


COMMUNITY INSIGHTS INTO, AND AN INTERNATIONAL
PERSPECTIVE ON THE ROLE FOOD ENVIRONMENTS AND DIET
PLAY IN THE SELF-MANAGEMENT OF TYPE 2 DIABETES
MELLITUS IN URBAN AND RURAL SOUTH AFRICA.

Mark Haydn Spires
Student number: 3580643

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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' overlaid in a light blue color.

Supervisor: Prof Thandi Puoane
Co-supervisors: Prof David Sanders & Dr Peter Delobelle

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PhotoVoice



ABSTRACT

Type 2 diabetes mellitus (T2DM) and pre-diabetes contribute increasingly to the global burden of disease. Along with other behavioural risk factors, diet plays a key role in the onset and management of the disease, in turn largely determined by what foods are immediately accessible in local food environments.

With this in mind, this thesis aims to answer the research question: What role do local food environments play in promoting or inhibiting access to healthy foods as part of the self-management of T2DM in urban and rural communities in South Africa, and what can be learned from an international perspective?

Specific research objectives include, to:

1. Understand the current national-level policy context with regard to the observed rise in NCDs, their proximal determinants (specifically an observed change in diet patterns), and contributing environmental factors;
2. Identify the current food-related environmental factors associated with the onset and/or management of T2DM in an urban and a rural setting (as well as in four additional international settings in order to provide an international perspective);
3. Explore community perspectives of the role the local food environment plays in the self-management of T2DM in an urban and a rural setting; and, consequently
4. Recommend intervention- and/or policy-related actions that can be implemented based on study findings.



A review of the literature and relevant policies was conducted towards achieving the first research objective. Quantitative data were systematically collected at an urban and rural site in South Africa through the creation of an 'environmental profile' in an attempt to achieve the second objective – comparable urban and rural data was also collected as part of a larger study at two other international sites (Kampala, Uganda and Stockholm, Sweden) to provide an international perspective. Included in the third objective is the collection of qualitative data through a community based participatory research method at the same urban and rural sites in South Africa. Finally, intervention and/or policy-related recommendations are developed based on study findings and in consultation with relevant stakeholders through interviews.



Findings indicate that South Africa has taken relevant policy steps to promoting enabling environments in which people can adequately produce or procure food for themselves and their families. However, these steps have been slow and uncoordinated. Sustained, evidence-based policy, programmatic, and strategic efforts are needed to combat the current trend and achieve a real reduction in the current NCD-related burden.


Findings also reveal that levels of knowledge regarding what healthy food is, and how to navigate food environments is high among study participants. However, food environments, and issues regarding the affordability, availability, and accessibility do not facilitate the regular, easy access to desired healthy food items.

Multiple policy and/or programmatic recommendations are shared.

DECLARATION

I declare that *COMMUNITY INSIGHTS INTO, AND AN INTERNATIONAL PERSPECTIVE ON THE ROLE OF FOOD ENVIRONMENTS AND DIET PLAY IN THE SELF-MANAGEMENT OF TYPE 2 DIABETES MELLITUS IN URBAN AND RURAL SOUTH AFRICA* is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Mark Haydn Spires



29 October, 2018

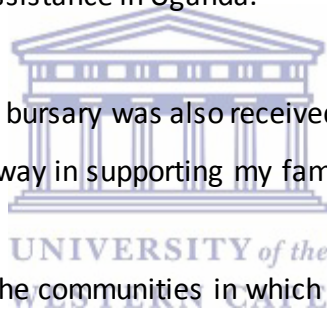


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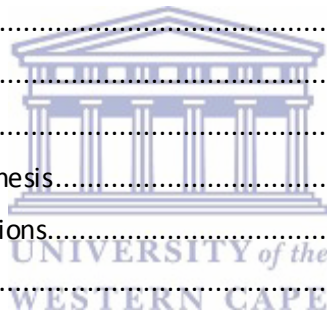
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CHAPTER 1 – INTRODUCTION

1.1 Background

Diabetes is a serious chronic non-communicable disease (NCD) and a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation (WHO, 1999).

Diabetes can be caused by a number of different factors depending on the type of diabetes and the individual; factors include genetic makeup, family history, ethnicity, health and environmental factors (Diabetes.co.uk, 2017). Risk factors for T2DM include obesity, sedentary lifestyle, and an unhealthy diet (CDC, 2017).

Globally, diabetes is on the rise: prevalence rates among adults (those over the age of 18) have increased from 4.3% in 1980 to 9% in 2014 in men, and from 5% to 7.9% over the same period of time in women (NCD-RisC, 2016). This increase has been observed in both the 'developed' and 'developing' worlds (WHO, 2016). South Africa is no exception, with prevalence in adults rising from 5.5% in the year 2000, to 7.5% in 2017 (Bradshaw, Norman, Pieterse, & Levitt, 2007) (IDF, 2018). Type 2 diabetes (T2DM) is of particular concern as it poses an increasing public health burden in South Africa (Guariguata, et al., 2013) with obesity as the main driver of the epidemic (Peer, Kengne, Motala, & Mbanya, 2014) (Kengne, Echouffo-Tcheugui, Sobngwi, & Mbanya, 2013). Additionally, T2DM requires a certain level of self-management if the negative effects of the condition are to be avoided. In order to effectively self-manage the disease, those with T2DM are advised, in part to avoid dietary sources of sugar, which for some, is not always a simple undertaking.

Implicated in this upward trend of diabetes globally, regionally, and in South Africa is an observed change in diet – a transition from traditional foods, to what has come to be known as the ‘western’ diet, a diet made up of food that is more energy-dense, processed, more foods of animal origin, and more added sugar, salt and fat.

The physical and social environment in which one lives and works can play a huge role in determining the food one eats (diet) and one’s resulting health, in that it largely determines the type and quality of food one has access to (Gordon, Ghai, Purciel, Talwalker, & Goodman, 2007). In fact, it has been demonstrated that factors in our environments lead to an increased risk in the levels of chronic diseases, over and above individual factors such as knowledge, attitudes, and behaviours (Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008). Simply put: unhealthy food environments foster unhealthy diets. With food environments in South Africa increasingly being dominated by food retail outlets peddling the ‘western’ diet (Ledger, 2017), it is no wonder that we are experiencing an increase in diet-related NCDs.

It is worth noting that, in light of this nutrition transition being experienced in South Africa and the changing food environment landscape, being able to access sufficient food as part of an individual’s diet has been enshrined as a human right, as part of the right to health. The right to health, like all human rights imposes on States Parties obligations to *respect* peoples’ rights, *protect* these rights, and do all they can to *fulfil/realize* these rights, which means that governments must, to the best of their abilities generate conditions in which everyone can be as healthy as possible, without discrimination. Such conditions range from ensuring availability of healthcare services, healthy and safe working conditions, to adequate housing and nutritious food (WHO, 2005). The United Nations Committee on

Economic, Social and Cultural Rights addresses the right to nutritious food as an underlying determinant of health and essential to the realization of health for all; and states that the minimum essential food which is sufficient, nutritionally adequate and safe should be readily available, accessible (physically, economically, and without discrimination), acceptable (culturally appropriate), and of good quality (CESCR, 2000). In South Africa, the right to food is enshrined in the Constitution. Section 27 of the Constitution states that ‘Everyone has the right to... sufficient food’ and that ‘the state must take reasonable legislative and other measures within its available resources to achieve the progressive realization of [this right] (Republic of South Africa, 1996).’

1.2 Research question, study aim and objectives

As diabetes, in particular T2DM, becomes more and more common place in all settings in South Africa, those living with the condition are encouraged by their healthcare providers to self-manage, in part by adopting healthier diets. However, the reality of the communities in which a large portion of these individuals live does not always allow easy access to the food items that make up the recommended healthy diets.

Therefore, this thesis aims to answer the research question: What role do local food environments play in promoting or inhibiting access to healthy foods as part of the self-management of T2DM in urban and rural South Africa; and what can be learned from an international perspective?

Specific research objectives include, to:

1. Understand the current national-level policy context with regard to the observed rise in diet-related NCDs, their proximal determinants (specifically an observed change in dietary patterns), and contributing environmental factors;
2. Identify the current food-related environmental factors associated with the onset and/or management of T2DM in an urban and a rural setting (as well as in two additional international settings in order to provide an international perspective);
3. Explore community perspectives on the role the local food environment plays in the self-management of T2DM in an urban and a rural setting; and, consequently
4. Recommend intervention- and/or policy-related actions that can be implemented based on study findings.



It is hoped, and expected that due to the methods employed, findings from this thesis will be culturally appropriate and thus assist in making tailored intervention and/or policy solutions.

The PhD research conducted in South Africa, more specifically within the urban community of Khayelitsha in Cape Town and the rural community of Mt. Frere in the Eastern Cape, is part of a larger multi-country study exploring innovative ways to improve and encourage the self-management of T2DM, namely the SMART2D (Self-Management Approach and Reciprocal Learning for Type 2 Diabetes) study (Daivadanam, et al., 2017). SMART2D's primary aim is to "strengthen capacity for T2DM prevention and management through task-shifting among health care providers and community health workers, and expanding care networks through community-based peer support groups, by targeting populations in different settings" (Saulnier, 2015). As part of the larger SMART2D study, my PhD research

activities will add valuable insights into the role that the food environment plays in food acquisition and diet, in relation to the self-management of T2DM. This approach/perspective was lacking in the larger study design. Observational quantitative data regarding food environments was also collected from the other SMART2D study sites and compared to South African findings to provide an international perspective. Resulting comparisons form part of my PhD study's findings and recommendations.

1.3 Motivation for Conducting this Study

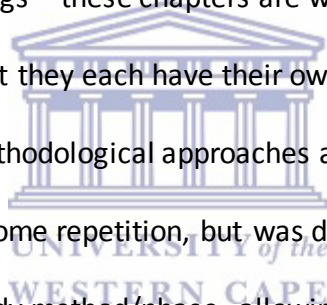
The value of delaying or preventing the development of T2DM can be seen from a societal perspective as well as from that of the individual's health and quality of life. However, this requires more than a bio-medical approach to the problem. A multi-disciplinary approach looking at an individual in terms of his or her family, community and environment and their inter-linkages and inter-dependencies is relevant. This is in sharp contrast to the medical approach where people with an illness (like diabetes or those living with HIV or AIDS) are viewed as dependent on medical providers. Approaches that include community perspectives would therefore be very appropriate.

To date, there have been very few studies in South Africa looking at community perspectives and knowledge regarding access to safe and nutritious foods, and the relationship of these perspectives to the food environment and diet, especially from the perspective of T2DM self-management. This proposed study will provide much needed insight into community perspectives on access to healthy foods as part of T2DM self-management from both an urban and rural setting.

It is also my personal desire to understand community perspectives on these issues, and provide a means by which the community can voice their thoughts/opinions on the issue.

1.4 Thesis outline

This thesis is presented in seven chapters. Chapter 1 introduces the aims and objectives of the thesis while also providing some background. Chapter 2 provides an overview and review of the relevant literature. The theoretical framework, study design and methods used to address the specific objectives and the rationale for these methods are provided in Chapter 3. Chapters 4, 5, and 6 each address a set of specific study objectives and share study-related methods and findings – these chapters are written in a manner similar to a peer-reviewed manuscript, in that they each have their own unique introduction and background sections, specific methodological approaches and conclusions, and associated references. This has resulted in some repetition, but was done in order to provide specific context/background for each study method/phase, allowing each chapter to, theoretically, stand alone as independent inquiries. In the final chapter (Chapter 7) the summary and recommendations of this thesis are presented, alongside findings (emergent themes) from interviews with stakeholders regarding policy- and/or intervention-related recommendations.

