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Mapping Urban Food Security in Delft: A Bottom Up Perspective

A thesis submitted in fulfilment of the requirements for the degree Masters in Arts in the Faculty of Arts, Department of Geography, Environmental Studies and Tourism

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Adrian Paulsen

Student no. 3332921

Supervisor: Dr Bradley Rink

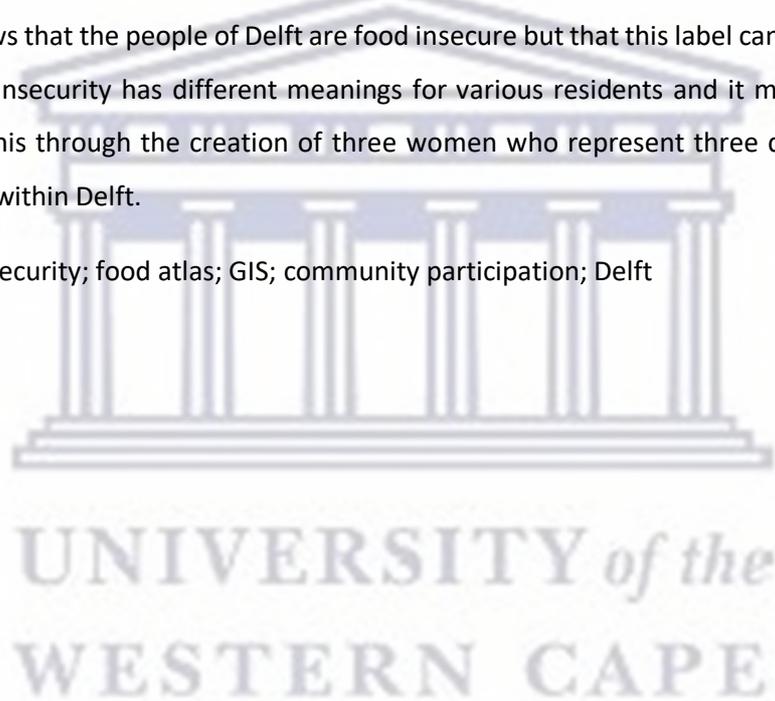


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Abstract

Food security is a complicated phenomenon that consists of the intersections of food and people, and the cultures that people create around food. In general, food security research is concerned with how people access food, how reliable that access is, how affordable that food is, and how culturally appropriate that food is. This analysis tends to ignore the complex relationships people have with food and who these people are. Through the mapping of the Delft food system by remote sensing, surveys and interviews I create a food atlas that consists of maps of the spatiality of food but also maps of feelings, anxieties, fears and resilience, all centred around the people of Delft. The results and discussions of this thesis shows that food security is far more complicated than initially thought and that there are multiple avenues of inquiry into the lives of people who are considered food insecure. My research shows that the people of Delft are food insecure but that this label cannot be applied too liberally as food insecurity has different meanings for various residents and it manifests in various ways. I explore this through the creation of three women who represent three different classes of women who live within Delft.

Keywords: food security; food atlas; GIS; community participation; Delft



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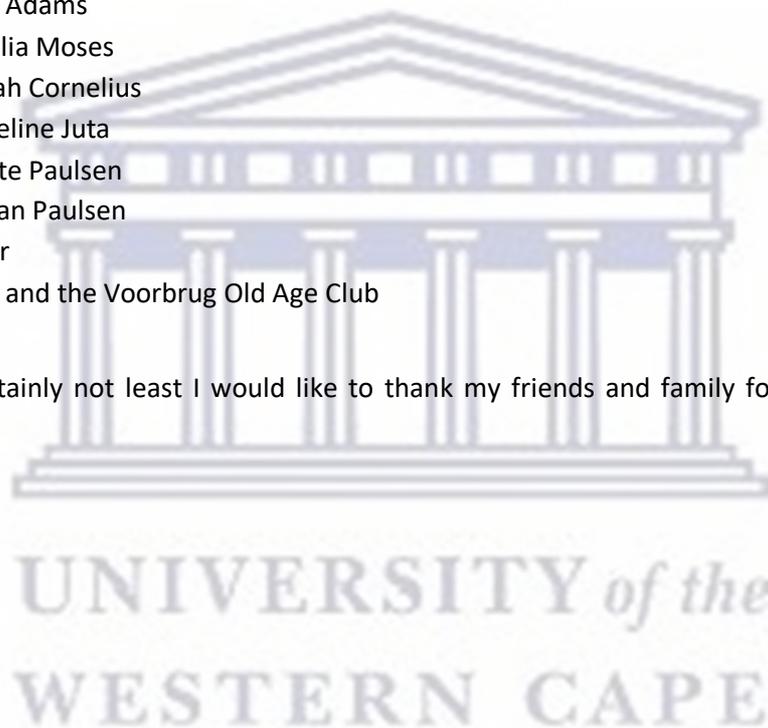
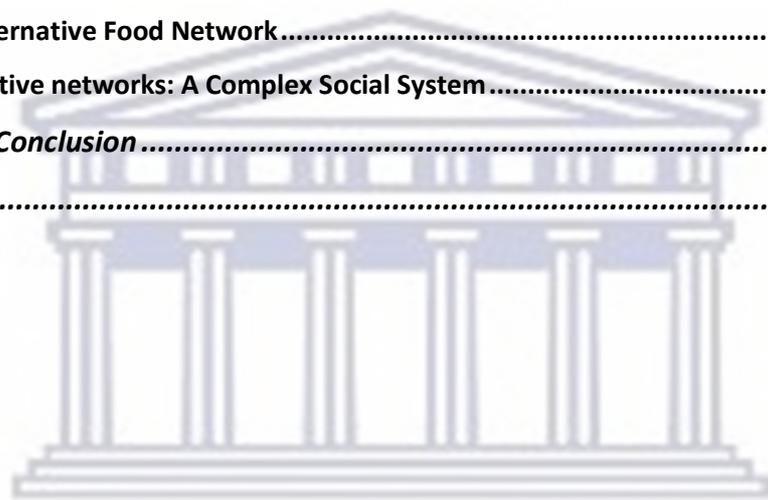


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1. Chapter 1: Setting the context

1.1 Humanising food security

This study highlights the lived realities in the struggle for food security. It is a labour of love that took close to three years to complete. During the course of the research I collected over 100 completed questionnaires and countless informal interviews whilst conversing with residents of Delft in order to understand the lived realities in the struggle for food security. The vast majority of these residents were women. During the course of this study I learnt an interesting fact that many people from poor backgrounds already know: households are run by women. Whilst they may not always be employed or formally educated, they are the ones that make purchasing decisions for the household; the ones who take care of children, parents and grandparents; and the ones who create and maintain community bonds through the sharing of food. Each and every household interviewed for this study shared similarities due to the nature of being in a low income area lacking in many opportunities and yet they were all unique in the ways that they sought out ways to cope in these harsh conditions. Thus, it would be easy to aggregate the data, providing a de-humanised and distanced reporting of the food environment within Delft, completely erasing the individuality of each household encountered.

Without being able to write a detailed description of every household, I have rather opted to humanise the raw data by looking for common themes and characteristics and assigning these to fictional people. The three imaginary women whom I present in chapter four serve as anonymised and composite representations of the data from this study. The purpose of the three characters is to underscore one of the principle contributions of this study, which is to demonstrate that food security is a human phenomenon, and that people are involved in every step. These imaginary, aggregated characters represent the three distinct social classes within Delft, namely, poor, middle class and wealthy. These terms are relative to Delft and only make sense within the context of Delft. A person characterised as wealthy within Delft would still be considered poor outside of Delft, therefore it is important to remember and contrast these social classes within Delft only. Furthermore it is also

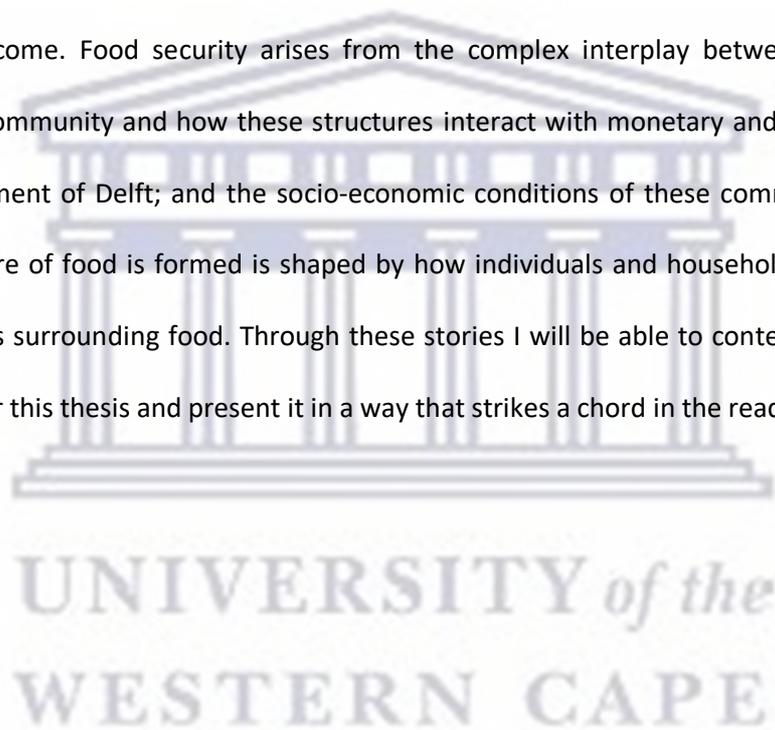
important to keep in mind that these social classes are not stratified within Delft, in other words, there is no “poor”, “middle class” or “wealthy” area. Rather, there are “poor”, “middle class” and “wealthy” households who co-exist within Delft, even within the same street. I decided to use these social classifications because powerful insights can be made through comparisons and also because I am a human geographer who is fond of looking at the human elements of even the most mundane phenomena. With this in mind, I turn to the aim and objectives of this study.

1.2 Research aim and objectives

With its focus on the lived realities of food security, the aim of this research is to investigate the complex relationships that residents of Delft, Cape Town have with food through the creation of a food atlas. The creation of the food atlas serves to unpack notions of food (in)security in a low income community by mapping selected food related indicators and highlighting the lived realities of managing food security through interviews with selected participants. Delft was chosen as a study area because of its history as an historically mixed-race area within the Cape Flats which can provide unique insights into how different racial and income groups access food. Delft has also experienced an increase in area and commercial activities through spatial development over a relatively short amount of time, and thus provides a useful measure of food access. And finally, Delft is an area of personal interest and deeply-contextualised knowledge for the researcher who has lived in Delft for five years at the time of the study. Related to this aim are a number of objectives. They include:

- To understand the community characteristics and demographics of Delft;
- To identify and geolocate all sources of food for the Delft community, including supermarkets, convenience stores, spaza shops, informal food traders, fast food outlets and any other sources of food; and
- To understand relationships between Delft residents and food, including: Store/Food seller proximity; Food prices; Food availability and types of food; Food temporality; Perceptions of food (in)security; Coping mechanisms regarding food insecurity; Food expenditure; Food networks; and Food culture.

The human approach to this study, using both quantitative and qualitative data, focuses on addressing the aim and objectives above. My approach contributes to the existing literature on food security providing a new lens for researchers to approach food security, by focusing on the people and not entirely on numerical indicators which can erase the human context of the people who form part of and generate the data for the research . The three women that I will introduce in subsequent chapters represent all of the sampled female respondents in Delft, how they interact with food, and how they create the culture around food. Through the stories of these three women I will show how the women of the household use monetary and social capital to procure food and how they adapt the household to fluctuating income. Food security arises from the complex interplay between the individual, household and community and how these structures interact with monetary and social capital; the physical environment of Delft; and the socio-economic conditions of these communities. How the community culture of food is formed is shaped by how individuals and households act, decide and agree on customs surrounding food. Through these stories I will be able to contextualise the data I have collected for this thesis and present it in a way that strikes a chord in the reader.



2. Chapter 2: Locating Urban Food Security

Food research is a field that is well researched and studied. This field can be divided into many sub-fields that are all extensively researched. For this study I focus on the following distinct fields within food research, namely: Food security, food deserts, food accessibility and food mapping. Food security is a topic that has been extensively covered in the global North. Research in the global North covers many topics ranging from food security mapping to food security strategies with special scales ranging from household level to global. The global South however, especially developing countries lack research pertaining to food security in comparison to the global North. Lessons learnt from food security studies in the global North cannot be easily transferred to cities in the developing world because these cities differ in their social and spatial make-up. According to Kroll (2016) Food security is defined as universal and consistent access to enough good food to sustain a healthy, productive and meaningful life – is often evaluated across four dimensions – availability, accessibility, utilisation and stability or resilience. The review of literature that follows will examine food research that is relevant to this research.

2.2 Conceptualising the food desert

A food desert is a term that is hard to define and has been the subject of much academic scrutiny because it is a research tool that has seen wide use in the US and UK but has so far failed to be applied to the context of the global South and Africa (Kroll, 2016). Food desert researchers have also failed to come to a consensus on how food deserts should be defined and how to apply them to a study area (Kroll, 2016). This problem is further compounded when one realises that a food desert can be defined through many variables and that researchers are free to use or discard these variables when constructing their definition of what a food desert is. Some of the variables that researchers (Walker et al., 2010; Kroll, 2016; Battersby and Crush, 2014) use to define food deserts include:

- Access to supermarkets
- Urban density
- Income level
- Distance needed to travel to access supermarkets

- Race/ethnicity
- Food store density
- Cost
- Location

From these variables researchers have defined food deserts in many different ways. Hendrickson et al. (2006: 372 as cited in Walker et al., 2010) define food deserts as: “urban areas with 10 or fewer stores and no stores with more than 20 employees”. Cummins and Macintyre (2002 as cited in Walker et al., 2010) define food deserts as: “poor urban areas, where residents cannot buy affordable, healthy food”. The conventional wisdom surrounding food deserts, according to Battersby and Crush (2014), defines food deserts to be: “...economically-disadvantaged areas where there is relatively poor access to healthy and affordable food because of the absence of modern retail outlets (such as supermarkets)” (2014: 1). Hendrickson et al. (2006) focus on the amount of stores available to residents while Cummings and McIntyre (2002), and Battersby and Crush (2014) focus on access to healthy foods.

Beside the fact that there is no consensus on the definition of a food desert, there are also many theories of how food deserts are formed. According to Walker et al. (2010) one theory is that the development and closure of stores leads to the development of food deserts. It is believed that the growth of large chain supermarkets on the outskirts of inner-cities in more affluent areas offer consumers a better quality, variety and price for food options. Additionally, these venues tend to have longer business hours and better parking options that are attractive to consumers. The expansion of these supermarkets have forced the smaller, independent, neighbourhood grocery stores to close, thereby creating areas where affordable, varied food is accessible to those who have access to a car, or those able to pay public transportation costs. This theory has led one independent retailer to define a food desert as ‘an area where high competition from the multiples [large chain supermarkets] has created a void’ (Furey et al., 2001 as cited in Walker et al., 2010: 876). Another theory of how food deserts form in the inner city, point to demographic changes in US cities between 1970 and 1988 (Walker et al., 2010). It is believed that during this period economic segregation became more

prominent and affluent households moved out of the inner city to suburban areas. Literature focusing on African food deserts also point to demographic changes as a possible reason for the formation of food deserts, specifically how poor urban areas have a lack of access to food. For South Africa, specifically, the demographic changes affected by Apartheid spatial policies are used as one of the possible reasons for the formation of food deserts in certain areas (Kroll, 2016). These demographic changes cause the medium income levels in these areas to decrease and therefore large retailers tend to close and move to higher income areas. Walker et al. (2016) posit that demographic changes in US cities during this time period caused over one half of all large retail stores to close in the three largest US cities. Battersby and Crush (2014) warn that in Africa the food desert concept requires a far more complex understanding. This includes the complexities of over-lapping market and non-market food sources; the nature and dynamism of the informal food economy; the inter-household differences that lead to different experiences of food insecurity; and the Africa-specific conditions that lead to compromised diets, undernutrition and social exclusion. Food desert research has also tended to be conducted from the household level and tends to ignore the structural drivers of food insecurity that operates beyond the household level.

Battersby and Crush (2014) assert that the focus on supermarket access as a metric to measure food deserts is somewhat inappropriate to use in the African context since the development of supermarkets on the continent—and in other world regions—is a relatively new occurrence. How then was food security and food deserts measured before the introduction of supermarkets? Applying the Euro-American food desert approach in Africa is problematic as it uses proximity to supermarkets as a proxy to access healthy foods as a metric to measure food deserts (Chi et al., 2013; Donkin et al., 1999; Eckert and Shetty, 2011; Hallet and McDermott, 2011; Reisig and Hobbiss, 2000; Sharkey et al., 2009). In African cities the retail typologies are fundamentally different. When the frequency of patronage is measured, large supermarkets are usually visited once per month while informal traders are visited several times a week (Battersby and Crush, 2014). Furthermore, the dynamism and complexity of the informal economy offers a particular set of challenges to a conventional food deserts

approach which assumes spatial fixity on the part of the retail outlets being mapped (Battersby and Crush, 2014; Kroll, 2016). The informal food retail environment in African cities is marked by great fluidity. Many traders and vendors operate only at particular times of day, or days of the week or days of the month. The fluidity of trade is an essential part of the urban food system and generates a food system responsive to the needs of low-income consumers. Thus the static nature of food desert mapping fails to capture the everyday mobility of residents whose lives are not restricted by the neighbourhoods in which they live (Battersby and Crush, 2014). Western food desert research tends to assume that residents within a certain community will not travel far distances to access a supermarket and that lack of access to a car will place you at risk of living in a food desert. Western food desert research also places those people living in poorer neighbourhoods as automatically at risk of living in food deserts. The African poor however are different in that they remain hyper-mobile (Battersby and Crush, 2014) and that residents do not necessarily shop within the neighbourhoods in which they live (Battersby and Crush, 2014), this then therefore calls in to question whether the assumptions of the urban poor as being likely to live in food deserts or to be food insecure are correct. The spatial configuration of food retailers have been thoroughly characterised in Euro-American literature and this has informed their food desert research; large supermarkets are located on the periphery and smaller retailers can be found within neighbourhoods. The spatial configuration of African food retailers however are fundamentally different, large retailers are usually situated along transport routes that workers use while informal food retailers and traders congregate around transport hubs such as taxi ranks (Battersby and Crush 2014; Kroll, 2016). Kroll (2016) further argues that food desert research does not take into account the temporality of food. How do researchers accurately assess access to healthy foods when these foods might be seasonal and perishable?

2.3 Approaches to food mapping

Food mapping makes use of various factors and indicators to create a spatial representation of food related issues such as access, security and poverty. The indicators used to inform and create the map can be varied and several can be used. For example the USDA food atlas makes use of over 200

indicators to inform their food atlas of the United States. These indicators cover aspects of food security as varied as income, proximity to stores, poverty level and many others. These indicators also cover many spatial levels from county to country wide. Although the USDA food atlas covers the entire United States, other food mapping endeavours do not have to be as ambitious; in fact most research on food mapping is done on the local level (Donkin et al., 1999; Eckert and Shetty, 2011; Hallet and McDermott, 2011; Hubley, 2011; Sharkey et al., 2009). The USDA food atlas is a powerful tool in the mapping and understanding of food poverty in the USA as it allows affected and interested parties to view food related issues at different spatial levels, informing decision making. The relevant literature will be reviewed here and thereafter will be analysed and discussed in further detail.

Chi et al. (2013) use the USDA food environment atlas and use geographically weighted regression (GWR) to improve the understanding of obesity in the US. The approach used by Chi et al. (2013) is purely quantitative, only using data available from the USDA food atlas and GIS software the researchers were then able to analyse the data by creating regression models. Using the regression model for all counties across the US the researchers found that the Southern US has the highest prevalence of obesity. Furthermore approximately 4% of individuals lived in homes more than 1 mile (1.6km) away from a grocery store without a car, but this rate went up to 5.06% for individuals residing in the South. The ratio of convenience-to-grocery stores is highest in the South (3.50) and lowest in the West (2.27), while the ratio of fast-food-to-full-service restaurants shows the opposite pattern. In the South the number of fast-food restaurants 1.13 times higher than full-service restaurants but in the Midwest the ratio goes up to 1.81. The researchers show, using Geographically Weighted Regression that indicators such as a high density of convenience stores over grocery stores, poverty rate and urbanized built environments are positively correlated with obesity.

Food mapping can be used to show food deserts on a spatial level. Researchers such as Hubley (2011) and Hallet and McDermott (2011) use GIS and census data to construct food desert maps, these maps take into account how accessible food retailers are to people by mapping the distance of population

groups from retail stores. Hubley (2011) makes note of how this approach can be problematic. She finds that the term “accessible” can have different meanings depending on who is asking. It is customary for food desert researchers to define accessible as within walking and driving distance but leaves the measurement of walking or driving distance up to the researcher to define. Walking distance has customarily been defined as within 1 mile (1.6km) of a retailer. Hubley (2011) further ascertains that the definitions of food accessibility breaks down when one considers rural areas where “accessible” food stores can be as far as 10 miles (16.1km). The ascendancy of supermarkets as the only measure of food security is also problematic as it ignores the importance of local food markets which are mostly informal and ethnic grocery stores (Hubley, 2011). Local food market and grocery stores serve people in areas where they may not have access to supermarkets (Hubley, 2011). Hubley (2011) addressed these problematic areas of GIS based food mapping by adopting current food mapping tools to be more relevant to her study area. Hubley (2011) not only mapped all supermarkets within her study area but she also used the Nutrition Environment Measure Survey (NEMA) which she adapted to use the “healthy options” category only. This new adapted tool was called the Maine Nutrition Environment Survey (ME-NEMA). Using this tool Hubley and a team of researchers created a food accessibility map. This map was then used to inform local food access policies.

Food desert research has been criticised for its lack of an empirical framework while at the same time sociologists criticise GIS based food desert research as simply exercises in software manipulation or gratuitous calculation, without relevance to real-world applications that separate spatial realities from social inquiry (Hallet and McDermott, 2011). In their study, Hallet and McDermott (2011) try and bridge the gap between the two sub-disciplines in an effort to better understand the idea of a food desert and to challenge the implications of what constitutes that idea. The authors mapped the location of full-service grocery stores with respect to transportation networks and the distribution of population by various demographic groups. Using aerial photography the authors identified only food retailers that were larger than 30 000 square feet (2787.1 square metres), excluding many smaller retail stores. The researchers also distributed 1000 surveys to residents asking them for their own

perceptions of whether they lived in a food desert or not, the researchers also asked questions around vehicle use. The researchers then used GIS to analyse the data. The results show that the further that food has to travel to get to a consumer the costlier it becomes, this has an impact on poor households especially as these households have less access to supermarkets where produce is cheaper. Hallet and McDermott (2011) also show that even though poor households might have access to cheaper food in some cases this food is generally of a lower quality. The researchers found that whether or not residents find themselves in a food desert was up to the personal shopping preferences of residents and whether or not they were willing to shop at certain stores. This finding gives residents agency and moves the concept of a food desert onto households and individuals rather than spatial areas.

In their study of predominantly low-income Hispanic neighbourhoods called *colonias*, Sharkey et al. (2009) mapped how neighbourhood needs are associated with two criteria of food environment access such as distance to the nearest food store and fast food restaurant and coverage (number) of food stores and fast food restaurants within a specified distance of the *colonia* using ground truth methods. Using ground truthing methods is especially important because it allows researchers to confirm whether or not spatial features actually exist or not, in this case the spatial feature of interest are supermarkets within the study area. Sharkey et al. (2009) note that studies show that some families living in poor areas in the US, UK, Canada, Australia and New Zealand have little to no access to supermarkets. This is especially worrying because supermarkets predominantly have a larger selection of fresh produce at more affordable pricing. Making use of a modified version of the 2002 North American Industry Classification System (NAICS), Sharkey et al. (2009) identified three overall categories of food stores: 1) Traditional food stores including supercentres, supermarkets and grocery stores; 2) Convenience food stores including convenience stores and food marts; and 3) Non-traditional food stores which are mass merchandisers, dollar stores and chain drug stores or pharmacies. Sharkey et al. (2009) differentiated supermarkets and grocery stores based on parking spaces available, the former having >100 parking spaces available. Using their above mentioned methods, the authors were able to show through mapping how different areas of the same census

area had variable access to food stores. They found that residents living in *colonias* had best access to restaurants and convenience stores.

Eckert and Shetty (2011) make use of GIS and food systems to quantify access to food. Eckert and Shetty argue that small retail stores are overlooked in food studies as a viable source of food security. This, they argue leads to gaps in food security research and can exaggerate the size and frequency of food deserts. Eckert and Shetty detail how inner city residents pay more for their food than their suburban counterparts and have lower access to fresh fruit and vegetables. This is due to spatial disparities within poorer and more affluent neighbourhoods. Studies show that there are fewer and smaller grocery stores in low-income areas, supermarkets have left city centres and poor areas because suburban areas are seen as more attractive. Eckert and Shetty list reasons for this: one being that supermarkets prefer suburban areas because of the relative abundance of suburban greenfields. Building supermarkets in greenfields allows supermarkets to be large and uniform in style. Suburban residents also shop throughout the month whereas inner city residents shop at specific times of the month. Crime is also a factor in where supermarkets are built, the inner city tends to have a higher crime level and so therefore they tend to have inflated insurance premiums. Another factor contributing to the absence of supermarkets in inner city areas is the lack of planning by cities to attract supermarkets to inner city areas. Due to the lack of supermarkets in the inner city, fast food restaurants have filled the vacuum, resulting in a higher prevalence of health issues such as diabetes and obesity.

