according to their pathway to impact, providing details on how the action is expected to impact food systems in order to deliver affordable healthy diets.

3.6 Steps to prioritise 'no-regrets' policy options to transform food systems

3.6.1 Sampling

Key informants were used to collect data and purposive sampling was applied to select the key informatnts. Purposive sampling is a technique widely used in qualitative research to identify and select information-rich cases for the most effective use of limited resources (Patton, 2002).

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This involves identifying and selecting individuals or groups of individuals who are incredibly knowledgeable about or experienced with a phenomenon of interest (Creswell and Clark, 2011). Therefore, this study used a purposive sampling technique to select 62 food systems stakeholders to participate in the survey. The sample size is a result of resource and time limitations since the study sought specialised participants (Patton, 2014). To ensure geographic representation and justify the study area, the researcher ensured the selection of participants from all nine provinces of South Africa. The composition of the participants is as follows: 20 from the private sector such as farmers,14 from development organisations, 11 from the public sector, 9 from civil society and 8 from academia. This sampling technique enabled the researcher to identify and select participants based on their availability and willingness to participate (Bernard et al., 2017). The participants were selected based on their knowledge and experience in food systems research for healthy diets and had to meet additional criteria for their participation to be valid. The respondents were required to meet the following screening criteria to participate in the study:

- They must possess expert knowledge of food systems and healthy diets; their occupation determines this.
- Before the interviews, they must submit their list of prioritised 'no regret' policy options.
- For their contributions to be used in data analysis, they had to have participated at least until halfway through the study.

The participants were identified using an online search and LinkedIn. The researcher's supervisor sent the invitations and consent forms via email. The recruited respondents included:

- Research departments and Universities, including academics involved in food systems research and healthy diets.
- Food processors and food retailers
- Governing stakeholders include the Department of Health, Trade and Industry and Competition, Agriculture and Environment.
- Civil society
- Primary food producers, including representatives from farmer organisations.
- Non-Governmental Organisations

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3.6.2 Categories of the participants

The surveyed participants are from the nine provinces of South Africa and are involved in various components of the food system. Figure 3.3 shows that in this study, the majority of the participants which is 32% fall under the private sector such as farmers and retailers, 23% came from development organisations that have food security projects, the public sector participants made up 18%, while participants from the civil society and knowledge organisations like academia were 14% and 13% respectively.

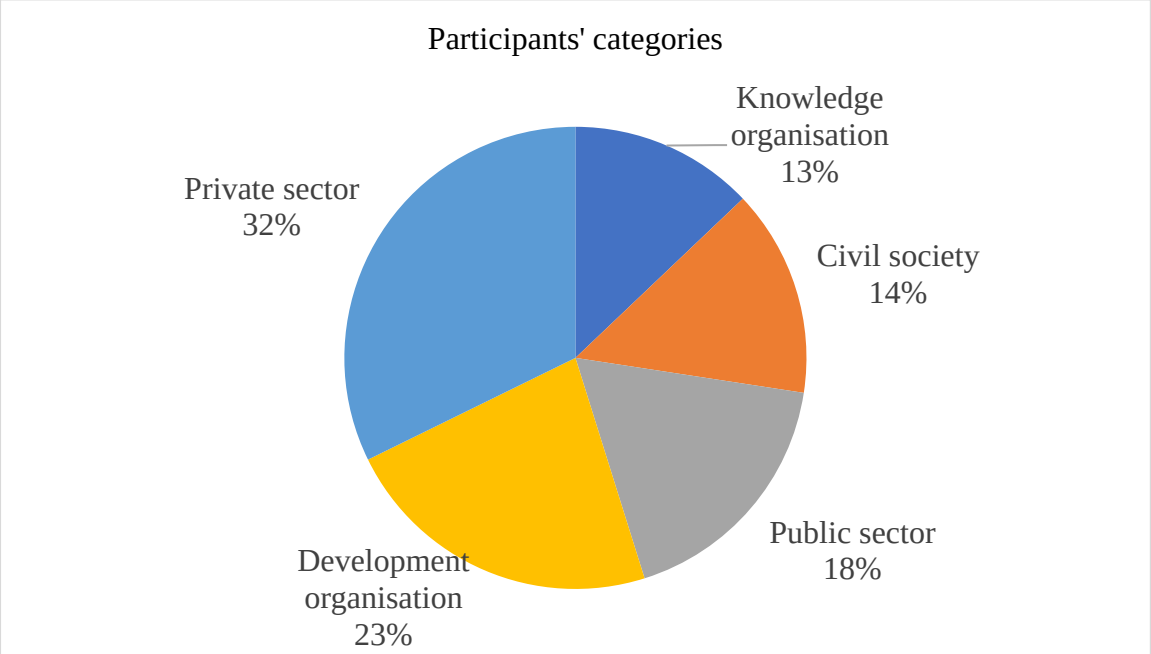

Figure 3.3 : Categories of the study's participants
Source: Author's analysis

3.6.3 Methods of data collection for the survey

The researcher developed a Google form containing policy options that were identified from the second systematic review. These policy options were categorised under the seven different themes that emerged from the PRISMA systematic review. The objectives of the study and how the participants' contributions would be used were clearly outlined in the Google form. The participants were asked to select policy options that they considered 'most' and 'least' important for transforming food systems towards affordable healthy diets in SA and to add essential policy options that the researcher had left out. A justification option was also included in the Google form.

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3.7. Methods of data analysis

3.7.1 Data analysis and synthesis from the systematic review

The data analysis was conducted as follows. Firstly, the researcher recorded the identified records in an MS Excel spreadsheet. The details included the title, type of document, year of publication, and geographical and thematic focus. Secondly, the eligible records were exported to the Atlas.ti software which was used to synthesise the studies. The included records were then read and coded using Atlas. ti software. Coding in Atlas. ti facilitated an iterative data analysis approach (Lewis, 2016). Finally, the systematic review used an interpretive approach to data synthesis. An Interpretive approach to systematic reviews "achieves synthesis through subsuming the concepts identified in primary studies into a higher-order theoretical structure" (Dixon-Woods et al., 2005). The coding process was done inductively and in phases. Line by line coding was used during the first phase to identify and categorise policy options by closely examining the text. All the lines which contained the policy options were highlighted and coded. Similar codes were merged into higher-order categories in the second phase and continuously compared and revisited (Lewis et al., 2018). In the final phase, selective coding was used, and the codes were revisited, searching for themes, concepts, and relationships.

3.7.2 Analysis of data from the questionnaire

The Best-Wort Scaling method was used to provide the ranking of each policy option as either 'best' or 'worst' after the participants had completed the survey. According to Auger et al. (2007), in the BW Scoring method, participants are presented with multiple choices and asked to select the one with the highest (best) and lowest (worst) degrees of importance. The BW scoring method was selected because it works better than traditional rating scales as it achieves better discrimination among the choices (Wilberforce, 2020). Furthermore, BW scoring avoids the problem of rating bias, as there is only one way to choose the "most" and the "least" preferred item, independent of the cultural background of the respondent (Cohen, 2009). In this study, BW Scoring enabled the participants to rank the 'no regrets' policy options identified from the systematic review.

An aggregate BW score was calculated by subtracting the aggregate 'least' value from the aggregate 'most' value for each policy option (Ahoudou et al., 2023). Oliveira et al. (2022) reported that the importance of each attribute in a BWS could be easily interpreted by using a standardised interval scale, which is calculated by dividing the square root of the frequency of the best by the frequency of the worst for each attribute. In this way, a scale is created so that

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attributes with the highest rank (sqrt B/W) become 100 (most important), and all other attributes are measured relative to this attribute. Below is the formula for Best and Worst scores:

$$\sqrt{\text{Best-Worst scores}} = \frac{\text{No. of times action chosen as Best} - \text{Worst}}{\text{No. of times policy option appears}}$$

3.8 Ethical considerations

In conducting the study, the researcher took cognisance of ethical considerations to protect the participants and the researcher himself. Hence, ethical clearance (reference number NAS311/22) was obtained from the University of Pretoria. The participants were asked to consent to participate in the survey after they were informed about the study's risks and benefits and how their data will be managed. For this study, the researcher explained the interview procedure, their role and how their information would be used. The participants had to sign consent forms attached to the survey before participating. Consent forms were sent to the stakeholders before the surveys. The participants had to select a consent option on the Google form as shown in Annex 1. To ensure anonymity and protection of personal data, numbers were used in place of the names of the participants. The data is stored for 10 years in a digital format in the University of Pretoria's Research Data Management Repository.

3.9 Chapter Summary

This chapter provided the methodology used in the study, which included the study area followed by the research method, sampling technique, data collection and analysis methods and tools, and ethical considerations. Since the study has three research questions, three methods of collecting data were used. To answer the first research question, the study used PRISMA to conduct the systematic review to identify food system literature. For the second research question, another systematic review was conducted using an approach adopted by Hawkes et al. (2020) to select the policy options from the identified literature. On the third research question a survey was used to engage participants in ranking the policy options that emerged from the systematic review.

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CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the study's findings in three sub-sections based on the research objectives. The first section presents the results of the systematic review to identify the existence of food system policies in South Africa to transform food systems towards affordable healthy diets. The second section identifies the policy options to transform food systems towards affordable healthy diets. The third section presents a list of priority policy options to transform food systems towards affordable healthy diets in South Africa through a survey of food systems stakeholders.

4.2 Existing food system policies in South Africa to enhance the affordability of healthy diets

This section describes the findings of the first research question in four sections. The first section provides findings of the first systematic review, including the characteristics of the analysed publications, such as the type of publications, year of publication, geographical focus and the thematic focus of the policy options.

4.2.1 Year of publications

Out of 20 documents included in this study, only three were published between 2016 and 2019. However, from 2020, the number of publications increased, with most documents (n=7) published in 2021. This reflects the increasing attention given to food systems transformation so that they are sustainable, deliver safe and healthy diets, and provide fair wages and prosperous livelihoods (Fanzo et al., 2023). The topics identified from the reports listed in Table 4.1 collectively investigated the strategies for transforming food systems to ensure they are sustainable, inclusive, and capable of providing healthy diets for all. They explore various dimensions, including necessary paradigm shifts, innovative policies, and practical interventions. The focus is on addressing global and regional challenges such as food security, nutrition inequities, and the affordability of healthy diets. Emphasis is placed on both high-income and low-income countries, with specific attention to Africa, Europe, and Central Asia and some general. The overarching goal is to reorient existing food and agricultural policies to better support nutrition and sustainability, informed by insights from scientific research, practitioner experiences and retrospective policy reviews.