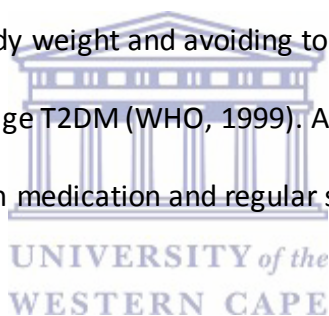


CHAPTER 2 – LITERATURE REVIEW

2.1 Diabetes

2.1.1 Diabetes – distribution

Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively utilize the insulin it already produces. Type 2 diabetes mellitus (T2DM), which affects the majority of people with diabetes around the world, occurs in individuals whose bodies are unable to effectively use the insulin they produce, and is strongly associated with excess body weight and physical inactivity (WHO, 1999). According to the World Health Organization (WHO), a healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use are ways to prevent, delay the onset of, and self-manage T2DM (WHO, 1999). Additionally, diabetes can also be treated and/or self-managed with medication and regular screening and treatment for complications.



Diabetes is a serious condition: Adults with diabetes have between a 2- and 3-fold increased risk of heart attacks and strokes (Sarwar, et al., 2010); 2.6% of global blindness is attributed to the disease (Bourne, et al., 2013); and, diabetes is among the leading causes of kidney failure worldwide (USRDS, 2014). Not only does T2DM significantly contribute to the global burden of disease, this contribution is currently on the rise: in 1980, 108 million were recorded as living with diabetes, that number rose to 422 million in 2014 with the global prevalence of diabetes among adults over 18 years of age rising from 4.7% to 8.5% over the same period (WHO, 2016). It is projected that this number will only rise (Zimmet & al., 2014) – see Figure 1.

Diabetes, in particular T2DM prevalence, has been rising more rapidly in low- and middle-income countries (LMICs) (WHO, 2016). It is reported that by 2035, the most dramatic change in the epidemiologic landscape is expected to come from the projected increase in T2DM cases in Sub-Saharan Africa (SSA) from 19.8 million in 2013 to 41.5 million, an increase of more than 100% (IDF, 2015) (see Figure 1). Additionally, low-income countries in Africa have the highest estimated proportion of undiagnosed diabetes (78%). Although not experiencing an increase in diabetes rates on quite the same level, Europe’s prevalence of 7% excludes an estimated 37% of undiagnosed T2DM (IDF, 2015).

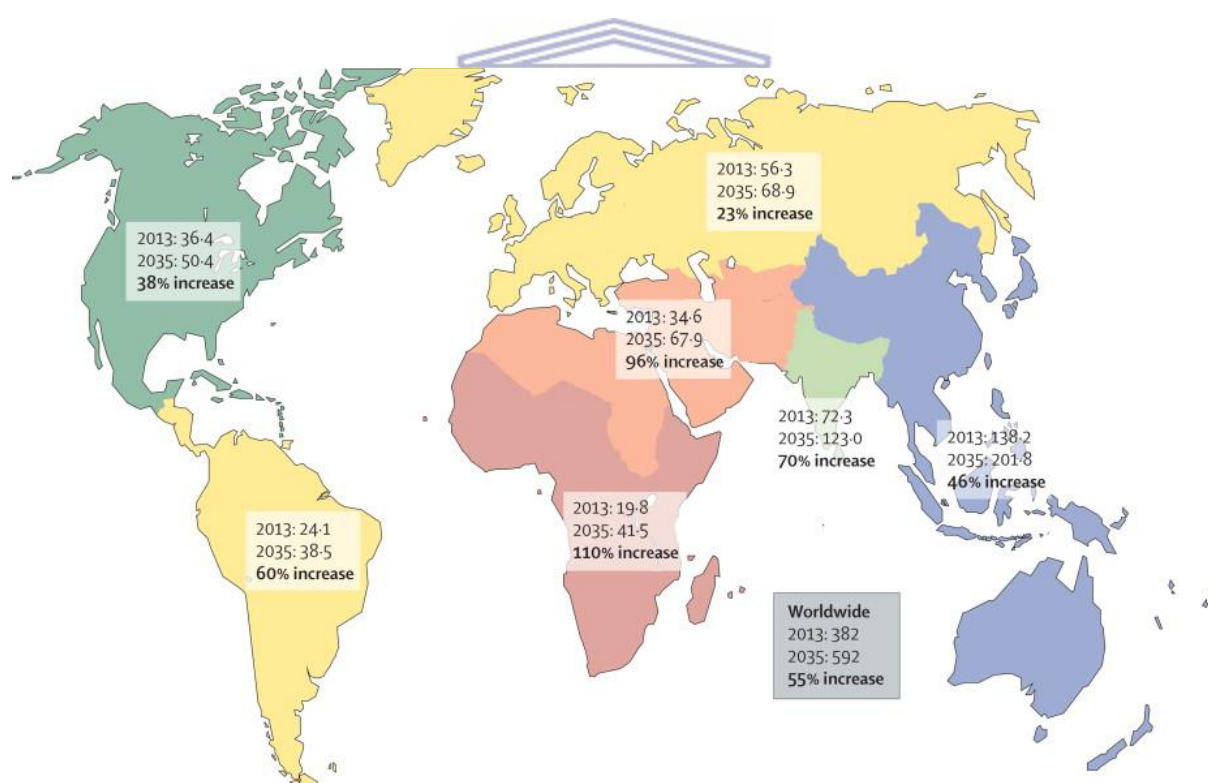


Figure 1 Number of people estimated to have diabetes (millions) (Data adapted from the International Diabetes Federation Diabetes Atlas, 6th edition) (Zimmet & al., 2014)

Diabetes prevalence rates in South Africa are considerably higher than the average for the rest of the AFR region (NCD Risk Factor Collaboration (NCD-RisC) – Africa Working Group)

(also, see Figure 2) with prevalence in adults rising from 5.5% in the year 2000, to 9% in 2009 (Bertram, Jaswal, Van Wyk, Levitt, & Hofman, 2013); ranging from 4% among the white population to about 13% among those of Indian origin (IDF, 2013) (Distiller, Brown, Joffe, & Kramer, 2010). These rates are higher (and also on the rise) among the disadvantaged population in the townships, with research showing an age-standardised prevalence of 13% for T2DM among urban-dwelling black South Africans, with a large proportion of these being undiagnosed, and less than 40% being treated (Peer, et al., 2012) (Bertram, Jaswal, Van Wyk, Levitt, & Hofman, 2013). A key publication by Bradshaw et al. concluded that diabetes is “an important direct and indirect cause of burden of disease in South Africa” (Bradshaw, Pieterse, Norman, & Levitt, 2007) when they found that overall, about 14% of ischaemic heart disease, 10% of stroke, 12% of hypertensive disease and 12% of renal disease burden in adult males and females (30+ years) were attributable to diabetes.

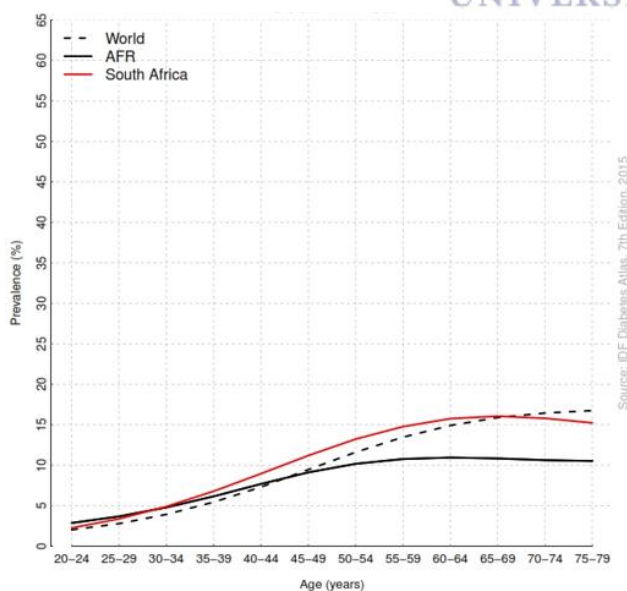
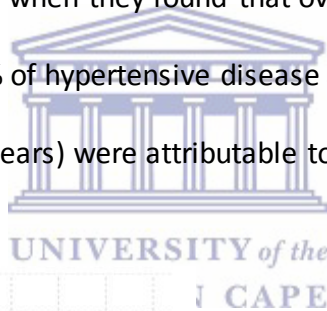
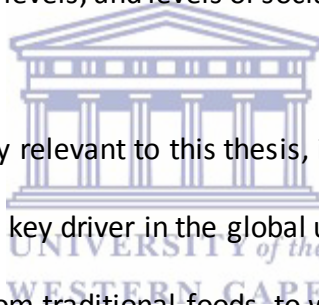


Figure 2 Prevalence of diabetes in adults by age in South Africa, 2015 (International Diabetes Federation)

2.1.2 Diabetes – driving factors

The exact cause/s of T2DM are not entirely known. However, a strong link with overweight and obesity, and with older age (45 years +), as well as with ethnicity and an individual's family health history have been shown to be risk factors (HHS, 2018) (IDF, 2017). Key modifiable risk factors include: overweight and obesity, unhealthy diet and nutrition, a lack of physical activity, prediabetes or impaired glucose tolerance (IGT), and smoking (IDF, 2017). Socio-cultural and socio-economic risk factors are also at play here. These factors are largely determined by geography and income levels, and include the accessibility to healthcare, local community infrastructure, level of education attained, economic stability at the community and household levels, and levels of social support (Smith, 2018).



Of importance to note, and wholly relevant to this thesis, is the observed change in diet at the population level in LMICs as a key driver in the global upward trend in diabetes. This change constitutes a transition from traditional foods, to what has come to be known as the 'western' diet i.e. more energy-dense, processed foods, more foods of animal origin, and more added sugar, salt and fat (Ley, Hamdy, Mohan, & FB., 2014). This does not bode well when it comes to the spread and/or management of T2DM, as one key study exploring what is currently known regarding the management of TDM through diet points out: "In the past two decades, evidence from prospective cohort studies and RCTs has shown the importance of individual nutrients, foods, and dietary patterns in type 2 diabetes prevention and management... healthy dietary patterns for diabetes prevention and management were typically rich in whole grains, fruits and vegetables, nuts, and legumes; moderate in alcohol consumption; and lower in refined grains, red or processed meats, and sugar-sweetened beverages (Ley, Hamdy, Mohan, & FB., 2014)."

Globally, communities in which there are low levels of access to affordable, healthy food options generally have poorer diets and are at a higher risk for certain diet-related diseases (Moore, Diez Roux, Nettleton, & Jacobs, 2008), including T2DM. Local food environments play a key role in individual, family, and population-level health.

The transition from a 'traditional' to a more 'western' diet is evident in South Africa where a steady increase in the per capita food supply of fat, protein, salt, and total calories has been observed (Kennedy, Nantel, & Shetty, 2004). Food-based dietary guidelines do exist in South Africa, and have been designed "to inform consumers how to choose food and beverage combinations that will lead to a diet that is adequate, that meets nutrient need and that is, at the same time, prudent, lowering the risk of non-communicable diseases (NCDs) (DOH, 2011)" like diabetes. However, awareness of (and compliance with) these guidelines has been reported to be low due to a general lack of understanding (Jacobs, 2009). Additionally, it may also be harder to abide by these guidelines if the environment does not allow.

