



**Utrecht University**



## RETHINKING RESILIENT URBAN FOOD SYSTEMS

Vulnerability to food insecurity as a consequence of drought – the case of Cape Town

**ABSTRACT:** The current rapid global urbanisation makes achieving food secure cities a growing challenge, sharpened by the connected and worsening issues of inequality and climate change. Economic shifts towards concentrated and corporate food systems are thought to increase the vulnerability of cities to climate related risks. The issue remains largely underresearched due a lack of knowledge of where food in cities is sourced from and how shock-prone these food flows are. By tracing food flows for five key food items to the city of Cape Town and using the drought of 2015-2017 as a lens, the research helps to understand and identify what processes shape vulnerability to food insecurity as a consequence of drought and what role economic shifts and power play. The paper calls on academics and policy makers to rethink the concept of resilient urban food systems available today.

**Master Thesis Research (30 EC)**

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## Executive Summary

In a rapidly urbanising world, the challenge to feed the food insecure in this world means to feed the cities - an insight sharpened by the connected and worsening issues of inequality and climate change faced globally. The South African city Cape Town is one of the most recent examples of this. During the years of 2015-2017, Cape Town was hit by an extreme drought of a severity not seen in over a century. The drought led to concerns about the city's ability to feed its residents and its vulnerability to future similar shocks.

Such incidents result in scholars and policy makers being increasingly interested in urban food systems and how to make them more shock-prone. Debates have emerged whether cities should increase food flows from local, peri-urban areas to lower the dependence on long value chains as concern has risen that food flows governed more and more by a handful of corporate companies increase vulnerability.

To address this debate, this research used the method of following five key food items of importance to the poor's food security, from point of retail in Cape Town to the point of production. Conducting interviews with actors along these food flows created knowledge firstly about how the city is fed and secondly how vulnerable these food flows are. The research shows that Cape Town's food system is characterised by diverse and interdependent food flows originating from different scales. These food flows show differing vulnerabilities to food insecurity as a consequence of drought. Unequal power distribution and market position impacted the vulnerability during the drought of 2015-2017. As powerful actors are less sensitive and more adaptive, shocks can exacerbate the dichotomy of vulnerabilities – more often than not at the detriment of the poor and their food security.

This study gives insight into the functioning and challenges of an urban food system, the complex and sometimes unexpected feedbacks of a system under stress, and shows the limitations of approaches aiming to strengthen local food flows. This study is relevant to both academics and policy makers. The aim is to add to the body of knowledge about urban food systems, with a view to advancing both conceptual and theoretical frameworks.

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## 1. Introduction: the need for robust urban food systems

There are almost 1 billion people in the world who are food insecure (FAO, 2012). As the vast majority of the future food insecure will live in cities rather than in rural areas, the importance of urban food security is increasingly recognised (OECD/FAO 2008; Crush & Frayne, 2011; UN, 2014). Achieving food security – the provision of sufficient, adequate and accessible food for all – is a challenge particularly pronounced in cities in Sub-Saharan Africa. Here, high rates of urban population growth, coincides with increasing levels of urban poverty, exacerbating already high levels of inequality (UN Habitat, 2014; FAO, 2016). In addition, climate change is adding pressure to the food system, making it increasingly challenging to achieve food insecurity (Ericksen, 2008; Rockström et al., 2009).

All these challenges are accentuated in Cape Town, South Africa. It is one of the most unequal cities in the world and it is growing rapidly (CPD, 2013; City of Cape Town, 2016a). The city shows high level of poverty and 80% of poor households are moderately or severely food insecure (Battersby, 2011). When climate-related shocks occur in such urban environments, food security outcomes are even more at risk. This has been the case for Cape Town when it was faced with a particularly severe and long lasting drought in 2015-2017 (South African Weather Service, 2017; PASCA, 2017).

Given these changes and challenges, a growing interest in urban food security, urban food systems and their functioning and weak points has emerged. Researchers, policy-makers and practitioners are increasingly examining how resilient, or shock prone, food systems are with the goal to achieve urban food systems which are able to ensure food security despite shocks (OECD/FAO, 2008; Lang et al., 2009; van der Ploeg, 2010; UNCTAD, 2013).

### 1.1. Problem definition and main research question

There is no consensus on how to achieve resilient urban food systems. Some scholars argue that the modern, industrial, food systems are increasing vulnerability and food insecurity (McMichael, 2009; Thu, 2009; De Schutter, 2014). These food systems are criticised for rising inequity in profits, power and food distribution (McMichael, 2000). Being at the forefront of food system modernisation in Africa (Reardon, 2003), South Africa's food system shows similar developments: concentration and consolidation within the food system, i.e. the dominance by fewer corporate actors, is shadowing the food system (Reardon, 2003; Pereira, 2012; Greenberg, 2016). In the Global South these trends are more pronounced in cities than in rural areas. In Cape Town, supermarkets, for instance, are rapidly expanding and are replacing more and more informal food retailers (Reardon et al., 2003; Battersby & Peyton, 2014). The academic discussion revolves around whether these *economic shifts* towards modern, more concentrated and often longer supply chains increase the food system's vulnerability

to sudden shocks such as drought (Fraser, Mabee & Figge, 2005; Ingram, Ericksen, & Liverman, 2012; Rotz & Fraser, 2015; Hendrickson, 2015; Toth, Rendall & Reitsma, 2016).

As a result of discomfort with the modern and industrial food system, other scholars, practitioners and policy makers put more focus on the local scale. New approaches such as the “City Region Food Systems”<sup>1</sup> have received a lot of attention in recent research and policy debates. The newly termed approach aims at increasing the resilience of urban food systems by strengthening the ties with its surrounding peri-urban and rural hinterland and increasing production in these areas (Foster & Escudero, 2014; FAO/RUAF, 2017). The development of this approach coincides with an emerging discourse seeing cities, rather than national governments, as better equipped to tackle the challenges of urban food insecurity (ICLEI, 2016; IPES, 2017). But the City Region Food Systems approach has been criticised as it assumes that the food system is a producer driven one (Gereffi, 1994), being able to address urban food security by increasing production. This notion disregards other aspects of food security, i.e. the market’s ability to supply affordable and accessible food to all urban consumers (Crush & Frayne, 2011). Moreover, the approach is based on the idea that cities are fed by their rural surroundings. This has been challenged by the by research finding that the rural to urban linkages are often weaker than anticipated (Wegerif, 2017)

There seems to be a debate both on how cities are fed and whether there are certain food flows which are more vulnerable to shocks. The following research question will therefore be addressed: **How have recent economic shifts in the food system of Cape Town influenced the system’s vulnerability to shocks such as the drought of 2015-2017?**

The research objectives are fourfold:

- (1) To offer insights into food flows and the functioning and challenges of an urban system. This can help to test the current ideas and theories of the City Region Food Systems.
- (2) To assess the vulnerabilities to food insecurity of different food flows.
- (3) To gain understanding of how current economic shifts such as consolidation affect the ability of the food system to ensure food security in times of stress.
- (4) To offer insights on how to increase the robustness of the food system to enhance food security outcomes.

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<sup>1</sup> “City Region Food Systems” emerged over 2012-3 in discourse across UN Agencies (UN Habitat, UNEP), Associations of local authorities (ICLEI), and the research community and is defined as “the complex relation of actors, relations and processes related to food production, processing, marketing, and consumption in a given geographical region that includes one main or smaller urban centres and surrounding peri-urban and rural areas that exchange people, goods and services across the urban rural continuum.” (Foster & Escudero, 2014).



The research applied food systems thinking with a pro-poor focus. This research first developed a model to examine the vulnerability of an urban food system to food insecurity as a consequence of climate related risks such as drought. In a following step, this model was applied to Cape Town, using the years 2015-2017 as a lens to understand and identify what processes shape vulnerability to shocks and what role economic shifts play. The research did so by focusing on five key food items to the urban consumers, mapping the various food flows and then engaging with suppliers in these food flows.

### 1.2. Academic and societal relevance

There are few grounded studies on food flow vulnerability, studies are generally limited to the production or consumer side (Gregory et al. 2005; Lobell et al. 2008). Food security outcomes are put synonymous with altered production or household income. Research has, however, shown that food security also depends on broader conditions influencing the affordability of and access to food as well as the food system's ability to manage stressors (Sen 1981; Watts 1983; Chambers 1989; Yaro 2004; Eakin and Luers 2006). But the evidence of how different factors influence food system vulnerability is yet scattered and limited (Ericksen, 2008; Ford, 2009; Wood et al., 2010; Tendall et al., 2016). For instance, studies considering economic shifts as driver of vulnerability often do so at an aggregate level, masking differences among food flows (Fraser et al., 2005; Hendrickson, 2015). This research can help advance the academic knowledge and contribute to the academic debate by providing additional insight for further conceptualisation of food system functioning and vulnerability.

From a development perspective, food security will remain high on the development agenda (UN, 2010). Food security is not only a basic human right but ensuring food system resilience can assist in reaching broader development gains of a country (Demment, Young & Sensening, 2003; Stein & Qaim, 2007). Food system vulnerability will remain an urgent issue as extreme weather events are predicted to become more frequent (Lobell et al., 2008) and rapid urbanisation makes addressing urban food insecurity essential (Revi & Rosenzweig, 2013).

### 1.3. Host organisation

The host organisation of this master thesis research was the African Centre for Cities (ACC) at the University of Cape Town. The results of the thesis feed into two projects hosted by the ACC. (1) The Consuming Urban Poverty<sup>2</sup> research project that focuses on governing food systems to alleviate poverty in secondary cities in Africa. Research for this project is being conducted in Kitwe (Zambia), Kisumu (Kenya) and Epworth (Zimbabwe). The project research coordinator Jane Battersby was the co-

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<sup>2</sup> Website Consuming Urban Poverty: <https://consumingurbanpoverty.wordpress.com/>

supervisor of this master thesis. (2) The Hungry Cities Partnership (HCP)<sup>3</sup> that focuses on the relationships between rapid urbanisation, informality, inclusive growth, and urban food systems in the Global South, including Cape Town. The project research coordinator Gareth Haysom was the second co-supervisor of this research.

#### 1.4. Structure of the report

The next chapter, chapter 2, develops the model to examine the vulnerability of Cape Town's food system and presents the conceptual framework guiding this research.

Chapter 3 elaborates the qualitative case study approach and how data was gathered in Cape Town using methods such as following the food and interviews to both map the food flows and assess the vulnerabilities of these to the drought. The chapter also discussed the limitations of this research.

Chapter 4 gives more contextual background on Cape Town, its food system characteristics and drivers of vulnerability. It focuses particularly on the background of economic shifts and their implications. These components were found to be relevant in the conceptual framework and form an important basis to start to understand the vulnerabilities of the urban food system.

Chapter 5 presents the first research findings and describes the findings of the food flows. The chapter highlights both important nodes, interconnections as well as dominant food flows. It also relates it to economic shifts and what implications they have for the different food flows. Chapter 6 describes and explains the patterns found with regards to both exposure-sensitivity and adaptive capacity and relates it to the implications for urban food security.

The last chapter 7 engages with the findings and concludes on their relevance and meaning. This is an important chapter as it combines the different findings and goes beyond the predominantly descriptive research analysis.

## 2. Theoretical background

This chapter develops the model to examine the vulnerability of Cape Town's food system. It combines theoretical concepts of food system and vulnerability analysis as well as current knowledge about the food system and food security in Cape Town. Food flows are taken as an entry point to the food system. The resulting conceptual framework combines different concepts and theories in an innovative way to be able to analyse the vulnerability of the urban food system of Cape Town.

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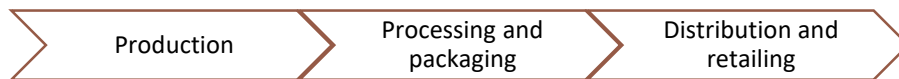
<sup>3</sup> Website Hungry Cities Partnership: <http://hungrycities.net/>

## 2.1. Food systems approaches and food security

The most prevalent definition of food security used today was defined at the World Food Summit in Rome in 1996: “*Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life*” (FAO, 1996). The definition combines the dimensions of availability, access, utilisation and stability over time (Ericksen, 2008).

Food security is, in turn, the outcome of effective food systems (Pinstrup-Andersen, 2009). Food systems are intrinsically complex – they comprise many different processes, value chains, actors and interactions, and their outcomes affect multiple stakeholders in diverse and sometimes conflicting ways (Tendall et al., 2015). A food system encompasses all activities from farm to plate: producing food, processing and packaging food, distributing and retailing food, and consuming food. The first three categories constitute the food supply chain; i.e. the food flow (fig.1) (Ericksen, 2008).

Figure 1: A simple supply chain



In reality, food supply chains may be much more complicated, with more actors and various supply chains even for the same food item.

### 2.1.1. Urban food systems and urban food security of Cape Town

By drawing artificial boundaries around urban food systems, food system analysis and food security outcomes get focus (Schröter, Polsky & Patt, 2005). In addition, it can steer attention to the fact that urban food security differs from rural food security. Unlike in rural areas, urban households are overwhelmingly dependent on markets for their food security rather than on own production (de Zeeuw & Prain, 2011). According to Crush and Frayne (2011), food insecurity in urban areas is not triggered by food shortages but rather by the inability of urban households to secure access to food. The dimension of *food access* is then of particular interest in an urban setting, next to *food availability*.

While *food availability* refers to the amount, type and quality of food available to the consumer and is determined by factors such as distribution, *food access* is the ability of the consumer to gain access to the type, quality and quantity of food required. It has the components of *affordability* and *allocation* (Ericksen, 2008). Affordability can be determined by the price of food relative to the purchasing power of households.

South Africa is at the forefront of the so called supermarketisation and retail modernisation (Reardon et al, 2003; Weatherspoon & Reardon, 2003; Tschirley et al., 2015) and shows evidence of concentration and consolidation within the food system (Greenberg, 2010). Nevertheless, the food system still has a rather dualistic nature, with high importance of the informal food economy to the urban poor in Cape Town (Battersby, 2016; Skinner & Haysom, 2016). Research in 2008 in Cape Town has also shown that, although the poorer consumers went to supermarkets at least once a week, they heavily relied on informal traders for their food purchasing strategies as these are able to provide smaller quantities (Battersby, 2016). Lack of space and refrigeration facilities may force poorer consumers to buy in smaller quantities at higher price, called the bottom-of-the-pyramid penalty (World Bank, 2010). The stability of food access is also important. The current drought has, for example, led to a sharp rise in food prices and volatility of prices (PASCA, 2017). High prevalence of poverty, unemployment and undiversified livelihoods make the poor urban dwellers particularly vulnerable to such food price increases (Battersby, 2016).

The food allocation in turn can be determined by spatial availability of food: where is food available and what type of food is available? In urban areas, lack of transport can mean that certain retail outlets are located too far away for the poor - and thus are inaccessible. Battersby and Peyton (2014) could for example show that there is a highly unequal allocation of supermarkets in Cape Town, with significantly lower penetration of supermarkets in low income areas. Poorer consumers thus often rely on the informal food sector.

## 2.2. Food systems and vulnerability approaches

The concept of vulnerability is increasingly used to address food system challenges. Ericksen (2008) argues that any system failure to deliver valued outcomes such as food security are indicators of system vulnerability. The food systems framework is useful for identifying entry points for changing undesirable outcomes such as food insecurity. Through an analysis of the drivers and activities that have resulted in these outcomes, one can attempt to assign causality and ultimately develop interventions to lessen that vulnerability (ibid). Next to vulnerability, the concepts exposure and sensitivity, adaptive capacity and drivers of vulnerability are of importance:

### **Vulnerability**

Vulnerability is generally defined as an inability to cope with external pressures or changes, for instance climate change or climate variability, leading to the risk of an adverse outcome (Adger 2006). It can also be described as a measure of the susceptibility to harm in a system in response to a stimulus or stimuli (IPCC, 2007). In this research vulnerability could be manifested through decreased food availability and higher food prices in urban centres. Vulnerability is a dynamic concept, as it changes

over time and place and as it is subject to various factors of influence (Adger, 2006). Furthermore, vulnerability in the context of climate change is determined by both *exposure* and *sensitivity* to climatic risks and *adaptive capacity* to deal with those risks (IPCC, 2007). Vulnerability science therefore seeks to characterise the determinants of exposure, sensitivity, and adaptive capacity, and how they interact together, to create dimensions of vulnerability in a system (Turner et al. 2003; Smit & Wandel 2006).

### **Exposure and sensitivity**

The degree of exposure (e.g. to a drought) is mediated by the system's characteristics and represents the likelihood (sensitivity) that the exposure will result in adverse outcomes (food insecurity). Exposure and sensitivity depend on inherent characteristics of both the system and the shock to which it is exposed (Eakin et al. 2007). According to Gallopin (2006), exposure refers to the degree, duration, and/or extent in which the system is in contact with, or subject to, the shock (drought). Conceptually, sensitivity can be measured as the amount of transformation of the system per unit of change in the disturbance (food insecurity relative to drought). It is an attribute of the system, existing prior to the shock, and separate from exposure.

The system's attributes represent broader environmental, political, social, cultural and economic conditions which can be called determinants or drivers of sensitivity (Ericksen, 2008). Vulnerability rises when sensitivity and exposure levels increase (Smit & Wandel, 2006). In this research, it is thus not only the exposure to the drought, but also the system characteristics, the drivers of sensitivity, which are of importance to understand. Although the entire food system may be exposed to a stress like little rain, food flows are not equally likely to experience its impacts because some are more sensitive than others (Ericksen, 2008).

### **Adaptive capacity**

Adaptive capacity refers to the ability of the system to deal with or cope with the external conditions to which it is exposed (Adger, 2006). In the field of climate change, adaptive capacity is defined as "the ability of a system to adjust to climate change (including extremes such as drought) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences" (IPCC, 2001). A major determinant of adaptive capacity is assets (Adger, 2006). Assets range from physical to social and political. Generally, actors with greater endowments of resources are less vulnerable.

But actors need more than just access to resources to be less vulnerable; they need to actively manage these resources in the face of shocks. Thus actual strategies (or actions) need to follow adaptive capacity. In the field of climate change, adaptation is defined as an "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates, harms, or

exploits beneficial opportunities” (IPCC, 2001). These strategies can be anticipatory or reactive, autonomous or planned (Smit & Wandel, 2006). While exposure and sensitivity thus increase vulnerability to food insecurity, adaptive capacity decreases vulnerability.

The concept of adaptive capacity has close relations to other concepts such as flexibility, coping ability and resilience (Smit & Wandel, 2006; Gallopin, 2006). Similar to vulnerability, adaptive capacity is determined by context specific factors and are flexible and dynamic over time. Adaptive capacity can change when there is social, economic or political change (Smit & Wandel, 2006). Most scholars agree that high adaptive capacity of actors will not lead to pro-active adaptation strategies alone, as higher level institutional and policy reforms are also needed (Adger et al, 2003).

Agder (2006) states that social vulnerability in any system is determined by the resources a system has at its disposal, as well as the distribution of those resources in the system. The distribution or equity in systems such as food systems brings us to the issue of economic shifts and power as particular drivers of vulnerability.

### **Drivers of vulnerability**

An important concept is that of double exposure, or the idea that multiple processes of change combine to cause vulnerability (Ericksen, 2008). An environmental shock (a perturbations beyond the normal range of variability in which the system operates) may be the trigger of adverse outcomes, but other processes such as economic shifts or urbanisation can coincide with or contribute to the system’s vulnerability (Gallopin, 2006; Hendrickson, 2015). Drivers of vulnerability ultimately determine how food system activities are performed and relate to the political, social, economic, institutional and biophysical processes (Ericksen, 2008; Vermeulen, Campbell & Ingram, 2012) that can make some food flows more vulnerable than others.

Important to note when vulnerability science is applied to food systems is (1) the multi-scale nature of food systems and the drivers of vulnerability and (2) the fact that most systems are usually exposed to multiple, interacting drivers (Gallopin, 2006; Ericksen, 2008). For meaningful analysis this meant that the research had to go beyond the food flows and its actors and relate findings to processes at other levels of the food system (e.g. national and international) and understand multiple drivers of change.

### **2.3. Food flows and economic shifts as driver of vulnerability**

Value chains are considered as a valid entry point to assess the food system vulnerability (Tendall et al., 2015). This research uses the term value chains as it is most commonly used, nevertheless, the research of ‘following food’ goes beyond the narrow meaning of value chains. Value chains are usually used to trace food from production to point of consumption; which has been critiqued as it can miss

both the complexity of food flows to urban centres (Wegerif, 2017; Consuming Urban Poverty Project, 2017). When following food, one traces food items from point of consumption to the production. In addition, food flows give more attentions to interconnections between food flows and important 'nodes' in these.