Eckert and Shetty (2011) warn that, since there is no singular definition to define food deserts, researchers should move away from using that term and instead focus on measures of accessibility. Accessibility measures the distance a population group has to travel to access a source of food such as but not limited to supermarkets, convenience stores, dollar stores, etc. Accessibility as a definition has also been in flux within the relevant literature, researchers are prone to use variable distances when defining how far “accessible” is. Hubley (2011) also discussed this variability within food

accessibility research. Acceptable definitions for accessibility range from just 500 metres to over 10 miles (16.1km). This variability makes it difficult to compare work across different literature which compounds the need to have a standard definition of what “accessible” should be. Eckert and Shetty (2011) use common accessibility measurements in GIS to devise a replicable methodology to measure food access. In their research retail outlets classified as convenience stores were not included, as they have minimal variety, usually do not carry fresh foods, and tend to have higher prices. Membership-based stores were also not included as the cost of membership may preclude some individuals from having access to these retailers. Addresses of grocery stores and other food retailers were compiled using Internet searches and local phone books, along with Google Maps for verification where needed. A list of residential households was obtained from the Lucas County Auditor database. This data was then included into a GIS database. Thematic maps were then created showing the average distance to any food retailer.

Donkin et al. (1999) attempt to map access to food at a local level using a quantitative approach which negates the need to interrogate people. Their research rather privileges the spatial or area perspective to food rather than an individual or household view. Of interest to this study is the leading questions the researchers ask themselves when mapping food access. These questions provide a basis to not only localise food accessibility research but to also personalise it to the target population. Some research questions of note: What foods are healthy and acceptable to the local population?; what foods, which might contribute to choice of a healthy diet, are available? Where is this food available: in what kinds of outlets? Where are these outlets? And when are they open? Is the outlet on its own, or with other food/non-food retail outlets, or near a school, or a bus-stop?; How much does the food which is available cost, and are there any price variations e.g. for bulk purchase, or by quality? These research questions ask what is considered as healthy foods to the target population itself, negating the need to impose notions of healthy foods on the research population. The research questions also debunk the notion of formal sources of food as the only source of food, recognising the role that informal food markets play in the livelihood strategies of people. According to the authors these

questions can be applied to any place. The authors chose to conduct their study in two contiguous wards in London, selected by virtue of their high Carstairs deprivation scores. The Carstairs index is a measure of deprivation used in spatial epidemiology to identify socio-economic confounding. Developed for Scotland, it was an alternative to the Townsend Index of deprivation to avoid the use of households as denominators. The Carstairs index is based on four census indicators: low social class, lack of car ownership, overcrowding and male unemployment (McLoone, 1999). A number of social indicators were available about the area, including ethnic group, household type, car access and tenure. A 2km area was then defined around a central point between two estates. This radius was selected because it represented a reasonable walking distance and a wide range of food retail outlets (small corner stores, supermarkets and superstores) including an area specialising in Asian foods. All retail outlets selling food, including newsagents, garage forecourts and off-licences, within this area were visited and their address and postcode recorded. Retail outlets were classified according to their description of themselves and according to the range of foods that they stocked; hence an off-licence store which sold a substantial amount of food may be redefined as a convenience/general store. The researchers also constructed a survey which would collect data on the quantities and range of foods which would contribute to a "healthy diet". The survey would also take into account different household sizes; reflect the preferences of the four major ethnic groups in the area (UK White/Irish, Black-Caribbean, Gujarati Hindus and North Africans); take into account ethnic variations in shopping practices, (e.g. in terms of the quantity bought at any one time); and reflect the fact that many people in the area will be on low incomes. The researchers also collected data by discussions in local community groups and meetings. In addition opportunistic interviewing took place outside a small supermarket, and receipts were collected outside one of the main local superstores. Shoppers' self-defined ethnicity, current postcode, duration in the country and family size were noted. The results of the study by Donkin et al. (1999) show that people in the study area do not have to travel more than 500m to access a food outlet with a median distance of 270m. The results also show that the

majority of residents bought their food from sources that would be considered non-traditional or informal such as news agents (24%) and off-licence (13%).

As can be seen from the literature above, food mapping encompasses many different aspects and each food mapping exercise needs to take into account the unique aspects of the spatial area under study. Chi et al. (2013) show how using GWR can find correlations between different themes or indicators between different spatial attributes. This is especially important for food researchers as this can help them understand which specific factors cause food related issues such as obesity which Chi et al. (2013) found out to be a combination of poverty, a density of fast food restaurants and urban built environment within the US. This same technique can be used in different regions in the world.

Hubley (2011) and Hallet and McDermott (2011) both discuss the importance of defining what “accessible” really means, this is doubly important in food mapping since accessibility is used as a metric to measure food deserts. The literature shows that researchers use different distances to measure accessibility ranging from 500m to over 16.1km. Hubley (2011) and Hallet and McDermott (2011) stress the importance of developing a consensus within food mapping research, this would allow different food mapping research to be comparable. At the same time researchers such as Donkin et al. (1999) argue that food mapping must be adaptable to best fit the specific scenario and spatial aspects of the research area. Donkin et al. (1999) also take into account the unique food networks that exist in the research area, a similar approach used by Hubley (2011) in her study. In comparison, Hallet and McDermott (2011) ignore other food outlets in their study area in favour of only mapping large retail stores. Hubley (2011) makes use of an adapted Nutrition Environment Measure Survey (NEMA) to best fit her study area. Donkin et al. (1999) takes this approach to, perhaps its logical extreme, instead of defining what “healthy” food is they left it up to their research participants to decide what would constitute a healthy diet. This approach takes into account the variability in diet, household size, income level and ethnic variations within a community. I use a combination of these

approaches within this study to find an approach that best fits the aims of this research, drawing inspiration from all of these research methods.

2.4 Food Networks

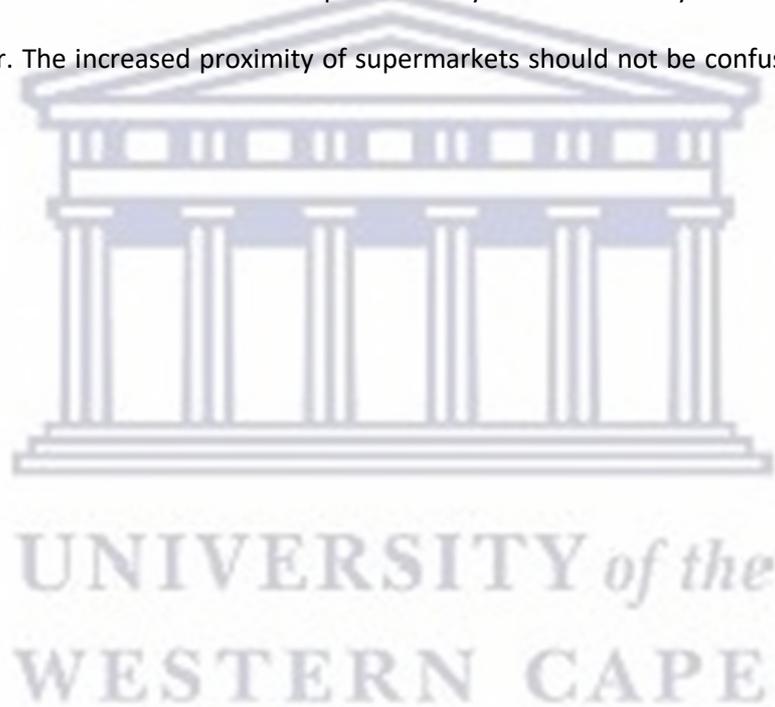
Food networks refer to the institutions that exist within communities to which each person and household has access. Food networks are used by people to access foods that they deem appropriate for themselves and their households. Food networks can be roughly divided into three main categories: 1) formal; 2) informal; and 3) alternative.

The formal food sector is a well-studied and understood sector. It comprises of all food retailers that are regulated and taxed by the government (Essop and Yu, 2008). This sectors' most public faces are shopping malls and the retailers that operate within these malls. Supermarkets are built within areas that have access to wealth, areas like the Cape Flats have very little access to supermarkets in comparison to wealthier areas (Peyton, Moseley, and Battersby-Lennard, 2015), although this is changing as supermarket chains like Shoprite slowly expand into low-income areas (Crush and Frayne, 2011). The expansion of these supermarkets into these areas increase overall food access and food security but so at the cost of nutrition (Crush and Frayne, 2011). The literature shows that supermarket expansion is generally perceived as a threat to the informal sector and while this has been shown to be true in North America, the same has not happened in Africa where the formal and informal food sectors co-exist (Battersby, Marshak, and Mngqibisa, 2016; Crush and Frayne, 2011; Ligthelm, 2003). The formal sector serves to provide foods that are cheaper and safer in comparison to the informal sector whereas the informal sector serves to provide foods that are sold in quantities that are preferred by people.

The informal sector contributes significantly to the GDP's of many African countries. It employs about 69% of people in South Asia, 57% in East and Southeast Asia (excluding China), 53% in Sub-Saharan African, and 34% in Latin America (Vanek et al., 2014: 10 as cited in Skinner and Haysom, 2016). While the informal economy contributes to the GDP of a countries economy, gives women access to the

economy and serves as a source of income it must be seen as more than just an economic activity as it also serves as a way to access food (Skinner and Haysom, 2016). Skinner and Haysom argue that the formal and informal economy are interlinked and that more than half of the sales in formal retailers such as Massmart, Makro, Shoprite, are to the informal economy such as spaza shop owners.

Crush and Frayne (2011) argue that the encroachment of supermarkets in poor neighbourhoods have a negative impact on the food security of the poor. Defenders of agribusiness argue that supermarkets offer cheaper food through economies of scale but Crush and Frayne (2011) argue that even though supermarkets are more visible and offer cheaper food they don't necessarily increase the food security of the urban poor. The increased proximity of supermarkets should not be confused with increased accessibility.



3. Chapter 3: Methods

3.1 Methodology

The methodology for this research has been designed to extract information for mapping purposes using quantitative data collection techniques while also being optimised for qualitative data. Although mapping through quantitative data can be a powerful tool to show inequalities in food access and other food related issues, it can also be one dimensional in that it can only visualise spatial data and thus erases the individuality of people. With this study I am interested in providing a multidimensional view of the delft food network and have therefore opted to conduct in-depth interviews with participants in addition to collecting more conventional quantitative data. Together, these data will be used to inform the food atlas and to provide context. Research on which this study is based received ethical clearance by UWC's Human and Social Sciences Research Ethics Committee (HSSREC) [Ethics Reference Number: HS18/1/20] and thus was conducted according to the requirements for informed consent.

3.1.1 Quantitative Methodology

Quantitative methods were used for the collection of spatial, opinion and behavioural data for GIS and mapping purposes. Data regarding the spatial features of Delft have been collected by physically confirming the presence of different categories of food retailers (formal and informal). The GPS coordinates of the various retailers have been collected along with a short description of their characteristics. This process has been repeated for all five neighbourhoods of Delft. The collection of spatial data was also supplemented by remote sensing via Google Earth and Street View. GPS coordinates and metadata was collected for each point of interest. The data was then exported and processed through ArcGIS mapping software where all maps were processed and exported.

A questionnaire was distributed to a minimum of 20 households per Delft neighbourhood for a planned total of 100 questionnaires. A total of 102 questionnaires were completed. The questionnaire

collected data on household and individual behaviour and opinions regarding food. Topics covered on the questionnaire included questions on food price perception, shopping habits, distance travelled to access food, perception of personal food security, temporality of food, food shortage coping mechanisms, types of food the household purchases as well as a section on asking the core questions of the Household Food Insecurity Access Scale (HFIAS). The HFIAS is a survey tool designed to collect information on household level food security through nine core questions. The survey collects data on anxieties around food, access to food and sufficient food quantity. The survey asks participants to recall up to a period of four weeks prior to assess household food security over time. The survey tool can be used to rank and classify households according to their responses from food secure all the way to severely food insecure. I used this survey method because the nine core questions are short, gives an accurate summary of household food security levels and because the survey methodology has been used extensively by other researchers in this field of study. Informal retailers were also be asked to fill out a short questionnaire regarding the types of food they sell, the temporality or seasonality of their foods and how their food network operates. Up to 10 informal food retailers were approached for qualitative interviews.

3.1.2 Qualitative methodology

Qualitative methods were used to supplement and humanise those quantitative methods discussed above. Data from qualitative methods were used to supplement and provide context for the food mapping of Delft. Selected households, spaza shops, informal food traders and managers from retailers and supermarkets within the Delft area were selected and approached to do interviews. These interviews served to gather information about perceptions of food (in)security; coping mechanisms regarding food security; food expenditure over time; food networks and food culture. The relevant literature has shown that mapping is supplemented by qualitative analysis of the study area (see: Donkin et al., 1999).

Relationship between the main objectives of this study as presented in Chapter 1 and the associated methods is provided below:

Objective	Method
1. To understand the community characteristics and demographics	Delft was divided into its constituent neighbourhoods; namely: Delft South; Leiden; Voorbrug; Roosendal and The Hague. 20 households per neighbourhood were asked to complete a questionnaire.
2. To identify and geolocate all sources of food for the community, including supermarkets, convenience stores, spaza shops, informal food traders, fast food outlets and any other sources of food.	Geolocation of all sources of food by remote sensing and mapping using GIS software
3. To understand relationships between Delft residents and food, including: Store/Food seller proximity; Food prices; Food availability and types of food; Food temporality	<p>Selected households, spaza shop owners, supermarket managers and food traders were interviewed in-depth. From these interviews the following data was collected:</p> <ul style="list-style-type: none"> • Perceptions of food (in)security • Coping mechanisms regarding food shortages • Food expenditure • Food networks • Food culture

3.2 Sampling

Sampling is the process by which researchers select a representative subset or part of the total population that can be studied for their topic so that they will be able to draw conclusions regarding the entire population. Sampling methods are available for both a quantitative and qualitative study. I outline my sampling methods below, taking into consideration both my quantitative and qualitative methodology.

3.2.1 Quantitative data sampling

For quantitative data, random and purposeful sampling was used to select four streets within each of the five neighbourhoods in Delft. After the first wave of random sampling was completed the assistance of community insiders was used in the second wave of sampling to identify further

households in the study area where data was lacking. The reason for this is because the first wave of random sampling was deemed to be too inefficient considering time and resource constraints.

3.2.2 Qualitative data sampling

For qualitative data, purposeful sampling was used to select participants for interviews. Selected Informal food traders (both spaza shop owners and street food traders) were selected for interviews. Selected households were also approached for follow up interviews.

3.2.3 Limitations of the study

The study used a limited sample size due to time and resource constraints. Therefore, while the findings in this study are relevant to the area and people of Delft, their extrapolation to contexts that differ from Delft may be less useful. Future studies could build upon the present to capture a larger sample of Delft and the surrounding areas. The study was also limited due to the size of Delft and the limited amount of area the researcher could cover on a given day. Due to this limitation, most mapping was done via remote sensing using Google Earth and Street View. A more detailed and up-to-date map for Delft is needed for more accurate results which would require a team of researchers mapping the entirety of Delft.

3.2.4 Fieldwork

Fieldwork started in December of 2018 and was completed during in the first quarter of the following year. In total, 102 surveys were completed. The first phase of fieldwork involved random sampling but this proved to be inefficient and community insiders were used afterwards to help find more participants for the survey. My experience in the field was daunting, especially during the heat of the summer months. I was not expecting people to be receptive to my asking them questions for the survey given dislike for surveys generally. After a few failed attempts to get the required number of surveys completed per neighbourhood I enlisted the help of community insiders. This process proved to be much more efficient and people were more receptive to answering my questions because the community insider could vouch for me. Education and language were barriers for data collection. I

found that I would sometimes slip into using academic language which I had to be aware of. I also found, over time that the survey was too long, especially with the additions I made to it. In retrospect, the survey might have been kept as short as possible even if it meant collecting less information. Language was also another issue, residents generally spoke both English and Afrikaans but were far more comfortable speaking in Afrikaans and understood Afrikaans better than English. I understand Afrikaans better than I can speak it and this proved to be a major hurdle in communication. I chose Delft as a study area because I lived in the area for 5 years, I knew the area and because of the lack of research on food security done in the area.

3.3 HFIAS Survey Design

The Household Food Insecurity Access Scale (HFIAS) is a survey tool that is used to measure the experience of food insecurity by measuring:

- Feelings of uncertainty or anxiety over food (situation, resources, or supply);
- Perceptions that food is of insufficient quantity (for adults and children);
- Perceptions that food is of insufficient quality (includes aspects of dietary diversity, nutritional adequacy, preference);
- Reported reductions of food intake (for adults and children);
- Reported consequences of reduced food intake (for adults and children); and
- Feelings of shame for resorting to socially unacceptable means to obtain food resources.

(Coates, Swindale, and Bilinsky, 2019)

The survey tool can be used to rank households along a spectrum of food security levels from food secure to severely food insecure. The survey itself consists of nine questions. Each question is also asked with a recall period of up to four weeks (30 days). The respondent is asked an occurrence question; if a condition happened in the past four weeks or not. Then a frequency of occurrence question is asked to ascertain whether the event in question happened rarely (once or twice), sometimes (three to ten times) or often (more than ten times) in the past four weeks. The nine core questions for the HFIAS are listed below.

HFIAS	
No.	Occurrence Questions
1.	In the past four weeks, did you worry that your household would not have enough food?
2.	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?
3.	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?
4.	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?
5.	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?
6.	In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?
7.	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?
8.	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?
9.	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?

Table 1: HFIAS Core Questions (Coates, Swindale, and Bilinsky, 2019)

In addition to the core questions I also asked 12 additional questions to gather data on feelings of shame, food culture, food access, purchasing habits and commonly bought food items. These additional questions are listed below. These additional questions were asked to get a more detailed and nuanced understanding of the food environment within Delft. These questions are justified within the parameters of the methodological framework wherein I seek to get a greater understanding of the food environment within Delft.

Food Networks and Informality	
No	Occurrence Question
10.	In the past four weeks, did you or any household member borrow food items from your neighbours?
11.	In the past four weeks have any neighbours borrowed food from you or any household member?

12.	In the past four weeks have you or any household member bought food items from food vendors, tuckshops or spaza shops?
13.	In the past four weeks have you or any household member bought food items from a supermarket?
14.	In the past four weeks have you used public transport to buy food?

Table 2: Food Networks and Informality

Qualitative Questions	
No	Question
15.	Do you know what the term food insecure means? (If no; then explain the term food security)
16.	Do you consider your household to be food insecure?
17.	Do you think that your household eats a balanced diet?
18.	Which mode of transport do you usually use when you buy food?
19.	Do you think that your community has enough resources to ensure that your household has access to a variety of foods?
20.	Do you avoid buying certain foods? (if yes, list reasons why and list the food items)
21.	What are the basic food items you buy every month?
22.	In the past 4 weeks what were the types of foods you bought every day?

Table 3: Qualitative Questions

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4. Chapter 4: The People and Context of Delft

The following chapter provides an overview of the people of Delft as well as an introduction to Delft as a place. This overview is intended to serve as a reference point and grounding for further chapters. From the survey and interview data as well as the interactions and conversations I had with the people while conducting this research, I created three imaginary women who serve as anonymised and composite representations of the data. The purpose of the three characters is to underscore one of the principle contributions of this study: that food security is a human phenomenon and that people are involved in every step. These imaginary, aggregated characters represent the three distinct social classes within Delft, namely, poor, middle class and wealthy. These terms are relative to Delft and only make sense within the context of Delft. Those characterised as wealthy within Delft would still be considered poor outside of Delft. Therefore it is important to contrast these social classes within Delft only. Furthermore it is also important to keep in mind that these social classes are not stratified within Delft, in other words, there is no “poor”, “middle class” or “wealthy” area. Rather, there are “poor”, “middle class” and “wealthy” households who co-exist within Delft, even within the same street. Because these women are only representations of the data and cannot account for the behaviours of all Delft residents I will use words such as “likely” to describe their behaviours.

4.1 Shamiela

Shamiela’s household is a poor one, she lives in an unrenovated two-bedroom house. She has an average household size of four people with more people living in informal structures on her property. Those living in informal structures on the property are usually family members who may not pay rent but may contribute towards electricity and other utilities. The only form of income in her household is likely to be social grants such as a Children’s Grant and Pension Grant, should an older family member live with them. Shamiela lives in a household where at least one family member—usually younger—has completed high school but she is unlikely to have completed high school herself. Her

household is severely food insecure, especially towards the end of the month when both money and food are running short. When this happens she is unlikely to borrow (or admit to borrowing) any food items from neighbours, relying on family members instead. She does this for many reasons: to avoid the shame and social stigma of asking neighbours for food; because she would not be able to reciprocate the sharing of food; and because there is less shame and stigma in reaching out to family members for food or money to buy food. Her household makes frequent use of the local tuck shops in the area to purchase daily necessities such as bread and milk. She makes purchases at the supermarket at least twice a month and either walks or uses public transport to get to the supermarket. She will sometimes travel outside of Delft to buy foods that are on sale or are cheaper like buying meat at a particular butchery in Mitchells Plain. Shamiela will avoid buying certain foods all together because it is too expensive. She considers her household to be food secure and she believes that her household eats what she considers to be a balanced diet.

4.2 Carmen

In contrast to Shamiela's household, Carmen's is a middle class one. Her household has access to diverse streams of income in the form of a monthly salary or wage from at least one working adult as well as social grants that can include Child Grants or Pension Grants or both depending on household structure. The fact that her household receives social grants means that the monthly income her household receives is within the threshold to receive a child grant or she may live with older parents that receive a pension grant. It is very likely that her household receives both types of social grants because of the fact that extended family such as a parent or parents are living with her. If her property has informal structures, they would be of higher quality than the informal structures found on the properties of poorer households. Her household is one where it is likely that at least one household member has completed high school and in rare cases where one household member holds a diploma or degree. Even though her household has access to various streams of income which would serve to protect her household from food shortages, her household still experiences anxieties over running out of food. This is largely due to the fact that households like hers find themselves in the transitional state

of becoming food secure through access to the formal economy through waged labour while also finding themselves poor enough to qualify for and need social grants. When food is running short in her household she is unlikely to reach out to neighbours for help or would under-report doing so. Households like Carmen's also report giving neighbours food at a far higher rate than they report asking for food. Because the sharing of food is a cultural practice that depends on reciprocity it is very unlikely that households like hers would not be making use of the food sharing network at the same rate they give food to neighbours. Carmen's household makes frequent use of the tuckshops in her area to buy goods such as bread, milk, potatoes, onions and small packets of sugar. Her household is sensitive to the prices of food and will avoid buying certain foods that are perceived as being too expensive.

4.3 Nolu

At the other end of the income spectrum is Nolu. Nolu's household is one that can be considered high income in relation to her neighbours in Delft. The only form of income in households like hers is a monthly salary. This source of income is enough to push her household above the threshold of qualifying for social grants. The average size for a household like hers is around four people with around two people working and earning a salary. At least one or more members have finished high school and in rare cases one member of the household has completed a diploma or degree. Her property is unlikely to have informal structures on it, and it is more likely that her home has been renovated. Her household experiences anxieties of running out of food at a lower rate than poor and middle class households. Nolu's household is very likely to be food secure. Her household also reports giving or lending neighbours food at double the rate that they ask neighbours for food. There are two possible reasons for this: one reason is simply that households like hers have enough food to last throughout the month and that they have enough excess food to lend to family and neighbours. Another reason high income households lend more food can be due to the fact that they feel a certain amount of shame when and if they have to access help from family and neighbours and would therefore under-report having to borrow food. Nolu's household makes more purchases from

supermarkets throughout the month than from tuckshops. Households like hers will make multiple trips to the supermarket throughout the month.

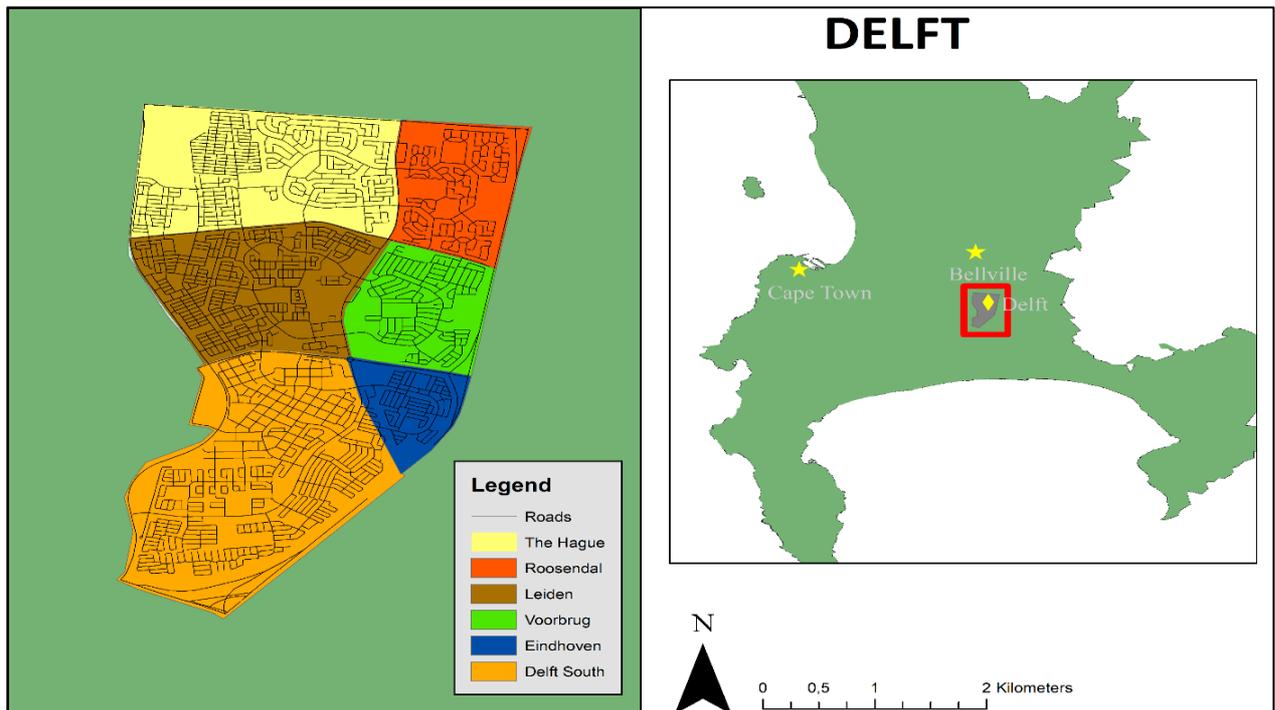
4.4 Delft

These three women from different households do not exist in a vacuum. Both Delft the physical place and Delft the metaphysical place play a role in the food environment. The physical environment encompasses everything that can be experienced by the senses. It is the first way in which people experience unfamiliar spaces, the way it is filtered through our senses and experiences informs us of how we will react and interact with the environment. It is at this level that we make most of our judgements. If a place is dirty or polluted, we associate that with other negative things such as crime. If it has lots of trees and green open spaces, then we associate that with wealth and privilege. The way places are built is intentional and carefully planned, thus certain aesthetics are associated with certain social classes. Inequality and privilege are designed within the very cities and neighbourhoods in which we live.