2.1.3 Diabetes – policy responses

According to the World Health Organization (WHO), an operational strategic plan for diabetes, the reduction of overweight and obesity, and for the reduction of physical inactivity are all in place (WHO, South Africa, 2016), as well as the national sugar sweetened beverage tax which was implemented as of April 1, 2018 (National Treasury of South Africa, 2018). In addition, evidence-based national diabetes guidelines at primary level are available and implemented (National Dept of Health, 1998). However, compliance with these

guidelines has been poor (Igbojiaku, Harbor, & Ross, 2013), and prevention of T2DM through risk reduction is not addressed. There is also no functioning diabetes registry.

2.2 Food environments

For the purposes of this thesis, the most appropriate definition of a ‘food environment’ is the one put forward by the Agriculture, Nutrition and Health Academy’s Food Environment Working Group: the food environment is “the interface that mediates one’s food acquisition and consumption within the wider food system. It encompasses multiple dimensions such as the availability, accessibility, affordability, desirability, convenience, marketing, and properties of food sources and products (Turner, 2017).”



Research looking into food environments and how people interact with the food system has predominantly been carried out in high-income countries as rates of obesity and accompanying health issues have been on the rise in these settings; as a result, there is limited knowledge about how individuals interact with food environments in LMICs, especially when it comes to food acquisition behaviours related to diet-related NCDs (Herforth A., 2015). Additionally, food environments in LMICs include not only the formal food sector (e.g. supermarkets), but also informal vendors. Further, these food environments in LMICs are rapidly changing as the foods found in the ‘western’ diet are becoming more-and-more available. Consequently, there is a need to explore, from a research perspective, LMIC food environments.

The following sections outline what is known about food environment, and the study thereof in relation to food acquisition and health, as it pertains to the goal and objectives of this thesis.

2.2.1 Food environments and food acquisition

It has been clearly demonstrated that the physical environments in which one lives and functions, and consequently makes food choices and develops dietary behaviours, are a very significant influence on what one eats (Sacks, Swinburn, & Lawrence, 2009) (Butland, et al., 2007) (Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008). Furthermore, evidence demonstrates that what kinds of foods are available (i.e. what foodstuffs are being supplied) and affordable to individuals within these environments determines dietary patterns (Wardle & Cooke, 2008) (Mintz, 1986). The availability and affordability of these foodstuffs in turn is shaped and determined by both food companies and the markets that they operate within (Hawkes, Jewell, & Allen, 2013), and the retail environment in which one acquires these food items (the location of outlets, the foods sold therein, prices, and promotional strategies adopted) (Mikkelsen & Chehimi, 2007) (Hawkes C. , 2008) (Dawson, 2013).

In South Africa, the situation with regard to food environments is rapidly catching up with higher-income countries, in that the 'western' diet is becoming more and more accessible to all segments of society. This transition has dramatically accelerated since the mid-90s when the post-apartheid government opened the borders to trade and foreign direct investment (Thow, et al., 2015). Since then 'Big Food' (a term used to label large commercial entities

that dominate the food and beverage environment) has come to dominate the food supply by making its products more available and affordable (Igumbor, et al., 2012) (Delobelle, Sanders, Puoane, & Freudenberg, 2016). Consequently, the vast majority of South Africans, whether living in an urban or rural setting, purchase their food from either supermarkets or other formal food retailers, fast food outlets or other restaurants, or informal vendors. It is this food that has mostly been somewhat modified (processed and flavoured) into something quite different from its natural state (Ledger, 2017). And, although retail environments like supermarkets and the like, are becoming more and more common in all South African communities, access to food (let alone healthy food) is still a major concern for a large portion of the population: In 2005, the *General Household Survey*, which in part aims to measure the household access to food (a key aspect of food security) found that just over one quarter of all South Africans (around 14 million) have limited access to food (StatsSA, 2016). Similarly, the 2016 *Community Survey* observed that 20% of respondents had run out of money to purchase food at some point in the last 12 months (StatsSA, 2016). A larger number of food insecure individuals was observed as part of *The South African National Health and Nutrition Examination Survey (SANHANES-1)*, when the national survey showed that just under half of the population were food secure, just over a quarter were at risk of hunger, and slightly less experienced hunger (mainly in urban, informal and rural, formal areas) (HSRC & MRC, 2013).

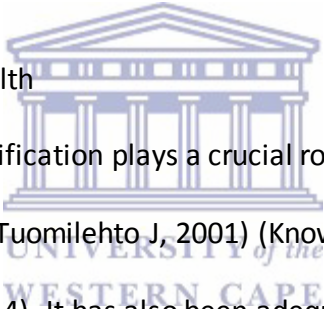
A review of the available literature dealing with food environments and access to healthy foods in Cape Town showed that the current focus of academic inquiry is primarily on geographic locations of supermarkets and their expansion into informal/lower-income areas, and on urban garden initiatives and their viability in contributing to higher levels of

food security in residential areas (Spires, Delobelle, Sanders, & Puoane, 2016). This review also revealed that this is a relatively new and emerging area of inquiry in Cape Town and South Africa, as indicated by the limited number of authors and the relatively large proportion of unpublished student research. Interestingly, it also found (as did the studies from the West) that current gaps in the literature include a lack of information on the health outcomes/implications of current food environments, including T2DM, and very little dealing with community perspectives on access to safe and nutritious foods.

Regarding the above-mentioned expansion of supermarkets into lower-income areas: As supermarkets have become more and more commonplace in both urban and rural low-income communities across South Africa (Battersby, 2017), the impact of their presence in local food environments, and more particularly the food security and health of those living in these communities, has been debated. Some have argued that the introduction of these retail outlets into these environments has been positive because of the outlets' ability to offer lower food prices and bring in fresher and safer food options (Reardon & Minten, 2011). Also, research has shown that these outlets do play an important role in these communities, finding that a large percentage of households in these communities frequent these formal outlets, mainly for largely bulk-type purchases (Crush & Frayne, 2011). However, others have pointed out that the larger unit sizes offered by supermarkets may be unaffordable for the poorest, and that these outlets are often situated in inconvenient locations (e.g. not easily accessible via public transportation) (Battersby, Marshak, & Mngqibisi, 2017); and that supermarkets in these locations often stock less healthy food options, when compared with those in higher-income locations (Battersby & Peyton, 2014).

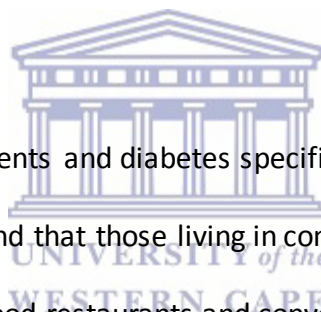
Additionally, the role of the informal sector in shaping food environments, diets, and health outcomes in South Africa has been explored. Studies have found that a large percentage of South Africans purchase street foods and fast foods from informal vendors, especially those with limited income (Steyn, Labadarios, & Nel, 2011) (Crush & Frayne, 2011); and that the role that these retailers play in lower-income areas, although varying from setting to setting dependent on location in South Africa, is crucial. Without a realistic consideration of the role that the informal food economy plays in combatting food insecurity in poor resourced settings, there is little prospect for appropriate prescriptions and successful interventions (Even-Zahav, 2016) (Skinner & Haysom, 2016).

2.2.2 Food environments and health



It is well known that lifestyle modification plays a crucial role in the prevention and management of type 2 diabetes (Tuomilehto J, 2001) (Knowler WC, 2002) (Riccardi, Vitale, & Giacco, 2018) (Dunkley, et al., 2014). It has also been adequately demonstrated that the consumption of fruits and vegetables in larger quantities, especially leafy green vegetables could help to reduce the risk of type 2 diabetes (Carter, Troughton, & Davies, 2010) (Villegas R, 2008) (Bazzano LA, 2008) (Montonen J, 2005) (Liu S, 2004) (Ford ES, 2001) (Meyer KA, 2000) (an Dam RM, 2002) (Montonen J K. P., 2005) (Hodge AM, 2007) (Ley, Hamdy, Mohan, & FB., 2014). However, lifestyle changes, especially those that concern a change in diet are not always easy, especially for those who live in areas where healthy foods are either expensive, or not available. As previously pointed out, the environment in which people live is known to influence their diet, as well as levels of physical activity, smoking behaviour, and other health-related behaviours. This in turn has an impact on levels of modifiable risk factors, and ultimately the incidence of a range of chronic diseases such as diabetes and

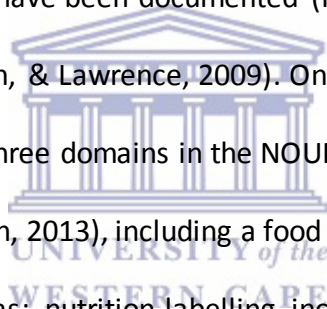
hypertension. International research increasingly implicates a rapidly changing food environment dominated by processed products high in sugar, salt and fat, in the increasing levels of chronic diseases, over and above individual factors such as knowledge, attitudes, and behaviours (Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008). Hawkes et al. point out that, with regard to diet and negative health outcomes, the evidence suggests that the “interaction between human food preferences and the environment in which those preferences are learned, expressed, and reassessed has a central role” (Hawkes, et al., 2015). This has especially been found to be true for communities predominantly made up of low-income, low socio-economic status residents (Franco, Diez Roux, Glass, Caballero, & Brancati, 2008).



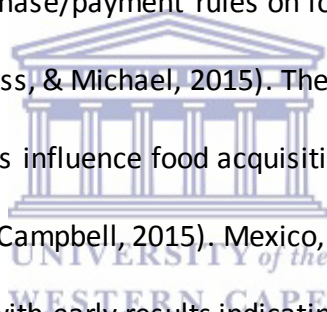
The link between these environments and diabetes specifically, has also been documented, although sparsely. One study found that those living in communities with outlets providing less nutritious choices (like fast food restaurants and convenience stores) were more likely to suffer from diabetes and/or be obese (California Center for Public Health and Advocacy, 2008). The authors also found that this correlation existed across all geographic regions, income levels and ethnicities. However, this publication, along with the vast majority of this literature deals with communities in the West (predominantly in the United States). These kinds of studies have traditionally focused primarily on either disparities in access to healthy foods (i.e. ‘food deserts’), or on diet with obesity as the primary outcome (Caspi, Sorenson, Subramanian, & Kawachi, 2012).

2.2.3 Food environment-relevant policies

Food environments, and their associated dimensions, are largely determined and shaped by external factors such as private and public-sector policies, and as such are open to change through targeted and well informed intervention and/or policy initiatives. These initiatives should attempt to alter the social and physical environment in a way that works towards achieving widespread reduction in the risk of unhealthy food acquisition and resulting consumption patterns (Morland & Evenson, 2009), largely by improving the availability, affordability and acceptability of healthy food items and diets; and decreasing the availability, affordability and acceptability of unhealthy food items and diets. Effective policy approaches to this end exist and have been documented (Roberto, et al., 2015) (Roberto & Pomeranz, 2015) (Sacks, Swinburn, & Lawrence, 2009). One popular approach has grouped relevant policy approaches into three domains in the NOURISHING framework (Hawkes, et al., 2015) (Hawkes, Jewell, & Allen, 2013), including a food environment domain consisting of the following policy action areas: nutrition labelling, incentivising the offering of healthy food options, food taxation, restriction of food advertising, improving the quality of food items, and encouraging healthy food retail environments. Similarly, and in order to monitor different factors influencing the food environment, the International Network for Food and Obesity / Non-communicable Diseases Research, Monitoring and Action Support (INFORMAS) has developed a set of modules to monitor, assess, and provide input on improving food environment related policies (Swinburn B, 2013). The Government Healthy Food Environment Policy Index (Food-EPI) module puts forward seven policy domain areas to this end: food composition, food labelling, food promotion, food provision, food retail, food prices, and food trade and investment (Swinburn B, 2013).