Value chains are a valuable entry point to this research for several reasons. Looking at value chains can help analyse the structures, systems and relationships in the food system and assess outcomes related to: food prices, food supply allocation and food supply stability (McLachlan & Thorne, 2009). By examining each step from production to consumption it provides a framework for characterising food system outcomes and their determinants at multiple scales. This helps to determine both exposure to drought and sensitivity as well as adaptive capacity of the value chains as well as other drivers of vulnerability. The concept helps to map the flow of food commodities to particular sub-populations and compare their relative food security outcome.

In addition, value chains are a valuable tool to make economic shifts researchable as they put focus on the concepts of governance and distribution of power within value chains and within the wider food system. Economic shifts lead to both vertical power via value chain governance in the 'own' value chain as well as market power relative to 'other' value chains and actors (Kaplinsky, 2000; Barrientos, 2013; Greenberg, 2017). Governance describes which firms within a value chain set and enforce the parameters under which others in the chain operate. Governance analysis allows one to understand how a chain is controlled and coordinated when certain actors in the chain have more power than others (Kaplinsky, 2000). Gereffi (1994, p. 97) defined governance as "authority and power relationships that determine how financial, material and human resources are allocated and flow within a chain." For the research, the distinction between producer and buyer-driven supply chains is useful (Gereffi, 1994). In buyer-driven chains the critical governing role is played by a buyer who takes responsibility for increasing the efficiency of their suppliers. This role is often played by large retailers such as supermarket. In South Africa large supermarket chains have gained enormous bargaining power, being able to dictate their buying terms to suppliers (GAIN Report, 2015).

In addition, the food system of Cape Town has seen increasing concentration, i.e. a company or a limited number of companies dominating more than one segment of a value chain, as well as consolidation, i.e. merger between large firms to a new entity to have more bargaining power (Greenberg, 2017). This puts larger companies in a better market position. There has been evidence that less powerful actors such as small-scale farmers and informal traders are being marginalised by the increasing power and dominance of the corporate sector (Pereira, 2012).

Although the concept of power is rather diffuse, vertical and horizontal power in a food system can mean that certain actors have the power to determine who wins and who loses in a food system or value chain, who sets the prices and who has higher margins – and may thus influence both sensitivity and adaptive capacity. If we accept that economic shifts can shape vulnerability in food systems, then economic shifts manifested in power relationships both horizontally and vertically can shape vulnerability as it can reveal inequities in the food system and reveal factors influencing food security issues which in turn can affect certain consumer groups disproportionately.

#### 2.4. Theoretical debate and current state of knowledge

Food system vulnerability research is still in its infancy and empirically tested indicators have not been developed yet. Indicators used are often taken from ecological resilience analysis and applied to the food system (e.g. Fraser 2006; Fraser & Rotz, 2015; Hendrickson, 2015). Research that has looked at economic shifts as consolidation, concentration and powerful actors in food systems suggest that food systems which are increasingly governed by powerful actors or corporations may generally be more vulnerable to shocks. Indicators which are used to analyse the influence of economic shifts on the food system's vulnerability are connectivity, diversity and decision-making autonomy (Rotz & Fraser, 2015; Hendrickson, 2015; Fraser, Mabee & Figge, 2005). A reduced redundancy of food flows and tight coordination and connections means few fail-safe mechanisms or buffering capacity, with little flexibility and thus low adaptation or recovery potential. This can result in increased vulnerability to stressors such as drought (exposure the system may before have been able to deal with). Conversely, participating in competitive markets with multiple suppliers can serve to maintain a flow of goods and services, smoothing the impacts of any local extreme event or shock (Ingram, Ericksen, & Liverman, 2012).

Approaches such as City Region Food Systems and more broadly the approach of alternative food networks (AFNs) with a focus on short supply chains, farmers markets and direct selling (Renting et al., 2003), is then often argued to increase resilience of urban food system as these add 'diversity', are less tightly organised, and that short value chain increase resilience against shocks as "they lessen the dependence on distant supply sources" (FAO, 2017, p.6).



## 2.5. Conceptual model and research questions

The conceptual model (fig.2) presented below reflects the relationships between various elements of this research's theoretical foundation. It explains the most important influences of different factors on each other and clarifies the scale of this research.

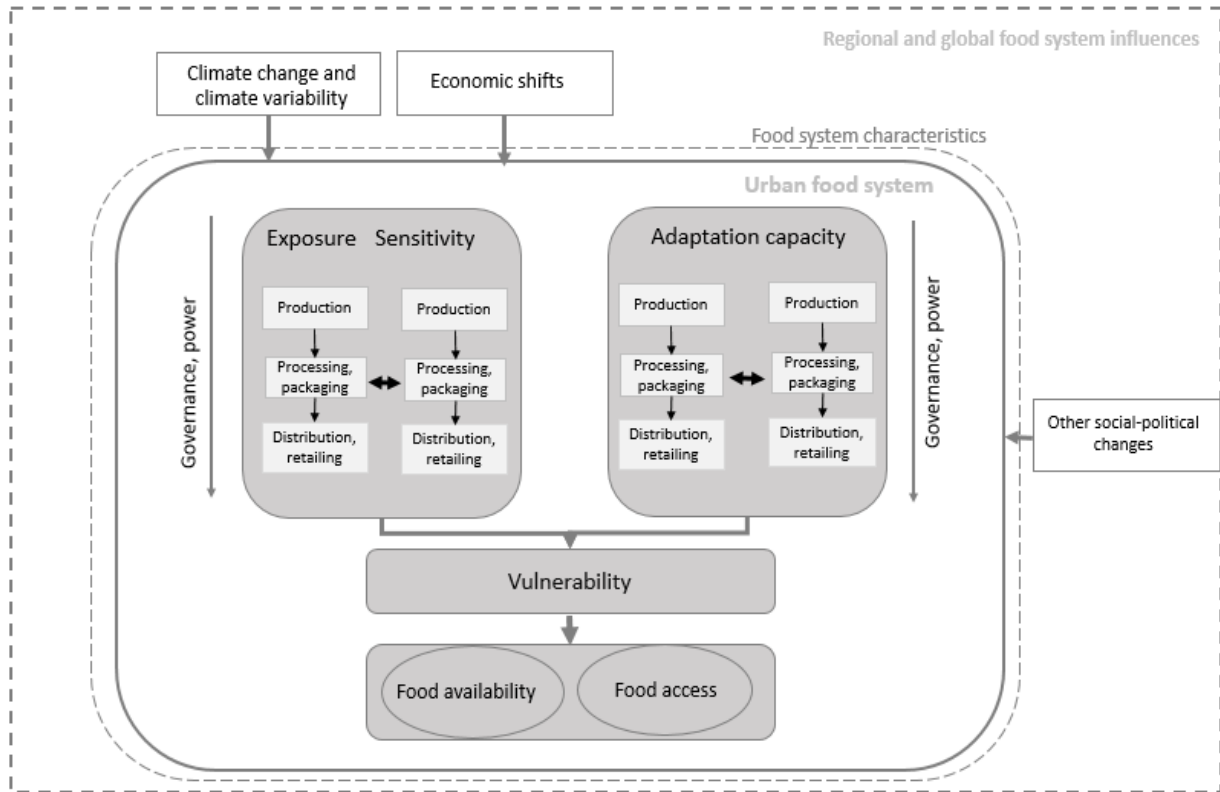


Figure 2: A vulnerability-based model for assessing potential implications of climate change for food security in the urban food system of Cape Town.

The conceptual model is largely based on current knowledge of food system vulnerability to food insecurity and value chain analysis to further analyse the responses and how climate related risks such as drought are mediated by the different food flows, how power shapes the responses and adaptive capacity. The model illustrates how climate related risks such as droughts interact with the urban food system of Cape Town to create conditions of food security and insecurity. The power and governance aspect helps to locate and explain inequities in the urban food system and how such processes can itself create or lessen vulnerability. The conceptual model also considers the wider institutional, economic, political and social setting as these shape the sensitivity and adaptive capacity of suppliers in the value chain.

The conceptual model specifically builds on theories of vulnerability Gallopin (2006), Smit and Wandel (2006), Ericksen (2008) and Ford (2009). Vulnerability to stressors is a function of exposure, which is

mediated by the food systems and value chain conditions and thus determine the sensitivity. The governance and power aspects shows that special attention will be paid to the economic shifts that are taking place, manifested in power differences within the value chains and the wider food system.

In the model, vulnerability refers to both exposure-sensitivity and adaptive capacity. Exposure depends on the magnitude, spatial dispersion, duration and timing of conditions which affect the food system (Gallopín, 2006; Ford, 2009). While sensitivity refers to *“the susceptibility of the food system to food insecurity as a consequence of climatic variability such as drought and implies the potential for adverse food security outcomes”* (availability and access) (Ford, 2009). This means the likelihood that climate related risks manifest itself in the form of constrained food availability, food allocation or food affordability. The nature of the food system concerns how food items are produced, processed, distributed, prepared and sold and how power shapes these processes. Climate-related shocks such as the drought have the potential to affect sensitivity by affecting the food system directly – e.g. the agriculture. More likely the effects will go beyond the production level and will be indirect – e.g. result in increased prices (access).

The second element in the model, adaptive capacity is defined as *“the ability of a system to adjust to climate change (including extremes such as drought) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences”* (IPCC 2007, p. 869). In the context of this research, the system of interest is the urban food system of Cape Town and those adjusting are the actors in the food flows. Adaptation strategies of these actors are defined as an *“adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates, harms, or exploits beneficial opportunities”* (IPCC, 2001), in this research moderating the food insecurity impacts. Importantly, vertical and horizontal power of the food system can shape both exposure-sensitive and adaptive capacity. For example when certain actors have more power to set prices and the power to influence how food flows to and in the city in times of stress (access and allocation).

The conceptual model attempts to highlight that 1) different value chains can have different vulnerabilities to climate-related risks due to differences in exposure, sensitivity and adaptive capacity. Thus resulting in different food security outcomes. 2) Economic shifts such as concentration and consolidation can shape the vulnerability and adaptive capacities within value chains and between value chains via governance and market position both vertically and horizontally.

Importantly, the model also highlights that food security is influenced by many factors, including policies and regional and even global food system processes (Ericksen, 2008; Ford, 2009). Moreover,

food security outcomes have important temporal dimensions. Food availability may decrease or food prices increase temporally, leading to transitory food insecurity (Ford, 2009). But the food system may also be chronically vulnerable, i.e. persistently unable to ensure food security (Ericksen, 2008).

The following sub questions were formulated as assistance in the research, to be aware of the different topics to be addressed and to be able to comprehensively answer the main research question.

1. How can the urban food system be described?
  - a. *From where do different retailers in Cape Town source key food items and how does food flow to and through the city?*
  - b. *How can economic shifts in the urban food system be described?*
2. How vulnerable are the different value chains to shocks such as the local drought?
  - a. *To what extent does exposure to the drought vary between the value chains?*
  - b. *To what extent does the sensitivity to shocks vary between the value chains?*
  - c. *Which adaptation strategies did different value chain actors utilise to cope with the drought and what factors limit adaptive capacity?*
  - d. *What role do economic shifts play in explaining differences in vulnerabilities of the value chains?*
3. Based on the vulnerabilities, what were the impacts for food security, especially of the poorest consumers in Cape Town?

### 3. Methodology

This chapter elaborates on the methodology utilised, the research instruments, as well as limitations and ethical issues. The research is a descriptive and explorative one with focus on gathering data on the food flows to and within Cape Town and on gaining knowledge on the vulnerability of urban food systems to climate related shocks. Lastly, the aim is to illuminate the implications of the vulnerabilities for the food security of the city dwellers.

The research followed the realist tradition (Blaikie, 1993; Bhaskar 1995), beginning with a descriptive exploratory stage based on the empirical results obtained. This stage included describing the food flows to and within Cape Town as well as the vulnerability to drought. This was followed by an explanatory theoretical stage and rationally explaining the patterns found. This second stage entailed the explanation of vulnerability, the differences in vulnerability between food flows and to what extent power could explain these differences. Further research is then advised to validate what is thought to be known.

### 3.1. Qualitative case study as suitable method

The core of the research was an in-depth exploratory case study of Cape Town, following five key food items from point of retail to production and engaging with actors along these food flows. A qualitative case study approach was applicable as the aim was to create knowledge. Particularly in instances where very little is known about system response to climate related shocks, case studies can help to identify and characterise some of the processes and conditions shaping vulnerability (Turner et al. 2003; Ericksen, 2008; Tendall et al., 2015). Until today, there are few studies on food flow vulnerability, studies are generally limited to either the production or consumer side or to the food system on an aggregated level, masking the scope of the challenges of an urban food system (e.g. Fraser 2006; Fraser & Rotz, 2015; Hendrickson, 2015).

The years 2015-2017 were in many ways anomalous in terms of climate, and representative of climate changes predicted for South Africa by global climate models (IPCC, 2014; Niang, 2014; Benhin et al., 2006). Inspired by Ford (2009), this research applied a vulnerability model to analyse links between climate-related conditions and food security by examining how value chain actors experienced and responded to climatic extremes in the years 2015-2017. This can support the development of baselines for characterising vulnerability to drought in urban food system and can help unravel important lessons for decision makers concerned with food security and vulnerability reduction (Ford, 2009).

Despite the methodological strengths of a case study approach, the results cannot automatically be generalised, i.e. to other cities (Yin, 2014). Case study research is also criticised for being more subjective than other methods. Using multiple sources, using 'triangulation' to confirm findings from different sources was therefore applied (Hay, 2010; Yin, 2014).

#### 3.1.1. Study area of Cape Town

Cape Town was chosen as it experiences major challenges such as extreme inequality and persistent poverty while at the same time being at the forefront of food system modernisation (Reardon, 2003; Weatherspoon & Reardon, 2003, Tschirley et al., 2015). Cape Town was also chosen as data on food security and the urban food system is available. The African Centre for Cities has done extensive research on the extent of Cape Town's food insecurity and on where poorer city dwellers buy their food; important information for both the research design and interpretation of the findings of this study.

The city covers a geographical area of 2,479 km<sup>2</sup> (Statistics South Africa, 2017). The study area was confined by the administrative boundaries of the City of Cape Town at retail level, but could go beyond Cape Town when following the food.

### 3.1.2. Mapping food flows and exploring exposure-sensitivity and adaptation

Interviews with food system actors in the food flows helped to firstly map the food flows to Cape Town and secondly assess the vulnerability to food insecurity of these. This helped to tackle conflicting perspectives in the literature about the vulnerability of food flows.

#### **Chosen food items to follow**

According to the most recent official household-level expenditure data from StatsSA IES 2010/11, the food expenditure of the poorest 50% of the population is dominated by staples and animal protein. Staple foods (bread, maize meal, rice, potatoes) account for 35% of the expenditure, animal protein foods (meat, fish and eggs) for 24%. Meat is a high value product, its importance is based on value rather than volume, while the importance of bread and cereals is driven volume. Vegetables follow with 7% of expenditure – in which tomatoes play an important role (Bureau for Food and Agricultural Policy, 2016). Slight regional differences can be observed. In the Western Cape, the poorest consumers spend relatively more on bread, potatoes, and red meat (ibid). This research is therefore based on the following five food items: maize meal, bread, potato, tomato, red meat. The research chose to first only follow beef, but during the interviews with traders it was found that lamb and goat are also of importance to the poor.

#### **Study sites**

The data collection started at the retail level and then involved the collection of the contact details of the primary suppliers to each retail outlet. All suppliers mentioned by the retailers were contacted – a form of snowball sampling – and an employee having knowledge of the drought impact was interviewed (usually management level, procurement, sales). This process continued until the original source was identified (the farm, the exporting country, etc.). Purposeful sampling at retail level was used to ensure variability as well as their significance to the poor consumers.

As supermarkets in Cape Town are found in almost all districts of the city and increasingly target low income areas (Peyton & Battersby, 2014), all five major supermarkets were targeted. Superettes and informal traders are predominantly located in lower income areas and included convenience shops (Spaza's), fruit and vegetable traders, and meat traders (especially braai, i.e. cooked meat/barbeque). During the interview process, an interview facilitator (Representative of the Informal Trader Association) accompanied and guided the researcher through the interview process with the informal traders and superettes. Criteria applied here were importance to poorer consumers, variety of respondents as well as personal safety.

Interviews with supermarket respondents would usually take place in the head office. The same applies to manufacturers, and processors located within the city boundaries. Interviews with informal traders and superettes would take place at the retail site. Informal trader interviews were held in Gugulethu, Mandalay, Kayelitsha, Nyanga, Phillipi, and Strand. With superettes interviews took place in Brooklyn and Grassy Park. Interviews with respondents outside of Cape Town were conducted on the phone.

Although the sourcing and distribution of supermarkets is often centralised, sourcing of informal vendors can vary according to location. Data obtained for the informal vendors was therefore triangulated with quantitative data. The Hungry Cities Partnership conducted a survey among 1025 informal traders in the City of Cape Town. Amongst other issues, the survey asked traders which products they had been selling over the past month and where they sourced the product from. The survey was conducted during the months of March and April 2017, in ten communities of the city with major informal trading areas. Figure 3 shows the data collection points of the survey (red); added are the data collection points for informal trade for this research (yellow).

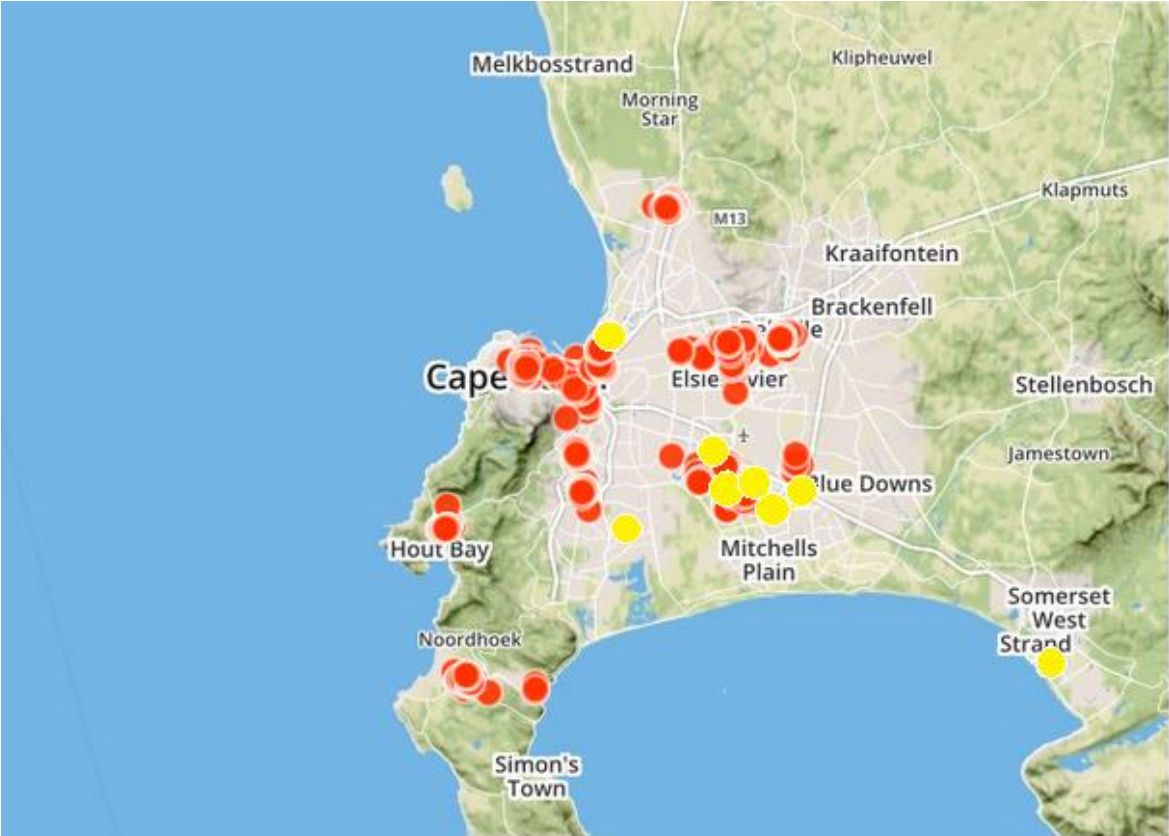


Figure 3: Data collection points informal retail survey of the Hungry City Partnership Survey (red); added are the data collection points for this research (yellow)

Most surveys were conducted in Belleville (18%), Cape Town Central Business District (12%), Nyanga (10.5%) and Du Noon (10%). Of the respondents, 54% were male and 46% were female (n=1023). In

terms of business location, 26.3% had a temporary stall on the street/roadside, 23.7% had a permanent stall on the street/roadside, followed by 15.9% having a permanent stall in a market. 9.8% of the respondents indicated that they had a workshop/shop, while 8.7% had no fixed location. 7.8% stated to work at a taxi rank, 7.3% at a railway station and 2.2% at a bus terminal. Only 3.6% of the respondents traded from his/her home or own vehicle (1.8%) (n=1023). Of the respondents, 51.7% were from a foreign country, while 48.3% were from South Africa (n=1023). South Africa has shown high migration rates from other African countries and it has been found that Somali traders, for example, dominate in the spaza business (Battersby, Marshak & Mngqibisa, 2016). This also shows that the interviews for this research were skewed towards men and South Africans.