The metaphysical environment is the one we create through our perceptions, memories and experiences. It is the memories we associate with places, the experiences we have with the people and environment and the way in which residents perceive a place. The metaphysical environment is created by the flows of people that live in an area and breathe life into it. On the macro scale, cities are a prime example of the metaphysical landscape. Comparing two random images of any two cities in the world will result in the observer having different opinions on the two cities and will place different connotations on the kind of place it is. Someone living in that city however may have vastly different opinions, people living in cities attain some of their identity from those places. It is why we are so interested in asking people where they came from and why we are so concerned about where we may end up and what places we may call home or reject as a home. It is what pushes us to go and pulls us to stay.

A range of factors coalesce to create the physical and metaphysical place we call Delft: how close the houses are built to each other; how narrow or wide the streets are; how many green spaces there are. All of these factors come into play to create Delft. In turn, the people living in Delft constantly produce and re-produce the area. To try and summarise Delft in terms of facts, figures and statistics would be doing it a disservice. Communities like Delft are more than numbers and facts. They are people and they are living, breathing places. Keep this in mind as I try and present Delft to you in as many facets as possible.





Map 1: Delft

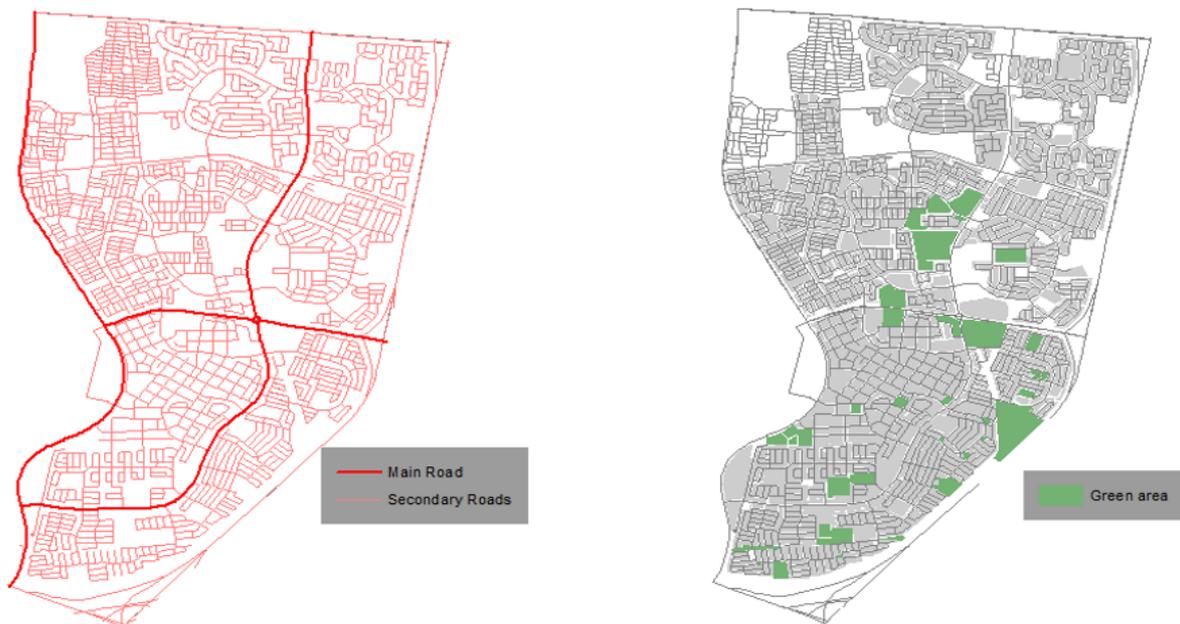
4.5 The Built Environment

Delft is situated south of Bellville, far from Cape Town's CBD. The map above gives an idea of where Delft is situated relative to Both Cape Town and Bellville. The location of Bellville is relevant because it is the closest commercial centre to Delft. It is in what is known as the Cape Flats, an area that was designated by the Apartheid government to house Coloured and Black people. The Cape Flats is known for its poverty and crime and Delft is no different. Delft saw a rapid expansion in the past decade, leading to an influx of people into the area. Delft is unique in the fact that it is one of few areas in the Cape Flats that has a near equal amount of both Coloured and Black residents, while other areas in the Cape Flats see a near majority of only one racial group which was a consequence of the Apartheid government's efforts to segregate people by race. According to South Africa's 2011 census (StatsSA, 2011) and data from Firth (2019), Delft has a population of approximately 152 030 and covers a spatial area of 11.08km² which gives it a population density of 13 721 people per km². It has approximately 39 575 households which gives this area an average of 3.8 people per household. There are slightly

more Coloured than Black residents (51.44% vs 46.22%) and the gender ratio is approximately 50:50 (see Infographic 1 below).

Delft has three main roads that can be used to enter and exit the area, namely, Delft Main Road, Symphony Road and Hindle Road. Delft Main Road runs through Delft in a North-South direction while Hindle Road runs through Delft in an East-West direction. Many businesses have taken advantage of the fact that most almost all traffic through and within the area will have to pass through the main roads, this is evident in Delft Main Road. Businesses, both formal and informal, are concentrated along this stretch of road, many of which serve food. Symphony road is devoid of any businesses, this is because this road divides Delft from the airport with little to no places to stop.

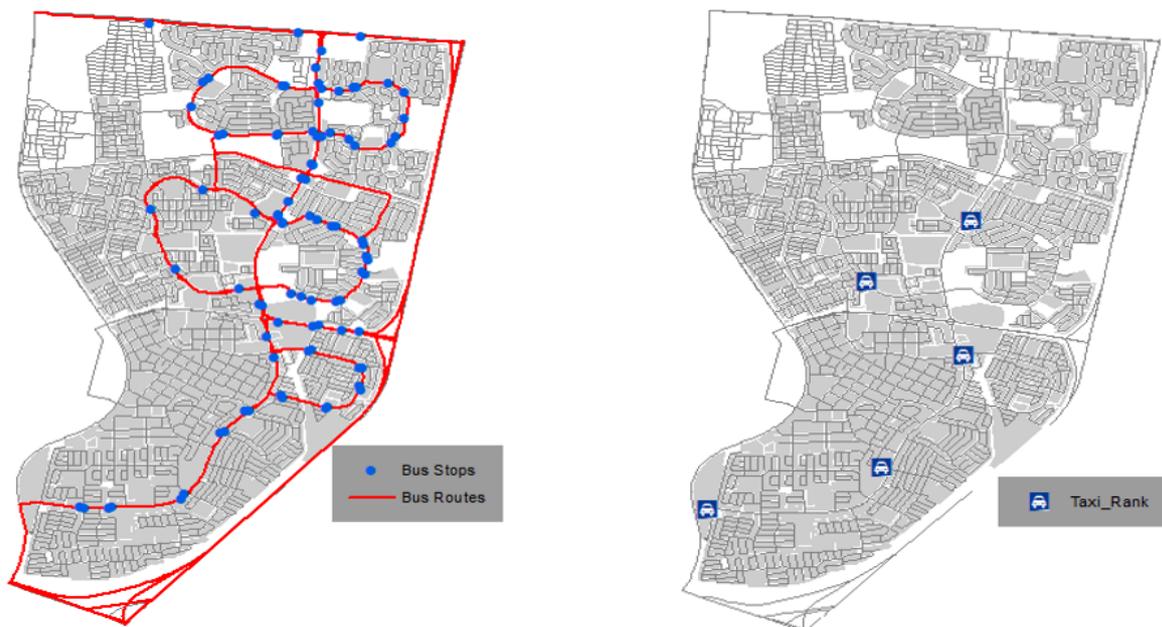
Delft is a densely built-up area that lacks open green spaces for residents to use for recreation. The area has one formal sports field and one public swimming pool. There are green spaces that are mostly empty fields that are used either for dumping or as improvised sports fields. None of the green spaces within Delft are used to grow food on a large scale. There are various reasons for this which is discussed later in this study.



Map 2: Roads and green spaces in Delft

4.6 Public Transport

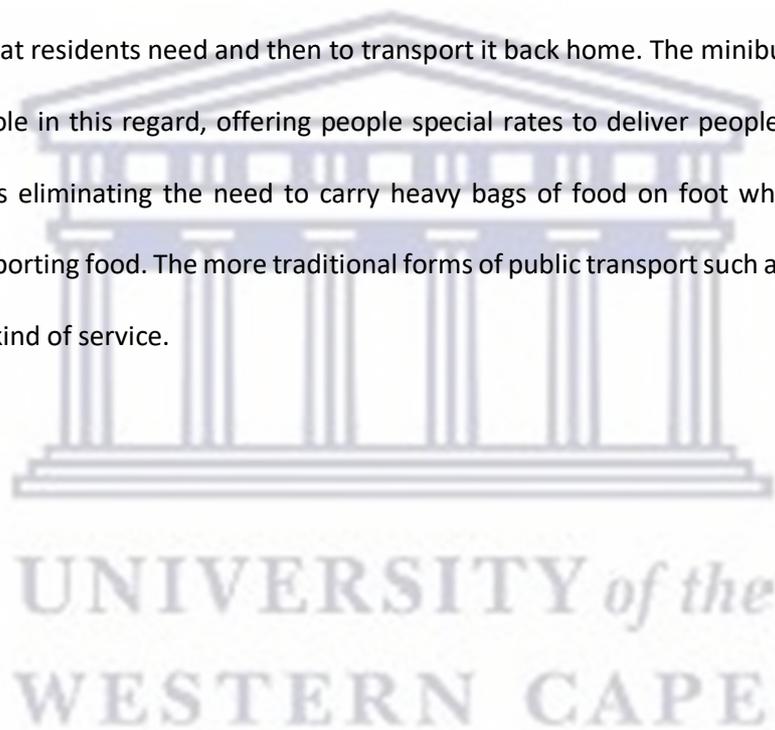
Residents of Delft lack access to most forms of government subsidised public transport, only having access to Golden Arrow busses. In spite or because of this, Delft has a thriving minibus taxi industry that allows access to most areas of Cape Town by taking a taxi from Delft. Therefore, residents in Delft are relatively well connected to the rest of the City. Minibus taxis are also the main form of transport for most residents, operating 12 hours a day, 7 days per week and can be found along the main road, at special pick-up and drop-off locations or at taxi ranks. About 33% of surveyed residents use public transport or combinations of public transport and other forms of transport to access food. Map 3 below shows where bus stops and taxi ranks are located.

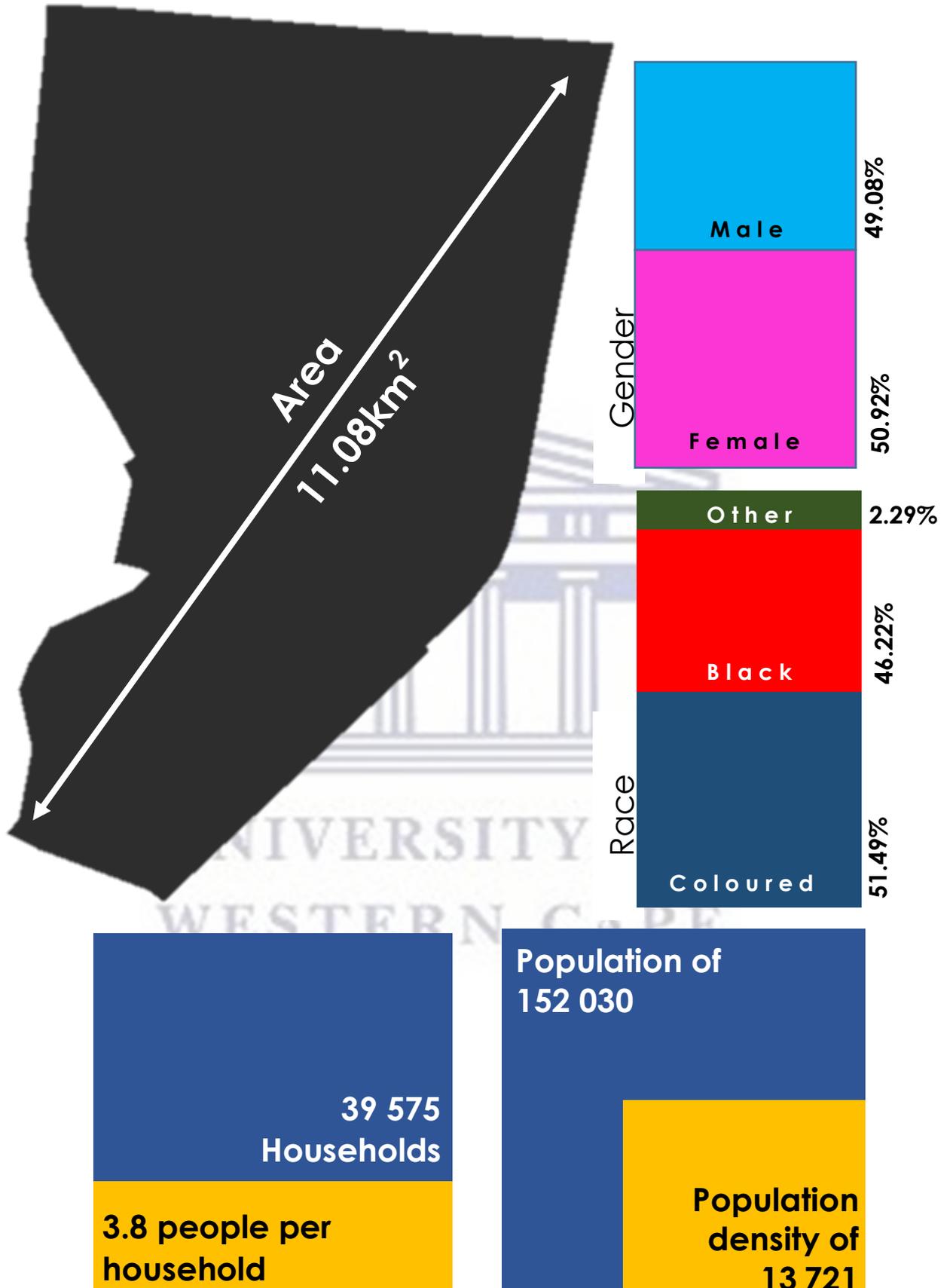


Map 3: Public transport in Delft

Delft residents can therefore access food from various retailers within and outside of Delft by taking a minibus taxi or bus. This is a factor that contributes to improving food security in an area where not all residents have access to a car. Residents make use of public transport to buy food outside of Delft when there are sales or at places they prefer to buy food from, this is usually done at the end of the month when bulk shopping takes place.

Public transport plays a key role in the food security of Delft residents. Without access to public transport, residents would not be able to access the rest of the city and thus would be forced to use only local malls and the informal sector to access food. This is not acceptable to most residents as they do not feel they have enough access to food from the formal and informal food networks that currently exist in Delft. Public transport therefore acts as an equalizer, allowing the poor to access malls and food vendors that they would not have been able to access otherwise. Food is not mobile in the sense that the final destination for food is store or tuckshop shelves or the side of the road with food vendors where it does not move until someone comes to buy it. Extra effort must be made to get to the food that residents need and then to transport it back home. The minibus taxi industry has played a major role in this regard, offering people special rates to deliver people and their food to their homes, thus eliminating the need to carry heavy bags of food on foot while also easing the anxieties of transporting food. The more traditional forms of public transport such as trains and busses do not offer this kind of service.





Infographic 1: Demographics
Data Source: Firth, 2019 and StatSA, 2019

5. Chapter 5: The Experience of Food Insecurity: HFIAS Survey

This chapter details the design of the HFIAS survey and provides a discussion of the results. The HFIAS survey is relevant to this study because it provides a tool to measure various aspects of food security. It provides us with a baseline that we can work with as well as a way to compare and contrast various households and neighbourhoods. I use the HFIAS survey firstly to measure, then unpack notions of food insecurity and what it means to the residents of Delft. The HFIAS survey results are contrasted against the qualitative survey results later in this and subsequent chapters.

5.1 HFIAS Survey Results

In the following sections, the HFIAS survey results will be discussed across three access-related aspects of food security, including:

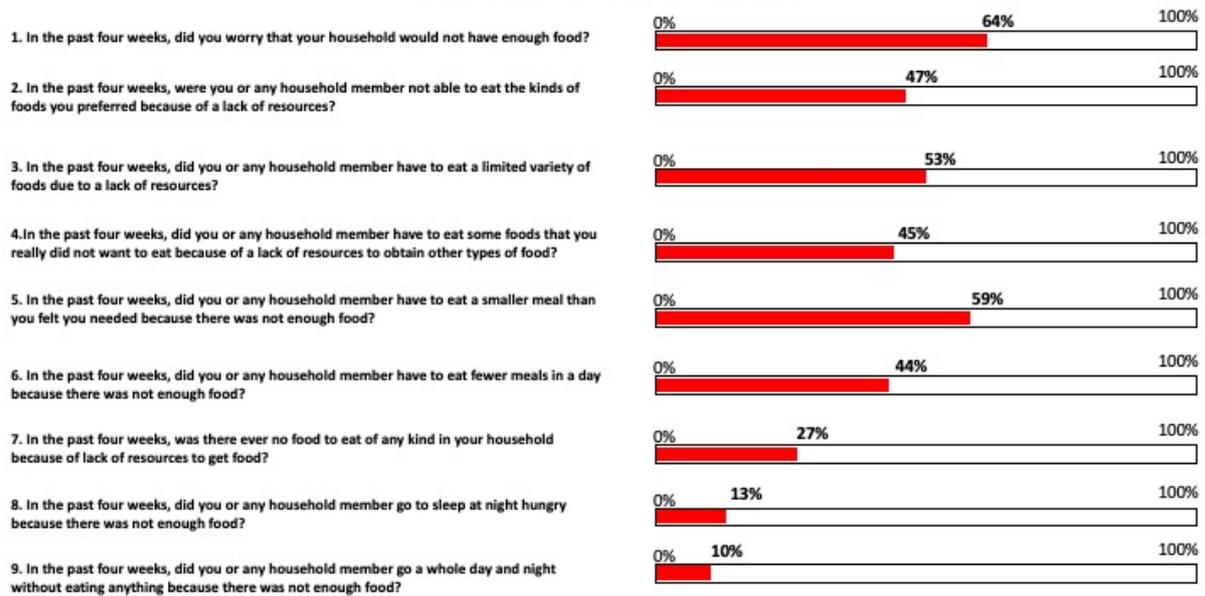
1. Access related conditions: Households that reported experiencing any food related condition at any time during the recall period as well as households experiencing a food related condition at a given frequency;
2. Household food insecurity access-related domains: Households experiencing any of the conditions at any level of severity in each domain; and
3. Household food insecurity access scale score: The sum of the frequency-of-occurrence during the past four weeks for the nine food insecurity-related conditions as well as the average of the household food insecurity access scale scores

This analysis is only relevant to the nine core HFIAS questions.

5.2 Access Related Conditions

The graphic below shows the prevalence of households any food related condition at any time during the recall period. In other words, this analysis is concerned with households answering “yes” to any of the questions.

ACCESS RELATED CONDITIONS



Infographic 2: Access Related Conditions

The following table shows households experiencing a food related condition at a given frequency. In other words, this analysis will show how often households experienced a given condition.

No	Occurrence question	Rarely (once or twice in the past 4 weeks)	Sometimes (three to ten times in the past 4 weeks)	Often (more than ten times in the past 4 weeks)
1.	In the past four weeks, did you worry that your household would not have enough food?	16%	21%	27%
2.	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	12%	17%	18%
3.	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	12%	15%	26%
4.	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat	15%	10%	20%

	because of a lack of resources to obtain other types of food?			
5.	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	17%	22%	20%
6.	In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	12%	16%	16%
7.	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	13%	10%	4%
8.	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	5%	7%	1%
9.	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	6%	3%	1%

Table 4: Food Related Condition Occurrence

From the data above it is evident that in Delft the food related conditions are concentrated within the less severe spectrum of food related conditions. These data tell us that Delft residents are experiencing food related conditions throughout the month. Very few residents however experienced severe food related conditions (Question 9 for example) and if so, they did not experience it “often”. This suggests that even the most severely food insecure Delft resident will find ways to access food. The data also show that Delft residents experiences a chronic form of mild food insecurity throughout the month.

5.3 Household Food Security Access Domains

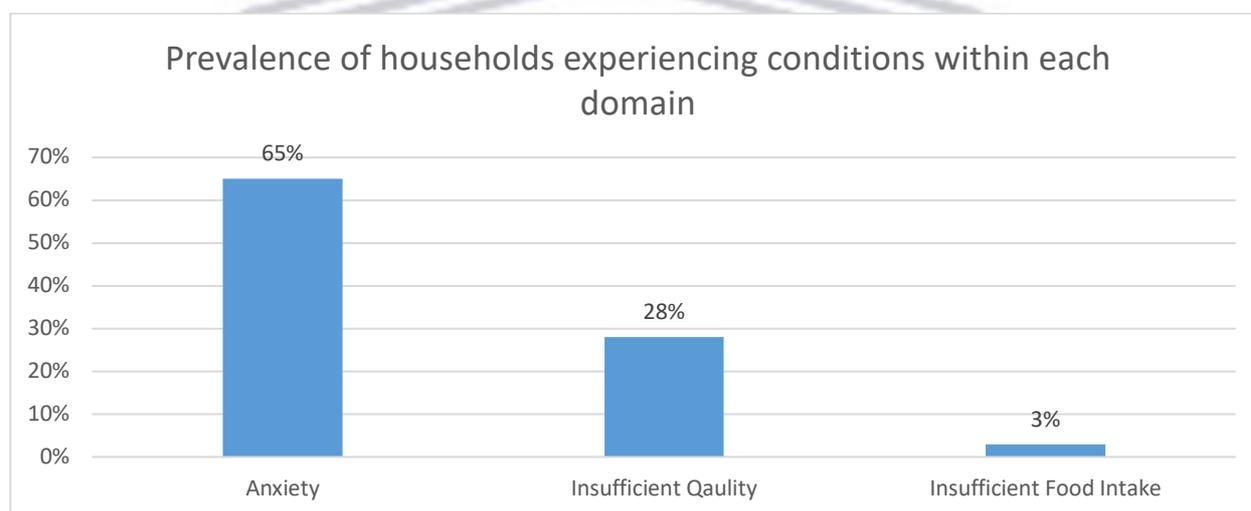
This analysis is concerned with households experiencing any of the conditions in certain domain at any level of severity in each domain. The domains are as follows:

No	Domain	Question number
1.	Anxiety and uncertainty about the household food supply	Q1
2.	Insufficient Quality (includes variety and preferences of the type of food)	Q2; Q3; Q4
3.	Insufficient food intake and its physical consequences	Q5; Q6; Q7; Q8; Q9

Table 5: Household Food Security Access Domains

The following table shows the prevalence of households experiencing conditions within each domain.

The data in the graph below shows the percentage of surveyed households that answered “yes” to each question within the HFIAS.



Graph 1: Prevalence of domains

The data above shows that for the majority of surveyed Delft residents there is constant feeling of anxiety surrounding food that could be caused by insufficient food quality and intake. The data from Section 5.3 provides further insights by showing that Delft residents are constantly facing food insecurity at a chronic level throughout the month. This could explain the high levels of anxiety that Delft residents have around food. The low levels of insufficient food intake in Graph 1 above also correlates with the data in Table 4 which shows that although some residents experienced severe food insecurity it happened at relatively low levels.

5.4 Household Food Insecurity Access Scale Score

This analysis is concerned with the sum of the frequency-of-occurrence during the past four weeks for the nine food insecurity-related conditions. Results of this analysis will give each household a score out of 27. The minimum score will be 0 for households that answered no to each question while the maximum score will be 27 for households that answered “often” to all questions.

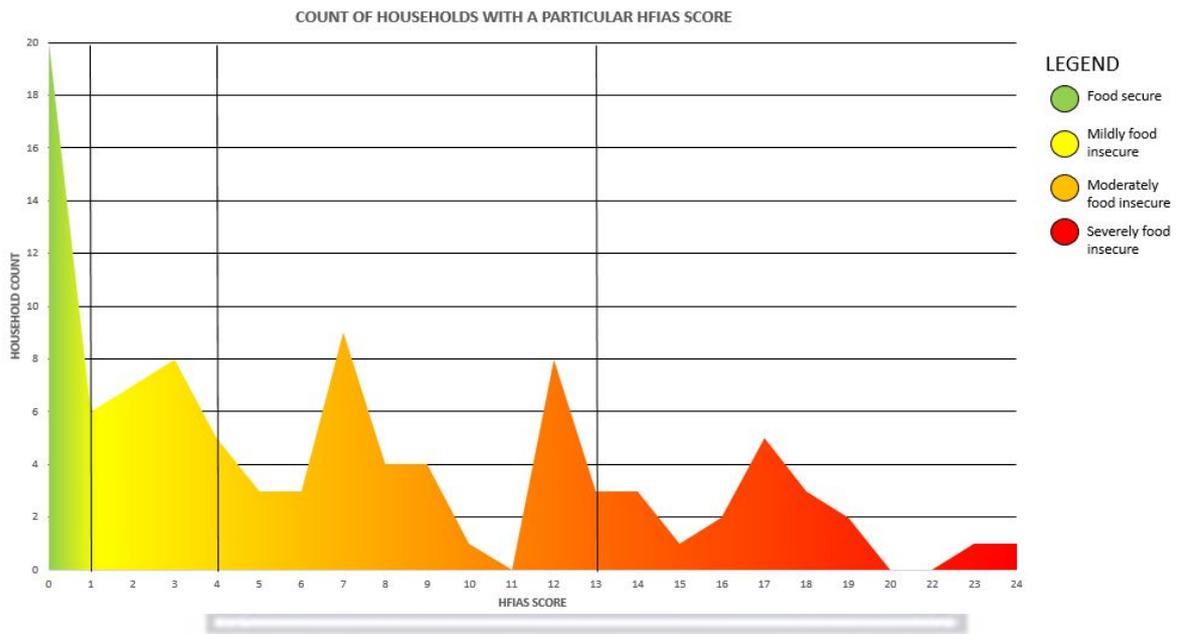
The scores are useful for ascertaining the food security of a household. The score a household receives gives an idea of how many food security related issues a household faces. A high score tells us that a household experiences many food security-related issues while also experiencing them often. A lower score generally indicates the opposite. A household with a low score will experience less food security related issues but they may still experience them frequently. A household with a score of 0 experiences none of the food security related issues while a household with the maximum score of 27 experiences all of the food security related issues at the highest frequency. The figure below illustrates the relationship between the level of food insecurity and the HFIAS Score.