The above aspects of effective food environment related policy approaches have largely been based on evidence. For example: evidence exists to support benefits of focused mass media campaigns, food pricing strategies, school procurement policies and worksite wellness programs; but there is less conclusive evidence for menu labelling and changes in the local built environment (Afshin, et al., 2015). In addition, there is a dearth of research into how nutrition labels are being received in the global South, especially among the urban and rural poor, in order to assess the effectiveness of labelling policies (Mandle, Tugendhaft, Michalow, & Hofman, 2015). In the United States of America, studies have shown greater effects of food policies related to bans/restrictions on unhealthy foods, mandates offering healthier foods, and altering purchase/payment rules on foods purchased using low-income food vouchers (Mayne, Auchincloss, & Michael, 2015). There is also consistent evidence that taxation and subsidy interventions influence food acquisition and dietary behaviour (Niebylski, Redburn, Duhaney, & Campbell, 2015). Mexico, for example, implemented a tax on sugar-sweetened beverages, with early results indicating that the purchase of soda and other taxed drinks had dropped by 10%; whereas the purchase of bottled water rose by 13%, showing that people were indeed substituting the unhealthy for the healthy (Colchero, Popkin, Rivera, & Ng, 2016). Sugar taxes have also been implemented in Denmark, Finland, France, Hungary, Ireland and Norway, based on substantial scientific evidence that has shown that decreasing sugar-sweetened beverage consumption reduces the prevalence of obesity and obesity-related diseases and that a tax on sugar sweetened beverages reduces the obesity rate (Hu, 2013) (Cabrera Escobar, Veerman, Tollman, Bertram, & Hofman, 2013). However, in order for full health benefits to be achieved, these taxes (and other food environment related policy, for that matter) would need to be part of a wider policy approach that includes policies that address, for example: food labelling, advertising



regulations, reformulation of foods and drinks by industry, consumer awareness programs, as well as subsidies on healthy foods.

Such policy initiatives do exist, to varying extents, in South Africa. These policies have been scanned and are outlined below based on Food-EPI module domains (Swinburn B, 2013).

Relevant domains include food composition, food labelling, food promotion, food pricing, and food retail.

Food composition relevant policies

The National Department of Health initiated a consultation of experts to discuss salt content in certain food products in South Africa, and ascertain appropriate target levels for its reduction. Subsequently, the Minister of Health published draft regulations in 2012 (DOH, 2012) proposing levels of salt be decreased in certain food products like bread, breakfast cereals, margarines and fat spreads, savoury snacks, processed meats as well as raw-processed meat sausages, dry soup and gravy powders and stock cubes over a period of several years. Final regulations were published on 20 March 2013, with implementation of reduction measures beginning in 2016 (DOH, 2016).

Additionally, in 2010 government gazetted regulations to reduce levels of trans-fat in foodstuffs, prohibiting a trans-fat content in excess of 2g per 100g of end product foodstuff. Products that claim to be "free of trans fat" must contain less than (or equal to) 0.01g per 100g of the end product foodstuff (DOH, 2010).

A 'sugar tax' (Rates and Monetary Amounts and Amendment of Revenue Laws Bill) was introduced in April, 2018 which brings into effect a tax rate of R0.021 (2.1 cents) per gram of sugar based on the current product labelling framework (National Treasury of South Africa, 2018). This rate roughly equates to a 11% tax incidence for the most popular soft drink (i.e. Coca Cola, averaging 35 g / 330 ml). For sugar sweetened beverages that currently do not apply nutritional labelling, a relatively higher fixed gram of sugar is assumed (i.e. 50 grams per 330ml) as an incentive for producers to move towards nutritional labelling until mandatory labelling legislative framework is put in place.



Additionally, the South African food composition tables, which contain information on the energy and nutrient composition of food, is a tool used for the assessment of dietary intake in the country (SAMRC, 2015). SAFOODS has established a national advisory group (South African Food Data Advisory Group) to assist and advise SAFOODS on core food composition related focus areas.

Lastly, based on the Strategy for the Prevention and Control of Obesity in South Africa, 2015 to 2020 (DOH, 2015), engagements with quick service restaurants have included efforts to ensure that healthy meals options are included on their menus at competitive prices. This is one of the key activities in ensuring that food and beverages products sold are aligned with optimal national and international nutritional standards.

Food labelling relevant policies

In 2010, the South African Food Labelling Regulations (Regulations Relating to the Labelling and Advertising of Foodstuffs) were gazetted and outline (in provisions 16-29) the details on how ingredients should be listed on any, and all food labels, including lettering size, order, naming of ingredients, the inclusion and itemized listing of additives, quantitative ingredient declaration, and the listing of class names of ingoing fats and oils (DOH, 2010). Regarding nutrient declarations: provision 50.12(a) states that when a nutrition claim is made “the nutritional information as required by these regulations shall be the real, typical values as determined by a reputable laboratory through chemical or microbiological analysis in accordance with the methods recommended in these regulations, Guidelines or Codex, and where no specific methods are recommended, a method which has been accredited by SANAS or ILAC (DOH, 2010).” However, food labels are only required if and when a health claim is made. It stipulates that it is mandatory for information to be provided in English, and where possible another language. Additionally, Reg. 13(a)(ii) points out that nutritional claims made on product packaging must have a Nutrition Information Table and must be verified by reputable labs and be verified at least once every three years. Analysis must be done in accordance with the methods stipulated in this regulation or where no method is stipulated, by methods approved and recommended by CODEX. When any organisation wishes to endorse a product in relation to health promotion e.g. the heart mark or ‘Weighless’ etc., they must obtain approval first.

South Africa does not require a single, consistent, interpretive, evidence-informed front-of-pack supplementary nutrition information system, which readily allows consumers to assess a product's healthiness.

Food promotion relevant policies

One of the proposed amendments (2014) to the 2010 version of Foodstuffs, Cosmetics and Disinfectants Act states in section 65 that “No food or non-alcoholic beverage shall be marketed to children unless it complies with all the criteria in Guideline 14” (DOH, 2014). Guideline 14 outlines what kinds of foods are included in the restriction (energy dense, nutrient poor food and non-alcoholic beverage, which are too high in any one of the following: fat, saturated fats, trans-fatty acids, total sugar, or total sodium), and the multiple mediums that could be used to advertise these products. However, this is self-regulated by The Advertising Standards Authority of South Africa (ASASA), meaning that the food industry determines levels of compliance.

Food pricing relevant policies

Certain basic foodstuffs in South Africa (including brown bread, dried beans, maize meal, milk eggs, fish, certain fruits & veg, and others - 19 items in total) are zero rated (zero-rated supplies are taxable supplies on which VAT is levied at a rate of 0%). Additionally, one of the actions within the Strategy for the Prevention and Control of Obesity in South Africa (2015-2020) (DOH, 2015), is to explore expansion of rebates on healthy food purchases as part of creating demand for healthy food.

Also, as previously mentioned and outlined, the 'sugar tax' as implemented in April 2018, is expected to result in the increase of the price of sugar sweetened beverages.

Food retail related policies

Plans are currently in place to increase the access and availability of vegetables and fruits by expanding household, local and community food gardens; as well as plans to explore opportunities to establish local markets for improved access to vegetables and fruits (DOH, 2015). Responsibility for these efforts will be carried by multiple government entities.

2.2.4 Measuring food environments

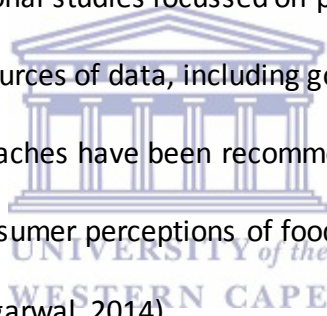
Historically, relatively little attention has been given to measuring the sources of food in specific community localities such as neighbourhoods or cities, but consideration of these environments is on the rise, along with a search for measurement tools to describe the sources and types of food available and their prices, promotions, and nutrition information (Glanz, Sallis, Saelens, & Frank, 2005). Additionally, when considering the measuring of these environments in LMIC settings, it is worthwhile to keep in mind that the unique characteristics of these environments (i.e. the introduction of more formal retail outlets and the types of foods being introduced into these communities as a result; the presence of an informal sector; etc.) demand a different approach for researchers in trying to understand how people make food choices in these settings, including the adaptation of relevant definitions, conceptual frameworks, research methods, and appropriate metrics (Turner, 2017). In a key systematic review of the published literature, Caspi et al conclude that there

has been relatively little discussion specifically devoted to the ‘food-environment-diet relationship’, and, that moving forward, studies that do focus on this dynamic should combine methods “given the complexities in defining the important features of food environments” (Caspi, Sorenson, Subramanian, & Kawachi, 2012). Also recommended as a result of this systematic review is the exploration and prioritization of appropriate methods for assessing perceived availability and accessibility dimensions. Along with this recommendation, is one calling for further investigation of the acceptability and cultural relevance of available food items. This all speaks to the lack of, and need for, community perceptions on issues surrounding local food environments and the accessibility of healthy food items.



It may be worthwhile at this point to note that two common terms have traditionally been used to define food environments: the ‘*community* food/nutrition environment’, which includes the number, type, location, and accessibility of food retail outlets; and the ‘*consumer* food/nutrition environment’, which is essentially made up of what consumers encounter in and around places where food is acquired. These two perspectives and accompanying definitions, for the most part, overlay, or line up with the two broad methodological approaches to measuring food environments, i.e. geospatial and observational. Geospatial approaches attempt to place food environmental factors within a given community, while observational approaches seek to quantify the external food environment in terms of both availability and price, among other things (Turner, 2017) – more on this in Chapter 3.

A note regarding the measurement of 'community food/nutrition environments': Because secondary sources of data are largely unreliable when it comes to providing an accurate picture of what a community looks like in terms of food retail outlets (Wang MC, 2006), i.e. mapping food retail outlets within a given geographical location; observational data (or at least following up secondary data sources by walking or driving through neighbourhoods) are considered the most accurate way to measure retail density and food availability. These kinds of observational studies were first published in the late 1980s and early 1990s in the USA, and were very successful in documenting the availability of healthy foods across different types of retail outlets. (Sallis JF, 1986) (Cheadle A, 1990) (Cheadle A P. B., 1991). However, few of these observational studies focussed on pricing, as this information was largely available via secondary sources of data, including government data bases. Increasingly, observational approaches have been recommended to capture personal food environment aspects such as consumer perceptions of food accessibility, affordability, desirability and convenience (Aggarwal, 2014).




One such observational tool is the Environmental Profile of a Community's Health (EPOCH), which seeks to capture, in a concise but generalizable form, those aspects of the environment that may be related with NCDs and their associated modifiable risk factors, such as food/diet, physical activity, and tobacco use (Chow C. , et al., 2010). EPOCH has been developed as part of the Prospective Urban Rural Epidemiology (PURE) study from a detailed review of the literature on social and environmental determinants and has been evaluated and found reliable in urban and rural communities of Canada, Colombia, Brazil, China and India. EPOCH is a two-part tool consisting of a direct observation of different

aspects of the built environment (infrastructure and services, commercial and shopping areas, grocery stores, tobacco retailers, restaurants, and pharmacy services) and a survey tool on community awareness, attitudes and social norms (Chow C. , 2009). As can be expected, resulting publications have focused primarily on contextual drivers of relevant health-related outcomes (Chow, et al., 2014) (Joseph, et al., 2012) (Corsi, et al., 2012) (Chow C. , et al., 2010) (Khatib, Chow, & Yusuf, 2012).