The survey involved 30 food items, of which only of relevance for this research can be seen in table 1. Regarding the five food items, vegetables are a major traded food item amongst the surveyed informal traders (22.9%), followed by meat (17.0%), bread (16.3%) and maize meal (13.1%).

*Table 1: Traded food items by the respondents over the last month (n=744 out of 1022; multiple answers possible)*

<b>Traded food item</b>	<b>Frequency</b>	<b>Percentage</b>	
Maize meal	134	13.1%	
<b>Fresh/cooked vegetable</b>	<b>235</b>	<b>22.9%</b>	
White bread	94	9.2%	16.3%
Brown bread	73	7.1%	
Cooked meat	95	9.3%	17.0%
Fresh meat	79	7.7%	
<b>Total</b>	<b>744</b>	<b>-</b>	

### **Gathering the data - interviews**

Interviews with retailers and suppliers were conducted between April and June of 2017. An interview guide with key themes was used to direct the interviews. The themes focused on the food flows, drought impacts on food availability and access, adaptation strategies applied to overcome these impacts, as well as conditions facilitating and constraining adaptability. Semi-structured interviews were preferred, to ensure that important topics are covered while allowing the interviewees to add own ideas and thoughts (Ford, 2006; Hay, 2010). In addition, conversations held with the research facilitator and supervisors provided more information and corroborated the interview data.

Due to commercial sensitivities and confidentiality issues, interview requests were posed with assurances of anonymity. Nevertheless, especially large companies were unwilling to participate. Cut-off criteria used was after two reminders. When supermarket head offices would not be willing to participate, the researcher and interview facilitator would approach individual stores of the supermarket chain, focusing on lower income areas. When other important nodes in the research were

unwilling to participate (most notably feedlots and abattoirs in the case of meat), the researcher approached producer and industry associations to receive information indirectly. This was also found useful to triangulate data that had already been gathered. The total sample size was determined by the point of saturation (Hay, 2010), until the researcher felt confident about understanding the food flows, connecting nodes, major actors and how they were impacted by the drought.

The total number of interviews was 47. Out of these, 40 were from retail to farm level (35 men, 4 women). Table 2 shows the interview specifications. In addition, 6 interviews were held with experts (4 men, 2 women) and 1 interview was held with the Western Cape Government (1 man). These interviews supported the completion and triangulation of received information (Hay, 2010).

Table 2: Characterisation of interview respondents

Value chain level	Number of interviews	Specifications	Interviewee roles/responsibilities
Retail	20	5 interviews with supermarkets	- Lead of Sustainability Project - Purchasing manager - Sales manager - Floor manager
		6 interviews with superette/mini-shop	- Owner - Employee
		9 interviews with informal vendors - 2 spaza shops - 4 fruit and vegetable vendors - 3 meat vendors	- Owner of business operation - Employee
Wholesale	6	Cash & Carries or wholesale markets	- Deputy Manager - Trading Manager - Purchasing Manager - Store Manager - General Manager
Manufacturing/ Processing	4		- Wholesale Development Manager - Executive Manufacturing - Executive Milling and Supply chain - Group Head of Technical
Farm	7	4 interviews with farmers	- Farm owner - Employee
		3 interviews with producer organisations	- CEO producer organisation - Head of Economic and Agribusiness Research
Other relevant nodes	3	Auctioning; storage and input supply	- CEO - Managing Director
<b>total</b>	<b>40</b>		



Per food item, the division looked like this:

Food item	Number of interviews
Maize meal	16 interviews
Bread	16 interviews
Potato	22 interviews
Tomato	21 interviews
Red meat	13 interviews

Respondents could sell more than one food item. Supermarkets, for example, sold all five food items – but interviews here would be guided by the respondent’s knowledge about the different food items. Spaza shops would usually sell maize meal, bread, tomato and potato (but not meat), while fruit and vegetable vendors would sell both tomato and potato. The Manufacturing/processing level included bread, maize meal and meat. Red meat was the food item least covered; i.e. no interviews with feedlots were held; abattoirs were only indirectly covered by interviews with industry organisations and a meat processor company who also operated an abattoir.

In total, 35 men for interviewed, but only 5 women. Two explanations could be valid. Firstly, men were more likely to agree to interviews. Secondly, spaza shops and more permanent fruit and vegetable stands are generally operated by men, while only meat trading is dominated by women (Battersby, Marshak & Mngqibisa, 2016). Among the respondents, South Africans were dominant, with only 3 respondents originating from other countries (Somalia, Egypt, and Britain). The majority of informal traders were black and coloured, the same was the case for superettes. The majority of respondents in supermarkets were coloured and white respondents. Respondents in the other nodes (e.g. manufacturers) were also predominantly white.

The quality of the interviews differed. Not all participants were willing to share sensitive information and discuss power issues. Two exceptions stand out: an unscheduled interview with a bread & maize manufacturer whom the researcher met by coincidence at an interview with a wholesaler. As he did not reveal his name, he was more willing to share sensitive information and dynamics of power in the market. Another interview was held with an employee at a meat processor who was more open about power dynamics and price setting. In general, producer and industry organisations were also more willing to share information about price setting and power. Informal traders were often used to use different language than the usual business language other stakeholders used. The interview facilitator was of great help here to bridge the cultural and language barriers.

### 3.1.3. Assessing food security outcomes and secondary data research

To measure relative vulnerability to food insecurity, indicators such as (temporal) price increases, relative food allocation and stability of food supply were used as indicators. Did actors experience supply disruptions or recognise reduced food availability? What were the impacts on prices? The researcher relied on the respondent's information which was complemented and triangulated with secondary sources (including statistics and government reports and peer-reviewed research) and expert interviews (Hay, 2010).

For interpretations of food allocation, the supply consistency between different food flows was compared; i.e. weather actors experienced supply disruptions. In addition, research about the geography of food retail helped to interpret the results in terms of food allocation (see also next chapter). Local historic prices for 2015 and 2016 were not always available (meat); official sources usually only gather prices and volumes for the formal sector and not for the informal sector (Battersby, Marshak & Mngqibisa, 2016). The researcher then relied on the respondent's information and triangulated this with experts and industry stakeholders. Price records for supermarkets in Cape Town were received from Retail Watch<sup>4</sup>. Data was also received from the Cape Town Fresh Produce Market on both price and volumes traded. This is important as aggregated data can mask regional differences.

### 3.1.4. Analysing the data

The interviews were recorded with the interviewees' permission, thereafter literal transcriptions was used. When the environment was not suitable for recording (e.g. noise), which often was the case with informal traders, notes were taken and verbatim quotes were retained. The researcher also kept a research diary with analytical memos. The data from these different sources was gathered and analysed using the programme Nvivo. This was an iterative process in which nodes were deleted, merged and created until all sensitivity and adaptations described fit into the node tree.

## 3.2. Limitations

**The researchers' positionality:** As young, white, female, unreligious, middle classed, and rather privileged researcher, the researchers' identity is shaped by beliefs and values that profoundly differ from most of the respondents. Respondents might have been biased in what they were willing to share and the researchers' interpretation of the data is prone to bias. Critical reflexivity and conversations with the research facilitator and supervisors reduced the susceptibility to bias (Hay, 2010).

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<sup>4</sup> Website Retail Watch South Africa: <http://retailpricewatch.co.za/>

**Time.** The fieldwork period to collect data for this research was about 12 weeks, which posed limits to the amount of data that could be collected. Food systems are very complex, therefore certain cut-off criteria were used: the research did not consider nutrition security or food safety, the research focused only on five food items and only covered the consumers indirectly.

**Data bias.** This research collected data during and after the drought – depending on the different sourcing regions and food items. Respondents were thus often recalling information. Data that is being recalled can be of low quality due to the time interval between the experience and the moment of data collection. Another bias can arise from the fact that retailers were asked for the contact details of their primary and secondary supplier – itself prone to bias. Supermarkets could for example choose the farmers they had a good relationship with rather than a farmer who had bad experiences working with supermarkets. The bias was reduced by triangulation with expert interviews.

### 3.3. Ethics

Data collection followed procedures for ethical research. The anonymity of respondents was ensured and informed consent received. All information provided during the interviews was kept absolutely confidential, and it was assured that identification by what the respondent said was not possible. To minimise the risk of psychological or social harm (e.g. embarrassment, feeling uncomfortable) during the interview process, an interview facilitator (Representative of the Informal Trader Association) accompanied and guided the researcher through the interview process with the informal traders.

## 4. Contextual background

This chapter zooms in on the components laid out in the conceptual framework – a necessary first step to understanding potential vulnerabilities and putting the findings into perspective. This chapter addresses national and regional food system characteristics, economic shifts as well as the urban food system characteristics of Cape Town.

### 4.1. National and regional food system characteristics

The direct contributions of agriculture to South Africa's GDP and employment are less than 5% and approximately 13% respectively. Nevertheless, taking the sector's full contribution, with multipliers and full value chains, into account this increases to 12% of GDP and 30% of national employment (DAFF, 2013). South Africa is naturally water scarce and the distribution of rain varies widely across the country – generally reducing from east to west. 65% of the country receives less than 500 mm of rain a year, well below the world average of 860 mm a year (Water Research Commission, n.d). Based on climate, certain areas of the country are more suited for particular crops and stock farming than others

(DAFF, 2017). For instance, approximately 70% of South Africa’s cereals and 90% of its commercially grown maize is farmed on the central plateau of South Africa near Lesotho (Blignaut et al., 2014). Cattle production is practiced mostly in the eastern areas of the country (DAFF, 2017).

The Western Cape Region has the highest variability of mean annual rainfall in South Africa (Water Research Commission, n.d). Nevertheless, the province is known for its production stability thanks to well-developed irrigation schemes. The Western Cape area is suitable for wheat production (around 86,500 hectares in 2013), potato production (6705 hectares) as well as cattle farming (383,500 hectares). The province has lower production of tomato (250 hectares) and very low production of maize (120 hectares) (Western Cape Government, 2013).

#### 4.2. Economic shifts and the expansion of corporate power

Since the end of apartheid, a general feature of Cape Town’s food system, embedded in the wider food system of South Africa, has been modernisation (table 3).

Table 3: Comparing "traditional" and "modern" food systems

<b>Food System Features</b>	<b>“Traditional” Food Systems</b>	<b>“Modern” Food Systems</b>
Principal employment	In the production of food	In the processing, packaging and retailing of food
Supply chain	Short and local	Long and global
Food production	Diverse, varied productivity	Few crops predominate, intensive, high input
Typical food	Basic staples	Processed food, more animal products
Purchasing from	Small, local shops or open markets	Large supermarkets chains
Main cause for national food shocks	Poor rains, production shocks	International price and trade problems
Influential scale	Local to national	National to global

Source: adopted from Maxwell & Slater (2003) as depicted in Ericksen (2008)

Food system modernisation has been supported by factors such as income growth, expansion of the middle class, increased urbanisation, as well as favourable policies (Reardon et al., 2003; Reardon et al., 2004; Humphrey, 2007). The deregulation of the agricultural sector in South Africa and worldwide neo-liberal policies facilitated the transition from tight nation-state control and marketing boards to global markets and corporate power (Van Zyl, Kirsten & Binswanger, 1996; Greenberg, 2015). While in 1990, more than 75% of food was sold under controlled marketing schemes in South Africa, today a handful of private players are controlling the market (Greenberg, 2015; Pereira & Drimie, 2016). The

food system today is characterised by industrial agricultural production, factory-based processing, and supermarket-controlled retail (Reardon, 2003; Tschirley et al., 2015).

### 4.3. Socio-economic profile of Cape Town

Cape Town is located in the southern peninsula of the Western Cape Province (fig.4). The urban food system is strongly influenced by urbanisation; mainly due to migrants from rural countryside, and other parts of Africa. The total population



Figure 4: Geographical location of the Western Cape and Cape Town, source: Western Cape Government, 2016

of the city was estimated to be 4,014,765 in 2017 – a large increase from 2,892,243 in 2001 (table 4). The percentage of formal dwellings stands at around 78.0%. Due to a lack of affordable housing, informal settlements are expanding (City of Cape Town, 2016a). The unemployment is high, although it has reduced from 29.2% in 2001 to 21.8% in 2017. The proportion of households with no income also remains high at 13.9%. Despite slight improvement, the Gini coefficient<sup>5</sup> is still above 0.5 – one of the highest in the world and mirrors a large disparity in income.

Table 4: Socio-economic characteristics of Cape Town in 2001, 2011 and 2017; sources as indicated<sup>6</sup>

Characteristics	2001	2011	2017
Population	2,892,243 <sup>a</sup>	3,740,026 <sup>a</sup>	4,014,765 <sup>b</sup>
Formal dwellings	78.9% <sup>a</sup>	78.4% <sup>a</sup>	-
Unemployment rate (%)	29.2% <sup>a</sup>	23.9% <sup>a</sup>	- 21.8% *
Proportion of households with no income	13.3% <sup>d</sup>	-	13.9% <sup>b</sup>
Gini coefficient	0.60 <sup>c</sup>	0.57 <sup>c</sup>	-

a Statistics SA (2017) based on official census 2001 and 2011  
 b Western Cape Government, based on community survey 2016  
 c City of Cape Town (2016a)  
 d Western Cape Government, 2007  
 \* Strict unemployment, which includes discouraged work seekers

<sup>5</sup> The higher the value between 0 and 1 of the Gini coefficient, the greater the level of income inequality.

<sup>6</sup> Years chosen based on official census in 2001 and 2011, and latest available data for 2017

The inequality is represented spatially in the city. Approximately 63% of households in the Khayelitsha/Mitchells Plain district fall within the low income bracket, of which 16.5% have no income. Around 51.0% of the households in the Cape Flats fall within the low income bracket of which 13.8% have no income (see also fig. 5). In these areas, food insecurity is the highest as households in lower-income groups spend approximately 35% of their income on food (McLachlan & Landman, 2013). Cape Town has unequal distribution of income across racial groups. The population is made up of the following groups: Coloured 42.4%, black African 38.6%, white 15.7%, Indian/Asian 1.4% and other 1.9% (Statistics South Africa, 2017) – with highest proportions of no income households among black African at around 9.0% of the 13.9%, followed by the Coloured and low percentages among the White and Indian/Asians.

4.4. Current knowledge about Cape Town’s food system

The spatially represented inequality means that the importance of informal traders is more pronounced in low income areas. A study by Battersby and Peyton (2014) showed that supermarkets

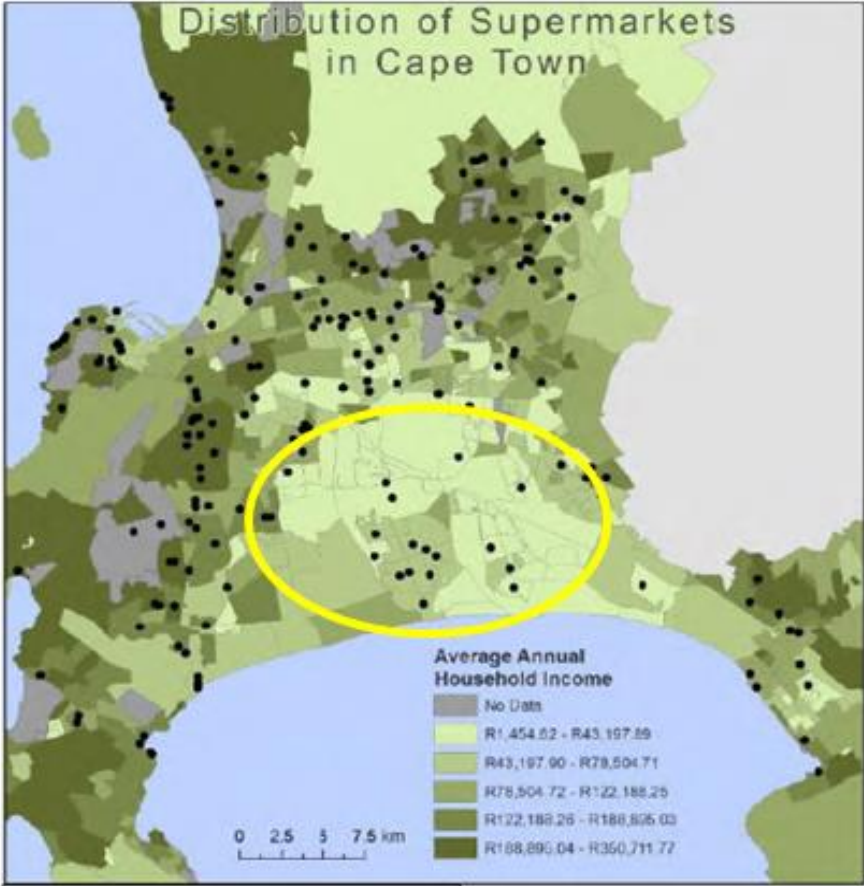


Figure 5: The distribution of supermarkets in Cape Town compared to geographies of poverty, with highlight inserted by author; source: Peyton, 2013

are unequally distributed, with low income consumers lacking access to supermarkets. Especially the areas with high levels of households with no income, in Khayelitsha/ Mitchells Plain and Cape Flats, show a dearth of supermarkets (fig.5). Lack of proximity to supermarkets coupled with lack of time and mobility implies that supermarkets are largely inaccessible for low income consumers (Crush et al, 2011). In addition, supermarkets often sell large unit sizes which are

unaffordable to the poor. Urban food security is thus not only matter of income, but is influenced by a complex set of factors (Battersby & Peyton, 2014). The AFSUN baseline survey, conducted in 2008 in three low income locations (Ocean View, Philippi, and Khayelitsha), showed that due to these factors the informal market is yet indispensable to the poor. Although 99.3% of the sampled 1060 households had purchased food at a supermarket at some point in the previous year, just 26.8% went to supermarkets once a week or more. Instead, households purchased their daily or weekly food supplies

Table 5: Comparison of different forms of retail, source: Battersby et al., 2016

	Advantages	Disadvantages
Supermarkets	<ol style="list-style-type: none"> <li>1. Lower prices per unit</li> <li>2. Higher safety standards</li> <li>3. Large range of foods</li> </ol>	<ol style="list-style-type: none"> <li>1. Unit sizes unaffordable for poorest</li> <li>2. Inconvenient locations</li> <li>3. Limited opening hours</li> <li>4. No credit offered</li> </ol>
Spazas	<ol style="list-style-type: none"> <li>1. Affordable unit sizes for the poor</li> <li>2. Sale of food on credit</li> <li>3. Long opening hours</li> <li>4. Convenient locations</li> </ol>	<ol style="list-style-type: none"> <li>1. Costs more than super markets per unit weight</li> <li>2. Perceived low quality of food</li> <li>3. Limited range of foods</li> </ol>
Fresh produce vendors	<ol style="list-style-type: none"> <li>1. Convenient location for daily purchase</li> <li>2. Produce restocked daily</li> <li>3. Often cheaper than supermarkets</li> </ol>	<ol style="list-style-type: none"> <li>1. Limited shelf life of produce due to lack of cold chain</li> </ol>
Meat vendors and livestock vendors	<ol style="list-style-type: none"> <li>1. Cultural preferences</li> <li>2. Range of cuts of meat, including "fifth quarter"</li> <li>3. Argued to taste better (live chicken)</li> </ol>	<ol style="list-style-type: none"> <li>1. Food safety</li> </ol>

from small shops (mainly spaza shops) or from informal markets/street food (61.5% and 55.1% respectively). This is due to the fact that informal spaza shops, fresh produce and meat vendors sell affordable unit sizes, are geographically more accessible, have longer operating hours offer credit when customers experience cash shortages (table 5).

**Urban Agriculture**

Urban agriculture plays an important part in the city’s food system. For example, it is estimated that some 30% of fresh produce grown in the Philippi Horticulture Area (commercial agricultural area within the city of Cape Town) is sold to the local informal sector (Battersby & Haysom, 2011).

**5. Food flows to and within Cape Town**

This chapter describes the first empirical results and answers the question of where different retailers source the key food items from and how food flows to and through Cape Town. The chapter shows the diversity of food flows and discusses the governance and power distribution in major food flows.