Infographic 3: HFIAS Scale

It should be noted that Graph 2 above only illustrates the likelihood that a household will find themselves within a particular category given their score. A household with a low score can still be classified as severely food insecure if they answered “yes” to particular questions in the survey and “no” to all other questions. Besides these outliers, the scale is still useful for making predictions based on score alone. It should also be noted that the distribution of the scores is not equal. For the purposes of this analysis, a household with a score that falls between a range of 0 – 1 will be categorised as “food secure”. Consequently, households with a score in the range of 2 – 4 will be categorised as

“mildly food insecure”. Households with a score in the range of 5 – 13 will be categorised as “moderately food insecure” and a household with a score in the range of 14 – 27 will be categorised as “severely food insecure”. This scoring method is based on my own interpretation of the scoring methodology provided by the HFIAS. The survey results were used to score each Delft resident. The graph below shows the distribution of scores.



Graph 2: HFIAS Score Count

The graph above shows the range of scores under which sampled Delft households fall. Many of the sampled households in Delft have a score of 0 which indicates that their households are food secure, but the vast majority of sampled residents find themselves at some level of food insecurity. An analysis of all the scores reveals that the average score for all sampled households is 7 which indicates that the average household in Delft is mildly food insecure.

Although the average Delft resident can be considered to be mildly food insecure the prevalence of each household finding themselves in a given category paints a different picture.

No	Category	Prevalence
1	Food Secure	21%
2	Mildly Food Insecure	9%
3	Moderately Food Insecure	28%
4	Severely Food Insecure	41%

Table 6: HFIAS Prevalence By Category

The majority of sampled Delft resident can be classified as food insecure (78%) with the majority finding themselves in the severely food insecure category.

5.5 Discussion of HFIAS Survey Results

The HFIAS survey results show a snapshot of the food security status of sampled Delft residents. At the time of the survey the majority of Delft residents were at some level of food insecurity. 65% of sampled residents experienced anxiety over food. This anxiety manifests because there is a fear that food in the household will not last during the month, that food supply will not be adequate, and that meals will not be large enough to satisfy hunger. This anxiety exists as a constant reminder to residents that their relationship towards food can be antagonistic. Because such a large percentage of people in Delft experience this anxiety, we can therefore assume that some form of culture would form around this shared sense of anxiety and shared survival techniques. The most prevalent form of food insecurity in Delft is anxiety over food, followed by insufficient quality and then followed by a small minority experiencing insufficient food intake. Insufficient quality of food is a consequence of anxiety over food becoming a reality. Households at this stage of food insecurity will compromise on food quality to make sure that there are meals to eat. They may repeat meals or even eat foods they may not like. Sometimes both occur at the same time. Households that experience insufficient quantity of food experience the final stage of food insecurity. In this stage the supply of food to the household is severely compromised due to lack of funds, lack of food retailers in the area or lack of transport to buy food and a lack of support networks to access food. Households at this stage of food insecurity

eat less food, may skip meals and generally experience hunger for prolonged periods of time. Households at this stage of food insecurity risk starvation unless an intervention is made in the form of community outreach or an injection of funds. Without access to social grants, survey results suggest that more households will find themselves in the severely food insecure category. Access to social grants alleviate food insecurity, pushing households up to less severe food insecurity categories.

5.6 Food Networks, Informality and Qualitative Survey Results

Results from the qualitative survey highlight the critical role of food networks in mitigation of food insecurity. This section presents and discusses the results of the food networks and informality section of the questionnaire. This part of the questionnaire was included to highlight the role that food networks play in the daily lives of Delft residents and how it forms an integral part of the food security system. The HFIAS and many food security survey tools assume that because a household is classified as food insecure they will remain so. Such an assumption ignores the context and cultures of food within particular communities. People such as those sampled in Delft are resilient and possess agency. Qualitative data from this research suggest that food insecure households will do everything in their power to access food through any means necessary. Food insecurity within Delft is chronic and long term. Thus, households and individuals adapt and find ways to cope. These coping mechanisms form part of the culture of Delft. In spite of their effectiveness, some Delft residents may not realise that their cultural practices around food are coping mechanisms. These coping mechanisms, which will be discussed further below, are not unique to the people of Delft but are convergent strategies adopted by many poor and vulnerable people. These coping mechanisms are predominantly practiced by women as they are the ones who are responsible for ensuring the household has food and that the food the household has access to is of sufficient quantity and quality. Quantity and quality are specific to the particular household, while the needs of one household differs from the next. What one household considers quality food another may not.

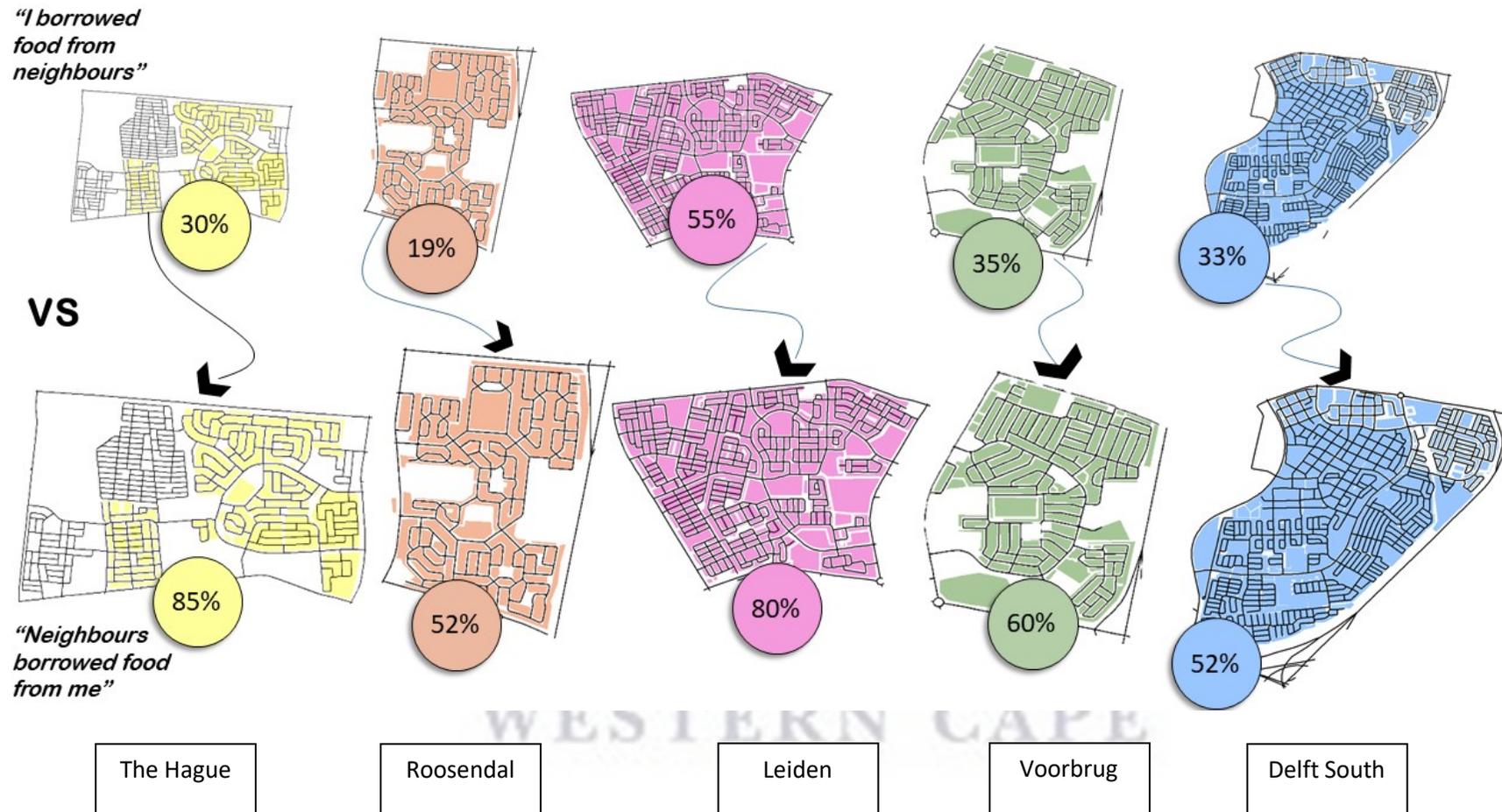
This section of the survey also serves to highlight the importance of the informal sector and how it serves to provide access to foods for poor residents. Without the informal sector, residents would have less access to affordable foods in convenient quantities. In this aspect of the analysis, I explore how Delft residents access foods, how often and from where. I also explore the personal opinions of residents, looking at their own perception of their own household food security status and their opinions of their community and how it helps or hinders them in accessing food. Finally I take a look at the types of foods residents buy on a daily and monthly basis.

5.7 Qualitative Survey Results

Results from qualitative data collection are visualised below as infographics and maps. Thereafter, I will unpack and discuss the results in the subsequent sections. The data visualised below supplement and humanise those gathered from quantitative methods. The qualitative results from selected households, spaza shops, informal food traders and retail managers within Delft area illustrate perceptions of food (in)security, coping mechanisms regarding food security, food expenditure over time, food networks, and food culture.



BORROWING FOOD FROM NEIGHBOURS VS NEIGHBOURS BORROWING FOOD FROM THEM

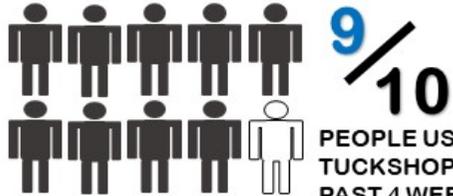


Infographic 4: Food Borrowing by Neighbourhood

Paulsen: *Mapping Urban Food Security in Delft*

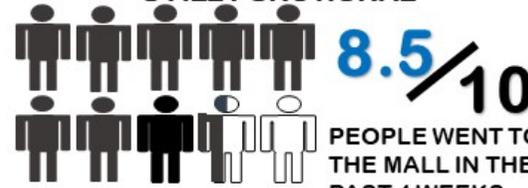


OVER 240 TUCKSHOPS MAPPED



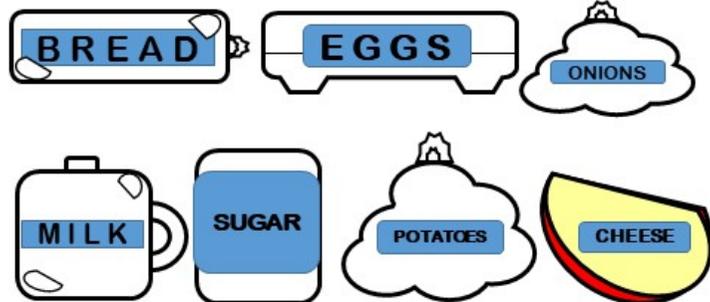
PEOPLE USED A TUCKSHOP IN THE PAST 4 WEEKS

OF THE 3 MALLS IN DELFT ONLY 2 ARE STILL FUNCTIONAL



PEOPLE WENT TO THE MALL IN THE PAST 4 WEEKS

FOODS BOUGHT DAILY FROM SPAZA SHOPS

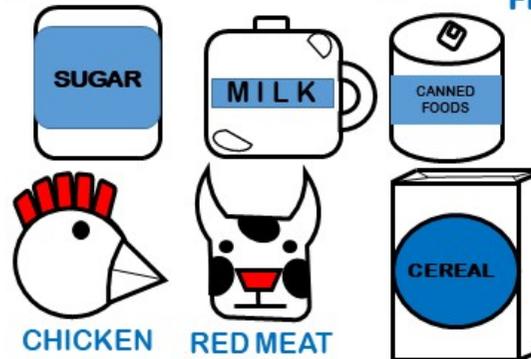


FOODS BOUGHT MONTHLY FROM MALLS

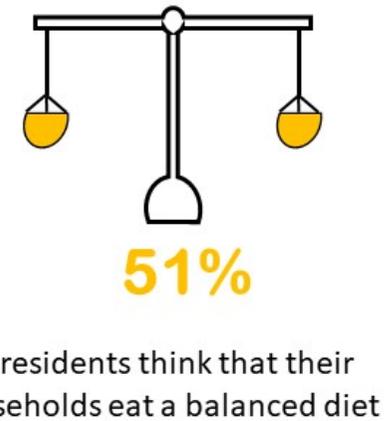
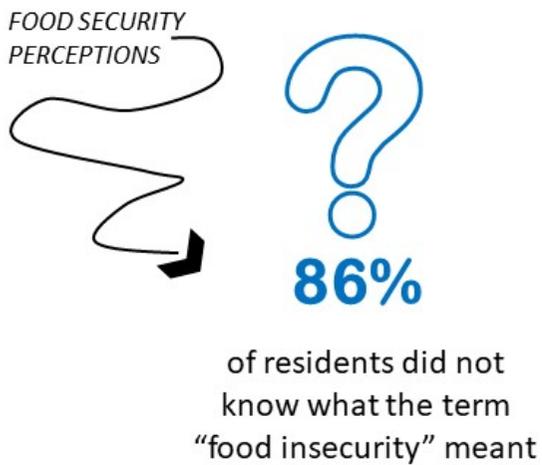
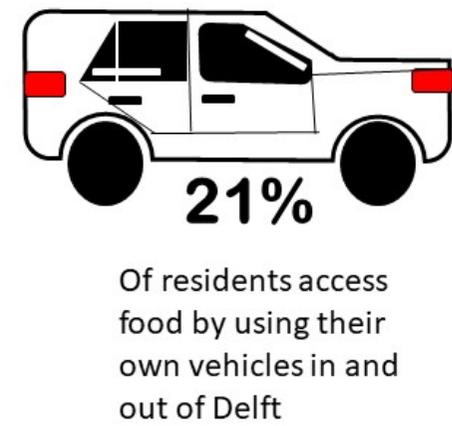
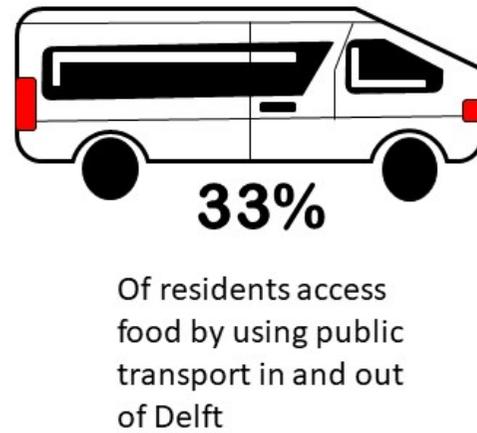


45%

OF RESIDENTS USED PUBLIC TRANSPORT TO BUY FOOD



Infographic 5: Formal vs Informal Sector



Infographic 6: Food Access and Perceptions

5.9 Discussion of Qualitative Survey Results

The survey results visualised using the infographics and maps above will now be discussed within the context of Delft.

Borrowing food is an important part of the food culture of Delft. As seen in Infographic 4 above, in all neighbourhoods of Delft, respondents report that neighbours always borrowed food from them at higher rates than they borrowed from neighbours. This is the case according to all respondents sampled. For this to happen in all five neighbourhoods is very unlikely and I suspect that interviewees underreported the prevalence that they borrowed food from neighbours. The expected rates of food borrowing should be equal since borrowing and giving food is a reciprocal act. Feelings of shame could be at play here and this is explored further in Section 7.3 below.

Both the formal and informal sectors play a role in Delft's food system. Infographic 5 illustrates the differences between the formal and informal sectors in Delft. The scale of the informal sector far outnumbers the scale of the formal sector, yet the formal sector sees almost the same amount of people. Through my analysis, I was able to map over 240 tuckshops in comparison to the only two functional malls in Delft. Similar rates of patronage of both tuckshops and malls, in conjunction with the fact that the majority of residents in Delft accesses the mall for bulk shopping when income is received, demonstrates the volume of people that access the mall every month. In comparison, accessing a tuckshop is something that happens throughout the month on a regular basis. This is also seen through the foods that are bought from tuckshops and malls. Daily goods are bought from tuckshops, including food items such as bread, milk, eggs, vegetables, sugar and cheese. It should be noted that these items are more expensive per unit than similar items from the mall. The reason residents buy these more expensive items from tuckshops is two-fold: Firstly, tuckshops are more convenient and are often closer than the mall; and second, tuckshops are better equipped to respond to the needs of residents, offering core food items in quantities that residents prefer. Meat is almost bought exclusively from malls, since the prices at which meat is offered in mall-based shops cannot

be beat. Meat is the most likely item to be bought in bulk. Canned foods are another item purchased almost exclusively at malls, since these food items last a long time and can be stocked for leaner times in the week. Milk and sugar are also bought at malls, the difference in this case that milk and sugar are bought in bulk, at considerably cheaper cost per unit than at tuckshops.

Residents are also likely to use public transport to access food within Delft. Infographic 6 illustrates how residents access food during the month. The majority of residents walk, which is not surprising considering the dense distribution of tuckshops in Delft and that the majority of residents live within 2km of a mall. The second largest proportion of residents use public transport to either access malls within the area or to access malls outside of Delft. The smallest proportion of residents use their own private vehicle to access food—not surprising considering the fact that not all Delft residents can afford a car.

More than 80% of residents do not know what food security means and 63% of all households consider themselves to be food secure after they were told the definition of food security. This therefore brings into question the usefulness of labelling certain people as food insecure if they themselves do not believe themselves to be food insecure. If households do not believe they are food insecure they may have a low likelihood of seeking help or responding to government aid programmes. More than 50% of households also do believe that they eat a balanced diet even in the face of severe food insecurity.

6. Chapter 6: Socio-Economic Factors Affecting Food Security in Delft

The preceding chapters provided an in-depth understanding of the food network in Delft: which foods residents buy; how they access it; and from whom they access it. This chapter serves to unpack the socio-economic conditions that cause food insecurity within Delft. Food security is very complex. The very nature of its complexity lends itself to being made easy to understand so that decisions can be made by decision and policy makers. In this chapter I aim to illustrate the nuance of food security while highlighting its complexity and how it is more than just assigning a number to a household. For example, two households may both be identified through HFIAS as being severely food insecure, but the way in which they experience that level of food insecurity differs greatly.

Food security generally refers to how people interact with food in respect to the temporality, spatiality, accessibility and affordability of food. For a household to be considered food secure they must have temporal access to food at all times; they must have spatial access to food; the food they have access to must be accessible in that sense that it is culturally and nutritionally appropriate; and it must be affordable in that they can afford the foods that are culturally and nutritionally appropriate for them. It is important to understand that food security is not a singular state of being, but rather arises from multiple factors that collude to create a state of food security or food insecurity. Some of these factors are socio-economic and some are spatial in nature. I discuss these factors further below. Furthermore, food security is also not a permanent state of being for all households, especially the most poor and vulnerable. Food security and insecurity can fluctuate throughout the year and can be seasonal; households may be more food secure during the summer months when casual and seasonal work such as when domestic and construction workers are needed and less food secure when winter arrives and those types of labour are needed less. Levels of food security can also fluctuate week by week as food in the household runs out in the middle of the month.

Survey tools like the HFIAS can provide us with a snapshot of household food security for a given time frame, but it fails to inform us of how complex household food security really is. To believe that households simply accept the fact that they are running out of food or that they do not have access to healthier food choices deprives these households and people of their agency. People are resilient and will make decisions to improve their situation in any way they can. In the case of Delft residents this means bulk shopping at supermarkets when salaries and social grants are received; it means buying foods in smaller quantities; and it means accessing community and family networks to secure food.

Various socio-economic factors govern whether a household will be able to achieve food security. These factors, in the context of Delft, are factors that are sometimes outside of the control of the residents themselves. These factors include level of education, income and residential area. These factors are also influenced by the historical injustices of Apartheid which affected the ability of people of colour to access education, attain generational wealth and to choose where to live. Although Apartheid has officially come to an end, its policies still have an effect on the people it was designed to oppress. To suppose that after only 25 years after Apartheid had ended, that wealth and education levels would somehow equalize is a fallacy. Generations of South Africans grew up during Apartheid and either benefited from it or suffered under its oppressive regime, although those who suffered are in the vast majority. Under the Group Areas Act, people of colour were relegated to the peripheries of cities, in areas that were deemed less valuable for habitation. Their schools were underfunded and options for further education were limited. White people earned far more, had access to better schools and living environments and had the opportunity to build up generational wealth while people of colour were forced to live in poverty through state sanctioned policies. After the official end of Apartheid, when these oppressive policies were lifted and people of colour were allowed to live as full citizens, we would expect to see levels of education and wealth start to equalize, this is happening, but not fast enough. The earning potential of White South Africans is still far higher than that of South African citizens of other races even when levels of education are taken into account (Keswell, 2004;

van der Berg, 2002). These socio-economic effects are also gendered, in that men have better outcomes than women across racial lines. This should not be surprising considering the patriarchal nature of South African society, where more value is placed on raising men than women. I will show through this analysis how these factors conspire to keep poor residents, and residents within the context of Delft in a state of chronic food insecurity.

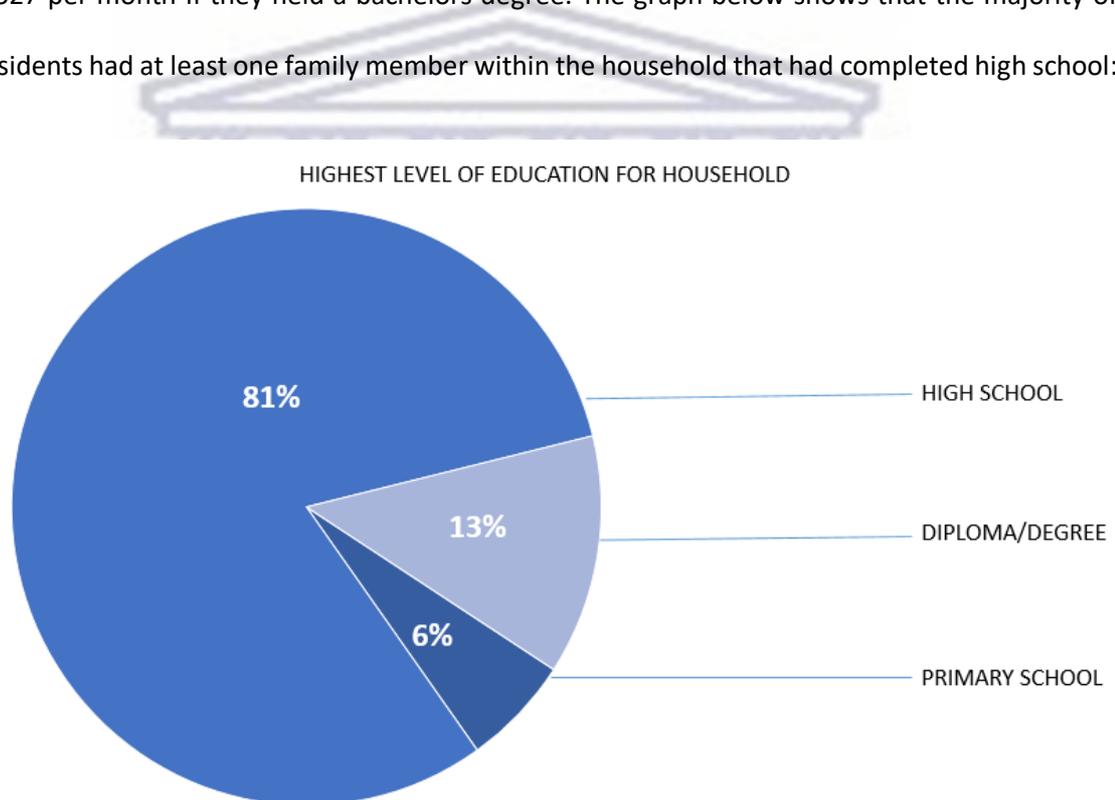
6.1 Education

Education levels are strongly correlated with the food security status of a household. The earning potential of a household is also correlated with the education level of the head of the household and to a lesser extent the level of education of the other members of the household. Education informs the types of jobs that can be accessed. Higher and more specialised levels of education generally equate to higher levels of income while the opposite also holds true (Fin24, 2017; Nwokolo, 2015; Niankara, 2018; Mutisya, Ngware, Kabiru, and Kandala, 2016). When people are denied access to a quality education their future earnings are also impacted. Levels of education also feed into the cycle of poverty, where low income households are unable to provide quality education for their children who are then denied opportunities to further their education because of poor performance at school and/or lack of funds to pursue further studies. This affects future earning potential, increasing the possibility that household income will be low. When household income levels are low, purchasing power falls which then affects what, where and how foods are accessed.

The link between low levels of education and increased risk of food insecurity also holds true when the link is reversed. In other words, education levels are directly affected by the food security status of the household. Children born into food insecure households are prone to decreased academic performance and achievement, lower reading scores, delayed development, lower weight than their peers and underdeveloped social skills (Anisef et al., 2017; Faught et al., 2017; Jyoti and Jones, 2005).