One approach that has been successfully used to gain insights into community perceptions on health (and other) related issues is PhotoVoice. PhotoVoice is a community-based research methodology developed primarily for use with underserved populations. It's a tool for understanding a social problem from the perspectives of research participants that will inform quantitative data but, what is more important, may lead to culturally appropriate solutions because the participants are involved in the collection, interpretation, and dissemination of the findings (Wang & Burris, 1997). Essentially, as part of this approach participants are asked to take photographs that best answer or address key questions dealing with a particular health-related issue (the role of food environments and diet in diabetes self-management). Through the process of 'Participatory Analysis' (Wang, Yi, Tao, & Carovano, 1998) participants select photographs to discuss, participate in structured interviewing and/or FGDs, identify common issues and themes in their photographs, and record the findings. PhotoVoice has been used successfully in the past to document food environment / food security related issues from the perspectives of community members (Valera, Gallin, Scuhk, & Davis, 2009) (Paula Belon, Nieuwendyk, Vallianatos, & Nykiforuk, 2014) (Belon, Nieuwendyk, Vallianatos, & Nykiforuk, 2016) (Lardeau, Healey, & Ford, 2011)

(Heidelberger & Smith, 2015) (Díez, et al., 2017) (Neill, Leipert, Garcia, & Kloseek, 2011) (Chilton, Rabinowich, Council, & Breaux, 2009).

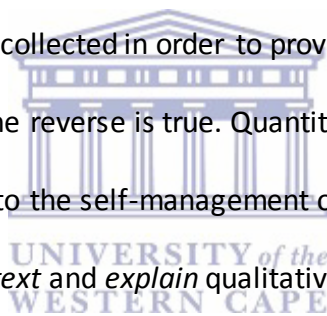
Having pointed all this out, it is again important to note that the above outlined literature on measuring food environments has overwhelmingly been published by, and deals with environments located in the 'North'. A recent, key publication (Turner, 2017) addresses this issue directly and outlines the following key points (relevant to this thesis) to be considered when conducting food environment research in LMICs:

- 
1. There is a need to consider all food sources from which people acquire food (i.e. both formal and informal).
 2. Research must account for the full spectrum of healthy and unhealthy food products available to community members.
 3. Research must focus more on personal perceptions that are known to be highly influential in shaping people's decisions about what foods to acquire and eat.

These points, as well as the above outlined literature, call for an innovative way of combining research methodologies in exploring the relationship between food environments and dietary behaviour, while also taking into account various aspects of this relationship that can only be explored through an increased understanding of community perceptions, particularly those in LMIC settings. When employed, perception measures have traditionally been used to gain insights into opinions or attitudes regarding how consumers

navigate their immediate local food environments – questions could include those dealing with how easy or hard it is to find fruits and vegetables, or whether certain foods are too expensive (Glanz, 2009). Glanz goes on to explain that having both objective and subjective indicators help to answer important research questions, like the one posed by this thesis.

Consequently, all these observational approaches, as well as Turner et al.'s key points, have been considered and addressed in developing and carrying out the research outlined in this thesis. Specifics on how this was accomplished using both quantitative and qualitative methods are outlined in Chapter 3. However, it's worth noting at this point that, although in most studies qualitative data are collected in order to provide context to, or explanation for quantitative data; in this study, the reverse is true. Quantitative data describing environmental features relevant to the self-management of T2DM, in particular diet, were collected in order to provide *context* and *explain* qualitative findings as a result of the PhotoVoice methodology. This justification for the collection of both forms of data is what Bryman refers to as "*complementary*" (Bryman, 2006), further explained as seeking "elaboration, enhancement, illustration, clarification of the results from one method with the results from another" (Greene, Caracelli, & Graham, 1989).



CHAPTER 3 – METHODS

This chapter describes the theoretical framework, research design, and methods employed as part of this thesis.

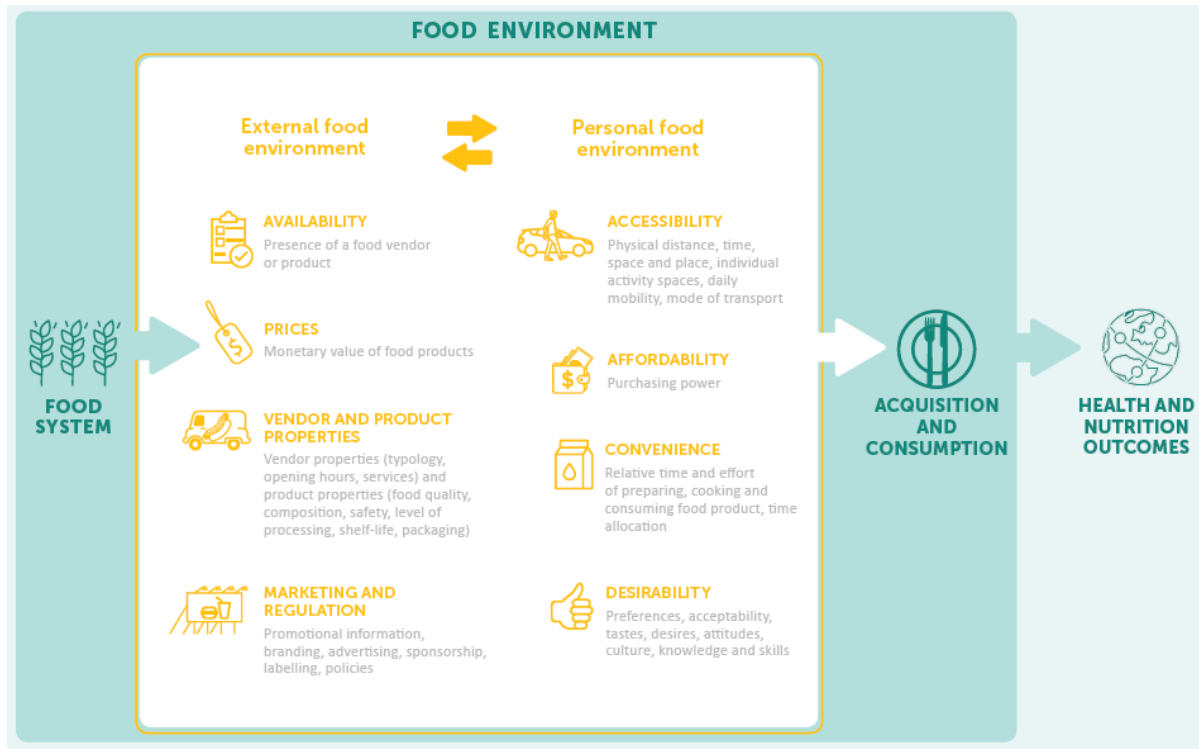
3.1 Conceptual Framework

There have been many frameworks developed in order to better understand behaviours related to food choice, availability, affordability, accessibility, desirability, consumption, and security, as well as the relationship of these behaviours to the local food environment (Furst, Connors, Bisogni, Sobal, & Falk, 1996) (Slobal & Bisogni, 2009) (Rose, Bodor, Hutchinson, & Swalm, 2010) (Neff, Palmer, Mckenzie, & Lawrence, 2009) (Krebbs-Smith & Scott-Kantor, 2001) (LSRO, 1989) (Quandt, Arcury, & Bell, 1998) (Nie & Zepeda, 2011) (Sharkey, Horel, & Dea, 2010) (Dean & Sharkey, 2011) (Glanz, Sallis, Saelens, & Frank, 2005) (Glanz K, 2007) (Sharkey, Horel, & Dea, 2010). However, the vast majority were conducted, and deal directly with higher-income communities predominantly in the 'North'.

The framework selected to guide the research conducted as part of this thesis, however, has been specifically developed for the purposes of exploring and better understanding peoples' interactions with their food environments in LMIC settings: The 'ANH-FEWG food environment conceptual framework' (Turner, 2017) consists of two domains: The *external food environment* domain, which includes exogenous dimensions such as food availability, prices, vendor & product properties, and marketing & regulation within the physical setting; while the *personal food environment* domain includes endogenous dimensions such as food accessibility, affordability, convenience and desirability at the individual level (figure 1).

These domains align directly with the ‘community nutrition environment’, and the ‘consumer nutrition environment’ as outlined in Chapter 2 of this thesis.

Figure 1 The ANH-FEWG food environment conceptual framework (Turner, 2017)



The ANH-FEWG framework seeks to provide clear definitions for terms that are frequently used to define similar concepts across food environment research and is designed to align with recommended theoretical and methodological approaches appropriate for LMICs.

For the purposes of this thesis, the primary area of interest is the relationship between the local, or ‘external’ food environment, and community members’ perceptions of that environment primarily in relation to aspects that would fall under the ‘personal food environment’; and how these aspects either assist or hinder the effective self-management of T2DM through dietary management. After exploring policies that relate to the rise of

NCDs in South Africa, this thesis sought to observe/map urban and rural external food environments through an adapted quantitative approach; and then explored community perceptions of these environments (both personal and external) through a qualitative, community-based participatory research methodology.

3.2 Methodology

3.2.1 Study Design

Both cross-sectional quantitative and cross-sectional qualitative data were collected and analysed to answer the research question, achieve research objectives, and ultimately develop intervention and/or policy-related recommendations that can be implemented based on study findings.



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3.2.2 Study population/setting

The urban field site / setting is Khayelitsha, a partially informal township in Western Cape, South Africa, located on the Cape Flats in the City of Cape Town. As of 2011, there were around almost 400,000 residents in Khayelitsha, 98.6% of them Black African (StatsSA, 2011). More recent estimations indicate substantial growth. The most recent reliable estimates classify just under 20% of those residing in Khayelitsha as unemployed, with 30.8% of those over the age of 20 with their matric qualifications, and only 4.9% of those in the same age group receiving any form of higher education (StatsSA, 2011).

The rural field site / setting is Mount Frere, South Africa, situated in the Eastern Cape of South Africa between the towns of Kokstad and Mthatha. As of 2011, there were just over 5,000 residents in Mount Frere, 96.1% of them Black African (StatsSA, 2011). The most

recent reliable estimates classify just under 11% of those residing in Mount Frere as unemployed, with 38.2% of those over the age of 20 with their matric qualifications, and 26% of those in the same age group receiving any form of higher education (StatsSA, 2011).

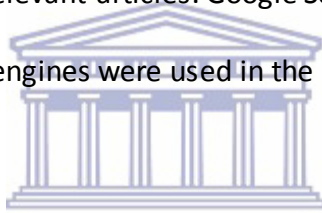
3.2.3 Study procedure

By adopting a sequential data collection strategy, i.e. “collecting data in an iterative process whereby the data collected in one phase contribute to the data collected in the next” (Driscoll, Appiah-Yeboah, Salib, & Rupert, 2007), it was hoped that insights would be gained towards the attainment of research objectives. Two data sets were used as part of this process: 1. Quantitative observations/assessments of aspects of local ‘external’ food environments; and 2. Qualitative data related to community perceptions on the role ‘personal’ food environments play in their self-management of T2DM. Additionally, interviews with key decision makers from each of the South African sites (urban and rural) were conducted to solicit feedback regarding findings and resulting intervention and/or policy recommendations.

The study was conducted in three phases. These phases, and the order thereof reflect, and align with the aforementioned research objectives. For ease of reading, and where necessary, sampling, sample size, data collection procedures, and data analyses are briefly mentioned in this section – further details regarding these aspects are provided in subsequent chapters.