**5.1. Interdependence and differences in the urban food system**

From processing, manufacturing and distribution, large parts of the activities in the urban food system take place within the city’s boundaries. But due to the nature of the national food system, food consumed in Cape Town is often not locally produced. As discussed in the previous chapter, based on climate certain areas of the country concentrate on particular crops and stock farming (DAFF, 2017). Food therefore reaches the city through a variety of food flows, making the Cape Town food system

highly connected with the national and even global food system. Only a few truly local supply chains can be found, mostly for fresh produce and meat, both for formal and informal retail. Even the purely local value chains are influenced by other scales of the food system, e.g. through price determination, and cannot be seen as separate from the other food system scales.

The food flows are specified from the retailers view, covering supermarkets, superettes and informal traders. The supermarket generally occupy large retail areas, roughly between 350 to 4000m<sup>2</sup> with 3-4 or more cash registers (Reardon & Berdugué, 2002). Five supermarket chains dominate 97% of the national market – which is also the case in Cape Town (GAIN Report, 2015): Shoprite and Pick n Pay with around 30-35% of the national market each. SPAR follows with around 25% of the market. The rest is held by Woolworth and Fruit and Veg City. Supermarkets generally sold all five food items traced. Although all the supermarket chains, except for Woolworth, have extended their offering to target customers in townships, supermarkets predominantly cater for middle and higher income consumers (Greenberg, 2017).

That being said, the informal food retail remains an important urban food system component. Although difficult to quantify, it covers around 30% of all food sales (GAIN report, 2015, Greenberg, 2017). According to Smit, “most of the food retail sector in most African cities can be classified as being at the ‘informal’ end of the formality/informality continuum” (2016, p.83). There are large numbers of informal traders and ‘small self-service stores’ called superettes in Cape Town. Their economic and political power is dispersed and weak – unlike corporate retail where the actors are large, consolidated and centralised units that can exert direct influence over the market (Greenberg, 2017). Informal traders and superettes cater for low to middle income consumers in residential areas. Superettes are smaller than supermarkets in terms of selling area and product range, they do not offer meat and do not specialise in fresh produce. Informal spaza shops are small full-service shops usually run from home and service local population mostly in lower income areas. Just like superettes, spazas do not sell meat. Instead, there are a variety of small street vendors serving passing consumers on the street and residential areas, specialising in red meat or fresh produce. The traders do not always have permanent trading areas. Compared to the large numbers of employees in supermarkets, the spazas studied had 1-2 employees running the business during times of the interviews, this was 1-7 for meat traders, 1-4 for fresh produce traders, and 1-4 for superettes. It is important to note that the informal food retail is diverse and ranges from small-scale operations to large scale operations that distribute to several other businesses (Battersby, 2012).

As will be shown, informal traders depend largely on major formal players for their food sourcing. Food flows are often not separated between formal and informal, are not solely linear, but are



interconnected. There are often important ‘nodes’ in the food systems on which both informal and formal retailers depend. This is very pronounced for processed food such as maize meal and bread, where a trend towards standardised large scale manufacture based foods can be seen. As this counts for all income groups, all retailers largely depend on the same dominant manufacturers.

Despite these nodes and interdependences different circuits of food flows can also be noted. This is more pronounced for fresh produce and meat food flows where retailers cater for different consumer groups and different needs and demands. As informal traders and superettes cater predominantly for lower income, cash-strapped, consumers their main aim is to find the produce of best value. Here, also local food flows can be found which bring cheaper produce to the consumer. The main challenge mentioned was often price fluctuations, so traders were faced with the need to shop around to find the best prices. Food flows are also influenced by the fact that retailers have different resource endowments. Informal traders for example often lack refrigeration and need to restock perishable food items often, sometimes on a daily basis. At the same time they are often faced with the lack of own transport, reducing their mobility and flexibility.

Supermarkets are not faced with these challenges; they do not lack infrastructure and often operate their own distribution fleet. Their challenges mentioned related more to long term trends such as slowing income growth and climate change or difficulties to cater for all income groups. As they cater for wealthier consumers, supermarkets may have more room to take higher profit margins. Informal traders and superettes are often limited to do so due to cash-strapped consumers and competition. For example, while industry sources estimate the gross profit margin of supermarkets to be around 20-25%, spaza shops and fresh produce traders reported a gross profit margin of around 10-20%.

The following pages will outline the food flows more specifically, supported by graphic depictions of

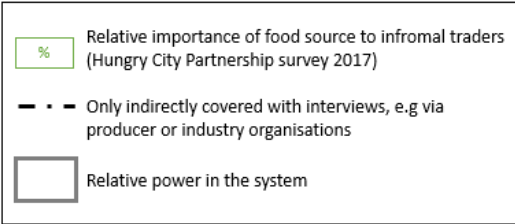


Figure 6: Legend to figure of food flows

the food flows as understood from the interviews. The figures show food flows to the different retail types, complemented with quantifications taken from the Hungry Cities Partnership (HCP) Survey for the informal traders. The figures also show which food flows were only indirectly covered with interviews and where relative power in the food flows resides. The latter part

will be described more in-depth at the end of this chapter. It is important to note that food waste has not been covered in these food flows.

## 5.2. The flow of maize meal

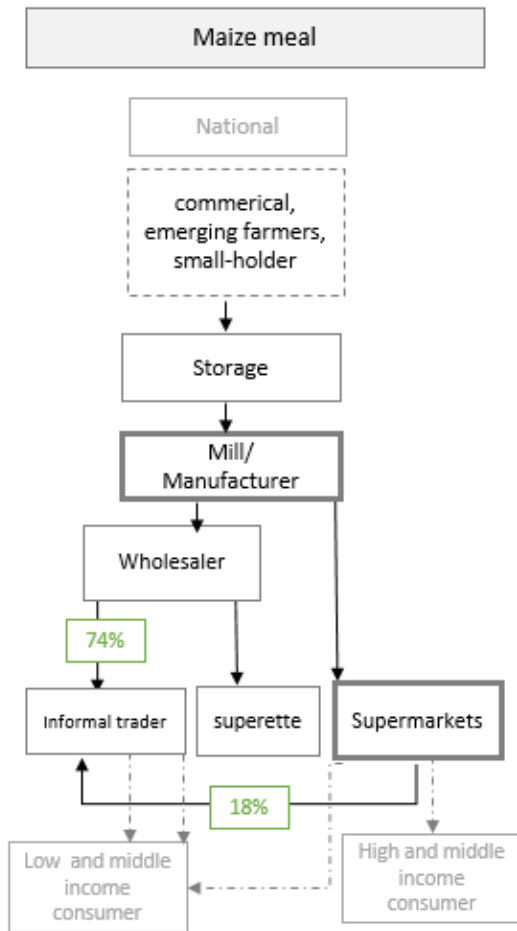


Figure 7: Food flows of maize meal; source: author

*“In Cape Town, we don’t have that many maize suppliers. But up in Joburg and Northern Cape, there are a lot of independent millers. So you will find, ach, 50 different types of maize price. Whereas in Cape Town, you predominantly only got 2, maybe 3. Of any significance. Obviously Sasko produces White Star - that is the main one, Premier produces Iwisa (...) and Impala. Then you will find a couple from the Northern Cape, there is one called Batho Bothle, which you will see in very few shops, Tiger brands does ACE, but ACE does not perform in Cape Town. So that is pretty much all the maize that you will find here.” (Interview maize manufacturer #13).*

### 5.2.1. Supermarkets and maize meal

Supermarkets either source maize meal directly from manufacturers or via the chains own distributions centres (DCs), followed by distribution around the country from this central point. Sourcing from DC’s ensures economies of scale and associated discounts and rebates that can be secured from suppliers when DC’s buy in bulk. The main manufacturers mentioned were Pioneer (brand White Star) and Premier Foods (Iwisa and Impala) for maize meal who often own their own milling operations. As the Western Cape is not self-sufficient in terms of white maize and maize milling operations are usually located near the source, rather than close to the market, maize is predominantly sourced from the country’s maize belt in the East (DAFF, 2017; Interview storage and input supplier #44).

The industry for processed food is increasingly concentrated and controlled by a handful of farmers, silo owners and manufacturers. The nodes of milling and manufacturing are dominated by large players: Pioneer Foods (Sasko Milling), Tiger Milling, Premier Foods who also dominate both the maize milling and the wheat milling market (Greenberg, 2017). These are important nodes on which all retailers rely.

While there are many informal mills operating near the maize belt, this is less so the case for the Western Cape, indicating relatively higher concentration:

*“In Cape Town, we don’t have that many maize suppliers. But up in Joburg and Northern Cape, there are a lot of independent millers. So you will find, ach, 50 different types of maize price. Whereas in Cape Town, you predominantly only got 2, maybe 3. Of any significance. Obviously Sasko produces White Star - that is the main one, Premier produces Iwisa (...) and Impala. Then you will find a couple from the Northern Cape, there is one called Batho Bothle, which you will see in very few shops, Tiger brands does ACE, but ACE does not perform in Cape Town. So that is pretty much all the maize that you will find here.”*

### 5.2.2. Superettes and maize meal

Superettes mainly source maize meal indirectly from the large manufacturers or from wholesalers. These wholesalers can belong to a chain, for example Massmart, or be independent wholesalers. Wholesalers in the city often have better buying conditions and can offer the cheapest produce to superettes. An important aspect of the wholesalers, both those being part of a chain and independent ones, are buying groups such as Unitrade Management Services (UMS) and Elite Star Trading. Buying group-led buying gives actors more buying power than they would have individually. Wholesalers source from manufactures and specialise in supplying both superettes and spaza shops. They, for example, often send leaflets to these with information about their newest offers. On these leaflets, maize meal would usually be on a monthly offer to retailers (Interview superette #14). With these special offers, both superettes and spaza shops noted to be able to sell maize meal at the same price as the wholesalers. Especially when superettes or traders buy in bulk (sometimes with other traders) and receive better pricing, they are still able to make a profit, despite selling at wholesale price.

### 5.2.3. Informal traders and maize meal

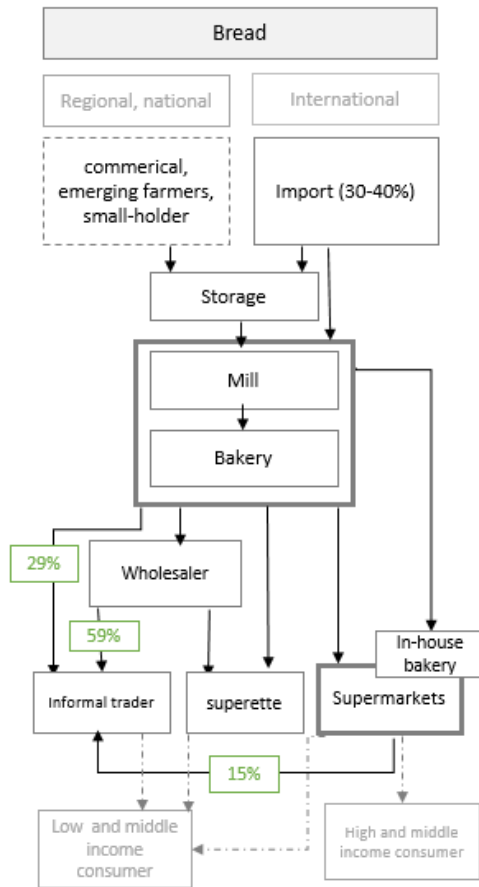
In the HCP survey, informal traders surveyed sources maize meal mainly from wholesalers (73.7%), followed by supermarkets (18.0%) – they mostly transported maize meal with own transport.

*Table 6: Main sources of maize meal for informal traders, main transport, and mean amount spent over the last month (n=133); multiple answers possible*

Source	Frequency	Percentage	Main means of transport from source	Mean amount spent (ZAR)
<b>From wholesaler</b>	<b>98</b>	<b>73.7%</b>	<b>Own transport (71.4%) Pay someone else (13.3%)</b>	4258.65
<b>From supermarket</b>	<b>24</b>	<b>18.0%</b>	<b>Own transport (50.0%) By foot (25.0%)</b>	3193.58
From small shops/retailers	8	6.0%	Own transport (50.0%) By foot (25.0%)	4122.25
From informal sector producers/retailers	8	6.0%	By foot (37.5%) Informal delivery (37.5%)	3533.75
From formal markets	7	5.3%	Own transport (42.9%) Formal delivery (42.9%)	2264.29
Direct from factory	5	3.8%	Own transport (80.0%) Pay someone else (20.0%)	6455.60
Direct from farms	5	3.8%	Bus or taxi (40.0%) Own transport (40.0%)	2780.00

### 5.3. The flow of bread

For bread, the main manufacturers mentioned by all retailers were Pioneer (Sasko bread), Premier (Blue Ribbon), Tiger Brand (Albany), and to a lesser extent Golden Crust, a medium sized bakery based in Cape Town which, interestingly, sources its flour from Sasko. Whereas one of the biggest bakeries in Cape Town bakes around 300,000 loaves a day, Golden Crust bakery bakes around 40,000.



South Africa is not self-sufficient in terms of wheat and millers therefore stated to import between 30-40% of their demand from a variety of international sources. The wheat is then shipped to Cape Town where the manufacturers offload the vessels with their own transport. The main international sources for wheat are Russia, Germany, Canada, Australia, and the Ukraine (DAFF, 2017). For bread manufacturers, it is more important to be close to where there is a high density of retail outlets. All the mentioned bread manufacturers therefore have bakeries in Cape Town. Manufacturers have their own logistics, with bakeries delivering daily to supermarkets. Interestingly manufacturers have started to also deliver directly to informal spaza shops. For Premier, this accounts for over 60% of bread sales in South Africa (Website Premier, 2017).

Figure 8: Food flow of bread

#### 5.3.1. Supermarkets and bread

Next to receiving bread from large manufacturers owning their bakery operations, supermarkets also have own in-house bakeries, receiving flour from the main manufacturers. Nevertheless, because of rising energy prices, and lower perceived quality by the customers, some supermarkets have stopped or reduced their in-house bakery operations (Interview supermarket #9).

#### 5.3.2. Superettes and bread

Superettes sourced bread either directly from bread manufacturers or indirectly via wholesalers. As mentioned, superettes and informal traders often cannot add much mark-up. As example, one superette respondent mentioned that if bread (Blue Ribbon) costs R12.45 at wholesale level, he would sell it for R13.00 (Interview superette #18).

### 5.3.3. Informal traders and bread

Informal traders sourced bread mainly from wholesalers (61.7% for white bread and 54.8% for brown bread). As mentioned, bread is also being directly delivered to the informal traders (26.6% and 31.5%).

Table 7: Main sources of white bread for informal traders, main transport, and mean amount spent over the last month (n=94); multiple answers possible

Source	Frequency	Percentage	Main means of transport from source	Mean amount spent (ZAR)
From wholesaler	58	61.7%	Own transport (75.9%) Formal delivery by supplier (15.5%)	1824.78
Direct from factory / order <sup>7</sup>	25	26.6%	Formal delivery by supplier (92.0%) Own transport (8.0%)	1720.48
From supermarket	15	16.0%	Own transport (73.3%) By foot (13.3%)	1926.53
From formal markets	7	7.5%	Own transport (85.7%)	649.71
From informal sector producers/retailers	4	4.3%	By foot (50.0%) Own transport (50.0%)	2050.00
From small shops/retailers	2	2.1%	By foot (50.0%)	950.00

Table 8: Main sources of brown bread for informal traders, main transport, and mean amount spent over the last month (n=73); multiple answers possible

Source	Frequency	Percentage	Main means of transport from source	Mean amount spent (ZAR)
From wholesaler	40	54.8%	Own transport (67.5%) Formal delivery by supplier (17.5%)	1088.58
Direct from factory / direct order	23	31.5%	Formal delivery by supplier (91.3%) Informal delivery by supplier (4.3%) Own transport (4.3%)	1846.30
From supermarket	10	13.7%	Own transport (70.0%)	1224.80
From formal markets	4	5.5%	Own transport (80.0%)	437.50
From informal sector producers/retailers	3	4.1%	Formal delivery by supplier (66.7%)	1983.33
From small shops/retailers	2	2.7%	Own transport (100.0%)	8000.00

<sup>7</sup> The answers 'direct from factory'(n=13) and 'through order from factory' (n=12) were clustered into one category when respondents named 'formal delivery by supplier' as main means of transport and are thus coming from the same source.

The manufacturers either operate their own fleet of vehicles distributing from bakeries in Cape Town to informal traders or agents collect the bread and then deliver it to spaza shops around the city. This depends for example on the resource endowments (such as bank accounts) of the informal traders. When traders lack bank accounts bakeries cannot deliver directly to spazas (talk with Gareth Haysom).

Wholesalers such as 1Up Cash and Carry and Jumbo Cash and Carry were named as sources for bread. Main brands traded were Sasko (Pioneer), Blue Ribbon (Premier) and to a lesser extent Albany (Tiger) as it is a premium brand. One of the biggest manufacturer explained why they deliver directly to spaza shops:

*“So I can tell you, the informal trade - which is about 70% of my business - informal trade is more profitable because they don’t have trading terms. The end consumer pays the same or a bit less in a Shoprite than in a spaza, but Shoprite trading terms and rebates and all that, which is not true in the bottom trade, so that’s more profitable. And that’s why we all go through the trouble and take the risk.” (Interview bread manufacturer #33).*

According to respondents, brand loyalty was perceived to be important among low-income customers due to quality perceptions. Bread and maize manufacturers therefore stated that they significantly invest in building brand awareness and loyalty.

#### 5.4. The flow of fresh produce: potato and tomato

For fresh produce, a major important node is the Cape Town Fresh Produce Market (CTFPM) for both informal traders and superettes, and to a lesser extent for supermarkets. Supermarkets influence food flows, as more and fresher produce flows from the Philippi Horticulture Area (PHA) to supermarkets rather than informal traders and food flows have moved away from the CTFPM.

##### 5.4.1. Supermarkets and fresh produce

To ensure price and delivery of fresh produce, retailers have opted to source directly from farmers. The fresh produce is generally custom-packaged at farm level and sent to DCs, effectively transferring the risk to the farmers. Respondents estimated that they receive around 90% to 95% of their fresh produce directly from farmers. Because of perishability retailers based in Cape Town prefer to source from the Western Cape, which also reduces transport costs. Nevertheless, supermarkets also spread their risks by sourcing from other climatic areas in the country to guarantee consistent supply.

It is important to note that the largely commercial farmers supplying to supermarkets do not operate on an open market. There are around 700 commercial farmers nationally supplying to certain

supermarkets often only using the CTFPM as outlet for surplus produce (Interview expert #6, Interview commercial farmer #34).

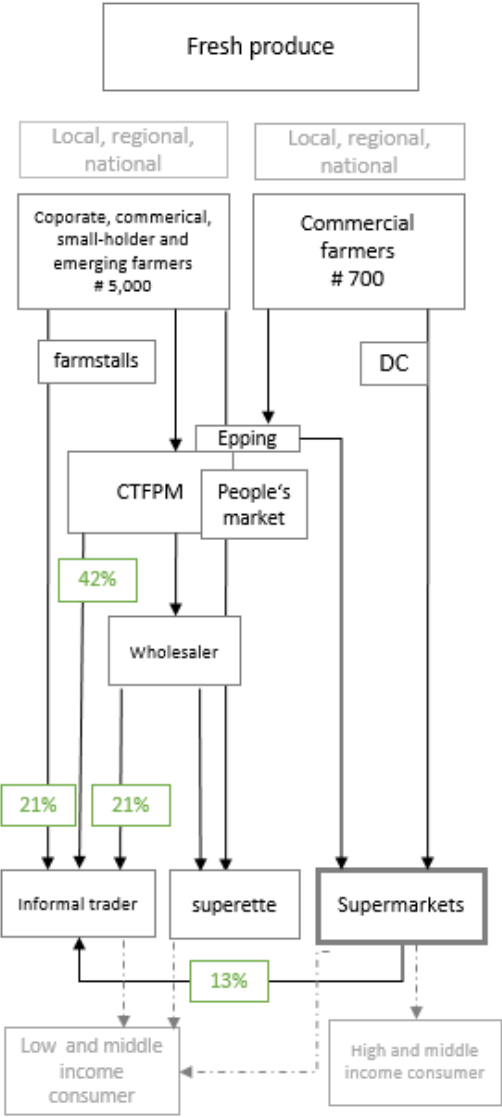


Figure 9: The food flow of fresh produce

**Philippi Horticulture area**

Supermarkets also source from the Philippi Horticultural Area (PHA) – one of the shortest food flows recorded in this research. The agricultural area within the city’s boundaries supplies an estimated 50% of certain fresh products for Cape Town, producing approximately 100,000 tons annually (Batterby & Haysom, 2012). It was estimated that around 75-80% of the PHA fresh produce flows directly to the major supermarket chains and less so to informal traders (Interview Potato SA #36, interview PHA farmer #40). The PHA has a high agricultural output and is a food source which spans all seasons unlike other agri-zones within the Western Cape (Battersby & Haysom, 2012). Nevertheless, the PHA farmer

Potato (next to meat) has the largest local content among the five food items. The Western Cape is home to one of the 16 potato production areas in the country and has around 6700 hectares of potato production (Western Cape Government, 2013). The so-called Sandveld area is under production most of the year and is the third biggest production area in the country in terms of yield (Interview Potato SA #36). One supermarket explained that they only source from another region for three months of the year.