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Table 4.1: List of included food system reports

No.	Year of publication	Title
1	2023	Searching for the essential: Exploring practitioners' views on actions for re-orienting food systems towards healthy diets.
2	2023	Science and Innovations for Food Systems Transformation
3	2023	Sustainable and nutrition-sensitive food systems for healthy diets and prevention of malnutrition in Europe and Central Asia.
4	2022	The State of Food Security and Nutrition in the World Repurposing food and agricultural policies to make healthy diets more affordable.
5	2022	Insights for food systems transformation from Southern Africa
6	2021	Reverse thinking: taking a healthy diet perspective towards food systems transformations
7	2021	Towards food systems transformation—five paradigm shifts for healthy, inclusive and sustainable food systems
8	2021	Policy options for food systems transformation in Africa - from the perspective of African universities and think tanks
9	2021	Connecting the dots: policy innovations for Food Systems Transformation in Africa
10	2021	Policy Considerations for African Food Systems: Towards the United Nations 2021 Food Systems Summit
11	2021	Transforming food systems: regional policy brief
12	2021	Transforming Food Systems to Achieve Healthy Diets for All
13	2020	Changing diets and the transformation of the global food system
14	2020	Achieving Food System Transformation: Insights From A Retrospective Review of Nutrition Policy (In)Action in High-Income Countries
15	2020	*2020* Global nutrition report: action on equity to end malnutrition
16	2020	Food security and nutrition building a global narrative towards 2030
17	2020	Transforming Food Systems: The Missing Pieces Needed to Make Them Work
18	2019	Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems.
19	2017	Nutrition-sensitive agriculture and food systems in practice. Options for intervention
20	2016	Food systems and diets: Facing the challenges of the 21st century

Source: Author's computation (2023)

4.2.2 Type of food systems transformation reports

Figure 4.1 shows that the most reviewed documents were nine food system reports such as the annual State of Food Security and Nutrition report published by the (FAO et al., 2023).

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Followed by seven journal articles. Additionally, two book chapters, one policy brief and one book, were published during this period.

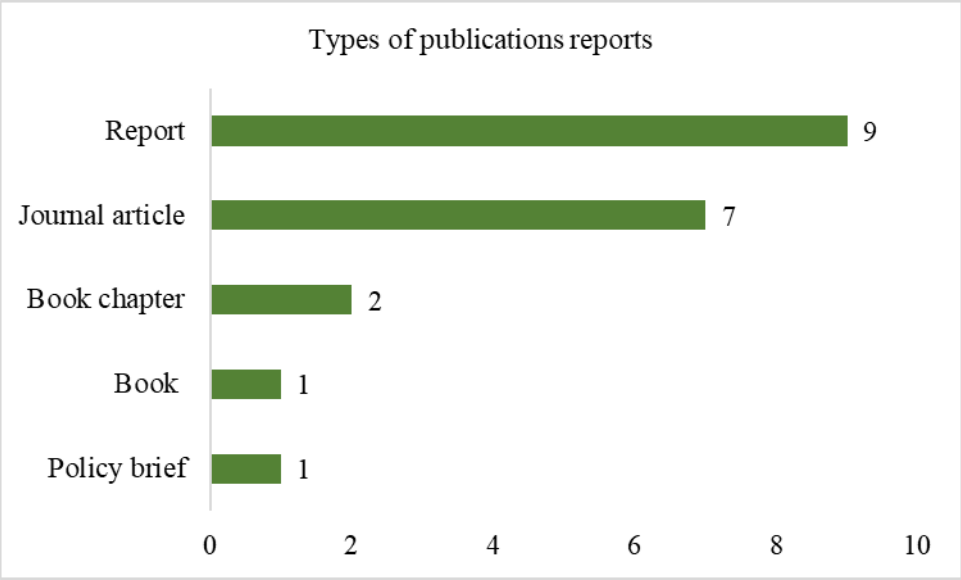

Figure 4.1: Types of the food system reports reviewed

Source: Authors computation (year)

4.2.3 Geographical focus of the food systems transformation reports

Figure 4.2 shows that regarding the location that the studies focused on, 70% of the reviewed documents had a global focus. Studies considered global provide healthy diet policy options that are not specific to any country or region. Only 30% of the studies focused on Africa. Only one global study gave a particular mention of South Africa's policy options at the time of the search on the databases. When South Africa was included as a keyword in the search strategy, the results yielded fewer publications but more publications when it was excluded as a keyword in the search strategy. The lack of literature on South Africa regarding this topic is not surprising, considering the food security and nutrition challenges Therefore, Bennie et al. (2023) state that further research is needed to better understand the complexities of South Africa's food system.

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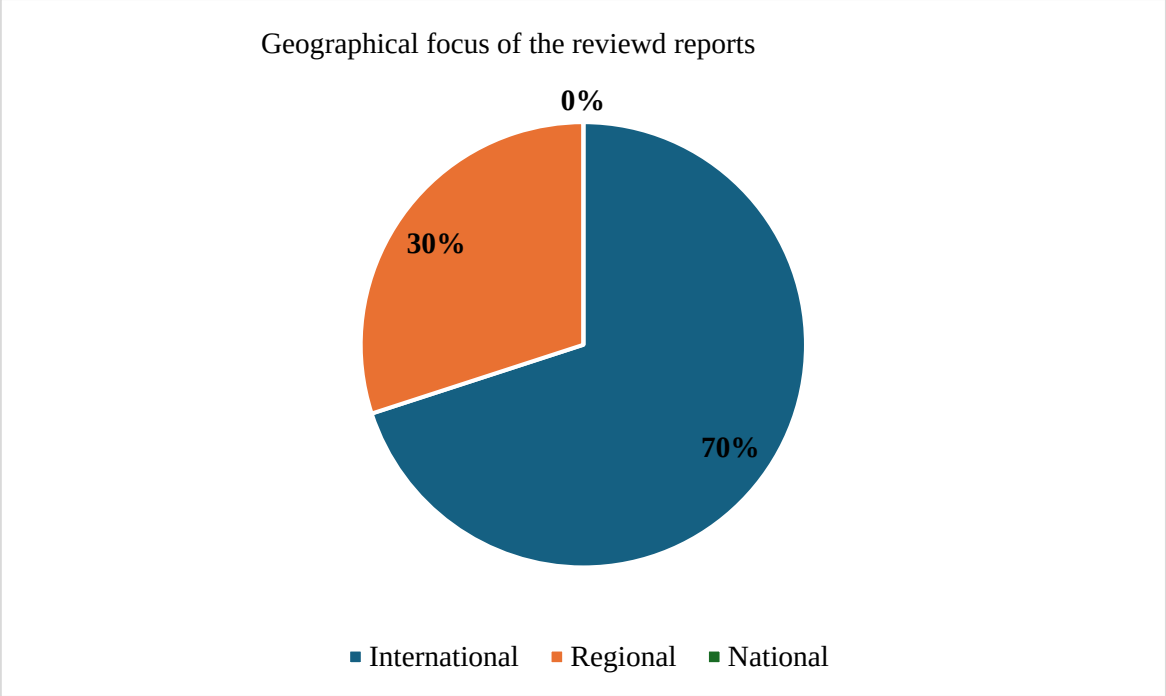

Figure 4.2: Geographical focus of the reviewed food systems reports.
Source: Author's computation

4.2.4 Thematic focus of the studies

The thematic analysis identified seven broad themes from the 20 documents included in this review. These themes were varyingly represented across the 20 documents. Governance policy options were the most dominant theme, accounting for 19% of the representation, followed by agricultural, research technology, and innovation, with 16%. Financial, supply chain and regulatory policy options were tied at 13%, while the education and awareness policy options were the least mentioned in the reports (Figure 4.3). According to Parsons and Barling (2021), having several thematic areas of policy options speaks to the need for a holistic approach to transforming food systems. The United Nations Development Programme (2024) emphasises the need for strong policy coherence, ensuring all the policies are targeted towards a common objective.

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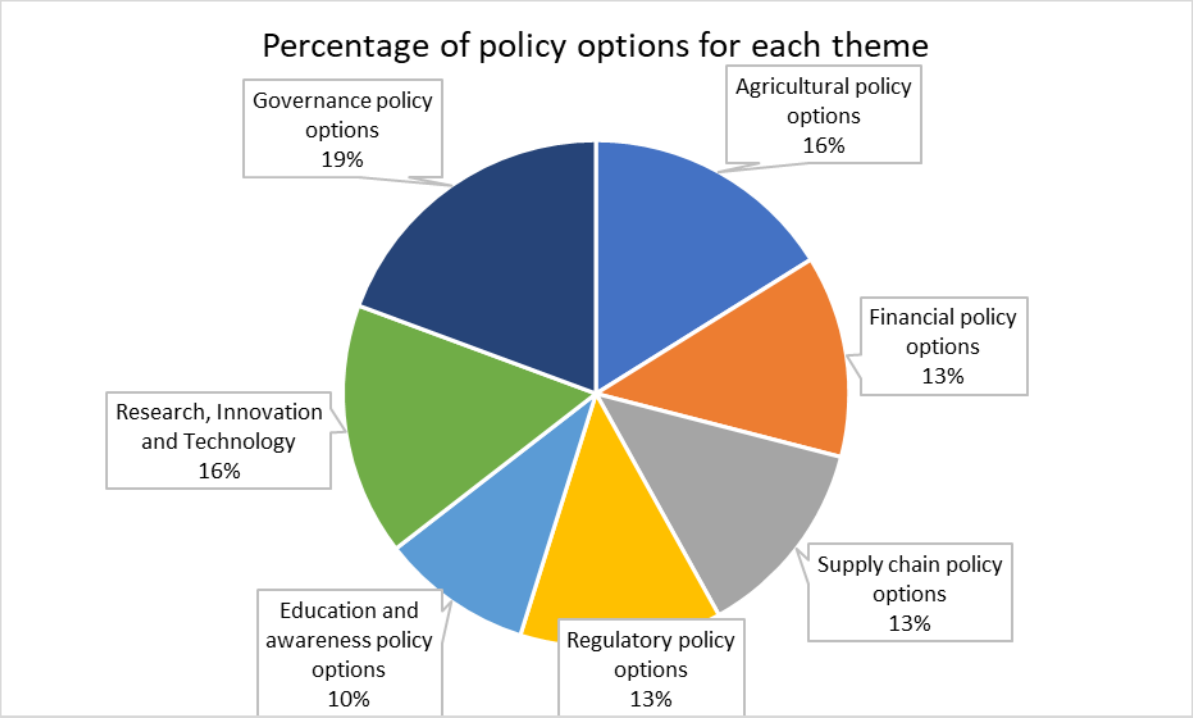