These factors feed into the cycle of poverty and chronic food insecurity. This cycle is self-perpetuating if no outside interventions are made such as feeding and nutrition schemes at schools and interventions at the household level to insure better access to nutritional foods.

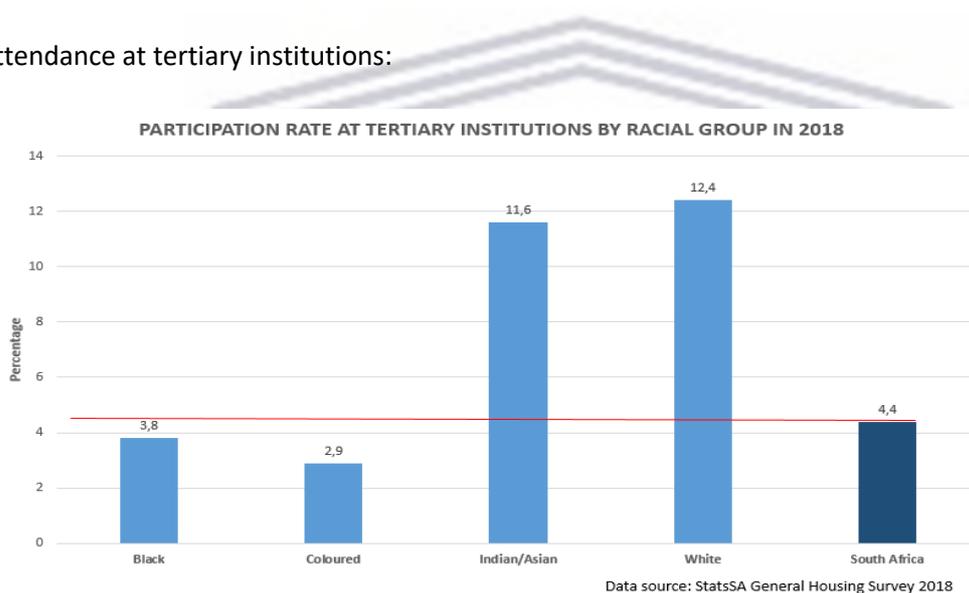
According to data from StatsSA and Anylitico (Fin24, 2017), South Africans can reasonably expect to earn up to R1 704 per month without any form of schooling; up to R1 867 per month with some level of primary school (Grades 1-7 incomplete); up to R1 946 if they completed primary school; up to R4 977 if they completed matric (Grade 12); up to R13 378 per month if they held a diploma; and up to R21 527 per month if they held a bachelors degree. The graph below shows that the majority of Delft residents had at least one family member within the household that had completed high school:



Graph 3: Level of Education

In terms of education, 6% of surveyed households had a primary school level of education as the highest level of education for the entire household. These households were primarily made up of older individuals who had never finished school. The 2018 General Housing Survey (StatsSA, General Household Survey 2018, 2018) shows that almost 60% of South Africans over the age of 60 did not complete grade 7.

The majority of surveyed households had a high school level of education. 81% of all surveyed households reported having at least one member of the household completing high school and the remaining 13% of households had a diploma or degree as the highest level of education for their household. One explanation for households not having a higher level of education is the costs involved in accessing tertiary education. According to the 2018 General Household Survey, 42% of youth in the Western Cape did not attend tertiary education because of the costs involved (StatsSA, General Household Survey, 2018). Black and Coloured people in South Africa also have the lowest levels of attendance at tertiary institutions:

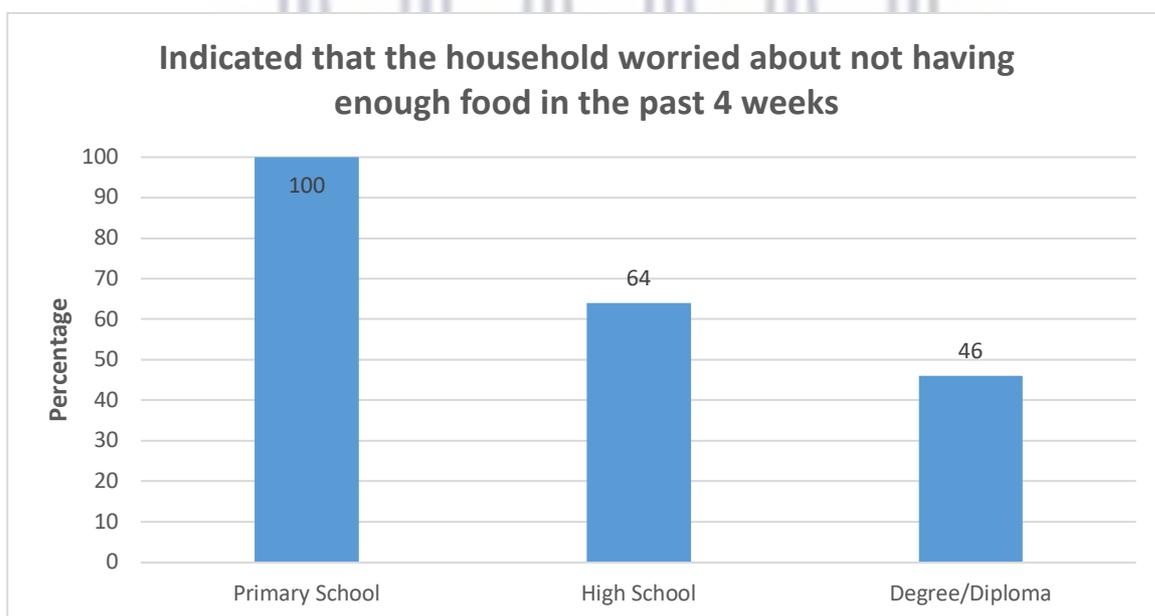


Graph 4: Participation at Tertiary Institutions by Racial Group

The graph above clearly shows that Black and Coloured people attend tertiary institutions at lower rates than the national average. Black people only make up 3,8% of all university students even though they make up more than 80% of South African citizens by race. White and Asian students make up the majority of university students, in the context of white students this is not surprising, as this racial group has the highest average income in South Africa, which would mean that they would be able to afford paying the costs associated with tertiary education. Even though national schemes such as the National Student Financial Aid Scheme (NSFAS) serve to fund students who would not be able to finance their studies otherwise, there are still further barriers to entry to accessing tertiary education.

For example, application fees are not covered by NSFAS and have to be paid out of pocket by prospective students. There are many secondary costs incurred by students pursuing tertiary education that are not covered by NSFAS and therefore form barriers to entry for university students. Pursuing further education for poor households also needs to be viewed within the context of opportunity costs: Should money be used to pay for application fees or should it be used to buy a meal for the household? Should all these costs be incurred to send a household member to university when returns on this investment may not be seen for years to come? When accessing foods and services are pressing matters in the present it becomes almost impossible to think of the future.

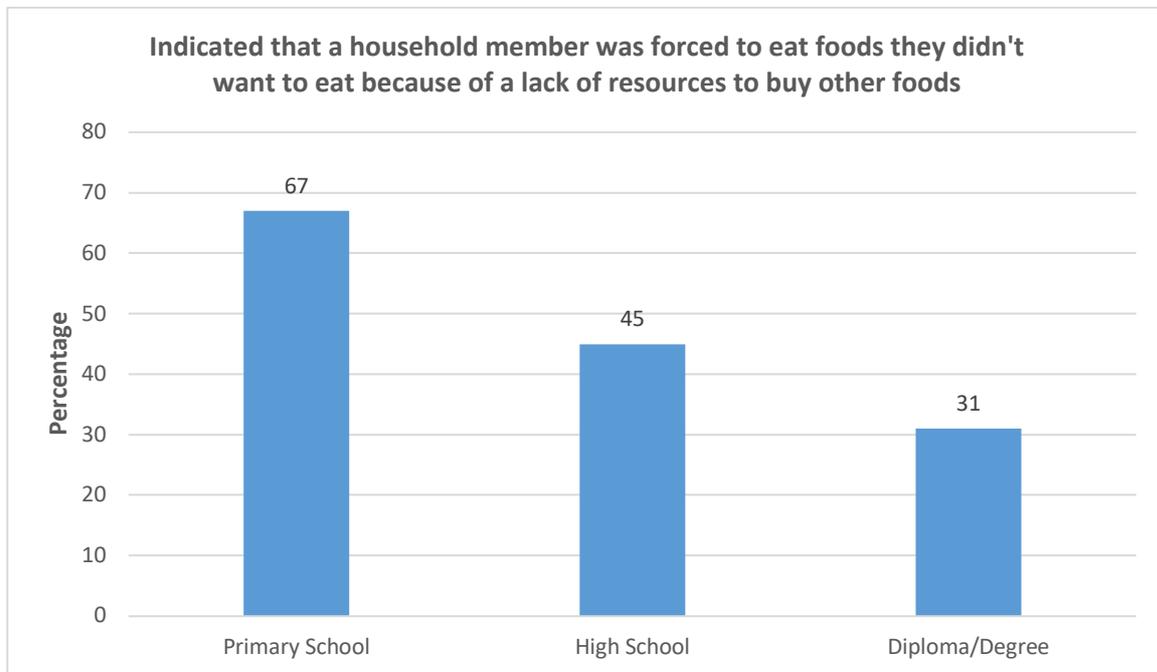
The likelihood that a household in Delft will experience food insecurity is generally correlated to the level of education within the household, however, additional data could provide a more concrete confirmation of these trends:



Graph 5: Anxiety over Food (by level of household education)

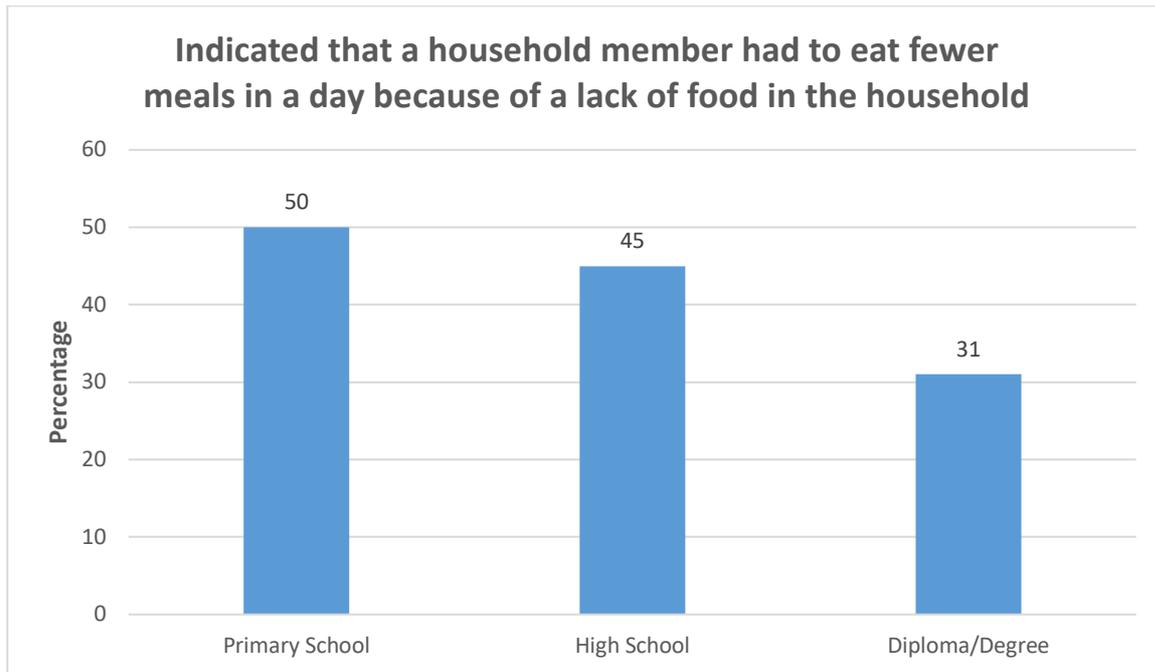
100% of households that only had a primary school level of education achieved by a household member indicated that they worried about not having enough food. This number drops down to 64%

when households have a high school level of education, while less than 50% of households with a degree reported worrying about running out of food. This trend continues when other food security indicators are taken into account:



Graph 6: Eating Undesirable Foods (by level of household education)

67% of primary school level households indicated that at least one household member was forced to eat foods that they did not want to eat because they lacked the resources to buy other foods. This number decreases to 45% of all high school level households and further decreases to 31% of all diploma and degree level households.



Graph 7: Eating Fewer Meals during the Day (by level of household education)

50% of all primary school level households indicated that at least one household member had to eat fewer meals in a day because there was a lack of food in the household. This number decreases to 45% of all high school level households and further decreases to 31% of all diploma and degree level households.

The data above show that a trend exists between food security indicators and household education level. The level of education can thus be used to predict levels of household food insecurity. This finding aligns with the literature on this aspect of food security. A factor that was not surveyed in this study was the link between academic performance and food insecurity, but I presume a strong link between academic performance in Delft school-going children and household food security levels. This prediction would also be in line with the literature on the same subject.

This data also illustrate how the social injustices of the past have affected and continue to affect Delft residents in terms of their educational attainment. The cycle of food insecurity and educational

achievement is an insidious one that affects the ability of food insecure households to attain food security and hinders children within food insecure households to achieve their full potential.

6.2 Household Income

Household income is strongly linked to whether or not a household is food insecure, especially within poor populations (Tawodzera, 2016; Battersby, 2011; Nwokolo, 2015; Sekhampu, 2013). Not only is the source of income important but also the bracket of income (Battersby, 2011). Households who earn within the lowest income bracket are at extreme risk of being food insecure (Battersby, 2011; Nwokolo, 2015). This is because they have less money to purchase food considering other household expenses (Haysom, 2016). Food purchases are considered flexible expenditures while other expenses such as rent, transport money and household utilities are considered fixed and must be paid every month, therefore monthly food expenditures tend to fluctuate every month depending on how much money is left over for food purchases. Higher income is therefore correlated with greater household food security since the purchasing power of households rise as income increases. This gives these households agency to take greater responsibility over their food purchases.

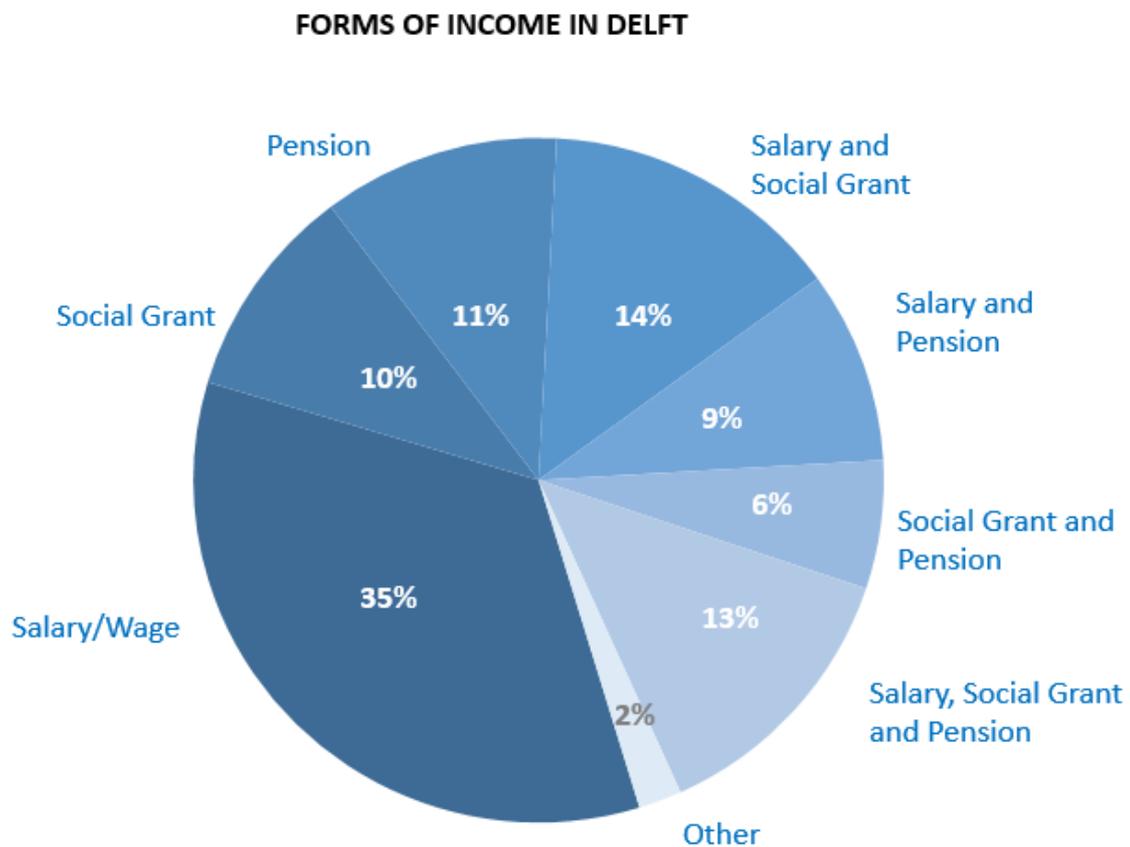
The source of income is also very important. Households who have a salary or wage income are likely to be food secure since this income source provides a regular and predictable income every month. This would then allow those households to plan their monthly food purchases. Analysis of survey data shows that salary or wage income is correlated with a decreased risk of food insecurity while household income from pension and social grants is correlated with an increased risk of food insecurity. Households that have a wage or salary as a source income in conjunction with a social grants are less likely to be food insecure than households that depend solely on social grants. Households that only rely on social grants – whether it is pension, social grants or both – would be at an extreme risk of food insecurity. Households relying solely on social grant allocations are unlikely to be able to afford all the foods they want and need because these allocations are so low and because

they spend a large proportion of their income on food, making their households vulnerable to food price increases. Survey results show that 78% of households who rely solely on social grants reported that they worried about not having enough food in the past four weeks, and a further 52% of households that rely solely on social grant allocations experienced not being able to eat the foods they would have preferred to eat due to lack of resources. In comparison, only 52% of households that rely solely on salary or wage income reported that they worried about not having enough food in their households in the past four weeks, and 44% of households that relied solely on salary or wage income reported that they could not eat the foods they preferred to eat due to lack of resources.

Social grant compensations currently range from between R400 – R1 710 per month (Western Cape Government, 2019). The most common forms of social grants in Delft are Child Support Grants and Pension Grants, which are also known as Grants for Older Persons. The amount of a Child Support Grant is currently R400 per child under the age of 18 (Western Cape Government, 2019). The current amount for a Pension Grant is R1 690 for those over the age of 60 and R1 710 for those over the age of 75. Households that rely solely on social grants as a form of income would therefore be likely to be classified as indigent according to the City of Cape Town which uses a threshold of less than R4 500 a month to receive a 100% discount on all rates and refuse removal (City of Cape Town, 2019).

It should be noted that even though negative outcomes are associated with receiving social grants, social grants themselves do not cause these negative outcomes. Receiving social grants (especially child grants) is an indicator of many factors, one of which is low household income but it is not the cause of low income. Without social grants, outcomes for these households would be much worse. Social grants enable households to plan out and make monthly purchases of food, they also enable households to access the formal food sector. In fact, social grants are understood to improve outcomes for poor households (Walder and Devereux, 2019).

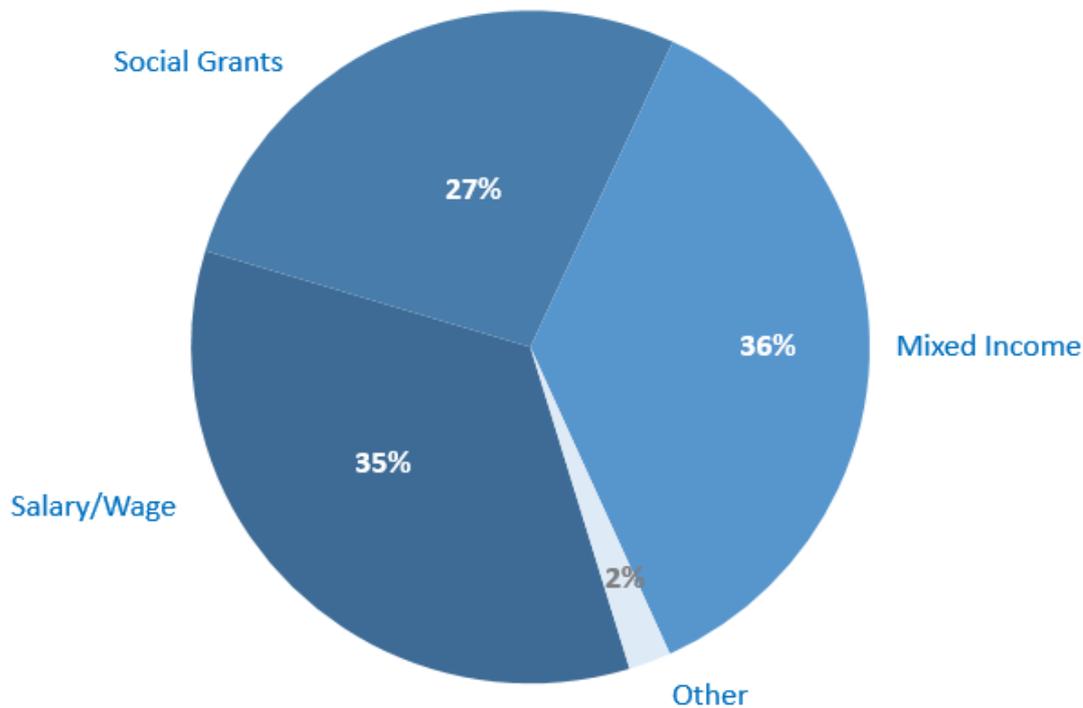
The graph below shows the various forms of income in Delft and what proportion of residents receive these forms of income:



Graph 8: Forms of Income in Delft

The various forms of income for the 102 sampled Delft households are shown in the pie chart above. The chart shows that there is not a single dominant form of income, but rather that there are varied income streams. A high income neighbourhood would have one dominant income stream, namely wage and salaried income while an impoverished neighbourhood would predominantly have income streams from social grants. Delft residents receive income from both streams, meaning there is high social stratification when it comes to income: the very poor live amongst the relatively well off. A better representation of this data is shown below, where income is classified into four streams:

FORMS OF INCOME IN DELFT – COMBINED INCOME STREAMS



Graph 9: Forms of Income in Delft, Combined Income Streams

Mixed income makes up the largest proportion of all income in Delft. These households receive a regular wage salary but their combined monthly income is still low enough that they qualify to receive social grants, or they have older persons living with them that receive a pension, sometimes both. Households in this income bracket are not as vulnerable to food price changes as those household relying on social grants only, but are not as well off as those households who rely only on salaries or wages.

Salary or wage income is that which is typically received from jobs in the formal sector, although such income can also be seasonal in sectors such as construction, landscaping and casual workers more broadly. This form of income is correlated with increased household food security, especially if it is the only form of income for the household. This generally means that the household earns enough to

not qualify for child grants. Salary income makes up the second largest proportion of all income in Delft.

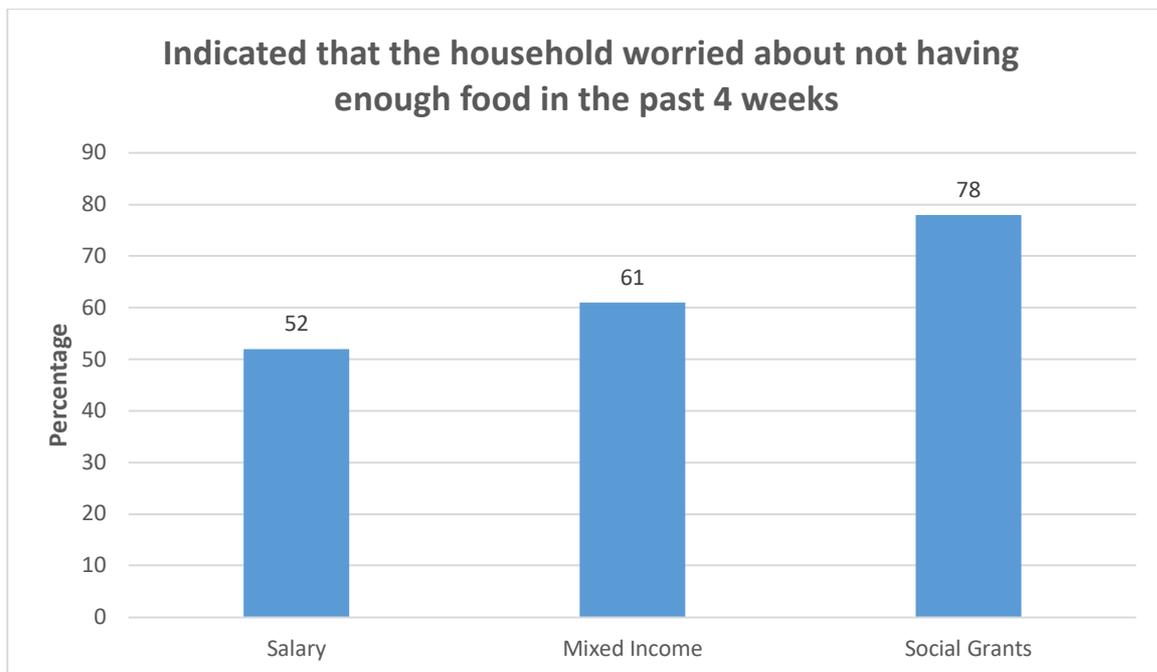
Household income received solely from social grants means that no adult in the household is currently formally employed, although they may be working in the informal sector. Households that only receive this form of income are extremely likely to be food insecure. Social grant allocations are not adequate enough to sustain an entire household throughout the month. In spite of this, social grants are extremely important. Without them, these households would find themselves in extreme poverty. Income from social grants makes up the third largest proportion of all income in Delft.