The local supply of tomato is lower, as the Western Cape only has around 250 hectares of land under tomato production (DAFF, 2017). Tomatoes can therefore be sourced as far as the Limpopo province, bordering Zimbabwe. Here, the largest production area of tomatoes is found, 3590 hectares, accounting for more than 75 % of the total national area planted (DAFF, 2014). Z22 is the largest South African farming enterprise based in Limpopo and major supplier to all supermarkets. This enterprise produces 40% of South Africa’s tomatoes (Website Z22, 2016).

interviewed stated that he had stopped growing potatoes last year as potatoes are relatively costly to produce, require field rotation, and due to theft, i.e. potatoes would often get stolen by inhabitants of the nearby townships (Interview PHA farmer #40) .

#### 5.4.2. Superettes and fresh produce

The large difference from supermarkets is that superettes source fresh produce mostly via the Cape Town Fresh Produce Market or via wholesalers. Wholesalers interviewed mentioned that they also source from the CTFPM, thus fresh produce can still originate from the same source (Interview wholesaler #13, #31). Depending on the price, some superettes mentioned they source directly from farms as well.

#### **The Cape Town Fresh Produce Market (CTFPM) as important node**

Cape Town hosts one of the 19 major fresh produce markets in South Africa, and the Cape Town Fresh Produce Market (CTFPM) is an important component of the urban food system. The Department of Agriculture introduced the system of National Fresh Produce Markets in 1967 and for the national potato crop, around 46-50% goes through the system of National Fresh Produce Markets (Potato SA, 2016). CTFPM distributes around 40% of total fresh produce sold in Cape Town. The large market receives produce from local, national and international sources, mainly for local consumption. Food flows from Namibia in the case of tomatoes and the Netherlands in the case of potatoes have been recorded. There are approximately 5,500 farmers supplying the market and around 8,000 registered buyers (Interview CTFPM #16).

The Cape Town Fresh Produce Market is a privatised market, working on a commission basis, in which six agents on the floor sell the produce on behalf of the farmer. Prices are determined by demand and supply, in a 4-5 day sales cycle prices can therefore vary 15-40%. The market mechanism is said to give relative more power to the farmer who would otherwise be a price taker. The prices set on the National Fresh Produce Markets function as benchmark used in all national fresh produce sales and to an extent this limits the ability of supermarket chains to demand too low prices from their suppliers. The Cape Town Fresh Produce Market distributes huge volumes of produce, primarily potatoes, tomatoes and onions, to a variety of buyers.

The CTFPM is a major source of produce for informal traders, wholesalers and (to a lesser extent) supermarkets. Supermarkets usually only source a small part of their demand from the Cape Town Fresh Produce Market. An exception is Fruit & Veg City which sources around 40% to 60% of its goods from the market, without middle men, making it possible to price their goods between 20-25% below supermarket prices (Entrepreneur Magazine, 2009). The Cape Town Fresh Produce Market is the most



important source of tomatoes and potatoes for traders in the informal markets. Potatoes South Africa estimate that informal traders buy around 53% of all fresh potatoes sold at CTFPM (Interview Potato SA #36). The vast majority of the CTFPM produce ends up in townships and forms part of the extensive informal trade in Cape Town.

In addition, there is the Epping market, also a privately owned market where producers can deliver their produce. This market does not work on a commission basis, instead the market owner acts as a middleman between the retailers or the wholesalers and procures directly from the producers, mostly working with preferred suppliers who will deliver to a pack house which will in turn pre-pack the produce into smaller (brand) packaging. Here the price is not determined by demand and supply, but by the supermarket and the costs of for example, the packaging. Respondents stated that farmers often see this as an additional marketing channel, although they may indirectly dilute the price they could receive by selling to the market agents on the CTFPM (Interview Potato SA #36; interview CTFPM #16).

The proportion of fresh produce sold through the Fresh Produce markets has been declining – mainly due to larger amounts of fresh produce going directly to supermarkets. As one respondent explained:

*“In the early 90s, 60% of fresh produce was moving through the Fresh Produce Market, we are talking now between 46 and 50%. Probably. And that is the evolution of the value chain, where your retail sector has become more sophisticated due to consumer preferences that is consistency, branding, continuity in supply and where relationship have been built through the retailer and the producer. The reason is when you only procure from the Fresh Produce Market, then the retailer does not necessarily have control measures in place to make sure that he can supply a consistent quality of a consistent brand for a certain period of the year. So its consumer preference in that particular sense. And then the retailer then also has greater control in terms of your voluntary and mandatory standards, related to MRL’s, packaging, agricultural practices and all that.” (Interview Potato SA #36).*

#### 5.4.3. Informal traders and fresh produce

Informal traders mostly sourced fresh produce from the formal CTFPM (42.1%) and to a lesser extent directly from farmers (21.7%) and wholesalers (20.9%). As mentioned before, when informal traders source from wholesalers it is possible that the produce still originates from the CTFPM.

In interviews, traders mentioned that they would try to find the cheapest produce and vary their source. As a main challenge price fluctuations were mentioned, especially in the case of tomatoes. Traders would try to look around to find the best prices to balance prices to a certain extent. Nevertheless, transport, time and fuel costs were named as limiting factors.

Table 9: Main sources of fresh and canned vegetables for informal traders, main transport, and mean amount spent over the last month (n=235); multiple answers possible

Source	Frequency	Percentage	Main means of transport from source	Mean amount spent (ZAR)
From formal markets	99	42.1%	Own transport (50.5%) Pay someone else (37.4%)	9933.00
Direct from farms	51	21.7%	Pay someone else (43.1%) Own transport (39.2%)	9808.26
From wholesaler	49	20.9%	Pay someone else (34.7%) Own transport (30.6%) Bus or taxi (26.5%)	5754.0
From supermarkets	30	12.8%	Own transport (40.0%) Pay someone else (26.7%) Bus or taxi (26.7%)	4384.93
From informal sector producers/retailers	14	6.0%	By foot (42.9%) Bus or taxi (35.7%)	972.86
From small shops/retailers	8	3.4%	By foot (62.5%) Own transport (37.5%)	2818.75
Direct from factory	5	2.1%	Pay someone else (60.0%)	5239.6
Imported	3	1.3%	Bus or taxi (100.0%)	2100.0

Larger informal traders are more likely to purchase from the CTFPM as access to own transport is needed to purchase the produce. Informal traders often buy from CTFPM, but not consistently from the same supplier at the market, but can also buy according to price and quality on the day. In addition, there is the so-called People’s market. The People’s market is located on the same premise as the CTFPM, is run by around 40 large-scale informal traders who source their fresh produce entirely from the CTFPM. Traders operating on the so-called People’s Market on the CTFPM site, often act as intermediaries between the CTFPM agents and smaller traders. This informal market allows people to purchase produce without a buyer’s card. During the interviews it was stressed that informal traders demand high quality produce, against common believe:

*“Informal traders they want value for their money, they come first in the morning to get stuff, there is a perception that the poorer people want the cheapest and lower quality food, that they are not as picky, but actually they demand better quality since they do not have the cold storage, no refrigeration, so the food needs to last longer. Traders make sure they come first in the morning to get the cheapest and best produce.” (Interview CTFPM market agent #5).*

Although the higher quality produce could cost the trader two to three times more, it will ensure that the produce is less perishable. This means that the trader has more time to sell the produce, without having to spend fuel to restock. Informal traders have to restock fresh produce (especially tomato) relatively frequently because of lack of stoage and refrigeration. Prices at the CTFPM were found to be

cheaper, but if traders lack transport they may opt to source from wholesalers. Sourcing directly from farmers near the Cederberg area in the Western Cape enabled traders in Strand to receive 15-20% lower prices in the case of tomatoes. Nevertheless, transport and fuel costs as well as time were a limiting factor.<sup>8</sup> From the Phillippi Horticulture area, fresh produce reaches informal fresh produce traders either via the People’s Market or the farmstalls owned by farmers surrounding Phillippi.

5.5. The flow of red meat

Also for red meat important nodes are found on which both informal meat traders and supermarkets rely. A trend towards feedlots and branded meat was noted. But also very local food flows were recorded catering for the poor and cultural demands.

5.5.1. Supermarkets and red meat

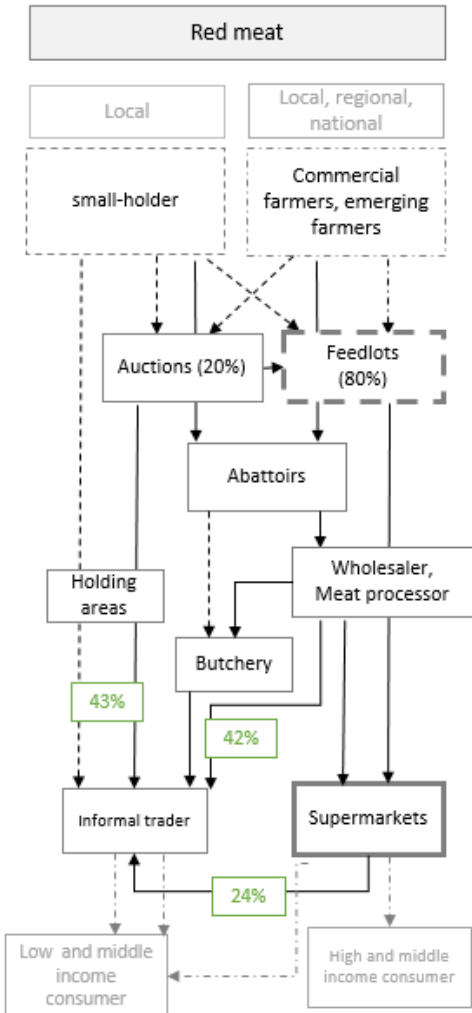


Figure 10: Food flows of red meat

The sourcing for meat is less straight forward. Supermarkets tend to buy from an abattoir or wholesaler – thus through a middle-man. Supermarkets sell red meat which originates either from feedlots or free range (for the health conscious consumers). It was estimated that 70-80% of beef moves from the farmer to feedlots. The remaining 20% go through auctions (interview auctioneer #37). Feedlots either slaughter the livestock themselves or send it to abattoirs. The beef supply chain has become increasingly vertically integrated (DAFF, 2015). This integration is mainly driven by the feedlot industry where most of the large feedlots own their own abattoirs. In addition, some feedlots have integrated further down the value chain and sell directly to consumers through their own retail outlets. Some abattoirs have also started to integrate vertically towards the wholesale level. Many wholesalers source live slaughter animals directly from farmers or feedlots on a bid and offer basis, i.e. they take ownership of the animal before the animal is slaughtered. The animal is then slaughtered at an abattoir of the

<sup>8</sup> Interestingly, there was an ongoing court case initiated by the Cape Town municipality to convict the informal traders and mirrors the ongoing hostility against the informal sector.

wholesalers' choice, and then the carcass is distributed to retailers (ibid). In 2013, the Western Cape had a total of 55 registered abattoirs - 44 feedlots for beef (and 34 for sheep) (Western Cape Department of Agriculture, 2013).

Supermarkets work with their own preferred suppliers such as Sparta, Tomis Meat and Excellent Meat, which either own abattoirs or both feedlots and abattoirs. Excellent meat also has their own wholesale business as well as retail business – which also supplies to informal traders. One supplier interviewed mentioned that they usually source from the Western Cape, especially the Southern Cape as far as George whereas their abattoir is based in Robertson around 160 kilometres from Cape Town (Interview meat processor #35). This abattoir in Robertson next to Tomis abattoir, around 100 kilometre from Cape Town, are the biggest role players in the Western Cape. With free range, supermarkets order a certain amount of free range beef from the abattoir who will then in term secure from their free range suppliers – which can be around the country as seasons and grazing areas are moving. Depending on the season, beef can be sourced from Namibia and Botswana.

#### 5.5.2. Informal traders and red meat

In the informal trade, there is a large trade in cooked meat though braai stands, with some of the most lucrative businesses due to the strong demand of meat (Interview expert #23). The majority of informal meat traders source meat directly from farms (43.04%) and from wholesalers (41.77%).

Table 10: Main sources of fresh meat for informal traders over the last month (n=79); multiple answers possible

Source	Frequency	Percentage	Main means of transport from source	Mean amount spent (ZAR)
<b>Direct from farms</b>	<b>34</b>	<b>43.04%</b>	Pay someone else (13) Own transport (11)	<b>12549.94</b>
<b>From wholesaler</b>	<b>33</b>	<b>41.77%</b>	Bus or taxi (17) Pay someone else (10) Own transport (8)	6119.27
From supermarkets	19	24.05%	Bus or taxi (11) Pay someone else (7)	4199.89
Direct from factory	5	6.3%	Bus or taxi (2)	5640.00
From small shops/retailers	5	6.3%	Bus or taxi (3)	5899.60
From formal markets	5	6.3%	Bus or taxi (2) Pay someone else (2) Own transport (2)	5420.00
Other (Butchery; Durban)	5	6.3%	Own transport (2) Bus or taxi (2)	<b>30800.00</b>
From informal sector producers/retailers	1	1.27%	By foot (100.00)	2000.00

Price, perceived quality and customs play a role in the sourcing decisions. In the case of the former, meat moves differently through the informal markets to reach consumers. For the respondents interviewed, this was mostly the case for goats and sheep. The informal supply chains often starts at livestock auctions, for example in Klapmuts or Gouda in the Western Cape. Some of the meat is bought by informal traders directly, but due to transport limitations, most meat will be bought by farmers (holding areas) in the city and traders will purchase the meat there.

One farmer explained why: *“We sell livestock, yeah. We have all the facilities that they can slaughter them and there are other facilities that they can cut the meat. I can slaughter a goat and give it to you as a present, but I cannot slaughter it and sell it to you. That’s what the law says, because I am not registered for an abattoir. So we give them the facilities to do that, because they want to slaughter the animals. Not all of them, but some of them. We have goats and sheep. And chickens. (...) Mostly when they buy a sheep, they don’t buy for themselves, they cut it in pieces and sell it in the townships (...). One black lady is buying 10 sheep on a Saturday morning, and on the pavement, they slaughter it on the pavement, and then from the pavement on the braai. From the inside to the outside, they sell everything.” (Interview farmer #40).*

This meat is often preferred by customers as it is fresh, meets the cultural demands of consumers and in addition, informal meat traders are able to sell small pieces of meat which are affordable to low income consumers. For instance, one trader interviewed sold meat prices for R10 each, prices unavailable at formal wholesale or retail level (Interview meat trader #28).

From the auctions, meat can come from commercialized farmers, but a respondents indicated a trend in the Western Cape that more and more households own livestock – also in Cape Town mainly near the N2 highway (Interview Red Meat Producer Organisation #32; interview auctioneer #37).

Another interesting meat flow is the one from wholesalers and processors who also supply supermarkets. Meat traders source regularly from local meat companies such as Britos and Jolly’s Meat in Mitchell’s Plain in the Cape Flats. As a carcass can be divided into different pieces of meat, the different meat suppliers discussed earlier can divide the carcass into the expensive and cheaper prices – and divide it among the different consumer groups (called balancing the carcass):

*“Look, this business supplies every part of the population in the Western Cape. From the very affluent that live in Constantia and those areas to the people that live in Khayelitsha. So literally everybody. From the poorest of the poor, that buys the low end products, we supply them the meats, the bones, the things like that. They buy that and then the fillet steaks we sell in Constantia. We supply everybody in Cape Town. It’s actually good business in that prospect. Because we have our own retail stores and*

they tend to be in the less affluent areas, but then for the main retailers, we have a wholesale business that supplies all the butchery shops, so where they get the meat” (Interview meat processor #35).

Another very distinct food flows is directly from the abattoirs in the Western Cape where informal traders buy the so-called 5<sup>th</sup> quarter and the offal of the carcasses and sell it in Cape Town. One respondent mentioned, that traders would come to their abattoir in the Western Cape three times a week with a truck to buy these meat products and sell it to mainly black customers in Cape Town (Interview Meat processor #35).

## 5.6. Power and governance

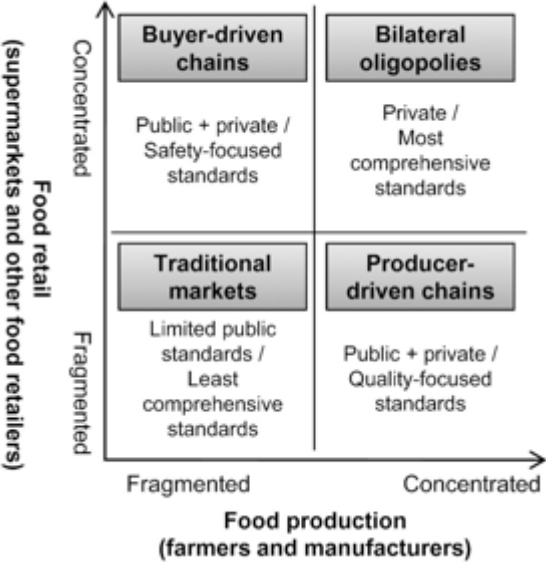
A couple of distinct food flows were documented during the field research (table 11). Each food flow shows distinct governance and power distribution.

Table 11: Major food flows and their governance

Product	Scale	Value chain	Governance
Maize meal	National/ international	Farmer → Storage → Miller → <b>Manufacturer</b> → <b>Supermarket</b>	Buyer driven / bilateral
Maize meal	National/ international	Farmer → Storage → Miller → <b>Manufacturer</b> → <b>Wholesaler</b> → Informal Trader/ Superette	Producer driven
Bread	Local/ National/ international	Farmer → Storage → Miller → <b>Manufacturer</b> → <b>Supermarket</b>	Buyer driven / bilateral
Bread	Local/ National/ international	Farmer → Storage → Miller → <b>Manufacturer</b> → <b>Wholesaler</b> → Informal trader / Superette	Producer driven
Fresh produce	Local/ regional	Farmer → <b>Supermarket</b>	Buyer driven
Fresh produce	Local/ national	Farmer → CTFPM → Informal trader	Traditional
Red meat	Local/ national	Farmer → Feedlot → Abattoir → Meat processor → <b>Supermarket</b>	Buyer driven
Red meat	Local/ national	Farmer → <b>Feedlot</b> → <b>Abattoir</b> → Meat processor → Informal Trader	Producer driven
Red meat	Local/ national	Farmer → Auction → Meat holding → Informal Trader	Traditional

Generally, power has shifted in in favour of large retailers vis-à-vis producers (Greenberg, 2017). Nevertheless, multiple governance structures and power distributions can be found even within the same product category (Dolan & Humphrey, 2004).

Mapping corporate power in the South African food system, Greenberg (2017) notes that the ‘largest nodes’ of power are to be found in the wholesale and retail, followed by food manufacturing and then primary agricultural production. He notes that some nodes tend to be dominated by corporations, for example supermarkets in retail or feedlots for commercial livestock. Other nodes have a strong corporate core but there is a far wider periphery, for example primary small-scale agricultural production and informal food retail. Greenberg notes that this dualism between the commercialised and periphery means that supply chains are managed in distinct ways even within the same product category, depending on factors like the type of buyers, the end market, and the degree of processing required. Accordingly, the role and position of certain actors can vary (Lee, Gereffi & Beauvais, 2012). For example, farmers and informal retailers have relative more power in the **traditional markets** than the one led by supermarkets.



Lee, Gereffi & Beauvais (2012) make the useful distinction between buyer-driven, bilateral oligopolies, producer-driven, and traditional markets (fig.11).

**Buyer-driven chains** emerge as retailers become highly concentrated (Gereffi, 1994). It means that the critical governing role is played by a buyer who takes responsibility for increasing the efficiency of their suppliers. In these food flows, supermarkets handle a small number of preferred, generally large-scale suppliers capable of meeting their stringent and costly requirements (Lee, Gereffi &

Figure 11: Governance structures (source: Lee, Gereffi & Beauvais, 2012)

Beauvais, 2012). This is found in the food flows of vegetables as well as meat to supermarkets. In these value chains, supermarkets have enormous buying power, can demand lower costs and higher standards from suppliers. Next to basic local standards suppliers have to adhere to, supermarkets often impose private standards on suppliers. Woolworth, for instance, requires that its food suppliers farm sustainably under its ‘Farming for the Future’ initiative. Most supermarkets also require Halaal and Kosher certifications. The costs of adhering to these standards and audits are borne by the supplier (Interview supermarket #1; interview meat processor #35).