Figure 4.3: Thematic focus of the policy options from the reviewed reports

Source: Author's computation

4.2.5 Themes identified from the systematic review

The PRISMA systematic review identified seven themes from the 20 analysed documents into which the policy options identified in this study could be categorised. Each theme had a varying number of policy options. The financial policy options included using economic tools to reduce the price of healthy foods and implementing social protection policies to increase consumers' purchasing power, especially for vulnerable households. The supply chain policy focused on ensuring the availability and delivery of safe, nutritious foods to markets, primarily through infrastructure improvements. The agricultural policy options aimed to increase the production of diverse and nutritious foods by farmers and households. The governance policy options involved improving food system stakeholder engagement, ensuring policy coherence, and integrating nutritional goals into food policies. The regulatory policy options included establishing legal frameworks to set mandatory compliance, particularly regarding food content and the restriction of certain nutrients like salts and fats. The research, innovation and technology policy options aimed to improve production yield and productivity through biofortification and increase the nutrient composition of foods through fortification. Finally, the education and awareness policy options encompass nutrition education and public education to help consumers make healthy food choices.

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The following sub-sections discuss the seven thematic areas and the number and the focus of the policy options, identified via the PRISMA systematic review.

4.2.5.1 Governance Policy Options

Governance policy options were identified in eight out of 20 documents. National food-based dietary guidelines were mentioned in three out of the 20 included documents. The analysis highlights that many countries, especially in the Sub-Sahara, do not have FBDGs; where they exist, they are underutilised or incompatible with health targets (Brouwer et al., 2021). In South Africa, the FBDGs were adopted by the Department of Health. The first list of recommended foods was published in 2003 and later updated in 2013 (Vorster et al., 2013). Since FBDGs must cater to the country's diverse population, evidence is still needed regarding whether the simplification of South Africa's diverse diets, as applied in the FBDGs and food guide, provides a meaningful education tool for healthy eating (RSA, 2013).

Furthermore, specific actions related to developing food systems policies included improving policy coherence, strong coordination and governance and multistakeholder coordination across government departments. These policy options have posed a challenge to the governance of the South African food system. Thow et al. (2018) argues that SA's policy incoherence results from conflicting policy goals and a lack of synergies across government departments. An example of this lies in economic policies prioritising the trade of cheap ultra-processed foods over nutritious foods. Meanwhile, Termeer et al. (2018) and Pereira and Drimmie (2016) cite weak coordination, which fails to reconcile multiple stakeholder interests and intersectoral collaboration. Furthermore, according to Hendriks (2014), in South Africa's food policy development and implementation, necessary stakeholder engagement has been limited.

4.2.5.2 Regulatory policy options

Regulatory policy options were identified in seven out of 20 documents. Most of these policy options (50%) mentioned restricting the marketing and advertising of unhealthy food, especially to children. For example, in countries like Poland and Hungary, these bans are mandatory, whereas in other countries like Bulgaria and Romania, these are voluntary or self-regulatory. The introduction of compulsory food labelling to aid consumers in making informed food choices was mentioned in five documents. This entails accurate front-of-package labelling or traffic light colours. Lastly, setting mandatory limits for specific nutrient components was noted in two documents.

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South Africa has not yet enforced any regulations on food advertising to children, although in 2009, a multi-stakeholder South Africa Pledge on Marketing to Children was created by the Consumer Goods Council of South Africa (CGCSA), which includes 24 signatories from food manufacturers, retailers, and fast-food chains. However, there are no particular commitments or monitoring of the pledge in place (Claasen, van der Hoeven and Covic, 2016). According to Brouwer (2021), mandatory regulations are more effective than self-regulation in South Africa. Nutrition labelling is regulated under the Foodstuffs, Cosmetics, and Disinfectants Act of 1972 in South Africa, but it remains voluntary. However, if nutrition labels are used, a standard format is required. Lastly, South Africa has made efforts to reduce salt intake in the general population to less than 5g per day in 2020, which is reflected in the 2011 strategic plan to prevent and control NCDs.

4.2.5.3 Financial policy options

Financial policy options to address the affordability of healthy diets, such as taxes on unhealthy foods and beverages, subsidies and food and cash vouchers to improve the purchasing power and diet quality of vulnerable groups, were included in 9 out of 20 policy documents. One study suggested that conventional sin tax may be effective but less politically feasible (Brouwer et al., 2020). For example, Hungary has a 'junk food tax,' France taxes sugar-sweetened beverages and Israel taxed unhealthy foods "such as soda and/ or trans fats." (Lee et al., 2021). A study by Temple and Steyn (2011) showed that a healthy diet was unaffordable to most South Africans. When replacing unhealthy foods with more nutritious options (e.g. corn flakes with bran flakes, white bread with brown bread), the costs increased by an average of 65%. South Africa also taxes sugar-sweetened beverages to encourage healthy food consumption. This is done under the Health Promotion Levy on Sugar Beverages i.e. sugar tax. The National Treasury proposed this policy, and it came into effect in 2018. This was in response to the rising NCDs, such as obesity, which had to be reduced by 10% in 2020 (Boatemaa et al., 2018). Furthermore, South Africa has a broad-based value-added tax of 15% and it exempts food items such as brown bread, maize meal, fresh fruit and vegetables, raw eggs, and pulses to reduce the tax burden of poor households.

4.2.5.4 Education and awareness policy options

Nine documents mentioned raising awareness to equip consumers with nutrition knowledge. Specific actions, such as using mass media and digital interventions to change consumer behaviour, improve diets and encourage active lifestyles, were mentioned in two out of the nine

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documents. Moreover, one study identified the need for complementary interventions such as counselling to aid app-based interventions. Some behaviour change actions targeted specific settings and vulnerable groups such as canteens (making healthy food default options in menus), health care (providing dietary counselling to women during antenatal care and pregnancy and schools. The nine documents only focused on unhealthy foods and did not mention unhealthy drink. Menon and Olney (2024) state that Social and behavior change (SBC) interventions use technical, social, and information platforms to provide education and behavioral models that support healthier diets. As stand-alone interventions, SBC efforts have had mixed results and evidence is limited on SBC efforts to reduce the consumption of unhealthy foods in LMICs. However, adding SBC as a complement to other nutrition and diet-related programs is essential to increase the effectiveness of various multisectoral interventions that aim to stimulate demand for healthy diets by addressing supply constraints that limit food choices. When it comes to implementing awareness and education policies for healthy consumer choices, Vermeulen and Schonfeldt (2023) state that South Africa must establish there must a better understanding of consumers' awareness and understanding of healthy eating and the availability of healthy food choices should also be investigated at local and national levels. Furthermore, building upon the establishment of food labels must be simplified and marketing practices must not be misleading and should adhere to legislative requirements.

4.2.5.5 Supply chain policy options

Policy options related to the supply chain were identified in 12 out of 20 documents in which actions to build agricultural and market infrastructure such as roads, transportation post-harvest handling and storage to enable the delivery of healthy foods to rural and urban markets were mentioned in eight out of the 12 documents. Food safety training for food producers and supporting farmer market access and e-commerce platforms were critical for ensuring safe and nutritious food in markets. The availability of healthy foods in markets can be enhanced by reducing food loss and food waste across value chains, especially during transportation and storage (Reyes et al., 2021). This recommendation for South Africa is highly justified because according to Trautman et al. (2023), South Africa is not on track to reduce post-harvest losses and enhancing access to agricultural technologies with respective scores of 0.00 and 1.89 out of 10 respectively.

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4.2.5.6 Agricultural policy options

This policy action was identified in eight out of 20 documents. All documents offered recommendations to increase the availability of healthy food by sustainably increasing crop diversification and promoting the production and consumption of nutritious indigenous crops. The strategies for diversifying agricultural production included facilitating incentives, providing subsidies for farmers that produce healthy food and developing climate-smart agriculture. Women's empowerment via control and ownership of productive resources and provision of training and agricultural assets was the second most mentioned recommendation. However, Reyes (2021) states that such actions must be mindful of the potential effects on women's availability and cultural context. The delivery of agricultural extension programmes was also linked to smallholder farmers increasing healthy food production. The CAADP Biennial review report states that 12.1% of farmers have access to agriculture extension services in South Africa and flagged this as an area that needs more attention. There was an emphasis on these programmes to be extended to urban and peri-urban areas. Another policy option that was identified in the systematic review was redesigning agricultural support. Laderchi et al. (2024) argue that reforming agricultural support to ensure it incentivises healthy food choices in line with the goals of the food system transformation could lower food systems' hidden costs. For example, repurposed subsidies could help to improve access to healthy diets and make them more affordable.

4.2.5.7 Research and Innovation

This policy action has been identified in eight out of 20 documents. The main emphasis of this thematic area was on food and biofortification to enhance the nutrient profile of affordable foods that are highly consumed by households facing financial constraints. According to FAO et al. (2023), food fortification introduced in 2003 in South Africa, is an illustration of the food system paradox in which appropriate policy responses have not yielded the results that were expected. However, Swart et al. (2022) highlight an improvement in the vitamin A status of the country which could be attributed to the National Food Fortification Programme and vitamin A supplementation programmes. Additionally, they state that in general, iron status appears to have improved, but limited data indicate that the prevalence of zinc deficiency is still high in South African children from low-income communities. The National Policy on Food and Nutrition Security for the Republic of South Africa (2014) supports biofortification through the Household Food and Nutrition Strategy. Moreover, the biofortification of staple foods like sweet potatoes has resulted in significantly reduced levels of micronutrient

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deficiencies, hidden hunger and diseases (CGIAR, 2019). Siwela et al. (2020) recommended the monitoring of the prevalence of micronutrient deficiencies before and after the adoption of fortification programmes.