A final category, labelled as “Other” in Graph 9 above, includes those households in Delft that do not receive any form of income. Typically this characterises households with unemployed adults. These households may however receive irregular income from the informal sector or from casual labour. Such income is not regular enough to be classified as an income stream. While only 2% of surveyed households indicated receiving no income, I suspect this number may be higher, as residents answering the survey may lie about or misrepresent their financial situation due to shame or in order to save face.

As the graph below shows, household income source can be used to predict the food security status of a household. In the context of Delft it means that access to regular income through salaried labour increases the food security of a household. Even if money runs out during the month, loans can still be made to cover the deficit because they can pay it back the following month. It also means that these households can access the alternate food network because they are very likely to reciprocate when the time comes to do so. For mixed income households it means that they receive social grants but are able to bulk up this income with income from salaried labour. These mixed income households still do not fare as well as salary only households, but they do much better than social grant only households because they have a higher average household income with which they can use to buy food. Social grant only households are the most vulnerable households in Delft. These households

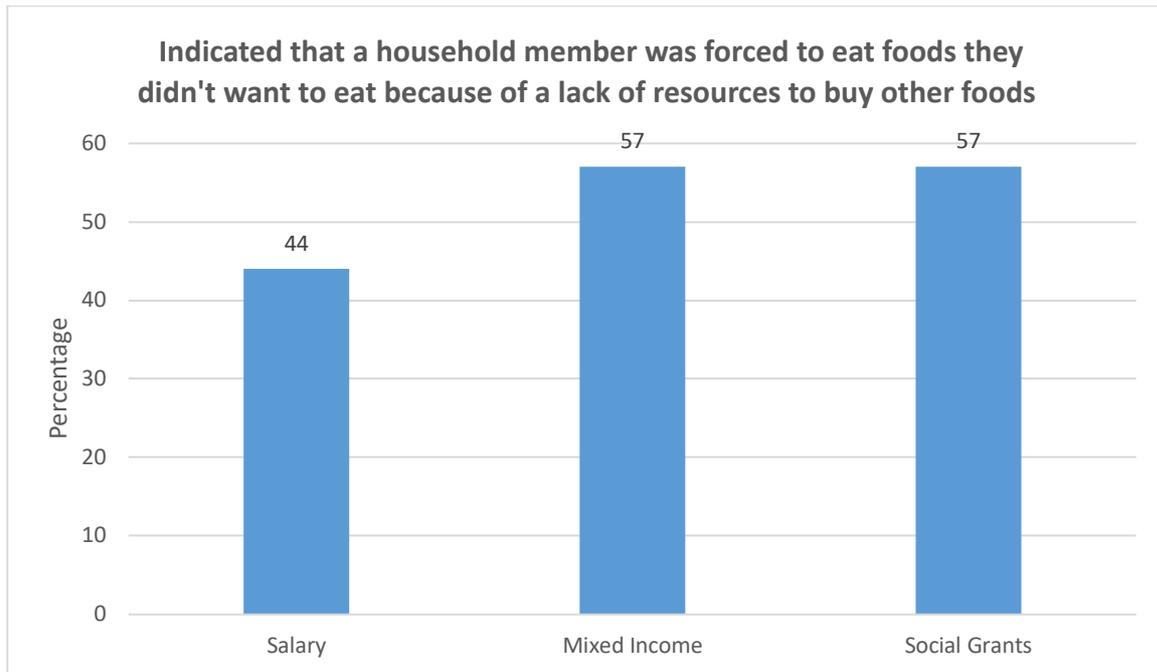
are extremely sensitive to food price shocks which can result in them buying less food if food price shocks affect basic food items such as bread and tinned foods.

The effects of household income will be analysed within the context of anxiety, insufficient quantity and insufficient food intake. The “Other” income type will not be included in this analysis.



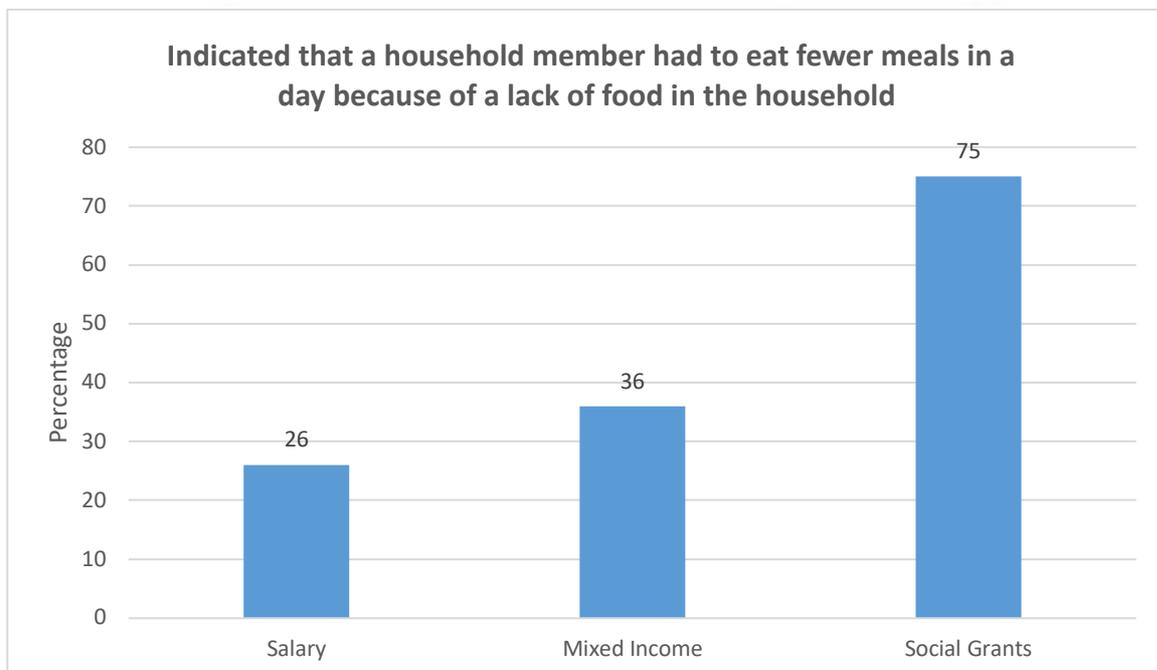
Graph 10: Anxiety over Food (by income source)

78% of social grant only households indicated that they had worried about not having enough food in their households, compared to 61% of mixed income households and 52% of salary only households. Social grant only households worry about not having enough food at an increased rate compared to other household income types.



Graph 11: Eating Undesirable Foods (by income source)

Social grant only and mixed income households indicated that they had an insufficient quantity of food at a similar rate, while salary only households indicated an insufficient quantity of food in the household at a lower rate.



Graph 12: Eating Fewer Meals during the Day (by income source)

Social grant only households indicated that they had insufficient food intake at a far higher rate than both salary and mixed income households. Social grant only households had a more than double reported rate of insufficient food intake than mixed income households and reported this at a higher rate than both salary and mixed income households combined.

The data clearly show that household income can be used to predict household food insecurity and that the more a household depends on social grants the more likely the household is to experience food insecurity. A reliance on social grants is an indicator of vulnerable households.

6.3 Residential Area

South Africa is a country characterised by a stark contrast between wealth and poverty that is spatially located and fixed. Areas of extreme wealth are found next to informal settlements with nothing but a road or railway separating the two areas. South Africa's Apartheid legacy has influenced the spatiality of race, education and income levels. Residential areas in South Africa remain aligned along Apartheid-era racial classifications, which also influences education and income levels. In other words, race aligns with social class and residential area. There are exceptions to this alignment, such as the South African middle class which is mostly made up of Black and Coloured people who have forged new homes in former "Whites-only" neighbourhoods. This middle class is made up Black and Coloured people that have managed to make enough income through hard work or luck to start a new life in suburbia. Their access to these neighbourhoods is regulated by wealth. Those who can make enough money and keep up appearances can stay. Fail to do so and you will be sent back to the Cape Flats or the homelands or wherever it is you came from before you had a free trial period of the Rainbow Nation. You do not pass Go, you do not collect an income this round, better luck next time. Delft is an area full of people stuck in this endless limbo of never passing Go, of never accessing the playing board, of never having a fair chance at life. But even in limbo people must live their lives. Delft is limbo because it is in a state of becoming but never quite being something.

Delft exists in contrast to an area like Belhar, just to the north. The differences between the two areas are obvious to the keen observer. While Delft is still in the process of finding its identity and flirting with wealth, Belhar is used to it. For a long time, residents in Delft had to travel to Belhar to access a supermarket. They had to send their children to schools in Belhar, and had to travel to there to access the rest of the city. Now, Delft has its own supermarket, its own schools and its own public transport system but they lived like second class citizens in comparison to Belhar for a long time and they still do in many ways. Belhar had a shopping mall long before Delft, even though its residents had access to other formal retailers in the area. It may be that investors would not take risks in a low income area like Delft when they have a better chance in a higher income area like Belhar. Because of this, most of Delft became a food desert, forcing residents to travel to access affordable food. Only when the local shopping mall was built in the area did Delft emerge from this desert. But it swapped one desert for another; a food desert for a nutritional desert. Residents still feel the need to travel outside of Delft to access food retailers, through this action they show a dissatisfaction with what they are offered in Delft.

More than 30% of Delft residents indicated that their community does not have enough resources (tuckshops, food vendors, close proximity to a mall, etc) to ensure that their household could have access to enough food. When prompted for reasons why they thought so, several issues were raised, including: not having enough shops in close proximity; having selfish neighbours; the need to take public transport to buy food; and not having enough malls in the area. Although many residents have income to buy food, the quality and affordability of food on offer in Delft drives them to other areas to purchase food. More than 40% of all residents have used public transport to buy food, preferring to shop in more established malls with a greater selection of food retailers. Another reason that residents prefer to shop outside of Delft is that food retailers they have access to are the ones that serve low income neighbourhoods such as Shoprite and U-Save. While food from these retailers may be more affordable, the products for sale are of the quality that residents prefer. Choice also matters to residents of Delft, who will travel great distances to access more expensive retailers such as

Woolworths Food, Food Lovers Market and Spar to name but a few. If residents feel that a food item is of superior quality, they will buy it, even if it is more expensive. This is an example of how the spatiality of Delft works against it. These relatively expensive food retailers market themselves to a higher-income demographic which often does not include Delft residents. Thus, the likelihood of Delft residents gaining access to a Delft-based Woolworths Food or Food Lovers Market is relatively low. The perceptions people have of spaces is stronger than reality, and as long as the negative perceptions of Delft exist it will forever be disadvantaged by factors outside of its control.

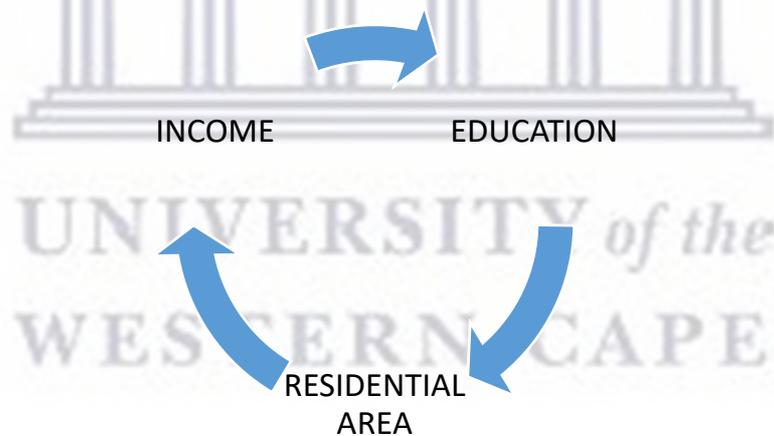
In conclusion, the unjust nature of South Africa's and the Western Cape's spatiality in particular have conspired to create areas of high inequality that serve to disadvantage people living in these areas. Apartheid's spatial legacies thus persist in shaping the food landscape. This greatly affects the kinds of retailers these areas have access to and subsequently the quality, affordability and accessibility of foods to which residents have access. Residents will seek out better opportunities to source foods even if it is more expensive. This is evident by the way Delft residents travel outside of the area to buy food. Food retailers that brand and market themselves to high earners benefit from the poor who buy purchase food from them but seldom open branches in their areas because of the perceived market risks such areas may have.

6.4 Conclusion

Education, income and residential location are factors that contribute to degrees of food security and insecurity. This is especially evident in Delft where residents are disadvantaged simply because they live in Delft. As such, Delft residents do not have equal opportunities to access further education or to achieve their fullest potential at school. Similarly, many Delft residents do not have enough income to buy sufficient quantity and quality of food considering other household costs. These factors are not the fault of Delft residents but are symptoms of an unjust and unequal society. These factors form a spiral that keeps the poor impoverished, and those who are food insecure in the same state. An

individual or household's residential area may therefore impact opportunities for educational achievement (the quality of schools in the area), thus affecting the earning potential of these residents. Level of educational achievement also affects where people can live because it correlates to household income which also dictates the possibilities for living in higher income areas. Income affects educational achievement because it dictates which schools can be accessed and it affects residential area because of the affordability of houses. All three factors then directly affect the food security status of the household. Education level is linked to how households procure foods and how students fare in school, creating a vicious cycle. Household income and income type dictate what kind of foods can be accessed by households. Therefore, lower household incomes limit access to cheaper and less nutritional foods. Residential area affects the food security of the entire area, with low-income areas having access to less choice. This is summarised up in the infographic below:

FACTORS AFFECTING THE FOOD SECURITY STATUS OF HOUSEHOLDS



Infographic 7: Socio-economic Factors Cycle

7. Chapter 7: Food Networks

Food networks are the systems of food procurement that arise from the interactions of multiple actors over time and space. These actors include but are not limited to people, food retailers, food vendors, wholesalers and public transport. Food networks are also complicated by various factors such as the availability, affordability, temporality, stability, utilization and cultural appropriateness of food available to actors in the food network. Food networks can further be complicated by dividing it into three domains: formal; informal; and alternative. We should take caution, however, not to think of the formal and informal networks as separate and stable entities. Rather, the definition of what constitutes formal and informal is mired in essentialist notions that leaves little room for nuance. Particularly in the context of food networks, formal and informal are not binary opposites, but lie on a broad spectrum of formality and informality which interact and rely on each other.

The formal domain or sector is constituted by any and all enterprises that are registered and taxed by the government (Essop and Yu, 2008) while the informal sector is touted by many scholars as something that escapes definition as it is not one homogenous group but rather a set of economic activities that encompass numerous features that range from type of activity, size, regulatory requirements and legal status (Ligthelm, 2003).

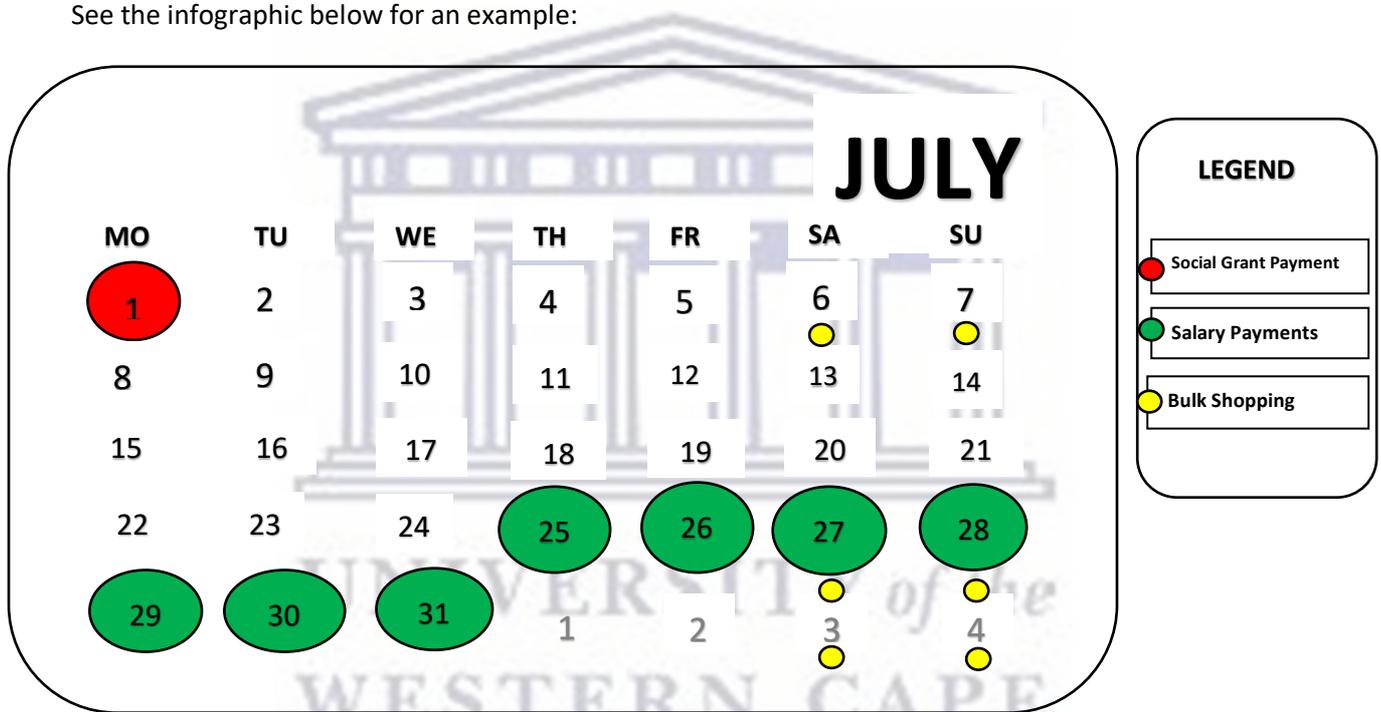
Alternative food networks are a feature of the food system where there is little study. This aspect of the food network is arguably the most important and potentially productive aspect of the food system for those who are food insecure. The alternative food network encompasses the domain of the household and community. It is where cultures and taboos around food are formed, and where community bonds are formed when neighbours share food with each other. Alternative food networks are those domains of food procurement that exist within communities and family units, and where there is no economic incentive. Such networks are altruistic and form where there are close-knit community and familial bonds. Alternative food networks involve the sharing of food or money with

the intent to procure food. These food networks are also reciprocal which means that any sharing of food or money is something that is expected to be repaid at a later date. Households of different social classes, racial backgrounds, and spatial locations access various parts of the food network in different ways and in different timescales. All these factors serve to shape the food network.

7.1 The Formal Food Network

Residents in Delft tend to access the formal food network at set times during the month, usually towards the end of the month. This coincides with the pay-out of salaries, wages and social grants.

See the infographic below for an example:



Infographic 8: Food Calendar

The formal food network in Delft comprises of chain supermarkets such as Shoprite, U-Save and Spar which are the only supermarket chains in Delft (see below).

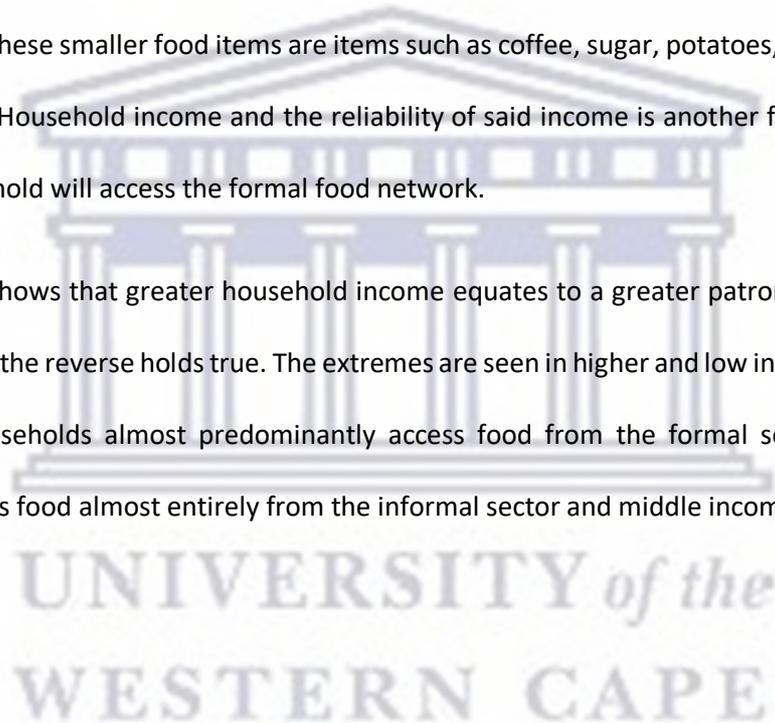
Besides the larger retailers, Delft also has several butcheries and wholesalers that sell bulk goods. Residents also access food outside of Delft on a regular basis, using either their own transport or public transport. 85% of surveyed residents accessed a supermarket within the previous four weeks of being

administered the survey, and of those residents a further 33% accessed supermarkets rarely or only once or twice within the previous four weeks. A further 34% accessed supermarkets sometimes or only three to ten times in the previous four weeks, and 18% of residents accessed supermarkets often or more than 10 times in the previous four weeks. Only 38% of residents who had bought foodstuffs from supermarkets had done so by using public transport. This suggests that residents who had not used public transport walked to the supermarket instead or used cars to do so.

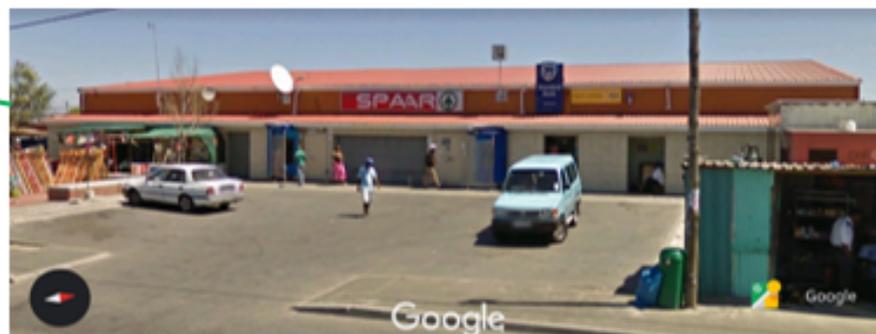
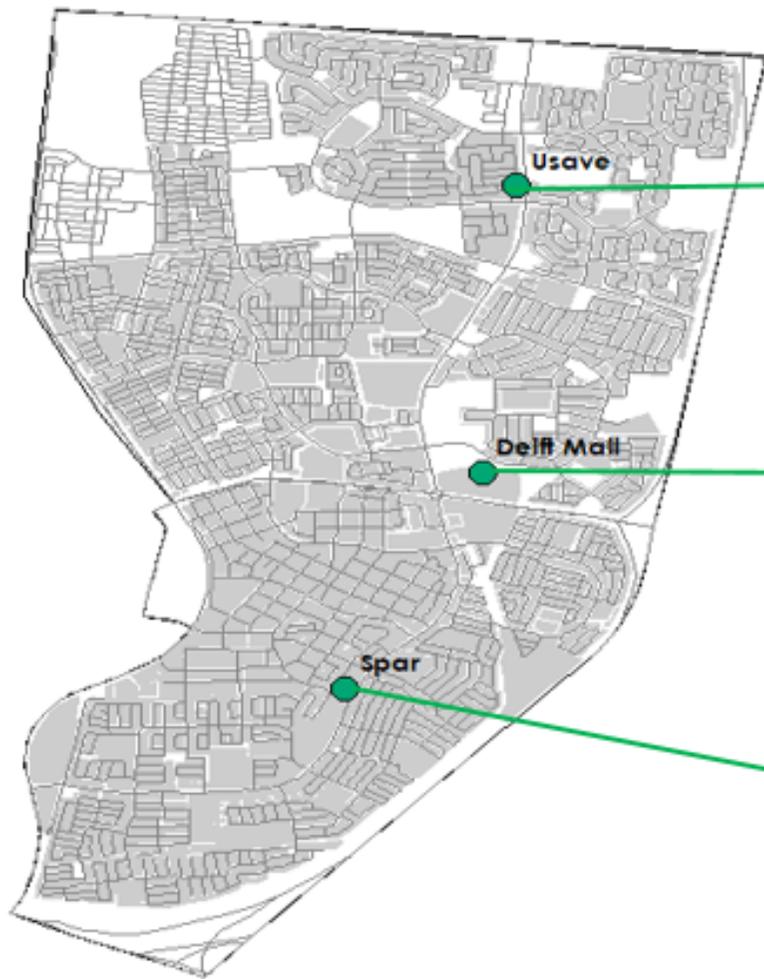
Access to supermarkets does not automatically equate to an increase in food security, nor does it necessarily improve diet quality (Crush and Frayne, 2011; Pechey and Monsivais, 2015). The type of supermarket an area has access to is a good indicator of the dietary intake of the surrounding population. Shopping at a low-cost supermarket has been linked to poor dietary outcomes when compared to shopping at high-cost supermarkets on account of the different costs and qualities of foods in-stock (Pechey and Monsivais, 2015). The types of food retailers that residents have access to create the area's food environment. In the case of Delft, this means that residents only have access to low-cost supermarkets which—although more affordable—means that residents have limited access to nutritional foods because low-cost supermarkets do not stock them. This means that residents have to travel outside of the area to access high-cost supermarkets only if they can afford to travel. The food environment in Delft can therefore be described as a nutritional desert, which is distinct from a food desert by the fact that residents in Delft do have spatial access to various supermarkets within the area that are affordable. Rather, it can be described as a nutritional desert because the nutritional value of the food that residents have access to is low. To access healthier foods, residents would have to travel outside of the area to shop at high-cost supermarkets which increases household expenditure for foods because of the added costs of travelling and because healthier foods are more expensive per calorie (Khan, 2018). This strategy to access healthier foods may not be something that most Delft residents can do because of household income being relatively low.

The introduction of supermarkets into an area can also drive out smaller competitors in the informal food sector who cannot compete with the buying power of large chain supermarkets. This has a negative effect on consumers who depend on the informal food sector to purchase goods. The urban poor still prefer to access food from the informal food sector even though on average food from the formal sector is cheaper. This is due to the fact that the urban poor are in close spatial proximity to the informal food network and it is convenient for them to purchase food items from the informal food network (Crush and Frayne, 2011). Another reason the urban poor prefer buying from the informal food sector is because they sell foodstuffs in smaller quantities that are bought by the urban poor as needed, these smaller food items are items such as coffee, sugar, potatoes, onions and rice to name but a few. Household income and the reliability of said income is another factor that dictates whether a household will access the formal food network.