In addition, supermarkets often impose a range of other costs through trading terms and agreements (e.g. for losses made). In interviews it was mentioned, for example, that suppliers had to pay for

financial losses made by supermarkets when standards were not met or that farmers need to lower their prices when supermarkets want to run 'special offers'.

Supermarkets put high demands with regards to costs, volumes, consistency, and quality. Some supermarkets are more active in building these required capabilities through close partnerships with local suppliers – at least in the case of vegetables. Then supermarket may even prefer to do business with relatively smaller suppliers rather than with large farming enterprises such as ZZZ. For the supermarket, this has advantages in terms of trust and collaboration as well as the exercise of power:

*“So our farms have become bigger and some of them even become companies, you understand. So ... in one sense it is ... a very good thing for us. Because they've got the resources to have their own technical people, their own product developers and own genetics, etc. to look after better ways. It supports us. The other bad thing about is that it is for us as a retailer, a difficult thing, to be honest, if the power does not sit with us. So if they become too big that is and we are a smaller part of their business than previously, other markets dictate what's happening to that product. That is a bit of a thing we battle with.” (Interview #1 Supermarket).*

Meaning that only with the smaller farmers, supermarkets can be price setters. Otherwise, actors with more buying power “could dictate what's happening to that product”.

In **producer-driven chains**, food manufacturers play a major role in organising supply chains (such as for bread and maize meal). These value chains are characterised by large entry barriers due to needed technologies and economies of scale. Also, manufacturers try to brand their products to relatively gain more power vis-à-vis supermarkets and their own brands (Kaplinsky, 2004). Manufacturers often try to control the international trade of the commodities wheat and maize and ensure that farmers meet standards. These aspects are important as profits are often tight in these value chains and financial losses can be severe if commodity quality is sub-standard (Interview manufacturer #33). Nevertheless, retailers possess so-called retailing power which cannot be undermined. In many cases they are still able to control pricing in their trading terms by controlling elements such as listing fees, rebates, advertising and slotting allowances, promotion fees, and payment period terms (Reardon & Gulati, 2008; Interview manufacturer #33). These value chains could therefore also be considered **bilateral oligopolies**. **Bilateral oligopolies** are characterised by the presence of concentrated producers and retailers with often tight chain coordination (Lee, Gereffi & Beauvais, 2012).

One quote of a manufacturer selling to both informal traders and supermarkets highlights the difference between producer driven and buyer-driven value chains in the case of processed food:



*“Okay, so lets say if you talk about Shoprite Checkers, it’s the biggest outlet in South Africa, the biggest number of stores, the market leader in the retail. If you (...) negotiate with them, they got a much bigger muscle and power to negotiate a better price than the store around the corner.” (Interview Manufacturer #33).*

Finally, **traditional markets** consist of numerous producers and retailers, generally small in size, with little explicit demand and supply coordination (Lee, Gereffi & Beauvais, 2012). Products are traded by price and quantity, with little or no brand recognition. Greenberg (2017) refers to these as the broad periphery – generally food flows to the informal sector. He uses this term to highlight that the economic and political power of these informal traders is often dispersed and weak. This is in stark contrast to supermarkets – a corporate core with concentrated power and ability to take deliberate actions to influence the market and their suppliers (Greenberg, 2017).

A crucial point to understand is that these informal traders are therefore largely price takers, although they may opt to buy in bulk together with others to receive better pricing. Unlike supermarkets, they are not able to put many demands. An important strategy is therefore to shop around, acquiring food from different sources – especially in the case of fresh produce and meat. With these flexible purchasing patterns they try to ensure the best price and quality for their customers.

### 5.7. Conclusion food flows

This chapter has shown two important aspects. Firstly, the complexity and scales of the food flows shows that urban food systems are not confined by city region boundaries. The idea that cities are fed by their rural surroundings and that food flows can be short and simple is masking the complexities of such a system. Formal and informal value chains are profoundly connected, despite some dualistic characteristics, and shows the complexity of food flows. Secondly, the chapter showed that governance power is unequally distributed, with the biggest distinction of between supermarkets in buyer driven value chains and informal traders in traditional markets.

## 6. Vulnerabilities of food flows to food insecurity

This chapter is linked to the objectives of gaining an understanding of what factors cause influence sensitivities in the different food flows and how adaptive capacity differs. This chapter demonstrates (1) that the various value chains have differing sensitivities and adaptive capacities; i.e. different vulnerabilities to food insecurity as a result of drought. (2) Vertical and horizontal power in the value chain and market can exacerbate the dichotomy of sensitivity and adaptive capacity during climatic shocks – more often than not at the detriment of the poor and their food security.

### 6.1. Exposure-sensitivities

Exposure-sensitivities reflects the susceptibility of the food system of climate related shocks manifesting itself in the form of constrained food access and/or availability. Firstly, the exposure concern the magnitude, frequency, spatial dispersion, duration, timing, and temporal spacing of climatic conditions which affect the food system (Ford, 2009).

#### 6.1.1. Climate abnormalities in 2015-2017

The drought of 2015-2017 was the worst drought since rainfall has officially been recorded in South Africa since 1904 (South African Weather Service, 2017). The duration of the drought (several production seasons), its high intensity as well geographical outreach made the drought extreme. Between March 2015 and May 2016 the seasonal rainfall fell seriously below average (South African Weather Service, 2017). The drought peaked in December 2015. The conditions were worsened by the fact that the country already experienced low rainfall in 2014 (fig.12).

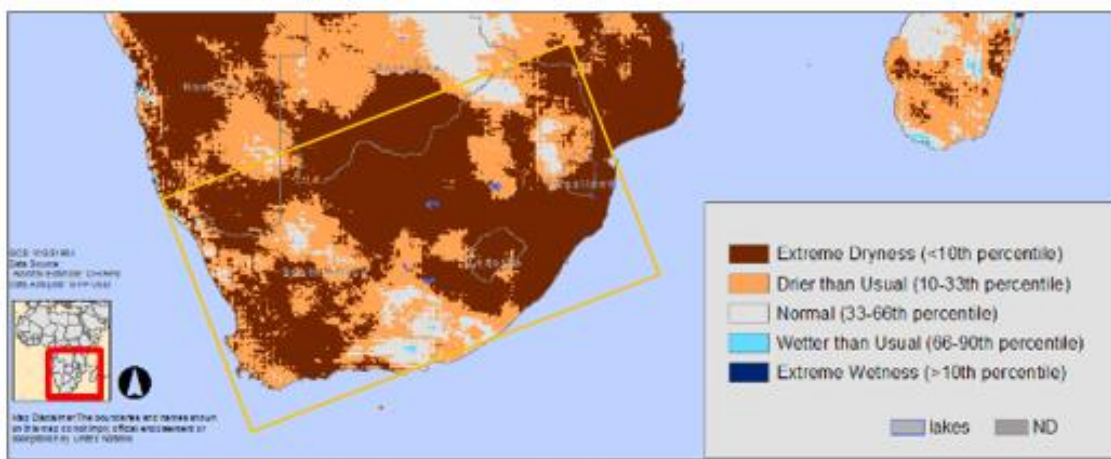


Figure 12: South Africa Two Year (June 2014-May 2016) rainfall extremes within 1981-2016 (percentiles) with inserted highlighted region of South Africa by author (WFP, 2016)<sup>9</sup>

<sup>9</sup> Extreme dryness was defined as amounts falling in the driest 10% of the record – corresponding to the 3<sup>rd</sup> driest or worse.

The prolonged period of below average rainfall led to both an *agricultural drought*, i.e. lack of moisture to support production and a *hydrological drought*, i.e. below average levels of water in aquifers, lakes, and reservoirs (South African Weather Service, 2017). The hydrological drought became severe in the in 2017.

In 2015/16, five provinces had been declared drought disaster areas (Mpumalanga, Limpopo, KwaZulu-Natal, North West and the Free State). Some parts of the Eastern Cape, Northern Cape, and Western Cape were severely affected as well. The Karoo and West Coast municipalities of the Western Cape were declared a disaster area in 2016. The entire Western Cape Province was only declared a disaster area in May 2017 when dam levels were critically low and municipalities put water restrictions to be able to support the population and industry. In the Western Cape, the level of dams has decreased to 48% in 2016 from 68% in 2015 during the same period (Western Cape Government, 2016b).

#### 6.1.2. Differences in exposure – sensitivity

The urban food system is so largely interconnected with the wider national food system that respondents often referred to the national drought rather than the local drought alone. Most actors interviewed experienced exposure, with only a few exceptions based on better ecosystem and farmer's adaptability at source. Although some farmer's may not have been exposed to reduced yields, the magnitude of the drought had cascading effects beyond the farmer's level: Reduced food availability in the food system as whole led to price increases, which all actors were exposed to.

### **General effects of the drought**

#### *White maize*

In the case of maize, yields were impacted in 2015 and 2016, while recovering in 2017. The maize crop declined by almost 30% in 2016 - from an already below average 2015 harvest. White maize was more heavily impacted than yellow maize (BFAB, 2016). At the same time, the rand also experienced sharp depreciation, which by May 2016 had declined by almost 48% over the preceding 24 months. As South Africa had to import scarce white maize, white maize price on the South African Futures Exchange (SAFEX) increased sharply to all time record levels of more than R5000/ton – an increase in maize price of more than 50% (SAFEX, 2017). Increases in maize prices had a particular devastating effect on food security as poor largely rely on maize meal for their diet (PASCA, 2017).

#### *Wheat*

Wheat production decreased by 311,377 tons (17.7%) for 2015/16 from the previous season (DAFF, 2016). Poor climatic conditions in the Swartland region in the Western Cape led to reduced yield by 22% year on year in the region. South Africa had to import around 60% of its national demand.

Nevertheless, the price impact of import was minimal in the wheat sector, as South Africa usually imports more than half of its domestic wheat requirement (Interview bread manufacturer #33). In addition, wheat represent only 20% of costs of final product, leading to only slight price increases (DAFF, 2017).

### *Potatoes*

According to Potato South Africa, around 80% of potatoes are grown under irrigation. Nevertheless, the extreme drought conditions in 2016 and hydrological drought caused irrigation farmers to experience lower yields. While in 2015, South Africa recorded the best harvest ever recorded of potatoes, the average yield in 2016 decreased by 10% to 2.22 million tons. The CTFPM is a good indication for price increases at wholesale level. While the average prices of potatoes traded on CTFPM were R2,798 per ton in 2015, prices reached R4,499 per ton in 2016. During 2016, some of the highest prices ever were recorded of R5,770 per ton in March 2016. In 2016, 17% less volume of potato was traded compared to 2015. In 2017, prices were decreasing constantly, reaching an average level of R3,396 per ton between January and May 2017.<sup>10</sup> In Western Cape, as of June 2016, 230ha potatoes were destroyed by heat waves in the Sandveld area.

### *Tomato*

Tomato production was less severely impacted than potato production. Tomatoes were more impacted in 2015 and 2017 than in 2016. On the CTFPM, 7% less volume of tomatoes was recorded in 2015 compared to 2016, while prices were on average only slightly higher (1%). Average prices were R6,100 per ton compared to R6,187. In 2017, tomato prices reached averages of R7,133 per ton between January and May.

### *Meat*

Meat was indirectly impacted via high yellow maize costs for feed. However, beef prices did not increase as sharply as other products in 2015 and 2016 due to emergency slaughtering by farmers – to be able to ensure cash flow and reduce the pressure on dry grazing land (BFAB, 2016). Farmers often decided to export, particularly to the Middle East, due to rand depreciation and higher international beef prices. Prices increased more sharply in 2017 when livestock farmers needed to recover their herds (ibid). While cattle at abattoir level reached an average of R34.6 (kg/A2) in January 2016, lamb reached R56.6 (A2/kg). Prices then increased sharply to R40.5 and R69.1, respectively in January 2017 (RPO, 2017). There are unfortunately, no official statistics on goat meat as it is sold mostly illegally.

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<sup>10</sup> Based on data received from Cape Town Fresh Produce Market; Potato SA, and Western Cape Government

The drought accelerated food price inflation. In March 2016, the tracked food basket showed food inflation of 9.8% y/y - with vegetables at 18.7%, bread and cereals at 13.3% and meat at 6.1%. In March 2017, food inflation had decelerated to 6.7% y/y. Although still high, this was the lowest levels recorded in 18 months (Statistics SA, 2017).

6.1.3. Differences in exposure-sensitivities

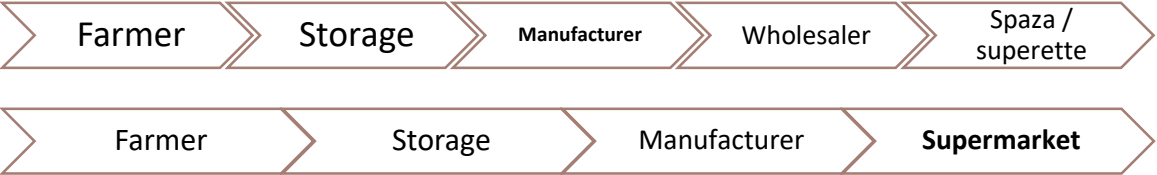
The Nvivo analysis has resulted in different factors influencing sensitivity which emerged from the interviews. At production level, exposure-sensitivities depends on where the product is sourced and the farmer’s sensitivity. At product level, it depends on the product requirements and processes. As no food flow actor is an island and is only as resilient/sensitive as the nodes that support them, factors of relevance are supplier reliability, information and collaboration as well as the actor’s dependency on primary suppliers or diversity of food sources. Downstream at consumer level, it is important to what consumer groups the retailer is selling to and how resilient these are to price increase. This forms an important feedback to the food flow’s sensitivity. Economic shifts and horizontal and vertical power did play a role in reducing sensitivities; this is especially pronounced in buyer driven food flows. Table 12 shows these different factors of sensitivity and uses buyer driven value chains to demonstrate the role of power in reducing sensitivities.

Table 12: Factors of exposure-sensitivity in value chains and power in buyer driven value chains impacting exposure-sensitivity, source: author

	<b>Exposure-sensitivity</b>	<b>Power in buyer driven value chains</b>
Production level	Farmer sensitivity	Power to choose supplier
	Relative power of farmer	Power to demand lower prices; trust relationship
Product level	Product requirements	Often high product quality requirements but power to demand high quality to be met
	Product characteristics	
Value chain level	Supplier reliability	Setting up contracts; collaboration and trust
	Supply consistency or fluctuations	power to demand consistent supply
	Dependency on primary supplier / diversity of food sources	Collaboration and trust relationship with selected suppliers
	information (e.g. price) / anticipation	Constant exchange of information to reduce uncertainty and reduce supply risk
Consumer level	Consistency consumer demand	High income consumers decreases sensitivity

For instance, while informal traders and superettes in traditional markets and producer driven value chains are more dependent on diversity of food sources during droughts to find the cheapest produce, supermarkets in buyer driven value chains can not only chose to work with preferred suppliers, but also make up for the lack of diversity of food sources with tight value chain collaboration. Traditional markets, what Greenberg (2017) termed ‘broad periphery’, are generally more sensitive to adverse food security outcomes than other value chains. Consumer feedbacks also play an important role. Rising prices have devastating effects on low income consumers, weakening the demand. This in turn can further weaken the market position of informal traders and superettes catering for these consumers, making them relatively more sensitive to further price increase and they lose the power to negotiate and cannot afford to buy in bulk. Major food flows and their sensitivities will be described in the following. As will be demonstrated, the relative importance of factors in table 12 varies between the food flows, based on differing characteristics of farmers, products, value chains and consumer demand.

6.1.3.1. *Processed food: maize and bread*



In the case of the processed foods maize and bread, all value chains were exposed to price increases as all basically all farmer’s yields were severely impacted and prices are formulated nationally at the SAFEX platform. Sensitivity to supply disruptions and price increases was also widespread as major food flows depend on a handful of large manufacturers. In the case of white maize this is particularly pronounced due to two factors: the extreme lack of diversity of sourcing options for white maize and the high product requirements – white maize needs to have the right quality, i.e. high milling percentages (to meet the manufacturer need) and product purity (to meet the consumer demand). These issues are highlighted by the following quote:

*“(…) but the problem is: where do you import maize from? The only alternatives that you have is Mexico – which in that specific year didn’t have the right quality and volumes (...). If you look at the milling percentages, it was much lower, about 15-20% of the milling percentages, so the price had to compensate for that. The other origin that you could import from is America. But the American grain compared to the South African grain isn’t naturally sun dried, so it goes through to drying process and that cracks the kernels and that again impacts on the milling percentages. (...) So it wasn’t only the fact that it was scarce, but it was also the fact that there was no alternative. Therefore it went beyond the*

*import parity, it went higher than import parity, up to that R5000 mark. As millers just scrambled to make sure that they have minimum volume to try and protect their brand” (interview Storage and input supplier #44).*

Interestingly, the feedback from the consumers and their product demands can seriously aggravate sensitivities and also pose limitations to adaptation:

*“So there was another incident, in 91,92 when there was also a shortage of white maize, and the government intervened during that incident to regulate the mixing in of yellow into the white to sustain the production. And the market violently reacted against it. Some of the brands experienced a 40% drop in market share, just because of that. So the millers still remember that incident and therefore they refused to mix in yellow maize and to mix in inferior white product that in this case would have been imported from Mexico or the US.” (Interview Storage and input supplier #44).*

The wholesaler as additional actor between the manufacturer and the informal spaza’s or superettes provides some resilience against supply disruptions as wholesalers have relative more market power. In addition, manufacturers have started to build strong relationships with the largest wholesalers which can reduce sensitivities to supply disruptions. Respondents highlighted the fact that there is now a significant collaboration between manufacturers and wholesalers in the form of collaborative planning and forecasting, for example on when to buy in new stock of maize meal (Interview wholesaler #13). Despite this cooperation, weak consumer demand is a limiting factor, increasing sensitivity. Manufacturers said they “would never cut anybody out” in times of low availability, but as the scarce maize meal “would come at a price”:

*“So you only got so much maize available, so your pricing will dictate how fast your maize sells. So you push your pricing up to try and control that, because you don’t want to run out of maize completely, so you can’t supply anything. And you are governed by your input costs there as well, especially of exchange rates.” (Interview Manufacturer #13).*

This indicates that cash flows of retailers and consumers then dictates where the product ends up. This adversely impacts the food security of the poorest consumers. In times of very high stress, the fact that main manufacturers sell to both wholesalers supplying the informal sector as well as supermarket may therefore be a problem, simply due to the fact that supermarkets have higher economic power and sell to consumers who are more resilient to price increases. One superette stated that “*It was the case of can you get maize?*” and that the sub choice was insufficient (Interview superette #14), while one informal trader said that his usual wholesaler had experienced supply shortages, but that they did not tell him why. The supermarkets interviewed did not experienced any supply shortages, despite

noticed increases in maize meal prices. Interestingly, a difference in sensitivity to supply disruptions between stores of the same supermarket chain were noticed. One supermarket in a low income area stated:

*“Suppliers couldn’t supply us with anything. So what our head office would do is allocate. Whatever supply they had, they would allocate it according to how big your store is, or how big stores are around you. So you can sell 1000 units of maize, but if the supplier would only manage to give 500, or 200, that is what you get, we couldn’t order more from him”. (Interview supermarket #7)*

In terms of bread, all retailers pointed to increasing prices, but no respondent experienced shortages in supply. One superette, however, stated that his bargaining power had declined as consumers bought less and he could not negotiate prices with his wholesaler in times of high prices, reducing food affordability.

6.1.3.2. Fresh Produce: Potatoes and tomatoes



From the interviews with informal fresh produce traders, a higher sensitivity to adverse food affordability rather than supply disruption emerged. For fresh produce, the sensitivity to food supply disruptions of informal traders is reduced by the fact that the majority of respondents sources fresh produce from a more powerful node – i.e. the Cape Town Fresh Produce Market which in turn sources from a large number of farmers. The large number of farmers or diversity of sources can counteract any farmer sensitivity. Although more vulnerable small-holder and subsistence farmers may be more likely to supply to the CTFPM rather than more resilient commercial farmers (Agri SA, 2016; interview farmer #34), the large number of farmers from across the country supplying to the CTFPM reduces the sensitivity of informal traders to supply disruptions. In other words, the diversity in sources or safe failure can make up for the lack of market power.

The same does, however, not account for sensitivity to price increases. Unlike supermarkets, informal traders are not able to control the supply consistency of fresh produce. According to the informal traders they are sensitive to the volatility of price observed at CTFPM market.