4.3 List of policy options extracted from the reports included in the systematic review

Following the identification of reports to be included in the study, 31 policy options to be refined into 'no-regrets' policy options through stakeholder engagement were extracted using the Hawkes et al. (2020) systematic review methodological approach. The policy options were identified from a systematic review of food systems reports, including detailed recommendations on how to transform food systems towards healthier diets. A list of all the recommended actions from the reports was recorded in detail then filtered and consolidated based on mapping the pathway-to-impact by which each policy option could enhance the availability and affordability of healthy food items. Table 4.2 captures each policy option's potential impact on addressing South Africa's food system transformation. This section summarises the seven potential themes to transform South Africa's food systems contained in Table 4.2. Each theme contains various policy options that seek to increase the availability and affordability of healthy foods while reducing the accessibility and affordability of unhealthy foods.

Table 4.2: Extracted policy options from the reviewed reports

No	Themes identified through PRISMA	Impact of the policy option
Agricultural actions		
1	Deliver urban and peri-urban agricultural programmes.	Increase the availability of fresh and nutritious foods in proximity markets and access to a diversified and nutritious diet for urban residents.
2	Provide agricultural extension programmes to train farmers to produce nutritious foods.	Diversification approaches increase the availability and affordability of diverse foods.
3	Promote production and consumption of indigenous foods	Increase the production and affordability of healthy food to the local population
4	Provide women and vulnerable households with agricultural assets and training	
5	Redesign agricultural development programmes to focus on nutritious food	
Financial policy options		
6	Subsidise healthy foods	Subsidies for selected nutritious foods can increase the affordability of healthy diets and/or incentivise purchase

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No	Themes identified through PRISMA	Impact of the policy option
7	Tax on unhealthy foods and beverages	Taxes on ultra-processed foods (e.g. sugar-sweetened drinks) can also be used to increase prices and restrict consumption.
8	Provide cash or vouchers to vulnerable groups	social protection helps families to increase their consumption and to access more and better food while also helping to develop their productive asset base, which is critical for sustaining good nutrition in the long term and facilitating access to health care and services.
9	Provide financial and technical support to small businesses	Increases availability and affordability of healthy foods
Regulatory policy options		
10	Restrict advertisements and marketing of unhealthy foods	Reduces the exposure of children to unhealthy foods especially snacks and limits consumers' chances of buying unhealthy foods
11	Mandatory limits on certain nutrients	Reduces the availability of unhealthy nutrients such as sugars/salts/fats in foods available to local populations
12	Mandatory nutrition labelling on food packages	Informs consumers about foods with healthier nutrition profiles and can also motivate manufacturers to produce foods with healthier nutrition profiles.
13	Zoning laws to restrict the sale of unhealthy foods	Reduce the availability of unhealthy foods especially in areas like schools
Supply chain policy options		
14	Training programmes on storage, processing and packaging to ensure food safety	Improves the accessibility of nutritious and safe foods in ways that address modern food environments
15	Establish short food supply chains	Prevents and reduces food loss especially through short value chains
16	Improve infrastructure in agriculture and market systems	Improve the availability in markets and affordability of nutritious foods
17	Facilitate access to food markets for smallholder farmers and SMMEs	Increases the availability of nutritious foods in markets serving local populations
18	Reduce loss and waste of nutritious foods	Ensures availability of healthy food to local populations
Governance policy options		
19	Ensure coherence and collaboration between different ministries	Improves food quality, food safety and food system sustainability for broad categories of stakeholders
20	Demystify the policy development process	Strengthens evidence-based solutions as far as food systems' ability to deliver nutritious foods is concerned
21	Adopt a public food procurement policy that applies nutritional guidelines	Increases availability, affordability and access of nutritious foods and reduce access to foods high in fats, sugars and salt to people served by public institutions
22	Trade policies that prioritise healthy foods	increases the availability of nutritious foods in importing countries, especially in counter-seasonal periods

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No	Themes identified through PRISMA	Impact of the policy option
23	Develop Food-based dietary guidelines	Increases the availability, affordability and appeal of nutritious foods, and reduces the availability, affordability and appeal of foods high in fat, sugar and salt to all populations
Awareness and education policy options		
24	advocacy on healthy foods and raising awareness via mass media	effective nutrition education ensures that increased food production/income translates into improved diets and improved nutrition status
25	Providing nutrition education and counselling to women	May improve some maternal and infant health and behavioural nutrition outcomes
26	Make healthy foods default options on menus of restaurants	Nudges patrons to make healthy food choices in food establishments
Research and innovation policy options		
27	Reformulation of processed foods	Reduces the availability of fats, sugars and salt in foods already available to all populations
28	Implement biofortification programmes	Increases the availability of micronutrients in staple foods already available to consumers
29	Implement food fortification programmes	Substitutes the consumption of nutrient-poor varieties with nutrient-rich ones
30	development of processed products that extend the shelf life of healthy food	Increases the availability, affordability and appeal of nutritious foods throughout the year to all populations
31	Develop alternative sources of protein	Increases the availability, affordability and appeal of alternative micronutrient-rich protein sources and reduce the appeal of red meat to high red-meat consumers

Source:Adapted from (Hawkes et al., 2020)

4.3.1 Agricultural policy options

Table 4.2 shows the agricultural policy option theme which contains five policy options that aim to enhance the availability, diversification and production of healthy foods by farmers in both rural and urban areas. Emphasis is placed on capacitation of smallholder farmers and the empowerment of women to produce indigenous foods that address nutrition security. For South Africa, these policy options are justified as smallholder farmers face challenges such as limited resources, support services and inadequate market opportunities. These policy options are supported by Ntombela (2022) who cited the need for the provision of extension services to ensure food availability at community and household levels. Urban and peri-urban agricultural programmes were also mentioned given South Africa's rising urban population. These programmes have a potential resolution to resolve the challenge of urban food insecurity for the urban poor (Khumalo and Sibanda, 2019).

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4.3.2 Financial policy options

The financial policy option theme that contains four policy options that aim to enhance the affordability of healthy diets and discouraging the affordability of unhealthy diets through the use of economic tools such as subsidies and cash and vouchers for vulnerable groups and taxes respectively (Table 4.2). The recommendation of these policy options is supported by evidence that cash transfers increase access to food and food consumption, and reduce food insecurity, in South Africa's case, social grants. However, various factors affect the extent to which social grants improve food security outcomes. These factors include the frequency, size use of the transfers (Waidler and Devereux, 2019). Examples of subsidy programmes in South Africa include food subsidies by private medical insurance companies which offer rebates to members who purchase less fast foods and these programmes have increased the ratio of healthy to total food expenditure and an increase in the ratio of fruit and vegetables to total food expenditure of 5.7% and 8.5% respectively. Another programme is the Healthy Options commitments by member organisations of the CGSA to disincentivise the upsizing of meals and meal items in the Quick Service Restaurant sector (Mpanza, 2019).

Regarding taxes on unhealthy foods, South Africa has a Health Promotion Levy (HPL) which is a tax on sugar-sweetened beverages to reduce NCDs. However, the HPL is not enough to have a sustainable impact on lowering NCDs (Smit et al., 2023). Contrary, in their study of changes in beverage purchases and the HPL, Stacey et al. (2021) found that the HPL contributes to lower SSB purchases and a reduction in the consumption of sugars from taxable SSBs. As for unhealthy foods, no evidence of a specific tax was found except the Value-Added Tax which applies to a wide range of food items. This shows that South Africa's focus has been on SSBs hence there is a potential for taxation as a policy to discourage the consumption of unhealthy foods in South Africa.

4.3.3 Governance policy options

The governance policy option theme that contains five governance policy options that aim to establish an environment that supports food- and nutrition-sensitive interventions (Table 4.2). The coordination of South Africa's food systems requires a multi-sectoral responsibility involving several government departments and Trade and Industry (Kushitor et al., 2022). Hence, the inclusion of the trade for nutrition and policy coherence policies in Table 4.2 is supported by Spires (2016) who stated that South Africa has a lack of policy coherence which is visible in the contradiction between the country's national trade and investment policy which

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results in high imports of processed foods and sugary beverages. Including FBDGs and a public food procurement policy that applies nutritional guidelines can save governments money on healthcare expenditure and increase educational outcomes in schools (WHO, 2021). Despite the country having been one of the first African countries to adopt the FBDGs, the FBDGs in South Africa have not been used as an important component of the NFNSP and the communication strategy as the process to develop the FBDGs and their characteristics align with the aims listed in the policy and the plan (Browne, 2021).

4.3.4 Research and innovation policy options

The research and innovation policy option theme that contains five policy options that focus on increasing the nutrient content of unhealthy foods through reformulation, reducing ingredients like salt, added sugar and saturated and trans fats and food and biofortification (Table 4.2) (Fanzo et al., 2023). The advantage of these policy actions is that they have a broader reach to poor households and an additional focus of ensuring that these foods such as staple grains, oils and salt which are highly consumed are affordable (Das et al., 2019). Examples of government reformulation strategies in South Africa include Regulations Relating to the reduction of sodium, control over the sale of poultry meat and trans-fats in foodstuffs (Mpanza, 2019).

4.3.5 Education and awareness policy options

The awareness and education policy option theme that contains three policy options which focus on promoting healthy food choices among consumers through awareness and education as well as nudging (Table 4.2). However, Prinsloo et al. (2012) state that food choices are not a straightforward and rational process due to consumers being overwhelmed by large amounts of information on food products and marketing information. In South Africa, price is of primary importance during food decisions regardless of nutrition or food quality (Koen et al., 2018). According to van der Merwe et al. (2024), consumer education should focus on increasing subjective knowledge about healthy food. However, these strategies should also incorporate and transfer scientific facts about ingredients intake and their link with health concerns to align subjective and objective knowledge. Therefore, interventions need to pay less attention to areas where objective knowledge is high and more where it is low.

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4.3.6 Supply chain policy options

The supply chain policy option theme contains five supply chain policy options that aim to increase the delivery and availability of healthy foods in markets (Table 4.2). Reducing food losses through post-harvest infrastructure development, training of farmers on food safety and improving roads and transportation. According to Mashau et al. (2012), the main causes of post-harvest food losses in South Africa are physiological, pathological and physical injury which leads to decay and bacterial infection compromising food safety. Supply chain policy options are important for South Africa because of the high levels of inefficiency in the food value chain (Oelofse, 2021). Furthermore, a study conducted by the CSIR, around 10.3 million tonnes per annum of food intended for human consumption in South Africa does not reach the human stomach (Oelofse et al., 2021). This is equivalent to 34% of local food production and the losses and waste are equivalent to 45% of the available food production in the country.