A general trend shows that greater household income equates to a greater patronage of the formal food sector while the reverse holds true. The extremes are seen in higher and low income areas, where high income households almost predominantly access food from the formal sector, low income households access food almost entirely from the informal sector and middle income households

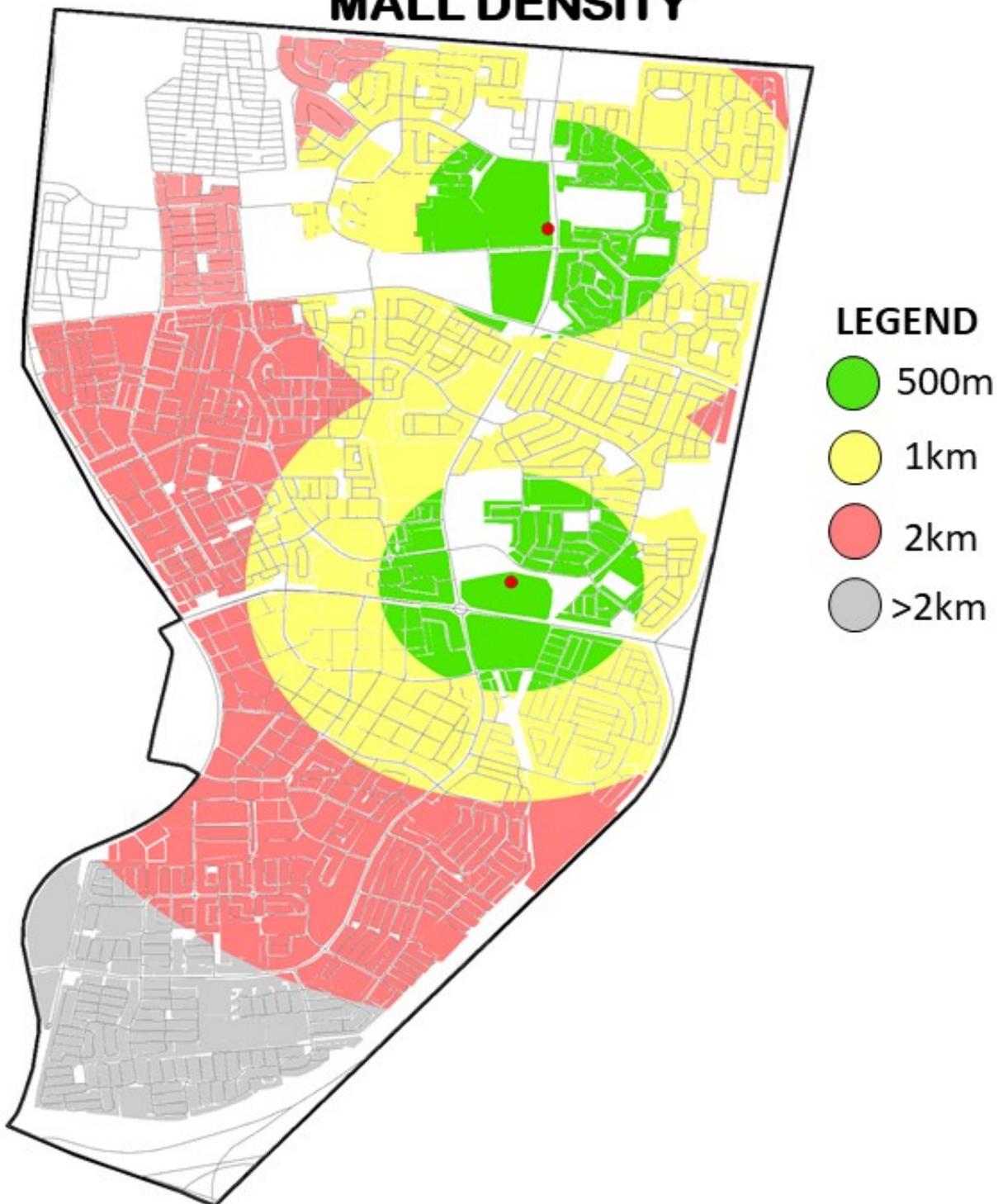
The logo of the University of the Western Cape, featuring a classical building facade with columns and a pediment, with the text "UNIVERSITY of the WESTERN CAPE" below it.

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Map 4: Delft Shopping Malls (Image source: Google Maps and Duval (2018))

MALL DENSITY



Map 5: Mall Density*

*NB: Spar supermarket is excluded due to it having shut down

access food from both (Crush and Frayne, 2011). This trend is further complicated by the fact that until recently, poor neighbourhoods never had convenient access to supermarkets. Residents of Delft only had access to a large retailer like Shoprite in 2018 when one was built in the area. Crush and Frayne (2011) show that people will access formal food networks if they exist. This holds true for Delft, where survey results demonstrate that even the poorest of residents access the formal food sector at least once a month. The reliability of income is another important factor to consider. People who do not have access to a reliable income are much more likely to use the informal sector to make food purchases because they cannot plan out their monthly food purchases. Under such circumstances, food is bought as needed. The opposite is true at the other end of the scale, where those with access to a reliable monthly income access the formal sector on a regular basis, making bulk food purchases when income is received (see Infographic 8 above).

The supermarket and the formal food sector generally are also linked to more affordable food prices, food safety and choice (D'Haese and Van Huylenbroeck, 2005). These factors serve to pull people away from using the informal food sector. The result is that many tuckshops and food vendors close because of the loss of business, and thus residents have less access to the informal food sector which drives them to access the formal food sector in greater numbers which then results in further businesses in the informal sector to close resulting in a negative feedback loop. This has not yet happened in Delft because residents enjoy variety of choice (Kahn, 1995) and they access different goods and services from both sectors. In fact, the opposite phenomenon has occurred in Delft, the opening of the new mall (Delft Mall) which houses Shoprite has acted as a nucleus for food vendors to congregate around, further increasing the size of the informal sector. The beneficial impact of the formal food sector for the informal sector can be seen from the experience of a fruit vendor in the area who sells fruits and vegetables. In this case, the vendor expanded their business by opening up another location near the mall. Both the formal and informal sector operate in parallel because they do not compete with each other directly and are connected in many ways (Battersby, Marshak and

Mngqibisa, 2016). Residents buy from the informal sector throughout the month, buying food items in small amounts while they access the formal sector to purchase goods in bulk.

Returning to Shamiela, Carmen and Nolu, the three imaginary, aggregated characters that underpin the results of this study, it is possible to see how each accesses food networks. Shamiela, Carmen and Nolu each access the formal food network differently. In the case of Shamiela, her household accesses the formal sector once a month when income from social grants is received. This is when Shamiela does bulk shopping. If her household is in close proximity to the formal food sector such as a shopping mall, then her household will access the mall multiple times a month to make small purchases. Bulk purchases will occur towards the start of the month when social grants are paid out. Her household is somewhat likely to travel to other areas to buy food using public transport but this depends on how much money can be spared for it. Shamiela's household will opt to use public transport to buy food in other areas because food is cheaper, or because there are food items that are on sale. Her household is also likely to buy meat in bulk from butcheries outside of the area.

Carmen's household accesses the formal sector between three to ten times each month. This is due to the fact that her household has access to multiple streams of income and therefore has the agency to make choices about the sector from which they will access food. Her household is not likely to make trips outside of the area to buy food, preferring to purchase food within Delft. A possible reason for this is because sale hunting may not be as pressing for her as for poorer households like Shamiela's.

Unlike Shamiela's household, Nolu's enjoys access to a regular salary which means that food purchases can be planned out on a monthly basis. Her household accesses the mall on a semi-regular basis and will make trips to buy food using public transport regularly throughout the month. Having access to a regular and adequate income means that relatively higher income households like Nolu's can access a greater selection of food retailers over a greater area.

When looking at the food purchases that households in Delft make, a clear distinction can be made between food items that are needed every day and are bought on a daily basis and food items that are bought in bulk and are bought monthly. We will focus on foods bought in bulk because these food items are bought from the formal sector. The graphic below shows the most commonly bought items of food by surveyed residents of Delft; the food prices are all from the local Shoprite.

Item	Cost Per Unit [R]	Unit Size	Price [R]
Full cream milk: Darling bag	0.90 per 100ml	1L	9
Full cream milk: Darling jug	1.25 per 100ml	2L	25
Full cream milk: Ritebrand carton	1.20 per 100ml	1L	12
Full cream milk: Ritebrand 6x1L carton	6.90 per 100ml	6L	69
Brown bread: Blue ribbon	1.57 per 100g	700g	11
Brown bread: Sasko	1.78 per 100g	700g	12.50
Brown bread: Albany	1.86 per 100g	700g	13
White bread: Blue ribbon	1.86 per 100g	700g	13
White bread: Sasko	1.57 per 100g	700g	11
White bread: Albany	2.14 per 100g	700g	15
Special maize: Impala	0.72 per 100g	2.5kg	18
Special maize: Impala	0.70 per 100g	5kg	35
Super maize: Iwisa	0.88 per 100g	2.5kg	22
Super maize: Iwisa	0.80 per 100g	5kg	40
Super maize: White star	0.88 per 100g	2.5kg	22
Super maize: White star	1 per 100g	5kg	50

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Margarine spread	4 per 100g	500g	20
Fat spread/butter	1.80 per 100g	500g	9
Peanut butter: Black cat smooth	8 per 100g	400g	32
Peanut butter: Black cat smooth	7.50 per 100g	800g	60
Rice: Ritebrand	1 per 100g	2kg	20
Rice: Spekko	1.37 per 100g	2kg	27.50
Rice: Tastic	1.40 per 100g	2kg	28
Sunflower oil: Ritebrand	2.53 per 100ml	750ml	19
Sunflower oil: Ritebrand	2 per 100ml	2L	40
Sunflower oil: Crown	3 per 100ml	750ml	15
Sunflower oil: Crown	1.65 per 100ml	2L	33
Tea: Ritebrand Rooibos 80s	20.62 per 100g	160g	33
Tea: Freshpak 80s		200g	50
Tea: Trinco 100s		250g	25
Tea: Teeco 100s		250g	16
Tea: Glen 100s		250g	26
Tea: Joko 100s		250g	40
Tea: Teaspoon Tips 100s		200g	19
White sugar: Ritebrand	1.30 per 100g	2kg	26
White sugar: Selati	1.99 per 100g	1kg	19.90
White sugar: Selati	1.67 per 100g	2.5kg	41.80
White sugar: Huletts	2.20 per 100g	500g	11
White sugar: Huletts	2 per 100g	1kg	20
White sugar: <u>Huletts</u>	1.68 per 100g	2.5kg	42

Tomatoes	1kg	1kg	16
Potatoes	1kg	1kg	10
Onions	1kg	1kg	10
Coffee: Ricoffy	18.99 per 100g	100g	19
Coffee: Ricoffy	14.80 per 100g	250g	37
Coffee: Ricoffy	17.33 per 100g	750g	130
Coffee: Ricoffy	10.60 per 100g	1.5kg	158
Coffee: Frisco	13.20 per 100g	250g	33
Coffee: Frisco	10 per 100g	750g	75
Coffee: Ritebrand	13.20 per 100g	250g	33
Coffee: Ritebrand	9.33 per 100g	750g	70
Eggs: Ritebrand 6			14
Eggs: Ritebrand 18			35
Eggs: Nulaid 6 large		>51g	15
Eggs: Nulaid 18 large		>51g	27
Chicken: County fair mixed portions	3.10 per 100g	5kg	155
Chicken: Farmers choice mixed portions	2.86 per 100g	4.2kg	120

Garlic polony	2.50 per 100g	2kg	50
Canned foods: Koo baked beans	2.80 per 100g	410g	11.50
Canned foods: Pot O Gold baked beans	1.70 per 100g	410g	7
Canned foods: Ritebrand baked beans	1.83 per 100g	410g	7.50
Canned foods: Lucky Star Pilchards in tomato sauce	4.75 per 100g/	410g	19
Canned foods: Cape Point Pilchards in tomato sauce	4.50 per 100g	400g	18
Canned foods: Glenryck Pilchards in tomato sauce	4.44 per 100g	360g	16
Canned foods: Saldanha Pilchards in tomato sauce	4 per 100g	400g	16
Spaghetti	114 - 119 per kg		
Cheese: Gouda			
Jam: Ritebrand	3 per 100g	900g	27
Jam: All gold	3.33 per 100g	900g	30

Infographic 9: Monthly Purchases

The graphic above clearly shows that households in Delft tend to buy goods that have a long shelf-life such as canned foods, maize meal and rice. The rest of the items are perishable goods that are needed daily such as bread and milk. Missing from the list are fresh fruits, red meats and other vegetables besides the ones on the list. While the 'shopping list' above provides insights to the monthly purchasing habits of Delft residents, it does not mean that residents avoid buying items not included on the list. It should however be understood that the items on the list are considered "necessary basics" and these are the items that must be bought every month. Other food items will be bought as needed when income fluctuates or will be bought from other supermarkets outside of the area or from the informal sector. Those items considered "basics" by Delft residents does not include all food groups, nor do they necessarily constitute the best options nutritionally-speaking. Rather, these food items have, over time become ingrained in the minds of residents as foods that are necessary to buy every month, that are appropriate for the household and are foods that are robust.

If residents want to access healthier foods, they typically need to travel outside of the area as Delft can be classified as a nutritional desert, devoid of any high-cost supermarkets that sell healthier and more nutritional food. Households like those of Shamiela and Carmen do not possess the necessary income to regularly shop from high-cost supermarkets. This means that their households buy foods that are cheaper and less healthy. Such is the reality of many households in Delft and other low income households throughout South Africa. A separate and parallel food network exists where low-income households can reliably access and afford foods from low-cost supermarkets which predominantly stock less healthy foods. Thus, low-income households exist within the shadow of the food pyramid. To escape the nutritional desert means that households need to have access to reliable transport and more disposable income for food, this is far easier said than done.

The formal sector, while organised and beholden to regulation, is still massively complex in its interaction within the food system. Similarly complex are the ways in which people interact with it. Common sense would dictate that supermarket access would equate to access to healthier and more affordable foods but this is not always the case. Low-cost supermarkets, like the ones found in Delft, offer affordable foods at the expense of nutritional value. While the introduction of supermarkets have forced informal businesses to close in the global North, this has not been the case in South Africa and especially in Delft where the two sectors operate in parallel which they also rely on each other. Access to supermarkets in Delft is dictated by income. Those who enjoy a regular income access supermarkets more than those who do not, and higher income means that households can expand the area in which they shop for food.

7.2 The Informal Food Network

The very nature of the informal sector makes it hard to study and even harder to quantify. Generally we categorise any unorganised and unregulated business as informal. This notion does not stand up to scrutiny however. First, let me unpack the idea that the informal sector is unorganised. From an outside perspective this may seem like the case, but this is simply not true. Informal businesses such as tuckshops and food vendors organise food delivery and storage logistics on a massive scale. For example, Somalian tuckshop owners are highly organised within the Delft area, controlling almost all of the market. They source and deliver foods in bulk, reducing costs and in that way they outcompete local tuckshop owners. Food vendors that sell the same products will organise for all their produce to be delivered in bulk, reducing costs for everyone. From the outside, the whole system seems unorganized and chaotic but the reality is that to be able to be competitive in the formal industry means that you need to more organized than your competitors (Charman, Petersen, and Piper, 2012). Secondly, the notion that the informal sector is not regulated also does not stand up to scrutiny. There is an assumption that because the informal sector is not regulated by the government it must therefore be unsafe. The reality is that the informal sector is regulated by all the actors involved, from the owners of the business to the customers themselves. They all form a system of trust where customers hold informal business owners accountable. Any shock to an informal business could be devastating and it is therefore in the best interest of the business owner to ensure they keep their customers happy by keeping prices as low as possible, ensuring food is as fresh as possible and ensuring food sold is as safe as possible. This goes without saying however that low prices, freshness and safety of food is all relative when compared to the formal sector, informal businesses cannot directly compete with the formal sector. Food from the formal sector will generally be cheaper on average, will be fresher due to strict adherence to selling foods before a sell-by date, and will generally be safer due to laws and regulation regarding food safety. Where the informal sector excels is convenience. There are rarely any lines or the need to wait for service at informal businesses. Customers are served almost immediately. Informal businesses also respond better to customer

needs, being able to sell food items in quantities that customers prefer on a daily basis. Foods that are sold in smaller quantities include but are not limited to items such as sugar, coffee, rice and tea. These items are sold in small plastic bags for as low as R1, while these items are more expensive per unit, they still serve the customers' need for foods in convenient quantities.

The informal food network in Delft is comprised of tuckshops (also referred to as spaza shops) and food vendors. Tuckshops are businesses that are run from homes, which are usually renovated so that the business is located in one half of the house, usually facing the street, while the other half of the house is for habitation. Many residents in Delft rent out their homes to foreigners who then proceed to run a tuckshop from the premises (Charman, Petersen, and Piper, 2012). The majority of tuckshops within Delft are foreign owned, with Somalian tuckshop owners making up the biggest share. Somalian tuckshop owners have managed to capture and outcompete almost all local tuckshop owners in the area because they are well organized, tending to work together instead of individualistically such as local tuckshop owners tend to do (Charman, Petersen, and Piper, 2012). They also have access to a logistics network which sources and delivers food to the area, further reducing costs for individual tuckshop owners. Somalian tuckshop owners also outcompete local tuckshop owners by selling items for a lower price than locals, forgoing profits in the short to medium term to ensure that they outcompete any local tuckshops in the area. This strategy has been very effective as the tuckshop market has been captured by Somalian tuckshop owners. While local tuckshop owners may resent Somalians for running them out of business, locals appreciate the improved quality of service and lower prices (Charman, Petersen, and Piper, 2012). While no tuckshop in Delft is registered or has a licence to sell food—due to the fact that as foreigners, they would not have access to formal avenues for registering and formalizing their business—they still access the formal food network to secure food items (Charman, Petersen, and Piper, 2012). Bakeries and Coco-Cola routinely deliver stock to tuckshops regardless of their informal, unregistered status because their business is too lucrative to ignore.

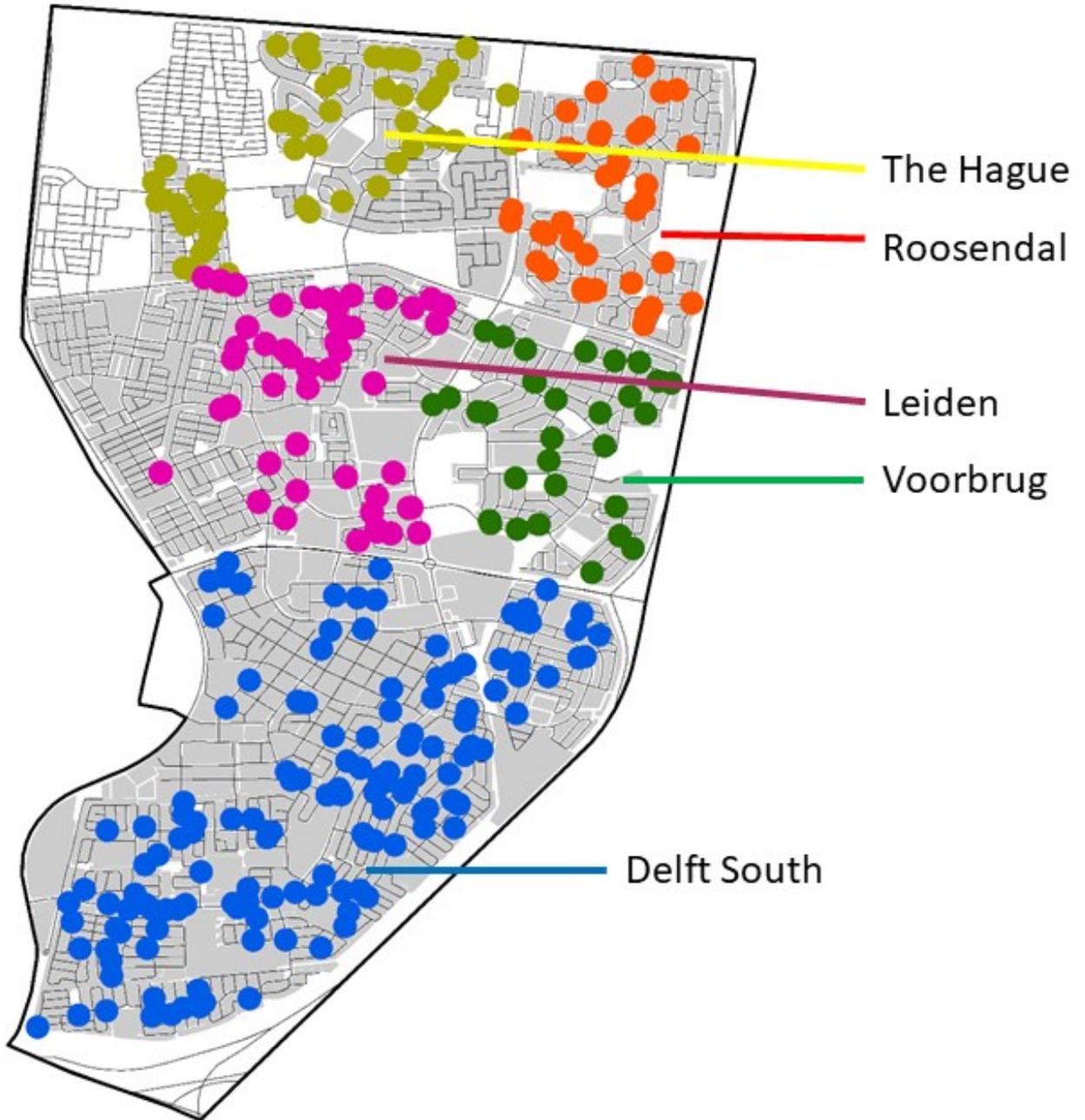
Food vendors are classified for the purposes of this study as any business that is operated from a stall, food truck or other informal structure that predominantly sells cooked foods but can also include raw animal products such as offal, live animals such as chickens or fruits and vegetables. Food vendors operate their businesses from the side of roads or in close proximity to shopping malls and taxi ranks. In the analysis of data, food vendors are divided into two groups: those who have been running their business for more than five years; and those who have been running their businesses for less than five years. The distinction is made because businesses that have been running for more than five years are considered as successful and are more likely to continue running in the future, while businesses less than five years old suffer from a 90% failure rate (Charman, Petersen, and Piper, 2012). Of the 16 food vendors interviewed for this study only one had been in business for more than five years. The average duration of time a surveyed food vendor had been operating for was just 10 months. Almost half of surveyed food vendors were foreigners and were running this type of business because they could not find work in the formal industry. One food vendor told me that she was a registered home carer back in her country but in South Africa she could not find work and had resorted to selling braai meat to make a living. Even South African-born food vendors faced the same, often insurmountable hurdle of finding work in the formal sector. A South African woman operating a stall near Delft Mall reported that she and her sister ran the stall together because there were no other opportunities. The informal sector in Delft serves to provide the unemployable with jobs and income while they serve the basic needs of the community by providing foods in quantities and at price points residents need.

The maps below shows the spatial extent of the informal food network in Delft. Great care was taken to map and include all tuckshops, vendors and businesses using Google Maps and first-hand knowledge, but given the precarious nature of the informal sector and degrees of visibility in the context of Delft, it is likely that some of these businesses slipped through the cracks of my analysis.