*“In a normal year, you have a steady flow of products and you will be able to predict according to the weather. But in drought situations, farmers do not always spend the right amount of infrastructure on*



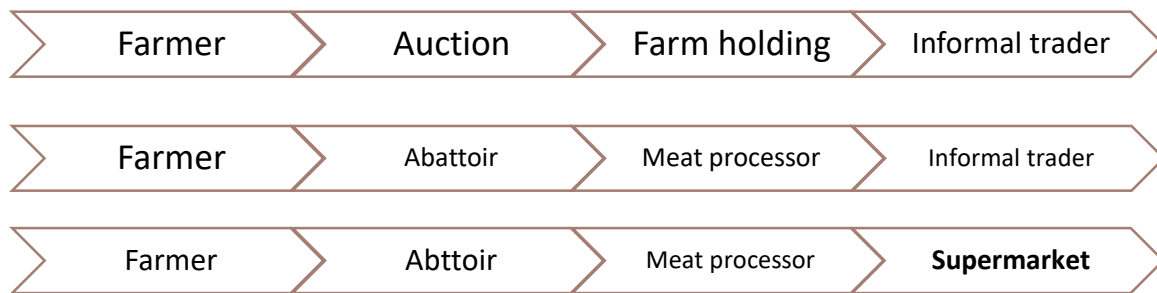
*their products, because they do not have enough water. (...) Your price signals will be a bit more difficult to read. Sometimes you will have a lot of produce and some days you have almost nothing.” (Interview CTFPM #16).*

Related to this are the lack of information and collaboration of informal traders with their suppliers, thus the lack of anticipative capacity. Fresh produce traders often drive to the Fresh Produce Market on the day they require new stock and often only learn about the prices on-site. During the extreme drought, however, the food flows of produce got more unpredictable which leaves informal traders more sensitive to price volatility. It implies that as they either have to decide to buy in at higher prices or to not buy produce at all. This can adversely impact the food security of their customers. Informal traders buying from traders at the informal People’s market are able to decrease the sensitivity to price volatility. As the traders on the People’s market are “constantly there” and can keep an eye on the market, they have more flexibility to buy at the right time when prices are low.

At product level, one aspect discussed by informal traders was the impacted quality of fresh produce during the drought. The reduced quality of fresh produce adversely impacted the perishability. As described earlier, informal traders are sensitive to this as they lack adequate storage or cooling. In the case of tomato, one informal fresh produce trader complained about the higher perishability of tomatoes during 2016, increasing his costs and mark-up. This in turn can reduce food accessibility. Consumers are more vulnerable when they depend on these traders who are unable to absorb cost increases.

Supermarkets are relatively more sensitive to supply disruptions when it comes to fresh produce as they have high product requirements. Farmers interviewed stated that if the product did not meet the requirements (e.g. produce being too small), supermarkets might not accept the produce. Nevertheless, the supermarkets sensitivity is reduced as they can chose to work with less sensitive farmers who. Farmers supplying to supermarkets did not experience problems during the drought as they could work with irrigation and tunnel farming. While supermarkets interviewed experienced price increases and reduced yields, they did not experience supply shortages. Spreading risks to different climatic zones as well as a high level of collaborative working relationship with farmers also helped to significantly mitigate risk of supermarkets. Some supermarkets have built strong and trusting relationships with farmers for decades. According to respondents, these relationships help them to anticipate potential supply shortages before they arise. In addition, experts stated that supermarkets can often negotiate lower prices (although they would still be higher than on CTFPM).

### 6.1.3.3. Red meat



Just as in the case with fresh produce, informal traders are relatively less exposed to supply disruptions of meat as they source from more powerful nodes such as auctions which in turn have a large supply base. The challenge was that during some weeks, prices of livestock would vary greatly – this combined with the fact that the auctions are located far from Cape Town made farmer’s from holding areas in Cape Town sensitive to price increases as they often lack time and cash flow to increase the number of trips to the auctions.

The fact that beef meat can origin from the same meat wholesaler and processor that is also supplying to supermarkets reduced some sensitivity to supply disruptions and price increases for the informal traders. The meat processor interviewed explained that they would ‘balance the carcass’, this sell the best and most expensive meat to supermarkets and the rest to lower income areas, allowing to price meat pieces according to disposable income.

Supermarkets reported to be more sensitive when it comes to free range beef. The environment in which free range beef is produced is less controlled than in feedlots. Unlike in feedlots where cattle is fed with fodder, cattle in a free range environment is dependent on naturally available grass. The higher consumer demands of labelled free range thus exposes supermarkets to higher risks in times of drought. The fact that supermarkets work less directly with red meat farmers as opposed to fresh produce farmers, increases sensitivities to supply disruptions. There seemed to be less tight value chain collaboration between the actors. This in turn means that there is less collaboration or governance power and sheep farmers are not tight into well controlled value chains increasing the risks for supermarkets.

*“You have to keep the lamb farmers happy. You’ve got to spend so much time and money and effort keeping the lamb farmers on board, you may agree to pay 70 Rand a kilo to a lamb farmer, and you send your truck 300 kilometre, and these lambs are no longer there, because someone got there that morning and offered him 15 cents a kilo more. And there is no like contracts, there is no contracts with*

any farmers, all the lamb farmers are free agents, they will go where the best price is (...)" (Interview meat processor #34).

Although the supermarket sourcing from that meat processor experienced a supply problem of sheep, the governance power meant that the supplier had to resolve the issue, which shows that supermarkets can decrease sensitivities by effectively transferring risk to their suppliers. When the meat supplier was interviewed, he stated that his company did not only have to find another supplier of sheep, but also had to make up for the loss in profit the supermarket had experienced.

## 6.2. Adaptive capacity and adaptation strategies

While exposure-sensitivity increases vulnerability, adaptive capacity decreases vulnerability. Thus strategies in the value chain can still make up for sensitivities experienced to reduce adverse food security impacts. The following factors were found to influence adaptive capacity and adaptation strategies:

Table 13: Factors influencing adaptive capacity and adaptation strategies in value chains

	<b>Adaptive capacity</b>	<b>Implications for strategies</b>
Resourcefulness	Financial assets, e.g. is the financial flow consistent?	> Ability to not pass on costs
	Physical assets, incl. product variety	> Ability to increase certain product prices but keep other low ('loss-leaders')
	Social capital and trust	> Ability to anticipate and collaborate to find solutions
Responsiveness / agility	Information	> Ability to react swiftly to changes
	Decision making autonomy	
Capacity to learn	Pro-active actions	> Ability to take advantage of opportunities and challenges
Motivation	Motivation to go back to normal quickly after disruptions (food availability/food access)?	> willingness to ensure food availability or affordable food prices
power ( <i>the power over resources in the system (horizontally – governance) (vertically - competition; market position)</i> )	Governance	> To demand lower prices; demand produce and supply according to set requirements in own food flow
	Market position	> Power to influence other food flows; power to tap into less rigid value chains

Adaptive capacity is unequally distributed in the urban food system – with strategies for adaptation reducing the vulnerability of actors who have the greatest resources and are most able to enforce value chain rules and mobilise collective action. In general, larger players were found to have higher adaptive capacity as they have greater resources, are more agile, have the capacity to learn to take pro-active actions rather than reactive actions. Larger and more powerful players like supermarkets have the financial resources to delay passing on price increases. In addition, they have the governance power to demand lower prices from players along the value chain. Supermarkets also have higher adaptive capacity as the middle- and higher income consumers were seen as ‘more resilient’, putting supermarkets better financial position. One particular adaptation strategy mentioned by supermarkets was the globalised world in which sufficient supply is available at all times. As long as one has the financial resources available, imports were seen as providing safe failure mechanisms to retailers.

The adaptive capacity of informal traders is limited, especially when informal traders do not have their own transport and lack price information. These factors seriously reduce the agility to react to change. Limited financial assets are another factor influencing adaptive capacity. For some traders with own transport, the economic impacts of adapting to the drought have been problematic. During the drought, informal traders used extra fuel searching for cheaper vegetable and meat produce. As many informal traders restock several times a week due to storage limitations, this had a large effect on costs. The impacts on food security were described as being particularly pronounced for traders with limited financial resources to absorb cost increases – these traders had to put up food prices instead, reducing food affordability.

Despite a lack in resources and limited adaptive capacity, informal traders and superettes were found to be motivated to go back to normal quickly after disruptions. Although they often struggled under the hardship of the drought, they were often so dependent on their customers for their business survival that they were willing “to take the hit” and not increase mark-ups despite greater costs – which often impacted both food availability and food access positively. The informal traders with higher cash flow were more able to do so. One of the biggest challenge reported of informal traders were “quiet days” which would seriously reduce their cash flow and adaptive capacity.

The distinction between reactive and proactive adaptation strategies is pronounced in the urban food system. While half of the traders did not relate changing product availability and price changes to the drought, most other actors in the food system were able take pro-active actions, allowing them to even take advantage of the changing conditions. Information and assets, social capital and trust between supermarkets and supplier were necessary conditions.

Asymmetric power distribution highlighted the fact that in times of stress, informal traders in traditional markets have little power to demand or negotiate, their resilience is in finding alternative cheaper food sources or otherwise reduce stock or change the price of food. Often a few rand would make a difference to their customers, showing the importance of multiple food sources and positive food security impacts. Supermarkets on the other hand are able to demand adaptation from their suppliers while they are also able to change food flows to their advantage.

#### 6.2.1. Processed food: Maize and bread

For the maize meal manufacturers, the sharp rand depreciation had been a challenge, pressuring profit margins. As prices went beyond import parity, at the same time as the economy slowed down (and later went into recession), the manufacturers were forced to “keep the consumers happy by keeping up supply, even if it is at a cost” (Interview #33) as they had to keep their relative market share and “protect their brand”. A delicate situation emerged when Pioneer, one of the two biggest maize manufacturers in Cape Town, took a hit with their maize hedging – as they had procured maize for 6 months (compared to usual 3 months), and then maize spot prices went from around R5,000 per ton to 2,000. Nevertheless, this did not result in relative higher prices compared to other brands:

*“Certainly in the last season, maize product from a retailer’s point of view would have been subsidized. If I saw some of the pricing at certain times and you equate that to the raw material price at that point, and you add the milling margin - it didn’t make sense. You could see that they were losing money at that point. Either the retailer itself or it was subsidized by the millers themselves. You know I finance both the farmer and the miller and I could see the balance sheets of millers under huge pressure.” (Interview Storage and input supplier #44).*

Another interesting fact is the temporal aspect of the drought: while at the peak of a drought large actors are better equipped to deal with the challenge due to their “bigger balance sheets”, at the time when prices decrease again, smaller actors may have a relative advantage while larger players still have to sell high priced maize they have in stock first. This can also lead to actions which directly hurt the poor. According to one manufacturer, smaller millers who may only operate when it is profitable for them to mill, can take away market share *“So the big brands will lose sales to those little ones.” (Interview Manufacturer #13)*. Interestingly, this is not so the case in the Western Cape as there are no smaller millers (as described earlier). But nevertheless, if price differences get very large between the provinces, companies with “odd deals on the side” could truck down produce – but this had to be stopped to secure market share:

*“It hasn’t happened for a long time, but we had it recently with a few trucks coming. But we stopped that quite quickly. You know, it’s a sale for the company, but it also has negative effects because now he is supplying to one guy at a ridiculous price whereas he could have supplied to 10 people at an average price. So they also need to know where to draw the line. Supply one customer and get a bulk out of that one customer that will transport and that will mess up all the other regions. So we said, ‘look we are 10 big clients, offer to the 10 biggest clients and make the playing field even.” (Interview Wholesaler #31).*

At retail level, supermarkets would always keep a handful of “loss-leaders” which are aggressively priced – maize meal and bread being among them. And indeed, comparing prices at retail level of Pioneer brands with Premier brands, no significant difference in increase were found, despite the mistake in maize hedging on Pioneer’s side.

Table 14: Comparing prices for (super) maize meal at retail level over three years (source: Retail Watch<sup>11</sup>)

Supermarket	Brand	size	Feb 2015	Feb 2016	Feb 2017	y/y
Checkers	White Star (Pioneer)	1kg	8,99	9,99	13,99	15,9%
		2.5kg	17,99	23,99	29,99	18,6%
		5kg	-	-	-	
Pick N Pay	White Star	1kg	8,79	8,79	15,99	22,1%
		2.5kg	18,49	23,19	30,29	17,9%
		5kg	31,9	42,99	60,29	23,6%
Checkers	Impala (Premier)	1kg	7,99	9,99	12,99	17,6%
		2.5kg	15,99	21,99	27,99	20,5%
		5kg	24,99	46,99	54,99	30,1%
Pick N Pay	Impala	1kg	5,99	9,99	12,99	29,4%
		2.5kg	15,99	23,99	28,49	21,2%
		5kg	-	-	-	
Checkers	Iwisa (Premier)	1kg	8,49	10,99	13,99	18,1%
		2.5kg	17,99	24,99	27,99	15,9%
		5kg	33,99	46,99	55,99	18,1%
Pick N Pay	Iwisa	1kg	9,49	10,99	13,99	13,8%
		2.5kg	-	-	-	
		5kg	32,99	40,99	55,99	19,3%

<sup>11</sup> With thanks to Vicky Baker from Retail Watch for sending the data

This shows that market concentration and competition can have positive food security effects when large players (either manufacturers or supermarkets) absorb price increases. One way to keep “loss-leaders” for supermarkets is to have a wide range of product and cross-subsidize between those products and raising net profit margins on certain products. Superettes described the same strategies: when wholesalers or manufacturers offered discounts on certain products, the respondent would “take the discounts and load it all onto maize, for example. Or I move it onto flour, or beans, and other things. It’s as simple as that. You just shuffle the numbers around.” (Interview Superette #14). Another strategy applied was to change the stock buy buying smaller quantities of maize meal, for example 5kg instead of 10kg or 1kg instead of 2kg – increasing food affordability. The superette owner felt that this was necessary as he had noticed that his customers struggled with the price increases:

*“I mean where you would be paying, it was easily 25% more. And 25% is a big increase! If you were paying 100 Rand, suddenly you would be paying 120 Rand (...). But I feel sorry for the man, who is walking in here to buy it. Because he is having to face the real consequences, should he be buying the big one or the small one? He is facing the real consequences. But that is what they do, they still buy it. They just buy the smaller ones” (Interview superette #14).*

As customers were also struggling with bread price increases, supermarkets applied the strategy of baking more bread in their own bakeries to stimulate demand. One supermarket locked their bread prices at around half the price of the bread of Pioneer and Premier. While superettes and informal traders did not have the same strategy at their disposal, they would let consumers buy half a loaf, for instance. Interestingly, they often reported that consumers still wanted the same bread (mainly Pioneer, Albany, Premier) as consumers trust their quality. This again, shows the feedbacks from the consumer side which can reduce adaptive capacity. Superettes and spazas stated they instead had offered customers to buy half loaves of branded bread. One superette employee stated that it did not matter when consumers were short on cash and would then forget to pay the difference later, effectively increasing food affordability.

### 6.2.2. Fresh Produce

As the food flows and adaptation strategies were more diverse for fresh produce, these are depicted graphically in figure 15. It shows clearly how different actors adapt and how power can influence food flows both vertically and horizontally. Informal traders and superettes were largely adapting by either changing the price of the produce they sell to stimulate demand, change stock (e.g. different variety of potato and tomato) or by varying the sourcing. Informal traders from the CTFPM, for example, reported to source more directly from farmers if they had stock available.

In addition, industry sources described that when supermarkets had a preferred supplier relationship with a farmer, the farmer might be sourcing from other producers, the same cultivar of the same

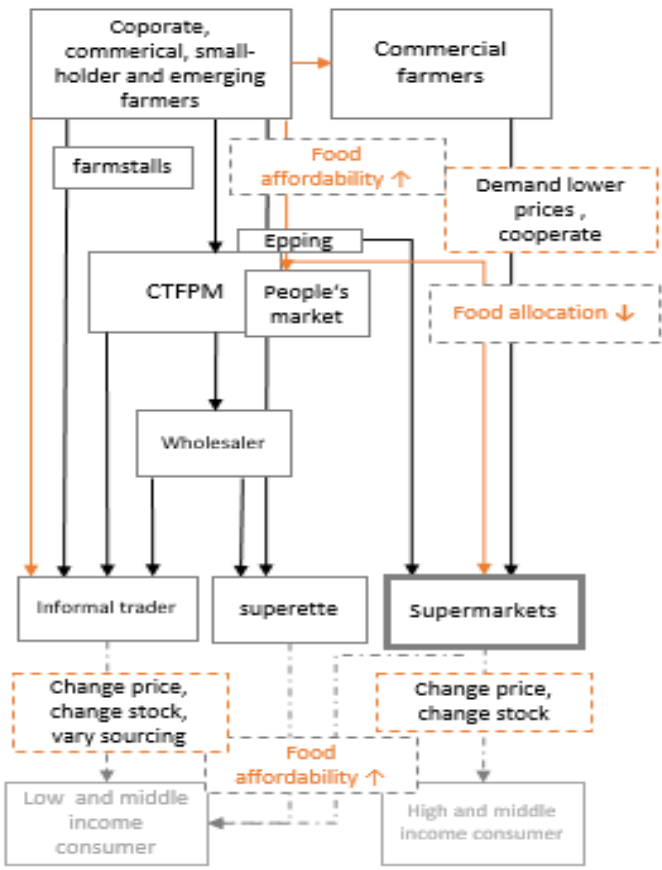


Figure 15: Food flow of fresh produce and adaptation strategies under stress

quality to make up his contractual obligations if he experienced reduced yields. The cost of doing so would, however, lie with the producer. This adaptation strategy at source could mean that other nodes may be indirectly impacted as food flows are diverged from them, increasing food availability to supermarkets but reducing food allocation in the food system more generally.

Although supermarkets would not like to admit that they source from the CTFPM (traceability and consumer demand), industry sources and several traders from the CTFPM stated that during times of stress, supermarkets or their middle-men would “walk the market floor more often” and source more often from the market - potentially negatively impacting the food

flows to the informal market, reducing food allocation.

One supermarket, in a high income area, who had trouble with the quality of the fresh produce received, changed their requirements and sold “ugly food” in their shops. Producer organisations indicated that this could have been a more for advertising purposes:

*“But to be fair, you higher LSM<sup>12</sup> will look at the ugly food as ‘Oh it’s organic’ and all that, so they will be attracted to it, because lets be fair: they can. But your townships, those informal guys, don’t have the luxury to be, they need to feed their families, they need a products that is going to sustain and they need the quality product” (Interview CTFPM #5).*

<sup>12</sup> Consumer strata



On the other hand, a supermarket in a low income area reported to “buy as cheaply as we could, from same supplier, if possible, but with lower demands – for example we would offer a medium sized potato instead of a large potato. And provide lower LSM consumers with less quality produce at cheaper price. But we also cut our margins to stimulate demand.” (Interview Supermarket #30).

Regarding pro-active adaptation, supermarkets apply differing strategies to increase the resilience at their supply base. While both Woolworth and Spar aim at strengthening direct collaboration with farmers, they do so in different if not opposing ways. Woolworth tries to more actively manage their suppliers, having reduced the numbers of farmers they work with over the year. Spar tries to set up flexible sourcing option, increasing the number of farmers they work with. Woolworth project called “Farming for the Future”, started 8 years ago – specifically designed to deal with risks such as the drought:

*“Well luckily, we started 8 years ago, with the Farming for the Future project, specifically designed for those kind of situations. So yes, it did affect us on price. Because even in the best farming practices if you have a drought, your yield will go down. But we did not run out product in this drought, like some of our competition, because of that. In Farming for the Future, the main objective is looking after the water use efficiency. And water use efficiency is not only how you use water how you measure water and how healthy is your water, it is how do you cater for the rainy day, if you could run out of water.”* (Interview supermarket #1).

Spar tries to rearrange their value chains, to move away from centralised distribution and shorten supply chains, to decrease margins along the value chain and increase food access. Spar recognizes that this may mean lower profit in short term, but can bring resilience in times of shock and therewith also economic benefits.

### 6.2.3. Red meat

With red meat, it was reported that the bigger nodes in the food flow would delay passing on price increases to keep their market share:

*“And the big thing now is that the impact of the drought is severe on price. Both from cattle and sheep perspective. It is ridiculously high. Because the breeding animals, the number of breeding in the country are low, because the people slaughtered some of the breeding animals. And now your problem, and if you talk to the abattoirs in the Western Cape, they exactly have the same problem, they have to keep their shelf space, so they can’t be out of the market. So they buy in at a high price, and I think they just sell the carcass at break even, maybe even at a loss, and that is the ridiculous thing about the drought.”* (Interview auctioneer #37).

One meat wholesaler stated to import more beef to be able to keep supply up, although the exchange rate led the wholesaler to increase prices. Nevertheless, in the low income area the wholesaler was selling, price differences with other wholesalers and butcheries had to be kept to a minimum as “there is a lot of competition in the area” and “customers shop around”. This meant that their profit margin decreased, but increased food affordability.