4.3.7 Regulatory policy options

The regulatory policy options theme that contains four policy options that ensure healthy food choices by consumers through imposing restrictions on advertisements and sales of unhealthy foods in certain zones like schools as through mandatory nutrient labelling (Table 4.2). In 2012, the Department of Health published two sets of regulations relating to food labelling and advertising, namely, Legislation R146, which introduced nutrition labelling, and Draft Legislation 429, which introduced nutrient profiling model to support marketing restrictions (DoH, 2014). Mchiza et al. (2013) who found that advertising to children influences negative food choices among children in South Africa support the restriction of unhealthy foods advertisements.

4.4 Prioritisation of policy options

After the systematic literature review and extraction of the policy options, 62 participants were asked to rank each of the 31-policy options under the different themes as ‘most’ or ‘least’ important when it comes to transforming South Africa’s food system towards affordable healthy diets. The votes were scored out of 62, which is the total number of respondents who answered the survey. This section presents the results of the different policy options under each theme.

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4.4.1 Results of the online survey

The results of the online survey are grouped into seven themes and presented in Table 4.3. The total votes or score that each policy option can attain is 62, which is the total number of the participants that were involved in the scoring of the policies as 'most' or 'least likely' to transform South Africa's food systems. Further explanations of the results of each policy option under each theme are presented in Table 4.3.

Table 4.3: Results of policy options

	Most important	Least important
Improve infrastructure in agriculture and market systems	97%	3%
Demystify the policy development process	97%	3%
Mandatory nutrition labelling on food packages	95%	5%
Provide agricultural extension programmes to train farmers to produce nutritious foods	90%	10%
Ensure coherence and collaboration between different ministries	90%	10%
Provide women and vulnerable households with training	89%	11%
Mandatory limits on certain nutrients	87%	13%
Develop infrastructure to reduce loss and waste of nutritious foods	87%	13%
Deliver urban peri-urban agricultural programmes	85%	15%
Facilitate access to food markets for smallholder farmers and SMMEs	85%	15%
Promote production and consumption of indigenous foods	81%	19%
Restrict advertisements and marketing of unhealthy foods	81%	19%
Develop Food based dietary guidelines	81%	19%
Subsidise healthy foods	77%	23%
Establish short food supply chains	77%	23%
Trade policies that prioritize healthy foods	77%	23%
advocacy on healthy foods and raising awareness via mass media	77%	23%
Reformulation of processed foods	77%	23%
Implement food fortification programmes	76%	24%
Provide financial and technical support to small businesses	74%	26%
Adopt a public food procurement policy that applies nutritional guidelines	74%	26%
Providing nutrition education and counselling to women	74%	26%
Zoning laws to restrict the sale of unhealthy foods	71%	29%
Training programmes on storage, processing and packaging to reduce spoilage	71%	29%
Provide cash or vouchers to vulnerable groups	69%	31%
Tax on unhealthy foods and beverages	66%	34%
Redesign agricultural development programmes to focus on nutritious food	65%	35%
Implement biofortification programmes	61%	39%
development of processed products that extend the shelf life of healthy food	61%	39%
Develop alternative sources of protein	56%	44%
Make healthy foods default options on menus of restaurants	55%	45%

Source: Author's analysis (2023)

4.4.1.1 Agricultural policy options

Table 4.3 shows that when asked in the online survey which agricultural policy options are most and least important in contributing towards affordable healthy diets in South Africa, four policy options scored above 81% of the votes. Most of the respondents preferred agricultural extension programmes (90%). The second most preferred policy option was supporting women and vulnerable households at 89%. The third most preferred policy option was the delivery of

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urban and peri-urban agricultural programmes at 85%. Promoting the production and consumption of indigenous foods was the fourth most preferred by the respondents with 81% of the votes. The policy option deemed the least important in this thematic area is redesigning the agricultural programmes for producing nutritious foods with a score of 65%.

4.4.1.2 Financial policy options

In the online survey, respondents were asked to rank the most important and least important financial policy options to contribute towards affordable healthy diets in the SA food system. Policy options oriented towards encouraging the purchasing of healthy foods were the most preferred compared to those that discouraged the purchasing of unhealthy foods. In Table 4.3 presented , the 'most important' policy option in this thematic area was subsidising healthy foods receiving 77% of the, followed by providing financial support to businesses with 74% of the votes and the provision of social protection in the form of cash or vouchers to vulnerable groups at 69%. The imposition of taxes on unhealthy foods and beverages was deemed the 'least important' in this thematic area receiving 68% of the votes.

4.4.1.3 Regulatory policy options

Table 4.3 shows that in the online survey, the 'most important' policy option was the mandatory nutrition labelling on food packages with 95% of the votes, followed by compulsory limits on sugar, salts and fats in processed foods with 87% of the votes. The restriction of advertisements and marketing of unhealthy foods and zoning laws to restrict the sale of unhealthy foods in certain areas scored 81% and 71% respectively.

4.4.1.4 Supply chain policy options

In table 4.3, improving infrastructure in agriculture and market systems to increase the availability of nutrient-dense foods was ranked highest in importance at 97% while developing infrastructure to reduce the loss and waste of nutritious foods and facilitating access to food markets for smallholder farmers and SMMEs through cooperatives scored 87% and 85% respectively. Establishing short food supply chains received 77% of the votes and providing training programmes for food producers and retailers on storage, processing and packaging received 71% of the votes.

4.4.1.5 Governance policy options

In the online survey, table 4.3 shows that 95% of the participants prioritised demystifying the policy development process when developing food system policies. This was followed by food

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policy coherence and collaboration between different ministries that deal with or are affected by food security and nutrition which scored 90%. Developing FBDGs scored 81% and prioritising trade policies that prioritise the export of healthy foods and reduce barriers to their import scored 77%. The policy option that scored the lowest in importance in this thematic area with 74% of the votes is adopting a public food procurement policy that applies nutritional guidelines to food procured for public institutions such as schools and prioritising purchasing from smallholder farmers.

4.4.1.6 Awareness and education policy options

The advocacy for healthy foods and raising awareness via mass media regarding unhealthy food was preferred by 77% of the participants, ranking higher than other policy options on this theme (Table 4.3). The second highest ranked policy option was providing nutrition education and counselling to women with 74% of the votes, followed by the least preferred policy option-making healthy foods default options on restaurant menus with 55% of the votes.

4.4.1.7 Research and innovation policy options

From the online survey the participants preferred the reformulation of processed foods hence this policy option scored 77% of the votes, followed by food fortification with 76% while biofortification and the development of processed foods with an extended shelf life were tied at 61% votes each (Table 4.3). The least preferred policy option was the development of alternative sources of proteins ranking lower with 56%.

4.4.2 Prioritisation of themes by participants' category

The online survey results presented in Figure 4.5 indicated distinct preferences among various stakeholder groups concerning policies to transform the food system in South Africa. Notably, respondents from the public sector preferred agricultural policies, while participants affiliated with knowledge organisations prioritised research, innovation, and technology policies. Civil society stakeholders emphasised education and awareness policies, whereas development organisations showed a preference for financial policy options. Additionally, supply chain policies resonated predominantly with public sector participants, whereas governance policy options found more excellent favour among those in the private sector. These findings suggest that the participants' categorisation likely played a pivotal role in shaping their respective rankings of the presented policy options. According to Dengerink et al. (2021), what food system actors consider to be the most effective food system transformation policies depends

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on what they prioritise as the most important food system challenge. While increasing food production is considered the most important policy option to solve food availability, improving access to healthy diets is seen as the most critical strategy to address nutritional quality. The results in Figure 4.5 indicate that the food systems stakeholders have different priorities when selecting policies that are most important when it comes to transforming food systems.

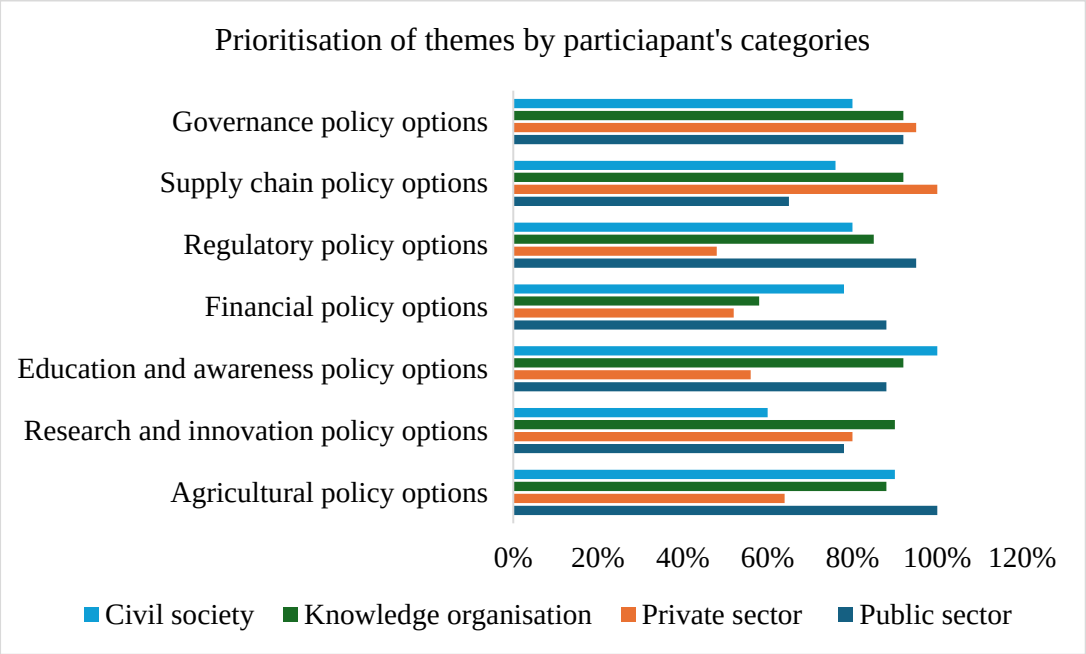

Figure 4.5: Prioritisation of themes by participants' categories.

Source: Author's analysis

4.4.3 Ranking of policy options by votes percentage and BW score

Thirty-one potential policy options identified from the systematic review analysis were presented to the participants in the Google Form to select the 'most' or 'least' policy options that could transform the food system for affordable and healthy diets. The results are illustrated in Table 4.4 . Only 20 out of 31 policy options were selected following the calculation each policy option's BW score. The average percentage for Most important policy options was 78% while the average for least important policy options was 22%.