Phase I: Understand the current determinants and policy context in South Africa (additional methodological considerations are described below in section 3.2.4, and in greater detail in Chapter 4)

- In order to provide context for the South African settings (the primary focus of this PhD work), a review of current (as of 2018) relevant national policies and literature on the determinants of diet-related NCDs in South Africa and beyond, was conducted and shared in Chapter 2 (literature review) of this thesis, as well as written up in Chapter 4. Key words such as ‘diet-related non-communicable diseases’, ‘food environments’, ‘NCD proximal determinants’, etc. were used to review the literature for relevant articles. Google Scholar and Johns Hopkins Libraries’ Catalyst search engines were used in the search.



Phase II: Identify and map the current food-related environmental factors that are associated with the onset and/or management of T2DM (additional methodological considerations are described below in section 3.2.4, and in greater detail in Chapter 5)

- Quantitative observational data were then collected in both urban and rural settings.
- Observations were made within a 1km radius of the central locations using a pre-developed walking protocol. Descriptive statistics were then used to describe the basic environmental features of each site resulting in an environmental profile for each location.
- Data were collected in both the urban and rural South African study site. In addition, and as part of the larger SMART2D study, comparable data were collected in urban and rural settings in and around Kampala, Uganda and Stockholm, Sweden. These

additional data served to provide an international perspective on our local food environments.

- A write-up of relevant quantitative findings (including findings from the two other SMART2D study sites, namely urban and rural Uganda and urban and rural Sweden) can be found in Chapter 5).

Phase III: Explore community perspectives on the role local food environments play in the self-management of diabetes (additional methodological considerations are described below in section 3.2.4, and in greater detail in Chapter 6)

- In order to discover and explore community perspectives on local food environments and diet, qualitative data were gathered by trained group facilitators as part of focus group discussions and field observations through the PhotoVoice methodology at both urban and rural study sites in South Africa.
- Qualitative analysis using a deductive thematic approach was conducted in order to categorise thematic results and identify any emerging themes.
- A write-up of relevant qualitative findings from the urban and rural South African sites can be found in Chapter 6).

Phase IV: Explore the relationships between environmental factors and community perspectives and develop intervention and/or policy-related recommendations that can be implemented based on study findings.

- Shared quantitative and qualitative findings with 4 key decision makers from both the urban and rural settings in the form of summary findings documents before interviewing them for their feedback on findings and thoughts on possible policy-

and/or intervention strategies. Key decision makers included those responsible for issues related to food and food security in both Khayelitsha (1 at the municipal level & 1 at the provincial level) and Mt Frere (1 at the municipal level & 1 at the provincial level). A pre-developed discussion guide was used to facilitate the discussions. Findings (emergent themes) from interviews are shared in Chapter 7.

- Identified possible intervention and/or policy-related recommendations that can be implemented based on all study findings (see Chapter 7 for recommendations).

3.2.4 Data collection

Quantitative data were systematically collected through the creation of an environmental profile at each site (both South African and international) in an attempt to address the second research objective. Qualitative data were collected through a community based participatory method known as PhotoVoice and used to explore the third research objective with community members, and in so doing promote awareness of the role of diet in diabetes self-management. Additionally, interviews with key decision makers from each of the South African sites (urban and rural) were conducted to solicit feedback regarding findings and resulting intervention and/or policy recommendations.

Quantitative data collection – EPOCH

EPOCH is composed of two main questionnaires: Part 1 – ‘Direct Observations of the Community Environment’ and Part 2 – ‘Survey of Community Awareness, Attitudes and Social Norms’. For the purposes of this thesis, only part 1 was adapted and used at each site. Part 1 of EPOCH is a physical environment audit tool in which researchers directly observe and systematically record physical aspects of the environment. It is divided into six sections,

of which two were used to gather environmental data relevant to diabetes and the aims and objectives of this study. The two sections include:

- 1) 'Community observation walk' – a +/-1km walk in a commercial or central shopping district designed to systematically observe and record food environment-related factors within a 1km stretch/section of the community which local community members consider to be the main commercial district for services and facilities; and
- 2) 'Assessment of a grocery store' – in which the presence, price, and quality of fruits and vegetables, and certain packaged food products are noted.

An additional section, i.e. a community-wide tally of food retail outlets was created and added to the above adapted EPOCH sections, and was carried out in each setting (both South African and international) as a third section. This was done in order to gain insights into food retail outlet distribution across the entire community.

A more detailed description of all three tool components can be found in Chapter 5. Also, see Appendices 1-3 for actual instruments.

Observations were conducted in urban and rural sites in all three SMART2D study sites (i.e. South Africa, Uganda, and Sweden) in areas that people from that community would consider the main commercial district for services and facilities in that community.

Observations were made as part of a planned walk through the central area. The route of the walk was mapped out prior to the observation day and was along one length of street or

may have involved multiple turns and be along more than one street to stay within the busy area of the community. The total area surveyed for each study site was within a 1 kilometre radius of the aforementioned central location. Information with regard to physical activity was also collected, but not included as part of this thesis.

All quantitative data were collected using paper instruments in the field, and later double-entered into (and managed using) REDCap (Research Electronic Data Capture). REDCap (www.projectredcap.org) is a secure, web-based application designed exclusively to support data capture for research projects. It was developed and is maintained by Vanderbilt University, and is licensed free of charge to Karolinska Institutet (KI) – the lead academic institution on the SMART2D project.



Qualitative data collection – PhotoVoice and stakeholder interviews

For the purposes of this study, urban Photovoice participants were recruited from the existing SMART2D study cohort based on existing SMART2D study participant eligibility criteria; i.e. male or female adults aged 30-75 years old, residing in the selected areas for at least 6 months prior to study enrolment, being able to provide written informed consent, being the only person selected from the same household, and be diagnosed with T2DM. For this thesis, participants were also sampled from a separate study cohort in a rural site in South Africa (Mt Frere) in order to compare findings between these settings. This rural study cohort was part of a separate study titled the Prospective Urban Rural Epidemiology (PURE) study (Teo, Chow, Rangarajan, & Yusuf, 2009) – a large prospective observational study designed to examine the impact of urbanization on the development of CVD risk factors in low-income and middle-income populations. A random list of diabetic PURE study

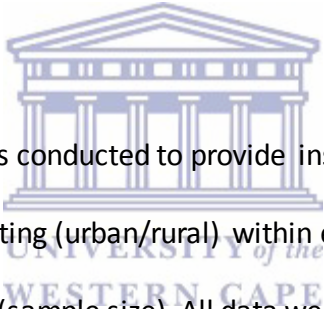
participants was generated and used to recruit rural participants. The same selection criteria were observed across the two study sites. The target sample size for each site was 10 participants.

Before taking any photographs, participants took part in workshops in which they were oriented to the aims and objectives of the study, as well as Photovoice as a research tool. One workshop was held per setting. As part of the workshops, participants were asked two key questions about their local food environment: 1) 'What in your community makes it easier for you to eat healthy'; and 2) 'What in your community makes it harder for you to eat healthy'. Participants were issued with journals and responded by writing exhaustive lists in these journals and selecting the top two factors in their opinions. They were then asked to go out into their communities and take photographs that best represented these top two factors. Photographs were numbered and assigned a title and a caption, which were recorded in their journals. Each title and caption described the contents of the photograph and why the participant felt that this part of their local food environment either made it easier or harder for them to eat healthy.

Additionally, interviews with key decision makers / government stakeholders from each of the South African sites (urban and rural) were conducted. Government stakeholders were selected based on their roles/responsibilities with regard to food security and/or health within their government department. A total of four decision makers were ultimately selected – one from the municipal level, and one from the provincial level for each setting. Although only two decision makers provided input for each setting, these individuals were strategically located within their departments and duties to provide much needed insights.

If this inquiry is furthered, it is recommended that additional decision makers (possibly from different, yet still applicable government departments) are involved. Five questions were used to facilitate these discussion: what do you think are the key concerns when it comes to food security in your jurisdiction?; What policies are already in place to address these concerns?; What additional policies do you think are needed to (better) address existing key concerns?; Is there anything new that you learned from the research that I shared with you?; and How do you think this research can be used to support existing and/or future policies and/or intervention strategies? Stakeholder feedback were used to inform intervention and/or policy-related recommendations in Chapter 7.

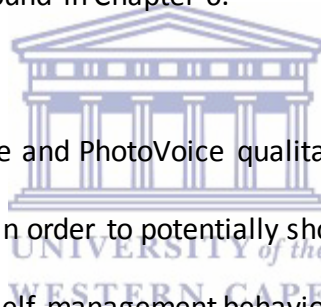
3.2.5 Data analysis



Descriptive statistical analysis was conducted to provide insights into the food environment-related characteristics at each setting (urban/rural) within each country site, keeping in mind the limited number of sites (sample size). All data were collected using paper instruments in the field, and later double-entered into (and managed using) REDCap (Research Electronic Data Capture). Subsequently, data were downloaded into Microsoft excel 2016 which was used for data analysis purposes. Study variables were analysed descriptively by totals, percentage and means where relevant.

Regarding the PhotoVoice qualitative data collected: because the existing constructs of availability, accessibility, affordability, desirability, conveniences, and marketing were considered and provided to participants as part of the definition of the various aspects of food environments, a deductive thematic analysis approach (Braun & Clarke, 2006) was adopted when analysing resulting texts. Steps in the thematic analysis approach included: 1)

familiarization with the data; 2) coding; 3) searching for prominent themes; and 4) reviewing identified themes. Common themes in the PhotoVoice findings were identified in this fashion. Decision maker / stakeholder interview feedback were also analysed following similar steps; however, because existing constructs did not exist, and because there were only four interviews that resulted in a relatively small amount of data, a more data-driven, inductive approach was taken – i.e. emerging themes were not placed into existing, predetermined constructs; rather, the emergence of themes was driven more by stakeholder feedback versus researcher’s theoretical commitments (Braun & Clarke, 2006). The software package ATLAS.ti was used for qualitative analyses. More details regarding qualitative data analysis can be found in Chapter 6.



Results from both the quantitative and PhotoVoice qualitative inquiries were compared / considered in light of each other in order to potentially show relationships between what is present in the environment and self-management behaviours (see Chapter 7). This approach has been shown to demonstrate linkages between human activities (such as food consumption) and their physical environments (Schmidt, 2005).

3.2.6 Data management

All original paper copies of adapted EPOCH instruments have been kept under lock and key in Cape Town, South Africa (except for those from Uganda, which will be kept under lock and key at the University of Makerere). All those dealing with quantitative data using REDCap are provided with a user ID and password through KI, and access is restricted on a role-specific, time-limited basis. Roles and user access rights are granted to individual users by the project data management supervisor at KI. Access to any identifying information and

the ability to export data will be limited to specific roles. Audit trails are provided by REDCap to allow the tracking of data manipulation and export. Identifying information, consent forms, and documents linking the study participants to their unique codes will not be uploaded to REDCap and are stored in a locked filing cabinet at UWC.

The database structure and content are maintained by the SMART2D principal investigator and the data management supervisor at KI. The database software is maintained by KI, and hardware is maintained by each individual site (i.e. Cape Town).

3.2.7 Validity/Reliability

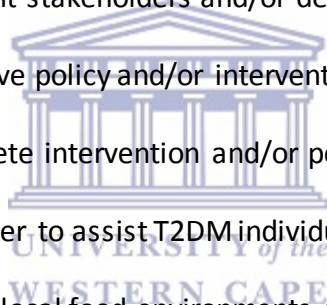
All questionnaires and Photovoice workshop discussion guides were translated into both isiXhosa (for Khayelitsha and Mt Frere). Instruments were then back translated into English for verification of the content. A pilot study took place in all settings (South African and international) before data collection commenced, in order to ensure content and construct validity.