One meat processor who also owns an abattoir reported that at certain times, supply of lamb was so low that other competitors from further away would come into ‘their’ area to buy lamb from their farmers to be able to reduce financial losses. This had adverse impacts on food prices for all retailers:

*“So now, these abattoirs are coming down into our area, paying our farmers more money, adding the transport costs, driving those lambs maybe 800 kilometres back up to Upington, slaughtering them and then transporting them back down here to Cape Town. (...). They pay more money to get the lambs from us, so that is pushing the price up, then they are adding 2 Rand a kilo, yes 2 Rand, transport up to the abattoir and then another 2 Rand back down here.” (Interview Meat processor #34).*

The farmer at the holding area in Cape Town stated to struggle financially as consumer demand was low and prices high. To help his customers, he bought a bakkie so that the meat traders from the townships would not have to pay transport costs anymore. Informal traders did notice price increases: *“I paid 1,500 for a sheep last year, now it is 2.0 or 2.2. I do not know why” (Informal meat trader #28)* Nevertheless, they did not notice changes in demand, indicating yet limited adverse food insecurity impacts.

### 6.3. Multiple stressors

Multiple stressors can limit adaptive capacity and increase vulnerability.

#### ***Increasing electricity and water costs***

According to manufacturers and supermarkets, the increases in costs limits their ability to pass on price reductions to consumers. Increases in electricity and water tariffs were particularly sharp during the research period. The projected cumulative increase in the average tariff of the monopolistic electricity supplier Eskom between 2010/11 and 2017/18 is around 123.72% (from 41.57 c/kWh to 89.13 c/kWh) (Agbiz, 2016). Supermarket stores in low income areas pointed to monthly energy bills which exceed the bills for rent, making it the single biggest expense. Such increases can limit, for instance, the financial viability of running in-house bakeries. In the City of Cape Town, water tariffs for commercial and industrial use increase from 23.10 per kl in 2015/16 to 25.35 in 2016/17 (incl. VAT), which is around 20% above both the Western Cape and national average (City of Cape Town, 2016b).

### ***Urban water crisis***

In addition, actors were concerned about future vulnerability, i.e. the fact that the food system is left more vulnerable after the prolonged drought period and had no time to recover. In the Western Cape, major dams are currently below necessary water levels to be able to make it through the summer season without water shortages. Farmers and businesses located in Cape Town felt there was little done to master the crisis, with promises of the city to look into water saving and new water supply, but little actions. Therefore, many respondents reported to have started fill water tanks and drill boreholes to keep up water supply in case of emergency.

Any water shortage within the city's boundaries would be primarily a problem for bread manufacturers – giving that water is an important ingredient for bread, as well as for meat value chain actors who use water to clean the carcass, for cooling, and to produce certain meat products. One meat processor had come up with innovative methods; using water for cooling as well as heating. Nevertheless, this cost the company large sums and the respondent worried it would end up effecting food prices. In addition, the respondents criticised that little was done by the city or national government to support or incentivise water savings at business level.

#### **6.4. The two sides of power**

During the drought 2015-2017, retail food prices in South Africa rose dramatically. These increases put the spotlight on market power of food manufacturers and retailers. The proprietary nature of information on processes within the supply chain makes it difficult to identify uncompetitive behaviour. One thing that was striking was that while the large companies, from supermarkets to manufacturers to large agri-businesses, see consolidation and concentration as one form of 'resilience', experts, the Western Cape Government and smaller value chain actors expressed suspicion about possible manipulation of prices. Respondents expressed concerns about large players using the drought to hike prices unfairly.

Larger players like supermarkets point to their shrinking margins and internal inflations being below the national food inflation to prove that they did not hike prices. Nevertheless, retailers publishing internal inflation being lower than Statistics South Africa's official food inflation often use different reference period and they also do not specify the food basket – which means that there is no transparency about how they calculate internal food inflation.

#### **6.5. Underlying vulnerabilities – slow changing variables**

The implications of climatic extremes in 2015-2017 also have to be situated in the context of changes at the socio-economic level which have been occurring in South Africa — what Chapin et al. (2006)

term 'slow variables' and Liu et al. (2007) 'legacy effects.' In Cape Town, there are cross-scale linkages that combine to increase vulnerability (Ericksen, 2008).

### ***Inequality and persistent poverty***

Apartheid legacies and resulting inequality are underlying vulnerabilities in Cape Town which seriously reduce the city's resilience. This leads to shocks quickly reaching the consumer - exacerbating food insecurity levels. Since apartheid, the poorest city dwellers have been consigned to the periphery of the city. This inequality is still represented spatially in the city (Battersby, 2011). Townships areas like Khayelitsha/Mitchells Plain and Cape Flats south-east of the city centre show high levels of poverty and food insecurity. 63.0% of households in the Khayelitsha/Mitchells Plain district and 51.0% of the households in the Cape Flats fall within the low income bracket (Western Cape Government, 2016a) and the majority of the households are either severely or moderately food insecure (AFSUN, 2008).

### ***Unequal distribution of retail***

One important driver of vulnerability at the urban scale which should not be overlooked is the fact that retailers are unevenly distributed throughout the city as described in the Contextual Background. A study by Battersby and Peyton (2014) showed that supermarkets are unequally distributed within the city. This geography inequality often makes informal traders the only viable daily source of food for poorer consumers (ibid).

### ***Urbanisation and high water use***

The drought in the Western Cape had also been heightened by human stressors such as rapid urbanisation, growth in manufacturing, agriculture (especially wine industry), and tourism (OECD 2008), while there is little opportunity left for further damming of rivers in the regions. It was already estimated in 2011 that the Western Cape will experience water-related constraints to development as early as 2019 due to population growth, urbanisation and industrialisation. It is estimated that the (Department of Water Affairs (DWA) 2011). With little opportunity left for further damming of rivers, plans are considered to mine deep aquifers in the Table Mountain Group, a large mountainous region along the west and south coasts of South Africa (Ernstson et al., 2010). Until 2017 little has been done.

## **6.6. Policies and adaptive capacity**

Most scholars agree that high adaptive capacity of actors will not lead to pro-active adaptation strategies alone, as higher level institutional and policy reforms are also needed (Adger et al, 2003). Adger (2006) states that social vulnerability in any system is determined the resources a system has to use as well as the distribution of those resources in the system. Here the capacity of the institutions

mediating interactions within the system becomes crucial. A couple of distinct issues were highlighted during the interviews and talks with supervisors.

In Cape Town, rapid urbanisation has led to the Philippi Horticulture Area being increasingly utilised for housing, including informal settlements (Interview farmer & Interview expert; Ernston et al., 2010).

### ***Criticised land reform policy***

While South Africa has long history of drought management and does have safety nets in place for the resource-limited farmers (Interviews experts #6; #24), the land reform policy limits pro-active adaptation to drought. The White Paper on South African Land Policy (1997) addresses the injustices and land inequalities that came about during colonial rule and apartheid (Montmasson-Clair & Zwane, 2016; Agbiz 2016).

*“I do think that policy uncertainty is without doubt the most concerning (land reform), I think that we are seeing in parts of the country farmers aren’t investing and if you got a climate that is so unpredictable, you need to be investing to be resilient. You need infrastructure, technology, information.” (Interview Expert #24)*

### ***Policies neglecting the importance of and constraining informal trade in the food system***

At urban level, food policies were criticised for being incomprehensive. Although food security is dealt with at national level and cities in South Africa of no mandate to specifically address urban food security challenges, the city of Cape Town does adversely impact urban food security with its policies concerning informal trade. The policy neglect of the role of the informal food retail sector in food security is often highlighted as a particular problem (Battersby 2011b). Despite research showing the importance of the informal economy for food security, there has been relatively little policy support and funding directed towards effective governance of this sector.

The City’s Informal Trading By-Law as well as the City of Cape Town’s Single Zoning Scheme, both passed in 2013 have been criticised to restrict informal traders. The Zoning Scheme, for instance, restricts the operating hours and puts requirements on these which makes 70% of spaza stores in Cape Town illegal (Battersby, Marshak & Mngqibisa, 2016.). In addition, from time to time there are suggestions coming up to restrict the informal meat sector due to safety concerns (ibid).

## 7. Conclusion and discussion

It is increasingly clear that food security is a critical aspect of urbanisation. It will be a major challenge to ensure that all city dwellers have food available, affordable and accessible to them at all times. This challenge is further sharpened by long term stressors such as rising inequality and climate change faced globally. Sudden shocks such as the extreme drought conditions in South Africa in the years 2015-2017 can have devastating effects on urban food security and can increase the systems' vulnerability to future shocks. It is an imperative to decrease these risks, but there is yet little empirical evidence on how. Urban food security is not only an issue of production; social science research has demonstrated that urban food insecurity is also concerned with access to food and the economic, political, and social conditions that influence the food system (Crush & Frayne, 2011; Ericksen, 2008). At the same time, urban food systems are rapidly modernising, sparking a discussion whether these developments increase or decrease the vulnerability to short-term shocks such as droughts (Fraser, Mabee & Figge, 2005; Ingram, Ericksen, & Liverman, 2012; Rotz & Fraser, 2015; Hendrickson, 2015; Toth, Rendall & Reitsma, 2016). To understand the challenges and dynamics of an urban food system in times of shocks, the paper set out to answer the question of *how recent economic shifts in the food system of Cape Town influenced the system's vulnerability to shocks such as the drought of 2015-2017*.

To answer this question, the paper developed a model to assess urban food system vulnerability to drought. In the case study of Cape Town, the model structured different food flows and empirical analysis of processes, conditions, relationships and feedbacks shaping food system vulnerability during extreme climate-related conditions in 2015-2017. The study demonstrates that the link between climatic shocks and food security outcomes is rarely simple but is mediated by complex interaction within and between the different food flow actors, influenced by factors at different spatial-temporal scales, and shaped by internal system dynamics and unequal distribution of power. In times of high stress the power dichotomy between actors in the system get exacerbated – often at the detriment of the poor consumer.

### **A review and interpretations of the empirical results**

A closer look at the food flows to and within Cape Town reveals that these are diverse and complex and also highly interconnected, ranging from local to international scale. Only a few truly local food flows can be found – mostly for fresh produce and meat, both for formal and informal retail. But even these local food flows are influenced by other scales of the food system, e.g. though price determination and cannot be seen as separate from the other food system scales. For bread and maize, clearly national and international food flows dominate. Consolidation and concentration is also

profoundly influencing how food is supplied to the city. Food flows are generally more and more buyer driven, although the food flows for processed food can be seen as producer driven.

The drought of 2015-2017 impacted all studied food flows, some less so for food availability, but due to the nature of price setting all experienced food inflation and rising food prices in real term. At the same time, the sensitivities and adaptive capacity differed among the food flows. As power is unequally distributed within the food system it unequally shaped both sensitivity and adaptive capacity of the food flow actors.

The power imbalance manifests itself, for instance, in the fact that informal traders are dependent on large players that supermarkets also source from. This can provide some resilience to local droughts in terms of food availability, but leaves informal traders exposed to other stressors (e.g. political and economic crisis). The fact that informal traders are part of producer driven value chains and have limited alternative food sources, coupled with weaker consumer demand during times of stress, also makes them more sensitive to price increases. At the same time the adaptive capacities of the informal traders are limited. They possess fewer assets and are confined to reactive rather than proactive adaptation strategies. In addition, their food flows are more subject to be adversely affected by the adaptation strategies of more powerful actors in the food system – either because these possess more power in the same respective food flows via value chain governance or, to a lesser extent, because they have the market power to tap into less rigidly governed food flows and influence the food flows to their benefit. Nevertheless, informal traders and superettes apply strategies which can increase the food security of their consumers. These actors are highly motivated to do so as their livelihood and business survival often depends so vitally on their customers.

Buyer driven value chains, mostly governed by supermarkets, are more concentrated, more reliant on a handful of suppliers (higher risk for supplier disruption). Products are also more sophisticated. These food flows are sensitive as they have high product requirements and as they work with more adaptive farmers who may choose to export in times of stress. Nevertheless, their adaptive capacity is high. Actors often have the necessary assets, information and collaboration in the value chain to be able to anticipate risks and take the measures to counteract supply disruptions.

Shifts in power, consolidation and concentration have conflicting implications for food security. This conflict or paradox can be translated as “when you are strong you also have to be kind” – which in this case means larger powerful players have to be able to cater for the poor and their food insecurity. On the one hand, economic shifts and the emergence of large manufacturers also catering for the informal traders and superettes or supermarkets catering for the poor, can have positive impact on both food

availability and food affordability in times of shocks. The pressure to keep their market share combined with their resourcefulness makes strong actors more inclined to and able to actually ‘take the hit’ and still ensure that food is available at affordable prices. Catering for high end consumers as well, gives them the resilience to compensate for that – these actors could, for example, raise the prices of some products and still keep loss liners. On the other hand, in times of high stress, actors are also pressured, which can influence them to not be kind – either directly by price increases or indirectly by influencing food flows and privileging high end consumers. It thus seems that economic shifts combined with high inequality between consumers may rather be detrimental than beneficial to food security. In that case, the availability of multiple food sources for informal traders and superettes is crucial. Fair competition between the actors they source from is also an imperative, so that traders are able to check prices and choose the cheapest option.

There are two other important aspects to this finding: the temporal aspect and the geographical aspect. At the height of the drought, i.e. the when the drought has the most adverse impact on food security, the market position and governance power of large players such as supermarkets and manufacturers often allows them to demand low prices and makes it possible to delay the passing on of costs to the consumers. Later in the course of the drought, when smaller actors are able bring for example cheaper maize meal to the consumer, more powerful actors can push out these smaller players as they are in need to regain higher profit margins – which indirectly hurts the poor.

The geographical aspect relates to the geographies of poverty in the city. The fact that supermarkets are unequally distributed in the city means that most adaptive capacity within the urban food system is not at the benefit of the poor and food insecure. Interestingly, the adaptive capacity also seems to be unequally distributed between the different stores of the same supermarket chain, as supermarkets in lower income areas also reported food supply disruptions. In time of high stress, supermarkets may thus choose to focus their efforts on more profitable stores. In short, drought exacerbates dichotomy and power inequalities in the urban food system at the detriment of the poor and their food security. Despite being limited in terms of assets and power, actors like informal traders and superettes become crucial to the food security of the poor.

### **Relevance of results for future vulnerability**

In Cape Town, the years 2015-2017 stand out in the climate records and in the memory of value chain actors as a period of extreme drought conditions. Looking forward, climate change scenarios indicate that such extremes will become the new normal in South Africa (IPCC, 2014; Niang, 2014; Benhin et al., 2006). By examining how actors experienced and responded to the climate-related conditions in



2015-2017, this case study provides real-time insights into how future climate shocks might affect food security.

Firstly, it shows that the impact of the extreme drought of 2015-2017 was strengthened by the interaction with other stressors at different scales. Cape Town has been struggling with urbanisation, poverty and inequality. Furthermore, the city has been rather limitative to informal traders, disregarding their importance to the urban food and potentially limiting their adaptive capacity. At the same time, the national economic crisis and the rand depreciation led to sharp food price inflation.

Secondly, different trends can exacerbate vulnerability to drought in the future; 1) The trend towards branded products with high requirements influenced by powerful manufacturers has increased the exposure-sensitivity to environmental fluctuations and economic fluctuations, and can continue to do so. 2) The trend that informal retailers more and more rely on the formal sector (e.g. manufacturers) makes availability in the broader term dependent on availability in the formal sector. This will also make informal actors more vulnerable to unfair price hikes and uncompetitive behaviour by formal actors after droughts. This points to potential trade-offs between food availability and food affordability. 3) The trend of diversification of low-income consumers towards supermarket food consumption can reduce vulnerability to environmental fluctuations as supermarkets have higher adaptive capacity and more power to influence food flows – but that depends on how well they will be able to cater for the poor also in times of stress.

Lastly, the case study indicates that there will be ‘winners’ and ‘losers’ in the food system as the climate changes. Winners such as powerful actors and affluent consumers will be able to take advantage of new opportunities without having to compromise food security. Supermarkets who are able to manage their supply base, find innovative solutions to dry climate, and have the financial resources and knowledge to do so, are able to take advantage of higher food prices. Losers will have difficulty maintaining food stock and consumers will be vulnerable to both short-term and chronic food insecurity. The case study indicates that access to financial resources and diversity of food sources will be major factors in determining winners and losers. Importantly, there are also differences among supermarket stores of the same chain and among informal traders. Winners and losers are thus found at a scale rather than at extreme ends.

What can be said more generally about the vulnerability of urban food system to droughts? Firstly, the specific nature of vulnerability will differ by city, on the mix and variety of food system actors and the magnitude of economic shifts. Available adaptation strategies, local resource availabilities and constraints, and socio-economic determinants will also differ. This being said, research across South

African cities has found evidence of similar processes and drivers of vulnerability to those identified here (Battersby et al., 2015). This indicates that the insights from this study could be broadly applicable to other urban food systems in South Africa.

The study raises a number of important research questions, which is also related to the limitations discussed in the methodological chapter. Firstly, the study is a snapshot of food system actor experience and response to drought in 2015-2017; the long-term implications of cumulative climate-change impacts for food security are yet unclear. Did the costs of adapting to the drought reduce resources available to resist and recover from future droughts? Are there trade-offs between adaptations utilised and adaptive options available for responding to future extremes? To what extent are food prices kept high after the drought, potentially inflated by powerful actors? To what extent can major stressors such as the drought lead to further consolidation and concentration of power? Continued monitoring and assessment of food system vulnerability should be undertaken to provide insight on these questions. Secondly, more case studies are necessary to develop a broader understanding of urban food system vulnerability to climate change.

#### **Discussion of the results: broader implications for research and policies**

In light of the results, it is evident that vulnerability analysis has to go beyond production or consumer focus as many vulnerabilities are shaped by interactions and power differences in the food system. This has implications for both academics and policy makers.

Firstly, most academic vulnerability or resilience studies look at the (urban) food systems and indicators on an aggregate level (Fraser et al., 2005; Hendrickson, 2015). These studies risk masking the power inequalities within the system, and how these play out under stress. A framework which points to interdependencies, power imbalances and trade-offs between food flows helps to reveal these dimensions of vulnerability. Furthermore, the study raises questions as to the commonly used indicator 'diversity' for food system robustness. This study shows that consolidation and concentration can actually both enhance and erode the vulnerabilities, depending on the characteristics of these processes. But what constitutes 'beneficial' consolidation and concentration as opposed to diversity is yet unknown and depends on many factors (such as inequality). This indicates that academic research yet lacks the understanding and theoretical tools to determine those thresholds.

Secondly, the study shows the necessity of holistic approaches which tackle drivers of vulnerability at different scales. This has implications for the governance of (urban) food systems as it implies that there are many actors involved, from local to national level, both public and private actors. It highlights what other social scholars have pointed to: who decides what is to be made resilient and for whom?

(Brown 2014; Cote and Nightingale 2012). At current state, there seems to be little agreement on this question and actors have different approaches tackling various issues, potentially counteracting each other. Although an urban food system is confined by boundaries it is a complex system where different aims need to be merged and power imbalances need to be bridged. It is of crucial importance that strategies are not counterproductive. One example: The national government mostly focuses on making production and smallholders more resilient, but at the same time the land reform hinders resilience of the agricultural sector. Another example: The private sector sees increasing market share and the ability to import food from different sources one form of resilience, but economic downturns and rand depreciation can render this strategy ineffective. This also highlights that policy makers and scholars working on the City Region Food Systems Approach need to bear in mind that they are not working in a confined 'bubble'. Any food system with dualistic power and complex food flows, will not be made more resilient by focusing on short value chains only. There is a risk of disregarding other drivers of vulnerability, leading to a delay in tackling underlying vulnerabilities within the city and broader stressors outside of the city region boundaries.

At national level, the study raises the following questions: What can be done to make the system less prone to economic shocks? How much should the public sector intervene in the food system? In the current state, the public sector often has a *laissez faire* approach to the food system beyond agricultural production, with the result that powerful private actors decide what is to be made resilient with limited incentive to cater for the poor in times of stress. This leads to the questions: What role can powerful actors play in making the food system more resilient? Can and should the public sector give incentives to the private sector to cater for the poor in times of stress? At city level, there are questions that the city of Cape Town can consider: Should the city reconsider restraining policies for the informal sector? How can the city tackle underlying vulnerabilities such as inequality and unequal access to supermarkets? Can the city play a role in increasing the adaptive capacity of the less powerful actors? The paper calls on academics and policy makers to rethink the concept of resilient urban food systems available today. Only when tackling vulnerabilities at different scales will cities be able to cater for all their residents food needs during all times. Research into policy options to address mentioned vulnerability determinants should therefore be a priority.

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