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Table 4.4: Ranking of policy options by votes percentage and BW scores

Policy options	Most important votes	Least important votes	BW Score
Introduce mandatory nutrition labelling on food packages to reflect nutrient composition	96%	4%	0.92
Improve infrastructure in agriculture and market systems to increase the availability of nutrient-dense foods	96%	4%	0.92
Demystify the policy development process	96%	4%	0.92
Advocacy on healthy foods and raising awareness via mass media regarding processed food	96%	4%	0.92
Provide agricultural extension programmes to train farmers to produce nutritious foods	91%	9%	0.82
Ensure coherence and collaboration between ministries that are affected by food security and nutrition.	91%	9%	0.82
Provide women and vulnerable households with training, education and resources to enhance agricultural productivity and incomes.	89%	11%	0.78
Impose mandatory limits on sugar, salt and fats in packaged foods	87%	13%	0.74
Develop infrastructure to reduce the loss and waste of nutritious foods and increase its redistribution	87%	13%	0.74
Deliver urban peri-urban agricultural programmes	85%	15%	0.70
Facilitate access to food markets for smallholder farmers and SMMEs by establishing cooperatives, hubs and developing mechanisms for collective bargaining and increasing access to price information	85%	15%	0.70
Promote the production and consumption of indigenous foods	81%	19%	0.62
Restrict advertisements and marketing of unhealthy foods	81%	19%	0.62
Develop Food-based dietary guidelines	81%	19%	0.62
Providing nutrition education and counselling to women	81%	19%	0.62
Establish or support short food supply chains	79%	21%	0.58
Trade policies that prioritise the export of healthy foods and reduce barriers to their import	79%	21%	0.58
Reformulation of processed foods to reduce the levels of sugar and fats	79%	21%	0.58
Redesign agricultural development programmes to focus on producing nutritious food	77%	23%	0.54
Implement food fortification programmes	77%	23%	0.54

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Policy options	Most important votes	Least important votes	BW Score
Reduce the prices of healthy diets by subsidising healthy foods	77%	23%	0.54
Lower the price of healthy foods by providing financial and technical support to small businesses that sell healthy food	74%	26%	0.48
Adopt a public food procurement policy that applies nutritional guidelines to food procured for public institutions such as schools and prioritise purchasing from smallholder farmers	74%	26%	0.48
Use zoning laws to restrict the sale of unhealthy foods in specific areas such as schools and clinics	72%	28%	0.44
Provide training programmes for food producers and retailers on storage, processing and packaging to reduce spoilage and contamination of nutritious foods	72%	28%	0.44
Provide social protection in the form of cash or vouchers to enable vulnerable groups to afford healthy diets	70%	30%	0.40
Reformulation of processed foods to reduce the levels of sugar and fats	68%	32%	0.36
Impose taxes on unhealthy foods and beverages to discourage consumers from purchasing such foods/beverages.	66%	34%	0.32
Implement biofortification programmes	62%	38%	0.24
Development of processed products that extend the shelf life of healthy food	61%	39%	0.22
Develop alternative sources of protein	57%	43%	0.14
Make healthy foods default options on menus of restaurants	30%	70%	-0.40

Source: Author's computation

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4.4.4 Prioritised list of 'no-regrets' policy options

Table 4.5 presents the final prioritised list of the final 20 'no-regrets' policy options to transform South Africa's food system for affordable healthy diets. These policy options were prioritised using their BW scores i.e only those that had a BW score of over 0.5 were included in the final list of policy options.

Table 4.5: Prioritised list of the 20 'no-regrets' policy options

Policy options	Most important votes	Least important votes	BW Score
Introduce mandatory nutrition labelling on food packages to reflect nutrient composition	96%	4%	0.92
Improve infrastructure in agriculture and market systems to increase the availability of nutrient-dense foods	96%	4%	0.92
Demystify the policy development process	96%	4%	0.92
Advocacy on healthy foods and raising awareness via mass media regarding processed food	96%	4%	0.92
Provide agricultural extension programmes to train farmers to produce nutritious foods	91%	9%	0.82
Ensure coherence and collaboration between ministries that are affected by food security and nutrition.	91%	9%	0.82
Provide women and vulnerable households with training, education and resources to enhance agricultural productivity and incomes.	89%	11%	0.78
Impose mandatory limits on sugar, salt and fats in packaged foods	87%	13%	0.74
Develop infrastructure to reduce the loss and waste of nutritious foods and increase its redistribution	87%	13%	0.74
Deliver urban peri-urban agricultural programmes	85%	15%	0.70
Facilitate access to food markets for smallholder farmers and SMMEs by establishing cooperatives, hubs and developing mechanisms for collective bargaining and increasing access to price information	85%	15%	0.70
Promote the production and consumption of indigenous foods	81%	19%	0.62
Restrict advertisements and marketing of unhealthy foods	81%	19%	0.62
Develop Food-based dietary guidelines	81%	19%	0.62
Providing nutrition education and counselling to women	81%	19%	0.62
Establish or support short food supply chains	79%	21%	0.58
Trade policies that prioritise the export of healthy foods and reduce barriers to their import	79%	21%	0.58
Redesign agricultural development programmes to focus on producing nutritious food	77%	23%	0.54
Reduce the prices of healthy diets by subsidising healthy foods	77%	23%	0.54
Implement food fortification programmes	77%	23%	0.54

Source: Author's computation

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4.4.4.1 Agricultural policy options

Twenty five percent of policy options under the agricultural theme were prioritised and included in the final list of 'no-regrets' policy options to transform food systems (Table 4.5). The highly voted policy option in this theme is the provision of agricultural extension programmes to train farmers to produce nutritious foods. The necessity of this policy option is supported by Hendriks et al. (2020), who, recommended changes in the producer support programmes and extension practices to broaden their focus beyond the production of staple crops to the promotion and support of agricultural systems that increase the production of nutritious foods in the food system. Misselhorn and Hendriks (2017) further indicated that extension services can be compounded by access to resources such as market information, credit facilities, infrastructure provision and the removal of barriers to market entry.

The second policy option under this theme was the provision of training and agricultural resources to women and vulnerable households which according to Gadeberg and Lecoutere (2023) is critical in reducing barriers women face in controlling productive assets and increasing productivity. The third policy option under this theme was to deliver urban and peri-urban agricultural programmes. Urban and peri-urban agriculture is an important policy option with potentially positive impacts on increasing dietary diversity in urban areas that have limited nutritious food options. Yet, in most cities, there is little government support for urban and peri-urban agriculture but restrictive regulations that limit local food production such as rising land value (HLPE, 2024).

The fourth policy option under this theme was the promotion of the production and consumption of indigenous foods. This finding is corroborated by Teagle (2024) who argues that most of South Africa's health, food and agricultural policies are not focused on access to fresh fruit and vegetables but on general food production and consumption. Therefore, recommend aligning food and nutrition policies to improve the availability, affordability and acceptability of indigenous crops and other fresh produce especially since these options are cheaper (Teagle, 2023). The fifth policy option under this theme was the redesign of agricultural development programmes to focus on producing nutritious food. Rosegrant (2023) argues for this policy option as necessary as it has the potential impact to increase the availability of nutritious foods especially the diversion of agricultural support to incentivise the production of more diverse and nutrient-rich crops over staples that tend to be less nutritious but only high in energy.

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4.4.4.2 Regulatory policy options

Fifteen percent of policy options under the regulatory theme were prioritised and included in the list of 'no-regrets' policy options (Table 4.5). The most voted policy option was the introduction of mandatory nutrition labelling on food packages to reflect nutrient composition. Food labelling in South Africa is already a requirement by the food industry. It is regulated under R146 of the Foodstuffs, Cosmetics and Disinfectants Act of 1972, which came into effect in 2012 (Igumbor et al., 2012). Currently, the labelling of food items sold on the markets is on the back of the package, which consumers do not easily understand due to jargon and interpreting the numbers. Bopape et al. (2021) argue that South Africa should adopt front-of-page labelling such as warning labels highlighting food items high in sugar, fats etc to discourage consumers from buying unhealthy products. The second policy option was to impose mandatory limits on sugar, salt and fats in packaged foods. The relevance of this policy option for South Africa is supported by Laderchi et al., (2024) who found that countries pioneering such restrictions have seen dramatic reductions in the fat content of foods and related diseases, particularly among the most vulnerable socioeconomic groups that cannot afford healthier food options. The third policy option was the restriction of advertisements and marketing of unhealthy foods. According to Tallie et al. (2019), better enforcement of regulations that target private sector behaviour, especially those relating to advertising unhealthy foods, breastfeeding supplements and food advertisements directed at children is essential to reduce the consumption of unhealthy beverages and foods.

4.4.4.3 Supply chain policy options

Twenty percent of policy options under the supply chain theme were prioritised for inclusion in the 'no-regrets' policy options list. The highly voted policy option in this list was the improvement of infrastructure in agriculture and market systems to increase the availability of nutrient-dense foods. Nutrient-dense foods tend to be more perishable; therefore, improving post-harvest handling is a crucial area for action to improve their availability and affordability (Herforth et al., 2020). The second policy option under this theme was to develop infrastructure to reduce the loss and waste of nutritious foods and increase its redistribution. According to Gosling et al. (2022), food wastage and loss are prevalent in both the production cycle and during consumption in South Africa (Table 4.5). Furthermore, the 2015-2019 Agricultural Policy Action Plan cites the lack of access to agricultural technologies among small-scale farmers coupled with the poor state of rural infrastructure low adoption of new technology across the food system, including post-harvest and food processing technologies as drivers of

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significant postharvest losses in South Africa and a barrier to market access for many smallholder farmers. Factoring in the current and future role of technological innovations in the food system, especially in agricultural production, is essential in developing and implementing national food security and nutrition policies and plans (NAMC, 2018).

The third policy option under this theme was to facilitate access to food markets for smallholder farmers and SMMEs by establishing cooperatives, hubs and developing mechanisms for collective bargaining and increasing access to price information. Not only is this policy necessary to help South African smallholder farmers who struggle with market entry but according to Hawkes et al. (2020) the policy can lead to an increase in the availability of nutritious foods in markets serving local populations. The fourth policy option under this theme was to establish or support short food supply chains. Regarding the policy, Chiffoleau et al. (2020) argue that it results in inconveniences and higher prices for consumers and that purchasing directly from farmers is not conducive as at times farmers are positioned far from local populations and are hard to reach.