Reliability was assured through the training of fieldworkers on how to effectively and consistently administer the instruments at all study sites.

Additionally, the same participants and research assistants were involved throughout all phases of the study at all sites. The primary researcher visited all sites beforehand to familiarize himself with the settings. He also personally gave trainings to fieldworkers on how to make observations and aided personally in all quantitative and qualitative data collection.

3.2.8 Intervention development and/or policy-related recommendations

As part of the Photovoice workshops, recommendations were solicited on how issues identified and discussed can be resolved. This included efforts made by the participants themselves, as well as actions to be taken by others (intervention and/or policy-related recommendations). The latter recommendations were considered by researchers in light of both the environmental profiles created and qualitative feedback from the participants. The literature was also reviewed to identify relevant interventions and policies from other jurisdictions to help determine what could be adopted. Additionally, semi-structured interviews were held with relevant stakeholders and/or decision makers to solicit feedback and recommendations for effective policy and/or intervention steps. This was done to the end of the development of concrete intervention and/or policy-related recommendations that could be implemented in order to assist T2DM individuals in their self-management of their disease with regard to their local food environments and resulting diet. Specific feedback and resulting recommendations are shared in the final chapter of this thesis.



CHAPTER 4 – Diet-related non-communicable diseases in South Africa: Determinants and policy responses

Introduction

Chronic non-communicable diseases (NCDs), mainly heart disease, stroke, cancer, diabetes, and chronic respiratory disease, account for more than two-thirds of global deaths, at least half of which are caused by common, modifiable risk factors such as unhealthy diets, obesity, tobacco use and lack of physical activity¹.

Currently, NCDs are the leading causes of death worldwide resulting in 16 million premature deaths each year²; and it's only projected to get worse: In 1999 NCDs were estimated to have contributed to just under 60% of worldwide deaths and around 43% of the global burden of disease³. Based on current trends forecast by the World Health Organization (WHO), these diseases are predicted to account for 73% of deaths and 60% of the disease burden by the year 2020¹. Global projections indicate that the biggest increase in deaths from NCDs will occur in low- and middle-income countries (LMIC) where currently, already 80% of global NCD deaths occur^{4,5}.

The recent recognition of the increasing threat of NCDs by the United Nations (UN) as major contributors to preventable disease and premature mortality has been a monumental step in placing these conditions on the global health and development agenda. A UN High Level

¹ Beaglehole R, Bonita R, Alleyne G, Horton R, Li L, Lincoln P, et al. UN High-Level Meeting on Non-Communicable Diseases: addressing four questions. *The Lancet*. 2011;30;378(9789):449-55.

² World Health Organization. Noncommunicable Diseases Progress Monitor Report, 2015. Geneva, Switzerland; 2015.

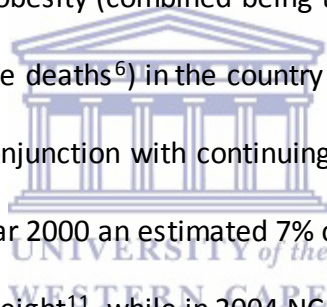
³ World Health Organization. WHO NCD Surveillance strategy [homepage on the Internet]. c2016 [cited 2016 Feb 11]. Available from http://www.who.int/ncd_surveillance/strategy/en/

⁴ World Health Organisation. Global Burden of Disease [homepage on the Internet]. c2016 [cited 2016 Feb 11]. Available from: http://www.who.int/healthinfo/global_burden_disease/

⁵ World Health Organization. Global status report on non-communicable diseases 2010. Geneva: WHO; 2011.

Meeting of Heads of State and Governments on the Prevention and Control of Non-Communicable Diseases was held in September, 2011. This meeting classified NCDs not just as a health concern but as a major development issue. Participants adopted a political declaration to increase global focus and attention to prevent and control NCDs, especially in LMICs.

South Africa was a participant and signatory to this meeting and supported the final political declaration. NCDs impose a large and continuously growing burden on the health, economy, and development of South Africa, currently contributing to a staggering 43% of recorded deaths. Rates of overweight and obesity (combined being the 2nd leading metabolic risk factor in terms of NCD attributable deaths⁶) in the country have been experiencing a sharp rise over recent years^{7,8,9,10}, in conjunction with continuing high levels of underweight and nutritional deficiencies. In the year 2000 an estimated 7% of all nationally recorded deaths were attributed to excess body weight¹¹, while in 2004 NCDs linked to dietary intake, together with respiratory diseases contributed 12% to the overall disease burden¹². Currently, more than 45% of men and women above the age of 35 are either overweight or obese¹³. While NCDs have historically affected the more affluent and mainly White population, these conditions are now affecting other population groups as well. It is



⁶ World Health Organization. Noncommunicable Disease Fact Sheet [homepage on the Internet]. c2016 [updated 2015 January; cited 2016 Feb 11]. Available from <http://www.who.int/mediacentre/factsheets/fs355/en/>

⁷ Armstrong ME, Lambert MI, Lambert EV. Secular trends in the prevalence of stunting, overweight and obesity among South African children (1994–2004). *Eur J Clin Nutr* 2011;65(7):835–40. doi: 10.1038/ejcn.2011.46.j

⁸ Department of Health, Medical Research Council and OrcMacro. South Africa Demographic and Health Survey 2003. Pretoria: Department of Health; 2007

⁹ Reddy SP, James S, Sewpaul R, Koopman F, Funani NI, et al. Umthente Uhlaba Usamila – The South African Youth Risk Behaviour Survey 2008. Cape Town: South African Medical Research Council; 2010.

¹⁰ Kruger HS, Steyn NP, Swart EC, Maunder EMW, Nel JH, et al. Overweight among children decreased, but obesity prevalence remained high among women in South Africa, 1999–2005. *Public Health Nutr*. 2011;18:1–6. doi:10.1017/S136898001100262X

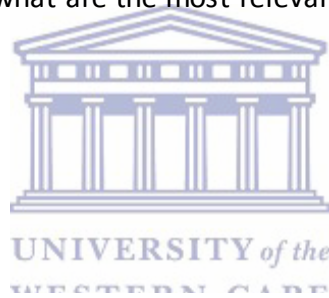
¹¹ Joubert J, Norman R, Lambert EV, Groenewald P, Schneider M, et al. Estimating the burden of disease attributable to physical inactivity in South Africa in 2000. *S Afr Med J*. 2007;97:725–31.

¹² Mayosi BM, Flisher AJ, Lalloo UG, Sitas F, Tollman SM, Bradshaw D. The burden of non-communicable diseases in South Africa. *Lancet*. 2009;374:934–47.

¹³ Bradshaw D, Steyn K, Levitt N, Nojilana B. Non-communicable Diseases – A race against time. Parow, South Africa: Medical Research Council; 2010.

believed that in the coming decades, NCDs will further exacerbate wide inequalities in longevity and quality of life in South Africa¹⁴. Additionally, the chronic nature of NCDs demands long-term care and imposes a significant burden on an overstretched health system already having to cope with the HIV/AIDS epidemic, a high burden of TB, maternal and child mortality, and high levels of violence and injuries.

This chapter explores what is currently known about the link between the rise in diet-related NCDs, their proximal determinants (specifically an observed change in diet patterns), its contributing environmental factors, what is currently being done or recommended to address this internationally, and what are the most relevant national-level policies for South Africa.



Proximal determinants

The leading behavioural risk factors for NCDs are tobacco use, harmful alcohol consumption, unhealthy diets that include high sugar, salt and fat intake, physical inactivity, and overweight and obesity¹⁵. More specifically, and for the purposes of this chapter, the continuing rise in prevalence of overweight and obesity in an increasing number of LMICs has been associated with a dramatic change in diet. Unhealthy individual diet is largely due to an observed change in diet at the population level. This change, dubbed the 'nutrition transition', is characterised by a shift from traditional diets based largely on staple grains or starchy roots, legumes, vegetables and fruits but minimal animal foods, towards more

¹⁴ Puoane TR, Tsolekile LP, Caldbick S, Igumbor EU, Meghnath K, Sanders D. Chronic non-communicable diseases in South Africa: Progress and challenges: Social and environmental determinants of health. In: Padarath A, English R, editors. South African Health Review 2012-13. Durban, South Africa: Health Systems Trust, 2013; p. 115-26.

¹⁵ World Health Organization. Global Health Risks. Mortality and Burden of Disease Attributable to Selected Major Risks. Geneva, Switzerland; 2009.

energy-dense, processed foods, and more foods of animal origin and more added sugar, salt and fat^{16,17,18}. This new diet, commonly known as the ‘western’ diet is primarily made up of cheap, highly palatable, heavily promoted, energy-dense and nutrient-poor foods¹⁹.

This transition is evident in South Africa, where a steady increase in the per capita food supply of fat, protein, salt, and total calories has been observed^{20,21,22}. The changes in nutrient intake among South Africans have been associated with changes in population level dietary patterns²³. Although a difference in the dietary composition among South Africans is still evident, the increasing changes to the food environment indicate that the ‘western’ diet will one day be common fare across the country²⁴.



Environmental factors

Globally, communities in which there are low levels of access to affordable, healthy food options generally have poorer diets and are at a higher risk for certain diet-related

diseases^{25,26,27,28,29,30}. Local food environments, defined here as “the physical presence of

¹⁶ Popkin BM. The nutrition transition in low-income countries: an emerging crisis. *Nutr. Rev.* 1994;52(9):285-98

¹⁷ Bourne LT, Lambert EV, Steyn K. Where does the black population of South Africa stand on the nutrition transition? *Public Health Nutr.* 2002;5(1A):157-62.

¹⁸ Jinabhai CC, Taylor M, Sullivan KR. Changing patterns of under- and overnutrition in South African children—future risks of non-communicable diseases. *Ann Trop Paediatr.* 2005;25(1):3-15.

¹⁹ Swinburn BA, Sacks G, Hall KD et al. The global obesity pandemic: shaped by global drivers and local environments. *Lancet.* 2011;(378):804–14.

²⁰ Kennedy G, Nantel G, Shetty P. Food and Agriculture Organization of the United Nations. Globalization of food systems in developing countries: impact on food security and nutrition. *FAO Food Nutr Pap.* 2004;83:1-300.

²¹ FAOSTAT—South Africa. Food and Agriculture Organization of the United Nations. [homepage on the Internet]. c2013 [updated 2014 May 26; cited 2016 Feb 09]. Available from <http://faostat.fao.org/site/368/default.aspx#ancor>.

²² Charlton KE, Steyn K, Levitt NS, Zulu JV, Jonathan D, et al. Diet and blood pressure in South Africa: intake of foods containing sodium, potassium, calcium, and magnesium in three ethnic groups. *Nutrition.* 2005;21: 39–50.

²³ MacIntyre UE, Kruger HS, Venter CS, Vorster HH. Dietary intakes of an African population in different stages of transition in the North West Province, South Africa: the THUSA study. *Nutrition Research.* 2002;22:239–56.

²⁴ Temple NJ, Steyn NP. Food prices and energy density as barriers to healthy food patterns in Cape Town, South Africa. *J Hunger Environ Nutr.* 2009;(4),203-13.

²⁵ Moore LV, Diez Roux AV, Nettleton JA, Jacobs DR. Associations of the local food environment with diet quality—a comparison of assessments based on surveys and geographic information systems. *Am J Epidemiol.* 2008;167(8):917-24.

²⁶ Goldstein H, Harvey S, Banthia R, et al. Designed for Disease: The Link Between Local Food Environments and Obesity and Diabetes. California Center for Public Health Advocacy, PolicyLink, and the UCLA Center for Health Policy Research; 2008.