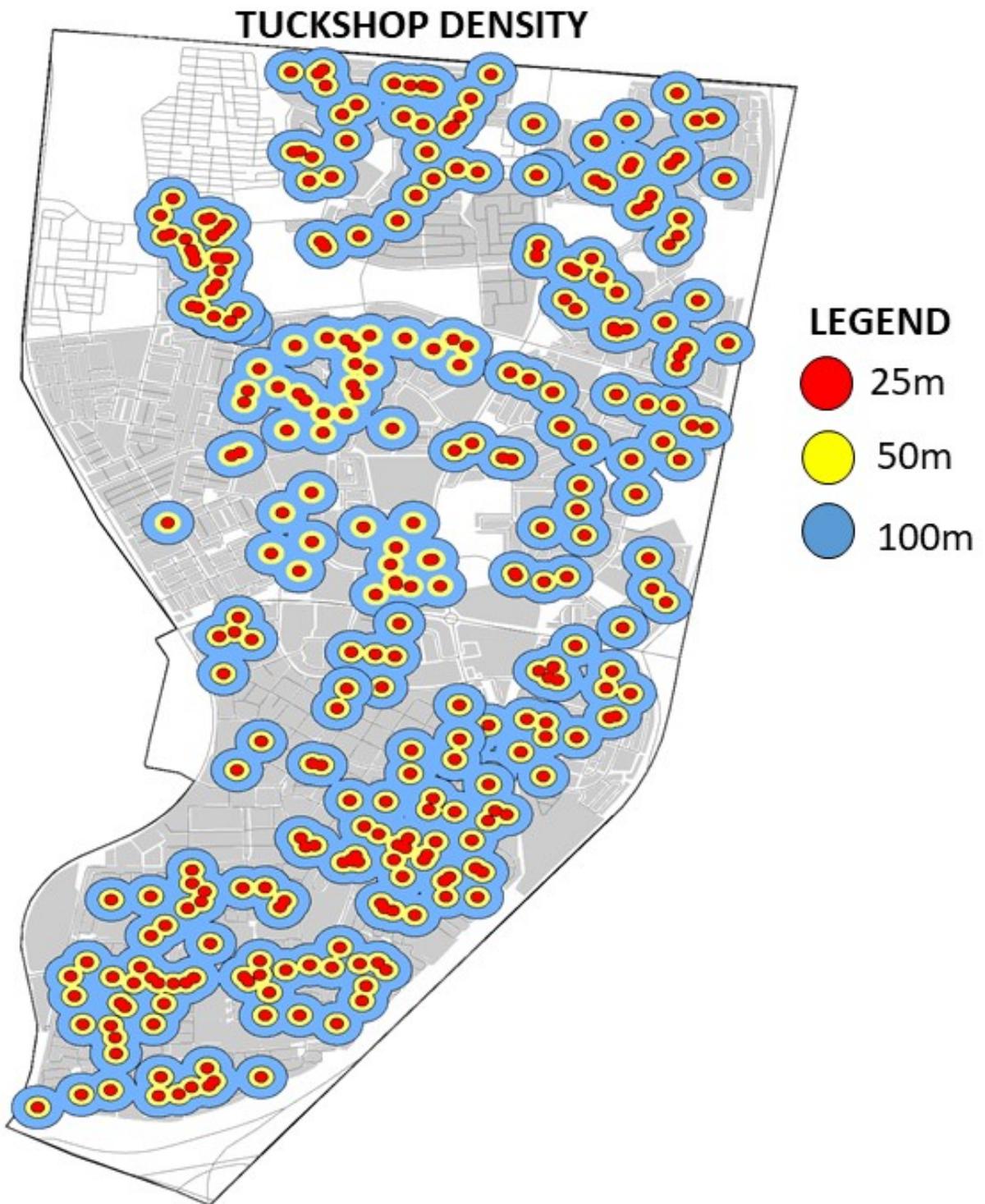


Map 6: Food Vendors in Delft

TUCKSHOPS



Map 7: Tuckshops in Delft



Map 8: Tuckshop Density

The maps above show how the informal network is spread throughout and is heavily integrated within the spatial fabric of Delft. A tuckshop can be found in almost every street and a food vendor can be found in every main road and congregated around shopping malls and taxi ranks. 90% of all surveyed residents used a tuckshop or food vendor within four weeks of being surveyed. More Delft residents access the informal food network at a greater frequency than they access the formal sector. The importance of the informal food network can therefore not be disregarded. To talk about the food security of Delft without considering the role the informal food network plays would be painting an incomplete picture. The tuckshop density map shows how much coverage tuckshops have in Delft. Most residents live within 100m of a tuckshop meaning that residents are well connected to the informal sector. Even though the majority of Delft residents access the informal food network in one way or another, they don't all access the food network equally. Again, we can find differences in the way in which Shamiela, Carmen and Nolu access the informal food network.

Shamiela's household and 56% of other households like hers accessed the informal food network within the past four weeks of being administered the survey. Those that did access this network were likely to access it more than 10 times in the past four weeks, which makes it likely that they access it at least once a day, if not more than once a day. Her household uses the network to predominantly buy goods such as bread and milk on a daily basis as well as items such as single use bags of coffee and sugar. On average, items such as bread and milk are cheaper at supermarkets. Thus, households like Shamiela's would save more over time if they bought these items from supermarkets. However, the reason they do not stems from two potential factors: Either because they do not live close enough to a supermarket; or because they prefer the convenience of buying these items from tuckshops.

Carmen and 88% of households like hers access the informal food network on a similar basis to households like Shamiela's. They also use it to buy items such as bread and milk on a daily basis but where they differ from households like Shamiela's is that they buy a wider variety of items such as potatoes, rice, polony and cheese. Their mixed forms of income might equip them to spend more money on items that are more expensive from tuckshops and food vendors for the trade-off of more convenience.

Nolu and 91% of all households like hers—that only receive an income through a salary—access the informal food network on a frequency that ranges from semi-regular to regular. Their households also buy items such as bread, milk, onions and potatoes on a regular basis but their income allows them to expand the range of items they can afford from tuckshops. Some households in this income bracket report that they also purchase items such as chicken and chicken necks, cheese, yoghurt and spices from the informal food network.

All three household types access the informal network on a regular basis. What sets them apart is what they can afford to buy from these establishments. Low income households like Shamiela's that only receive an income from social grants do not have the luxury of buying non-necessities from the informal food network, where prices are more expensive than the formal food network. Mixed income households like those similar to Carmen's, who receive both an income from social grants and some form of salary, can access even more items from the informal network. In this case they are able to buy items such as potatoes and onions that are used in everyday cooking. High income households like Nolu's, who receive an income from only salaries, can afford to buy non-necessities such as yoghurt. They have enough extra money that they can afford to buy these items from the informal network at prices that are far more expensive than if they had bought it from the supermarket.

A general trend also becomes present as income increases: patronage of the informal sector increases. This is counter to the prediction that as income increases we should see patronage of the formal sector

decrease. Analysis of data from this study suggests that because Delft household are low-income relative to the greater population, the informal sector still serves a market in the area. Another reason why residents access the informal sector more as income increases is because they value convenience over price for certain items of food. Finally, the informal sector is so enmeshed within the spatiality of Delft that it is likely to be accessed by all residents at least once a day.

7.3 The Alternative Food Network

The alternative food network is a form of accessing and procuring food that does not rely on access to capital but rather relies on social capital. This particular form of procuring food has not been rigorously studied before and there is a lack of research on this phenomenon. Perhaps because this phenomenon only arises in specific circumstances and in specific communities. The alternative food network is distinct from giving neighbours, friends and family food as gifts or as part of a cultural practice. Rather, the alternative food network is a complementary livelihood strategy. Those who make use of the alternative food network are likely to make use of it over a long period of time, until either their social capital is exhausted or their financial situation has improved to the point where they can more reliably access food from the informal or formal sector. To further illustrate and discuss the alternative food network, I will present both what it means and how it works within the context of Delft. However, to distinguish it from formal and informal food networks, I present below what the alternative food network is not:

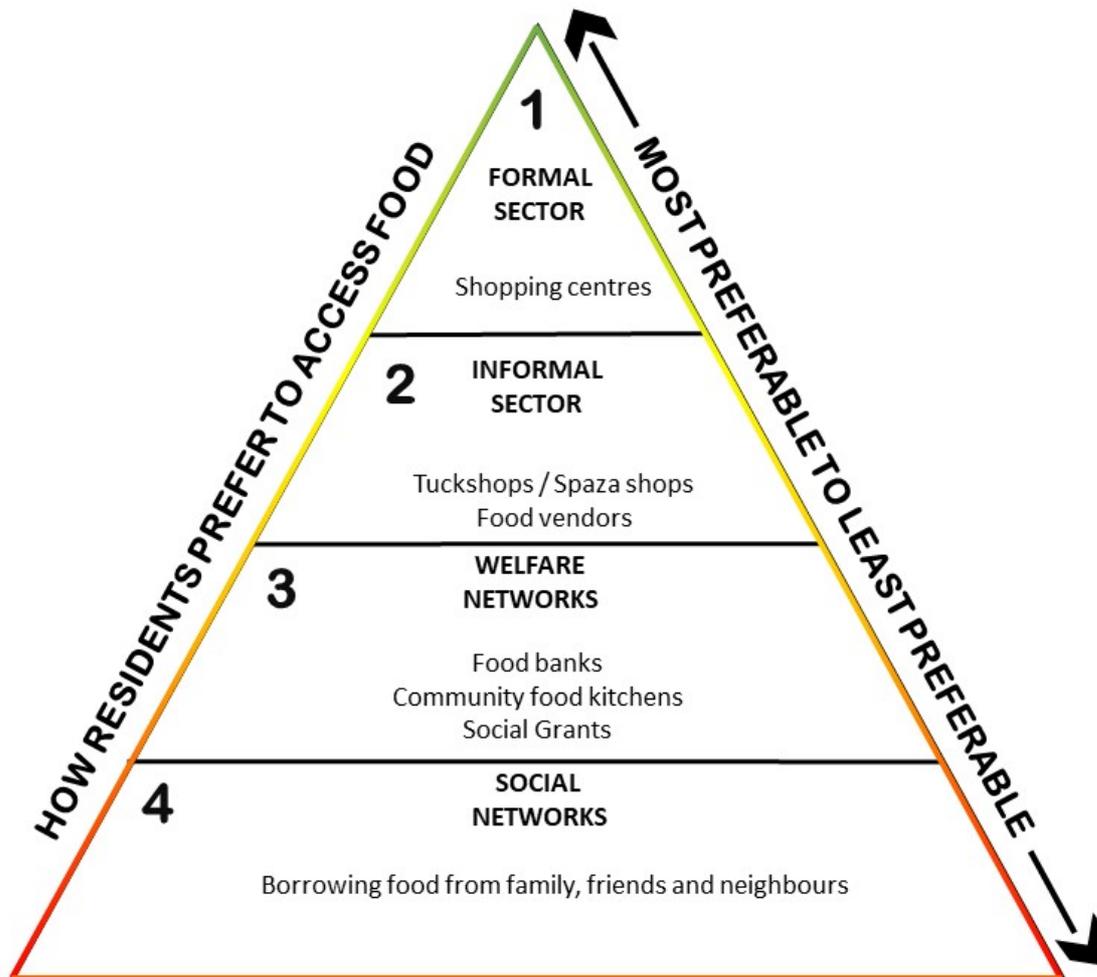
1. The alternative food network is not a livelihood practice in the sense that it is a primary source of food procurement. The alternative food network is a complementary form of accessing food in accordance with more traditional forms of accessing food, such as through the formal and informal sector;
2. The alternative food network is also not a stable or reliable way of procuring food. It relies on accessing networks of friends and family through the use of social capital. Social capital can be exhausted and access to food through this network can be cut off;

3. The alternative food network is not self-sustaining. The whole network relies on the reciprocity of its actors. If one of the actors fails to reciprocate access to food then the whole network can collapse and no more food will be accessed through this network;
4. The alternative food network is not anonymous. The actors in this network must all know and trust each other. This is why this network is unlikely to form with strangers. Friends and family are preferred; and finally
5. The alternative food network is not the same as food aid such as soup kitchens or food drives.

For many, accessing the alternative food network is a last resort (Haysom, 2016). Asking friends and family for food can be a daunting prospect that can cause shame. These feelings are perfectly captured in semi-formal interviews I conducted with Delft residents. When questioned about whether they ask neighbours for food when they run out, one respondent noted (NB: All text in bold is translated from Afrikaans):

“I don’t actually do that, I try to get by on my own, and I always tell my family, the day that I come to them then you must know it’s my last resort, if I can come make due through my own way – if I don’t have fish oil then I’ll take a piece of butter to fry my onions, but I’m not really a person that asks”

The answers to the question posed to the other interviewees shows a similar response. They would never ask neighbours for help if they ran out of food, and one interviewee admits that asking for food from family is a last resort. The responses to this question, in conjunction with what we’ve uncovered in the preceding chapters, allows us to map out how people in Delft prefer to access food. Accessing food from the formal sector is preferable, then from the informal sector. If food cannot be accessed from either of these sectors due to a lack of monetary capital, then residents will access food from welfare networks and will only access alternative food networks when welfare networks do not exist or if they are not adequate to meet the needs of the household. For example, most soup kitchens only operate on certain days of the week or are too sporadic with their operation to rely on. The infographic below maps out how residents access food:



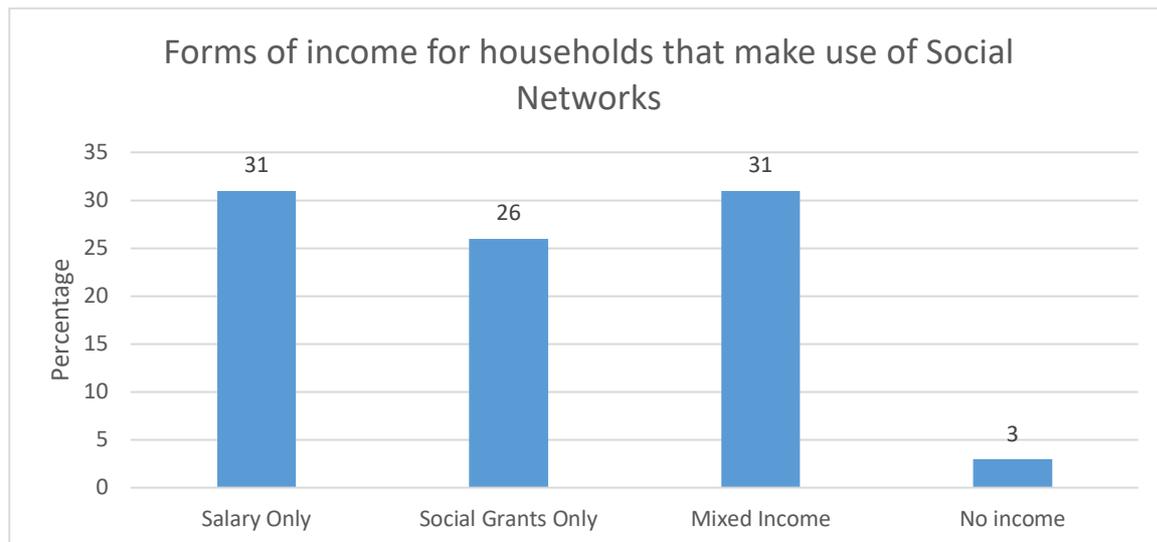
Infographic 10: Food Network Preference Pyramid

An interesting contrast is seen when interviewees were asked if they share food with neighbours, as demonstrated by a key quote below:

“I like to help, it’s an honour for me to help it feels good to help someone”

There is an interesting dynamic at-play here. People feel outward shame and hesitation when needing help but are very willing to offer said help if neighbours need it. I theorise that this dynamic exists because the food system is reciprocal and opens up the receiving party to future reciprocity which they may not be able to fulfil. This is especially troubling because there is no guarantee on the behalf of the receiving party that they will be in a position to return the favour in the near future. It should

come as no surprise then that this system would primarily be accessed by people who know that they will be able to pay back any social obligations in the future, the types of people who would make the most use of this system are those who can rely on a regular income and in fact, the data show that the majority of households that do make use of social networks are those that have a source of income, as seen in the graph below:



Graph 13: Forms of Income for Households that use Social Networks

When asked who they would reach out to if they ran out of food during the course of the month and needed help, the resounding answer was to family. The only exception was from one interviewee saying they would ask friends because their family was not “close by”.

It should come as no surprise then that asking for help from family is easier than asking from friends and neighbours because social bonds with family are likely to be stronger. Social capital with family can go further than it can with friends and neighbours. Reciprocity within family units may also be more lax than they otherwise would be with friends and neighbours.

When asked why they thought people were hesitant to reach out for help, one interviewee had the following to say:

“All that I think is that it’s just pride that puts you in a position that you won’t go ask...their pride doesn’t allow them to go knock on a door or to ask for help”

Feelings of shame and pride come up as factors in these responses. The interviewee points out that a limiting factor to reaching out is the fear that people will talk or gossip about it. Another Interviewee reported that some people may be shy. These limiting factors to reaching out for help are also survival tactics. In many cases, such responses to reaching out for help arise from past incidences that caused them to lose face or social capital. It is therefore in their best interest to preserve face and social capital, especially in close-knit communities where gossiping is a form of social bonding that has potentially negative consequences for those being gossiped about. The negative feelings of shame and pride serve to regulate how, where and how much food can be accessed through alternative networks.

Shamiela, Carmen and Nolu all use the alternative food network, although they may use it according to different temporalities and at varying scales. Households like those of Nolu may be able to access more food using this network because she would be able to reciprocate as her household income is high enough to guarantee reciprocity. In comparison, households like that of Shamiela’s who only have social grants as a form of income would not be able to access as much food because reciprocating with large amounts of food or small amounts of food to many people could lead to a situation similar to a debt spiral where larger and larger amounts of food would need to be borrowed to make up for the deficit, leading to a situation where reciprocity is broken and social capital is exhausted.

The alternative food network is one in which people can access to supplement their food intake. The alternative food network is accessed by expending social capital and is paid back in reciprocity. Using this network is a last option for many people because it causes feeling of shame in those who need to use it, asking family is preferred over asking friends as social capital goes further with family and reciprocity may be more relaxed with family. More needs to be done to understand this complex and interesting food network.

7.4 Alternative networks: A Complex Social System

The food network in Delft is complicated and interlinked. Various actors are involved and residents within Delft make use of the various sectors of the food network to access food. One of these networks—the formal food network, or the formal food sector—is the network that operates within the domain of legality and with the blessing and support of all spheres of government (local, provincial, and national). The formal food network is regulated by government and is therefore accountable to government to make sure that food is safe. The formal sector within Delft is small and makes up the smallest part of the food sector within Delft, being outnumbered both in physical locations and patronage by the informal sector. Residents within Delft make use of the formal sector to buy foods in bulk every month when salary and social grant payments are made. While the formal sector provides foods for cheap and in bulk it does not always provide the healthiest options. The formal sector in Delft prioritises affordability over nutrition.

The informal food sector within Delft is vast and encompasses all of Delft. It is mainly made up of tuckshops and food vendors. The informal sector in Delft is regulated by the residents themselves, keeping these business owners accountable through their buying power and ability to choose which tuckshop or food vendor they want to support. The informal sector within Delft is dominated by Somali traders who have outcompeted local tuckshop owners through their logistics network and their ability to forego profit in the short term to outcompete local businesses through prices. They have also managed to outcompete local tuckshop owners by being more organised and collectivist in their approach than their more individualistic and survivalist local counterparts. Tuckshops are found within and throughout the various neighbourhoods within Delft, serving almost every street while food vendors are found alongside main roads and around malls and taxi ranks where they can maximise foot traffic around their businesses. The informal sector is not in direct competition with the formal sector which is one reason they are still able to function in Delft, they instead focus on

providing food that is needed daily such as bread and milk, providing foods in convenient quantities such as selling sugar and coffee in small bags and reducing waiting times. Food vendors in Delft are a mix of both locals and foreigners. This part of the informal sector provides an income for people who either do not want to or cannot be employed in the formal sector. These businesses are not expected to last long as they are survivalist and will close down if better opportunities are presented. The average age of these businesses is around 10 months old.

The alternative food network serves as supplementary access to food. It provides a stopgap method for easing food insecurity between salary, wage or grant payments, or generally when food runs low within households. This network is accessed through social capital which can then be used to access food from friends, neighbours and family. Social capital can be exhausted however and access to food through this network can be cut off. Reciprocity is also expected to be maintained and failure to do so can also cause households to be cut off from the network. Negative feelings of shame and pride serve as a way of regulating the network so that one actor is unlikely to access too much food through this network. To access the alternative food network is also considered as the last resort for many people. Accessing welfare programs such as soup kitchens or food drives are seen as more preferable. Capital—both monetary and social—and time link food networks with each other. Food cannot flow without capital of some sort, whether it be monetary or social. Time, measured in weeks and months sets the tempo for how food flows into Delft. When social grants are received, food in households like Shamiela's becomes abundant. However, as the days progress, the supply of food slowly dwindles towards the end of the month, only to repeat this pattern on the next first day of the following month.

8. Chapter 8: Conclusion

Through this study I have demonstrated that the relationships that residents of Delft have with food are complex. The food landscape within Delft is complicated by various factors outside of the control of its residents, but through the agency of its residents they have created a food network that is robust, responsive and flexible. This study is significant due to the fact that it is unique in creating a first of its kind exploration of the food system of Delft through the creation of a food atlas that relied on the broad input of Delft residents through surveys, interviews and mapping. Using the data collected, I created three fictional women who would act as personifications of the data. This is the first time this has been done within the context of food literature. This approach allows us to speak about food security in a novel way and in a way that humanizes the data. Through this approach I also problematize the food system of Delft by situating it within the context of its spatiality and how residents access food in the literal and imagined landscape of Delft. The findings show that even though Delft is spatially disadvantaged, the informal sector has stepped in to replicate formal structures.

This study also challenges the notions of food deserts, especially within the context of South Africa where people have access to minibus taxis which allow them to reach shopping centres they may otherwise would not have been able to access. The dominant literature from the global North suggests that people living in areas without any shopping centres are disadvantaged because they lack ways to access food without cars. This approach prioritises a worldview that places great importance on car ownership and downplays the pivotal role played by public transport. Therefore, this research shows that most surveyed Delft residents do not live in food desert but rather in a nutritional desert, since access to food is less of a tension than the nutritional quality of the food available. This has consequences for the broader literature on food in the South African context and is worth exploring further.

This study has also challenged the current understanding of the role that supermarkets play within the food system. The contemporary understanding of the role that supermarkets play within the South African context sees their role as disruptors to the informal sector. This research shows that the opposite has occurred in the Delft area. In Delft, the formal sector acts as a nucleus for the informal sector to form around. The relationship is thus symbiotic. There is also very little competition between the formal and informal food sector. They act in parallel, and although they sell the same product (food), they serve different niches within the food sector. Residents access the formal food network for bulk purchases and the informal food network for daily purchases. The formal food sector sells food in predetermined quantities while the informal sector is much more flexible in how it packages and sells food. These insights open up further avenues into the roles that the formal and informal sectors play in communities.

Another useful insight that this research has uncovered is the complete dominance of Somali tuckshop owners in the informal sector in Delft. Somali traders have outcompeted South African tuckshop owners in a relatively short period of time. Their reliance on bulk buying and undercutting their competitors through collective action has ruthlessly driven out any competition from South African tuckshop owners who are profit driven and individualistic. This dominance of the market has generally benefitted Delft residents. This opens up many interesting avenues of research, perhaps the most interesting avenue of research is in getting a greater understanding of the tuckshop industry and how a community-based approach to tuckshops is a much better approach than an individualistic approach.

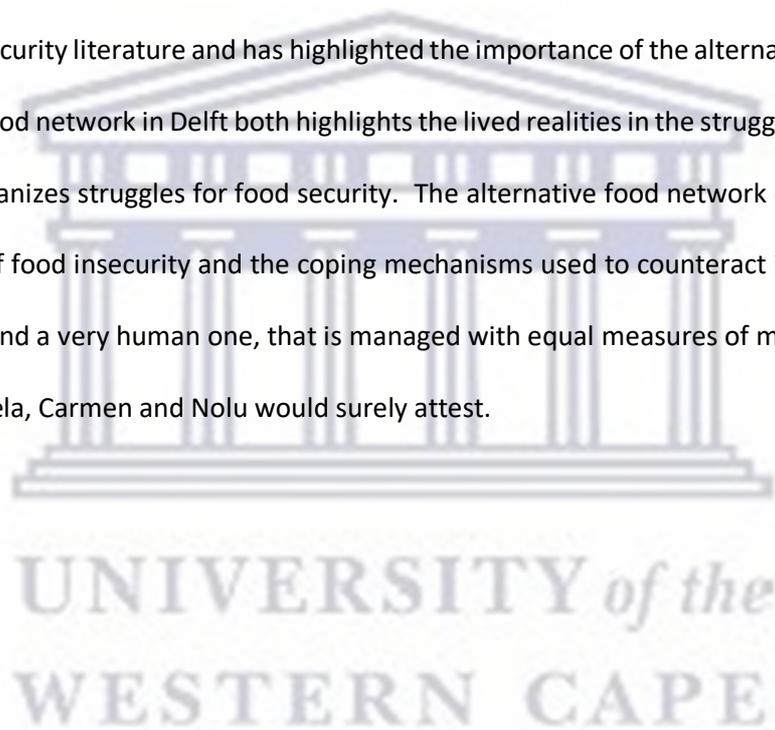
From the perspective of food networks, this study offers another contribution to the literature of food security in its exploration of the alternative food network. This particular exploration of the alternative food network is unique in that it explores it within Delft and does so in a way that is not usually explored in food security literature. This study has uncovered an otherwise invisible practice that contributes to furthering our knowledge of food security through the framing of social capital,

reciprocity and shame. Social capital acts as an alternative form of capital that helps the food insecure access food. Social capital is earned by having good standing with the community at-large. Reciprocity within food security is a theory this research proposes to help us better understand how and why these alternative food systems function. While conventional wisdom and the initial hypothesis of this study assumed that reciprocity in any alternative food network must be one-to-one, the research findings discussed above demonstrate that this is not the case within Delft. This should be explored further as it is a complex phenomenon that has until now not been examined in great detail. Finally, this research hypothesised that feelings of shame can act as a regulator within the alternative food network which stops the system from being abused. This whole area of research requires further investigation as it brings in new disciplines into the food security space, giving us a sociological and anthropological lens through which food security may be viewed.

Mapping has formed an integral part of this research. Through the use of mapping in this research, results have shown that food security is spatially situated, temporally experienced, and socially managed. The visualization of data through the use of mapping and infographics in this study demonstrated how wide-spread, complicated and entangled the food system is in Delft. The formal and informal co-exist within Delft. The visualization of data through mapping challenge the notions of formal and informal within Delft (and perhaps outside of Delft as well). Although the use of mapping within this study was limited in its scope, results demonstrate the situatedness of food across formal, informal and alternative networks. Additional resources and time are needed to do a more in-depth analysis of the food network within Delft.

The key findings of the HFIAS survey show its strengths and shortcomings. The survey tool provides a robust way to measure household food insecurity within a given time frame, but is lacking in a way to understand food security outside of its limited scope. Additional questions were designed in order to gain a greater understanding of the complex nature of food. Without these additional questions the discovery and analysis of the nature of the alternative food network within Delft would not have

been possible. The key findings from the HFIAS survey show that the majority of surveyed Delft residents felt a sense of anxiety throughout the month about having enough food. The majority of surveyed Delft residents found themselves to be in a low level of chronic food insecurity throughout the month. This was correlated to levels of household education and income type. Low levels of education and a reliance on social grants were found to be correlated with a high likelihood of food insecurity. These findings agree with conclusions from other food security literature. Finally, this research satisfies the aim and objectives of this study. New and exciting insights have been uncovered and new avenues of research have been identified. This research has challenged many long-held notions in food security literature and has highlighted the importance of the alternative food network. The alternative food network in Delft both highlights the lived realities in the struggle for food security while it also humanizes struggles for food security. The alternative food network exhibits the social-embeddedness of food insecurity and the coping mechanisms used to counteract it. Food security is a lived struggle, and a very human one, that is managed with equal measures of monetary and social capital, as Shamiela, Carmen and Nolu would surely attest.



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