4.4.4.4 Research and Innovation policy options

Five percent of the research and innovation policy options were included in the final list of 'no-regrets' policy options. Implementing food fortification programmes is the only policy option under the research and innovation theme included in the final list of 'no-regrets' policy options (Table 4.5). Olson et al., (2021) state that food fortification is a proven, safe and cost-effective strategy for improving diets and for the prevention and control of micronutrient deficiencies. In 2003 South Africa made the fortification, with vitamin A, thiamine, riboflavin, niacin, pyridoxine, folic acid, iron and zinc) of certain types of maize meal and wheat flour mandatory following the promulgation of R504 Regulations relating to the fortification of certain foodstuffs. Additionally, Keats et al. (2020) state that there is strong evidence that food fortification in high income countries is effective in addressing micronutrient deficiencies but the evidence is still lacking in low and middle-income countries.

4.4.4.5 Governance policy options

Twenty percent of policy options under the governance theme were prioritised and included in the list of 'no-regrets' policy options. The first policy option was to demystify the policy development process (Table 4.5). The policy development process consists of a sequence of different stages such as problem identification, agenda setting, consideration of policy options decision making, implementation and monitoring and evaluation. Therefore, this stage-based

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view necessitates the involvement of all government actors to strengthen evidence-based solutions as far as food systems are concerned (Sibanda and Mwamakamba, 2021). "The merits of moving towards an improved stakeholder engagement is to get policies potentially responsive to the needs of the diverse actors, particularly those marginalised within the food system" (Pereira and Drimie, 2016). It also has the potential to strengthen the problem identification process, thus resulting in well thought out, coherent and generally acceptable solutions.

The second policy option was to ensure coherence and collaboration between different ministries that deal with or are affected by food security and nutrition. Coherent policies for more inclusive and nutrient-sensitive investment are required to improve food quality, food safety and food system sustainability for broad categories of stakeholders. Both market incentives and public regulation are necessary to support connectivity and enhance responsiveness (Ruben et al., 2021). Furthermore, Thow et al. (2018) state that policy incoherence emanates as a result of tension between policy objectives and a lack of synergies across government departments to achieve desired results. This policy incoherence is evident in economic policies such as in trade and food, which are antagonistic to nutrition and health policies (Hunter-Adams et al., 2018). This means the prioritisation of trade to reduce food prices but only to end up importing more processed foods that drives up diet-related Non-Communicable Diseases in the country.

Multi-stakeholder collaboration across government departments is needed to reflect the interconnectedness of food systems transformation (Malabo Montpellier Panel, 2021). Delport (2019) points to the fragmentation of South Africa's food system policies as well as government departments working in siloes which has led to fragmented activities overlaps and duplication of roles as far as food security is concerned. The third policy option was to develop Food-based Dietary Guidelines, of which South Africa currently has prescribed FBDGs but still lacks data on nationally consumed foods and indigenous diets (Vorster et al., 2013).

The fourth policy option was to design trade policies that prioritise the export of healthy foods and reduce barriers to their import. This supports the Global Panel's view that the role of trade instruments should be incorporated in the search for solutions by governments seeking to deliver healthy diets. Any trade policies should complement areas of domestic policy, such as investments in the domestic agricultural sector, and social safety nets, to ensure that people

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with the greatest need for imported nutrients will have access to them and that those vulnerable to food price volatility are protected (Glopan, 2020).

4.4.4.6 Awareness and education policy options

Two policy (10%) options under the awareness and education theme were prioritised for inclusion in the 'no-regrets' policy options list (Table 4.5). The first policy option is the advocacy on healthy foods and raising awareness via mass media regarding processed food. One of the six strategic objectives of the National Food and Nutrition Security Plan of 2018-2023 is to influence people to make informed food and nutrition choices through an integrated communication strategy (Boatema and Drimmie, 2018). With South Africa having a high obesity rate, mass media campaigns that raise awareness regarding healthy eating are critical to help consumers make healthy food choices. South Africa's food environment is overwhelmed by aggressive adverts promoting unhealthy foods and beverages, making it difficult for consumers to avoid unhealthy diets (Yamoah et al., 2021). Additionally, these campaigns should be targeted at poor communities who consume a lot of energy-dense foods with little nutritional value. In these communities, lack of education and income levels prevail and mass media awareness can improve knowledge and help the government reduce unhealthy food consumption (Claasen et al., 2016). The second policy option was providing nutrition education and counselling to women, especially during pregnancy. The WHO (2023) recommends coupling this policy with promoting consistent and continued use of micronutrient supplements, food supplements or fortified foods.

4.4.4.7 Financial policy options

Five percent of the financial policy options were included in the final list of 'no-regrets' policy options (Table 4.5). The only policy option under the financial theme is the reduction of the prices of healthy foods via subsidies. According to Afshin et al. (2017), interventions that promote healthful behaviours, such as subsidies, generally have greater effect sizes compared with those that target the cessation of unhealthful behaviours. Gatto et al. (2022) argue that subsidies have a positive effect under more traditional food systems. Furthermore, the provision of subsidies needs to be closely tailored to each food system context, as the evidence for their effectiveness varies notably in different circumstances (Ruggeri et al. 2024). With South Africa's food system being dualistic, subsidies have a potential to reduce the prices of healthy foods by lowering the cost of inputs for smallholder farmers. Furthermroe, targetting

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low income groups especially rural households can reduce the unequal access to nutritious foods (FAO, et al., 2022).

4.4.5 Representation of themes on the no regrets list of policy options

Based on the final list of 20 ‘no-regrets’ policy options presented in Table 4.5. agricultural policy options were the most dominant policies while financial and research and innovation were the least dominant.

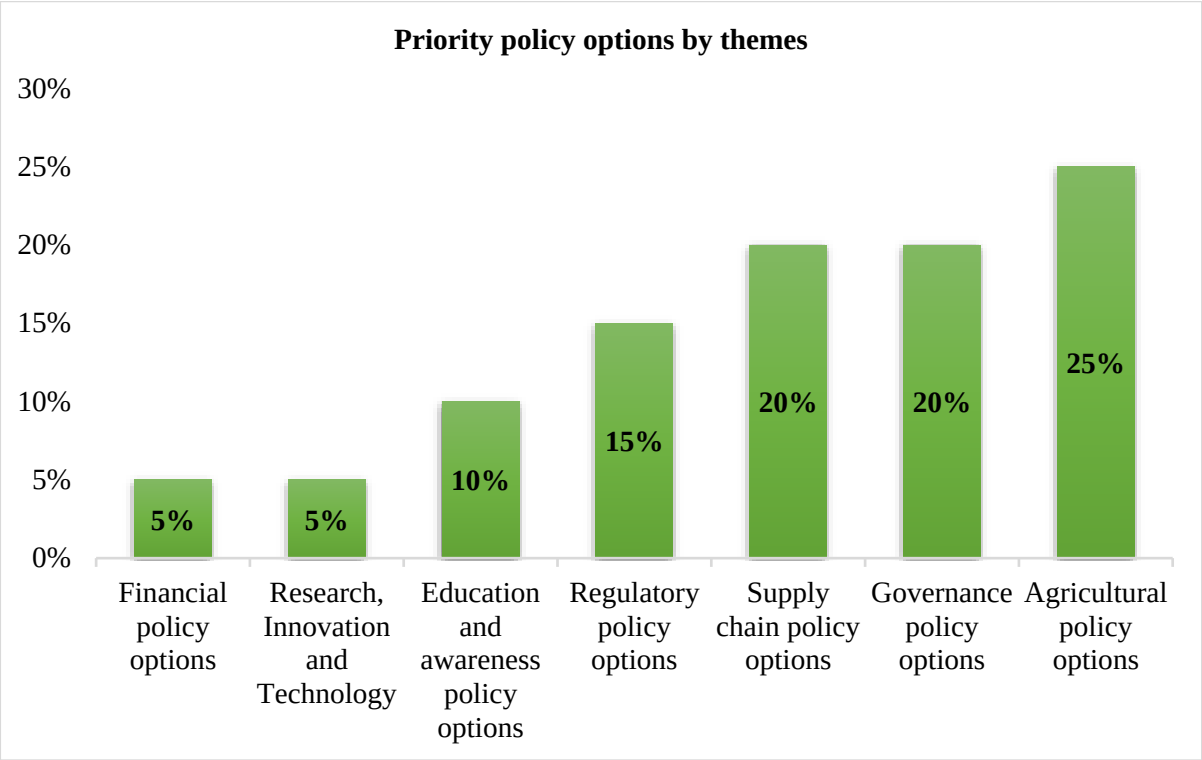

Figure 4.6: Priority policy options by themes

Source: Author’s analysis

4. 5 Chapter Summary

This chapter presented the results data from the systematic review of 20 publications from various databases. The results yielded seven themes and 31 policy options that were presented to the participants for ranking. The results showed varying preferences among the participants when it came to the importance of each policy option for South Africa's food system. Ultimately, 20 ‘no-regrets’ policy options were prioritised using their BW scores and included in the final ‘no-regrets’ policy options list to transform South Africa's food systems.

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CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary and conclusion of the main findings from both the systematic review and the survey. Additionally, recommendations are provided for policymakers and stakeholders operating within the food system, alongside suggestions for future research that could expand our comprehension of South Africa's food system. Ultimately, the chapter culminates with the study's concluding remarks.

5.2 Summary of the main findings

The first objective of the study was to investigate the existence of food system policies in South Africa. Systematic literature review method was used, particularly PRISMA, to identify food systems reports that prescribe policy options to transform food systems. Atlas.ti Software and Thematic analysis were used to collect and code data while thematic analysis was used to analyse the data. The main findings were as follows: The study identified and analysed 20 reports focusing on food systems transformation towards affordable healthy diets in South Africa. The majority of the analysed reports were published in 2020 (n=5) and 2021 (n=7). There was no report dedicated to South Africa as a focal point. This highlighted a need for increased research on food system transformation in the country. Seventy percent of the reports were research articles that had a global focus. The thematic analysis yielded seven themes under which the identified policy options were categorised. These included agricultural, financial, supply chain, governance, research and innovation, education and awareness and regulatory policy options. The supply chain policy options from this review were the most recommended in the analysed reports these are policies that are related to improving infrastructure such as roads and on-farm storage facilities to ensure the delivery and availability of nutritious foods in markets as well as food safety .

The second objective was to systematically refine and extract the potential ‘no-regrets’ policy options from these reports. Similar policy options were combined and refined according to their potential impact on the food system. These policy options were then deductively categorised into seven themes adopted from Hawkes et al. (2020). This systematic review resulted in 31 potential policy options which were categorised into seven themes. Namely, agricultural, governance, supply chain, financial, education and awareness, research and innovation and

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regulatory policy options. On this list, the most represented thematic areas were agriculture, governance and supply chain with five policy options each.

The third objective aimed to prioritise the 'no-regrets' policy options in their order of importance by engaging participants from the food system. An online survey in Google Form was sent to 62 participants asking them to rank the 30 policy options as 'most' or 'least' important. BW scores were used to rank the policy options and only those that received a high consensus were added to the list of 'no-regrets' policy options. The ultimate result was a list of 20 'no-regrets' policy options to transform food systems in South Africa towards affordable healthy diets. Mandatory food labelling was the most voted policy option with a BW score of 0.92 while food fortification was the least voted policy option with a BW score of 0.54. From the online survey, agricultural policy options were the most preferred by the participants making up 25% of the final list of 'no-regrets' policy options**.** While financial and research and innovation policy options had the lowest representation 5% each.

5.3 Conclusions

The no-regrets policy options identified from this study were across seven different themes, namely, agriculture, finance, governance, regulation,supply chain, education and awareness and research and innovation. Most policy options were agriculture related, followed by governance and supply chain. The study showed that research and innovation policy options which were the least voted, deserve more attention from the government and increased focus when it comes to Research and Development. The different preferences of the surveyed stakeholders when it comes to selecting the most important policy options highlighted the different priorities and interests that various food system stakeholders have when it comes to transforming the food systems. The study concluded that the transformation of South Africa's food system to deliver affordable healthy diets has no simple solution. A complex, multi-dimensional strategy involving all food system actors is required. Different contexts and dynamics must be considered when determining a healthy diet, especially in a culturally diverse country like South Africa.

5.4 Recommendations

Based on the findings of the study and too promote the identified no-regrets policy options the following recommendations are suggested:

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- South Africa needs to strengthen the regulatory and institutional frameworks by incorporating food systems policies into the NDP
- Invest in Research & Development to explore low-cost, nutrient-preserving processing technologies for traditional foods
- With fewer participants from the public sector in this study, there is a need to leverage public-private partnerships as a pathway to improve the functionality of the food systems in South Africa.
- Establish local pilot projects to demonstrate the impact of and promote the no-regrets policies such as urban and peri-urban agricultural programmes.
- Provide financial, logistical and technical support for relevant food system stakeholders to participate in food system working groups and forums.
- Monitor and evaluate multistakeholder partnerships in food policy engagements for improved policy outcomes.
- Data regarding the affordability of healthy diets could improve food and nutrition security by backing and informing policy decisions. Thus, it is recommended that suitable organisations such as Stats SA and NAMC also engage in the monthly calculation and publication of the cost and affordability of healthy eating in South Africa.
- Improve inclusive stakeholder participation and enhance engagement during food policy development. This can be done by conducting a comprehensive mapping and identification exercise of impacted stakeholders and creating decentralised participation plaftorms to accommodate local and vulnerable groups.
- Form multistakeholder working groups by establishing multi-sectoral committees comprised of NGOs, academia, private sector, community-based organisations and government. Additionally, there is a need to form partnerships between government departments when it comes to implementing policies that seek to address the food system to avoid duplication of projects. These partnerships can include cross-sectoral committees composed of representatives from relevant departments and entities.

5.6 Policy implications

The findings from this study necessitate a review of the goals of existing policies that have an impact on the country's food system, especially its ability to deliver affordable and healthy diets. Since this study highlighted that various policies are housed in separate departments, it

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is imperative to consolidate these policies and implement them under a designated department such as the Department of Agriculture, Rural Development and Land Reform or Department of Social Development. This study also outlines the need for an improvement in the country's policy development, which must include all relevant food system stakeholders.

5.7 Areas of further research

- Further research should include a comprehensive review of policy options and actions undertaken around the world to improve the affordability of healthy diets, combined with research to investigate the viability of 'no-regrets' policy options at local, provincial and national levels in the South African context.
- Further research, as indicated by literature on food labelling is instrumental in helping consumers make healthy choices. Specifically gaps in consumer understanding of food labels, effectiveness of food labels in promoting healthy food choices and the impact of language.
- More research on researh and innovation policy options since they are ranked low participants. Specifically, research on alternative sources of proteins, innovative food production methods like vertical farming and cost-effective measures of food fortification.
- What may constitute a healthy diet in the province of Gauteng may differ from that of the Eastern Cape. Therefore, there is a need for more research based on regions, which is primarily a function of tribes. Furthermore, research by Jacobs and Larney (2011) showed that many people in South Africa such as, especially in the Northwest province, do not understand food labels. Therefore, legally requiring food companies to labelling may not be as effective when it comes to nudging consumers to make healthy choices.

5.8 Delimitations of the study

The study used a systematic review to appraise publications for the sought-after 'no-regret policy options' to transform food systems. To reduce bias when it comes to selecting publication, the study adhered to the comprehensive PRISMA guidelines when preparing reports of systematic reviews, used multiple databases, developed a comprehensive protocol (inclusion and exclusion criteria, search strategy) and used a two-stage screening process which involved screening both the title and abstracts of the literature (Moher et al., 2009).

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ANNEXES

Annex 1: Questionnaire

Policy options to transform food systems towards affordable healthy diets in SA

Instructions

Thank you for taking part in our survey, ethical clearance number NAS311/22. This survey will take between 10 to 20 minutes to complete**.** The information you share in this survey will be treated with confidentiality. The data collected will be used for this research purpose only and will be anonymised. Your participation in this survey will contribute to the principal researcher's mini dissertation for the University of Pretoria, which will focus on the abovementioned title. The results from this survey will be shared with the participants for further validation.

In the study, a *healthy diet* is defined as one that is "health-promoting and disease-preventing. It provides adequacy, without excess, of nutrients and health-promoting substances from nutritious foods and avoids the consumption of health-harming substances". Additionally, by *'no regrets*' policy options, we refer to policy options that policymakers need to adopt to transform food systems. They are relevant, feasible and implementable.

Consent to participate

I consent ☐

I do not Consent ☐

Stakeholder category

☐ Academia/Research institution

☐ Government

☐ Primary food producer

☐ Consumer group

☐ Private sector (Retail, processing, wholesale)

☐ Non-Governmental Organisation

Which country do you work in?

_____

In what component of the food system are you mostly engaged or experienced in?

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☐ Food Production

☐ Supply chain

☐ Retail

☐ Health and nutrition

☐ Consumption/Civil

☐ Regulation and Policy

☐ Other (please explain)

_____

Based on your experience what are your criteria of 'no-regrets' policy option?

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List of policy options identified from the PRISMA systematic review			
Financial actions		Best	Worst
	Reduce the prices of healthy diets by subsidising healthy foods	☐	☐
	Reduce the availability and affordability of unhealthy food/beverages by imposing a tax such as sugar tax.	☐	☐
	Provide social protection in the form of cash or vouchers to enable vulnerable groups to afford healthy diets	☐	☐
	Provide financial and technical support to small businesses	☐	☐
Regulatory actions		Best	Worst
	Restrict advertisements and marketing of unhealthy foods	☐	☐
	Introduce mandatory nutrition labelling on food packages to reflect nutrient composition	☐	☐
	Use zoning laws to restrict the sale of unhealthy foods in certain areas such as schools	☐	☐
	Mandatory limits on certain nutrients	☐	☐
Agricultural actions		Best	Worst
	Deliver urban peri-urban agricultural programmes	☐	☐
	Provide agricultural extension programmes to train farmers to produce nutritious foods	☐	☐
	Promote the production and consumption of Indigenous foods	☐	☐
	Diversification of production	☐	☐
	Provide training and education to women in animal husbandry	☐	☐
	This can include initiatives such as farmers markets, community gardens,	☐	☐
Supply chain actions		Best	Worst
	Improve post-harvest storage facilities	☐	☐
	Reduce food losses and waste	☐	☐
	Improve infrastructure such as roads to ensure access to markets by farmers	☐	☐
	Facilitate market access by smallholder farmers and SMMEs	☐	☐
	Establish short food supply chains	☐	☐
Governance actions		Best	Worst
	on multi-sectoral collaboration with the private sector and civil society to ensure policy coherence across ministries	☐	☐
	Trade policies that prioritize the export of healthy foods and reduce barriers to their import	☐	☐
	Food procurement policies: Governments and institutions can use their purchasing power to promote healthy diets by procuring healthy and sustainably produced foods for public institutions such as schools and hospitals	☐	☐
	Develop Food-based dietary guidelines	☐	☐

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Education and awareness action		Best	Worst
	advocacy on healthy foods and raising awareness regarding processed food	☐	☐
	Providing nutrition education and counselling	☐	☐
	Make healthy foods default options on menus of restaurants	☐	☐
Research and innovation actions		Best	Worst
	Reformulation of processed foods to reduce sugar and fats	☐	☐
	Biofortification	☐	☐
	Food fortification	☐	☐
	development of processed products that extend the shelf life of healthy food, development of alternative protein sources	☐	☐

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Annex 2: Ethical clearance

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Natural and Agricultural Sciences

Deputy Dean of Research and Post Graduate Studies Preliminary Approval

20 November 2023

Mr L Mgweba
Department of Agricultural Economics Extension and Rural Development
Faculty of Natural and Agricultural Sc
University of Pretoria

Dear Mr L Mgweba

PERMISSION FROM DEAN'S OFFICE FOR RESEARCH PROJECT NAS311/2022

The letter serves to confirm that I am supportive of the following Masters research project:

POLICY OPTIONS TO TRANSFORM FOOD SYSTEMS TOWARDS AFFORDABLE HEALTHY DIETS IN SOUTH AFRICA

I have no objection to the research team requesting the staff/students from the Faculty of Natural and Agricultural Sciences to participate in this research project, **subject to ethics approval from your Faculty's Research Ethics Committee.**

Kind regards

Prof Vinesh Maharaj
Deputy Dean: Research and Post Graduate Studies
Faculty of Natural and Agricultural Sciences

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