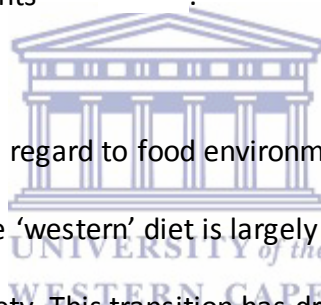
²⁷ Franco M, Diez Roux AV, Glass TA, Caballero B, Brancati FL. Neighborhood characteristics and availability of healthy foods in Baltimore. *Am J Prev Med.* 2008;35(6):561-67.

²⁸ Morland K, Wing S, Diez Roux A. The contextual effect of the local food environment on residents’ diets: the atherosclerosis risk in communities study. *Am J Public Health.* 2002;92(11):1761-67.

²⁹ Morland K, Diez Roux AV, Wing S. Supermarkets, other food stores, and obesity: the atherosclerosis risk in communities study. *Am J Prev Med.* 2006;30(4):333-39.

³⁰ Morland KB, Evenson KR. Obesity prevalence and the local food environment. *Health Place.* 2009;15(2):491-95.

food that affects a person's diet; a person's proximity to food store locations; the distribution of food stores, food service, and any physical entity by which food may be obtained; or a connected system that allows access to food³¹ play a key role in individual, family, and population-level health. International research increasingly implicates a rapidly changing food environment dominated by processed products high in sugar, salt and fat, and demonstrates that these environments contribute to increasing levels of chronic diseases, over and above individual factors such as knowledge, attitudes, and behaviours^{32,33,34}. Simply put: unhealthy food environments foster unhealthy diets. This has especially been found to be true for communities predominantly made up of low-income, low socio-economic status residents^{28,35,36,37,,38}.



In South Africa, the situation with regard to food environments is rapidly catching up with high-income countries, in that the 'western' diet is largely becoming more and more accessible to all segments of society. This transition has dramatically accelerated since the mid-90s when the post-apartheid government opened the borders to trade and foreign direct investment³⁹. Since then 'Big Food' (a term used to label large commercial entities that dominate the food and beverage environment) has come to dominate the food supply by making its products more available and affordable. Although there are over 1,800 food

³¹ Centers for Disease Control and Prevention. General Food Environment Resources [homepage on the Internet]. [updated 2014 Mar 6]. Available from <http://www.cdc.gov/healthyplaces/healthtopics/healthyfood/general.htm>

³² Story M, Kaphingst KM, Robinson-O'Brien R, Glanz K. Creating Healthy Food and Eating Environments: Policy and Environmental Approaches. *Annu Rev Public Health*. 2008;29:253-72 doi:10.1146/annurev.publhealth.29.020907.090926.

³³ Ledikwe JH, Blanck HM, Kettel Khan L et al. Dietary energy density is associated with energy intake and weight status in US adults. *Am J Clin Nutr*. 2006;83:1362-68.

³⁴ Perez-Escamilla R, Obbagy JE, Altman JM et al. Dietary energy density and body weight in adults and children: a systematic review. *J Acad Nutr Diet*. 2012;112:671-84.

³⁵ Baker EA, Schootman M, Barnidge E, Kelly C. The role of race and poverty in access to foods that enable individuals to adhere to dietary guidelines. *Prev Chron Dis*. 2006;3(3):A76.

³⁶ Kipke MD, Iverson E, Moore D, Booker C, Ruelas V, et al. Food and park environments: neighborhood-level risks for childhood obesity in east Los Angeles. *J Adolesc Health*. 2007;40(4):325-33

³⁷ Lewis LB, Sioane D, Nascimento L, Diamant A, Guinyard J, et al. African Americans' access to healthy food options in South Los Angeles restaurants. *Am J Public Health*. 2005;95(4):668-73

³⁸ Morland K, Wing S, Diez Roux A, Poole C. Neighborhood characteristics associated with the location of food stores and food service places. *Am J Prev Med*. 2002;22:23-29

³⁹ Thow A, Sanders D, Drury E, Puoane T, Chowdhury S, Tsolekile L, Negin J. Importing obesity: Implications of regional trade and investment for diet-related NCD prevention policy in Southern Africa. *Glob Health Action*. 2015;(8):28338. doi:10.3402/gha.v8.28338

manufacturing companies in South Africa, 'Big Food' manufacturers account for a disproportionately large amount of sales⁴⁰. According to a recent publication, 'Big Food' is becoming more widespread in South Africa and has been implicated in unhealthy eating⁴¹. Igumbor et al. explain that there has been an observed increase in the sales of almost all categories of packaged foods in the country from 2005 to 2010, for example: sales of snack bars, ready meals, and noodles all rose by more than 40%; and, when compared with the worldwide average of 89 Coca-Cola products per person per year, in 2010 "South Africans consumed 254 Coca-Cola products per person per year, an increase from around 130 in 1992 and 175 in 1997"⁴². Another study found that in 2010, up to half of young people were reported to consume fast foods, cakes and biscuits, cold drinks, and sweets at least four days a week¹³. It is worth noting that out of the top ten companies that dominate food processing/manufacturing in the country, five (including the most dominant company) are South African. Igumbor et al. conclude that "various strategies adopted by Big Food to increase the availability, affordability, and acceptability of their products have contributed to... dietary changes in South Africa and to the increased burden of obesity and NCDs."

Also, accelerating the spread of the 'western' diet in South Africa has been the rapid expansion of supermarkets, with chain outlets now owning more than 50% of the retail food market⁴³, making supermarkets the primary place South Africans purchase their foods⁴⁴. In general, supermarkets have made both staple and packaged foods more affordable⁴⁵;

⁴⁰ USDA Foreign Agricultural Services. GAIN report South Africa's food processing sector offers opportunities for U.S. exports. Available <http://static.globaltrade.net/files/pdf/20120123003839246.pdf>. 2011

⁴¹ Igumbor EU, Sanders D, Puaane TR, Tsolekile L, Schwarz C, Purdy C, et al. "Big Food," the Consumer Food Environment, Health, and the Policy Response in South Africa. *PLoS Med.* 2012;9(7): e1001253. doi:10.1371/journal.pmed.1001253

⁴² Hawkes C. Marketing Activities of Global Soft Drink and Fast Food Companies in Emerging Markets: A Review. Globalization, diets, and non-communicable diseases. Geneva: World Health Organization. 2002.

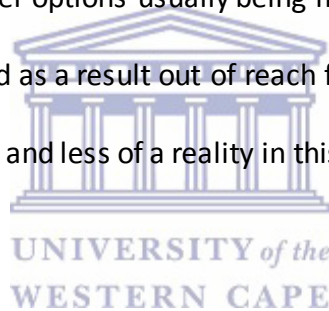
⁴³ Greenberg S. Contesting the food system in South Africa: Issues and Opportunities. Institute of Poverty, Land and Agrarian studies research report 42. University of the Western Cape: Cape Town. 2010

⁴⁴ D'Haese M, Huylenbroeck GV. The rise of supermarkets and changing expenditure patterns of poor rural households case study in the Transkei area, South Africa. *Food Policy.* 2005;30:97–113.

⁴⁵ Weatherspoon D, Reardon T. The Rise of Supermarkets in Africa: Implications for Agrifood Systems and the Rural Poor. *Dev Policy Rev.* 2003;21:333–55.

however, healthier food options typically cost between 10% and 60% more when compared with unhealthier options in these retail outlets⁴⁶. Availability of these healthier options has also been observed as an issue, particularly for those living in low-income areas. One study noted that “supermarkets in low-income areas typically stock less healthy foods than those in wealthier areas and, as a result, the supermarkets do not increase access to healthy foods and may, in fact, accelerate the nutrition transition⁴⁷.”

These environmental factors are decreasing the diversity of food stuffs consumed by South Africans. Dietary diversity plays a crucial part in preventing undernutrition and overweight/obesity. With healthier options usually being more expensive than their unhealthy alternatives^{48,49,50}, and as a result out of reach for many South African families, dietary diversity has become less and less of a reality in this country^{51,52,53,54}.



Policy approaches

International research has shown that “environmental and policy interventions may be among the most effective strategies for creating population-wide improvements in eating⁵⁵”. Consensus now exists, based on research and practice, on core policy actions that

⁴⁶ Temple NJ, Steyn NP, Fourie J, De Villiers A. Price and availability of healthy food: A study in rural South Africa. *Nutrition*. 2011;27: 55–58.

⁴⁷ Battersby J, Peyton S. The Geography of Supermarkets in Cape Town: Supermarket Expansion and Food Access. *Urban Forum*. 2014;25(2):153-64

⁴⁸ Temple NJ, Steyn NP. Food prices and energy density as barriers to healthy food patterns in Cape Town, South Africa. *J Hunger Environ Nutr*. 2009;4,203-13.

⁴⁹ Muzigaba M, Puoane T. Perceived and actual cost of healthier foods versus their less healthy alternatives: A case study in a predominantly black urban township in South Africa. *East Afr J Public Health*. 2014;8(4),283-90.

⁵⁰ Steyn NP, Mchiza Z, Abrahams Z, Temple N. Television advertising to children: Human Sciences Research Council; 2014. Available from <http://www.hsrg.ac.za/uploads/pageContent/4577/2014%20Television%20Advertising.pdf>

⁵¹ Labadarios D, Steyn NP, Nel J. How diverse is the diet of adult South Africans? *Nutr J*. 2011;17;10:33. doi: 10.1186/1475-2891-10-33

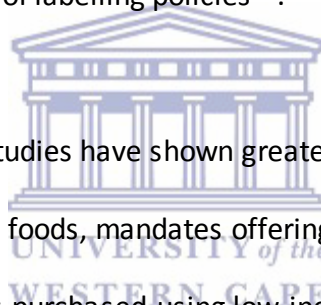
⁵² Puoane TR, Tsolekile L, Sanders D. A Case Study of Community-Level Intervention for Non-Communicable Diseases in Khayelitsha, Cape Town. *Institute of Development Studies (IDS)*. 2013.

⁵³ Tsolekile L, Lerebo W, Muzigaba M, Puoane T. Challenges in combating childhood obesity in black township schools of South Africa. *Afr J Phys Health Educ Recreat Dance*. Supplement 2. 2014; p. 442-56

⁵⁴ Stern R, Puoane T, Tsolekile L. An Exploration into the Determinants of Noncommunicable Diseases Among Rural-to-Urban Migrants in Periurban South Africa. *Prev Chronic Dis*. 2010;7(6):1-7

⁵⁵ Morland KB, Evenson KR. Obesity prevalence and the local food environment. *Health Place*. 2009;15(2):491-495.

can be taken to promote healthy diets^{56,57}. The policy actions have been grouped into three domains in the NOURISHING framework⁵⁸, including the food environment (e.g. nutrition labelling, food taxation, restriction of food advertising); the food system (e.g. supply chain incentives); and behaviour-change communication (e.g. mass media campaigns, nutritional advice and education). Evidence exists to support benefits of focused mass media campaigns, food pricing strategies, school procurement policies and worksite wellness programs, but there is less conclusive evidence for food and menu labelling and changes in the local built environment⁵⁹. In addition, there is a dearth of research into how nutrition labels are being received in the global South especially among the urban and rural poor, in order to assess the effectiveness of labelling policies⁶⁰.



In the United States of America studies have shown greater effects of food policies related to bans/restrictions on unhealthy foods, mandates offering healthier foods, and altering purchase/payment rules on foods purchased using low-income food vouchers compared with other interventions such as menu labelling or the implantation of new supermarkets⁶¹. There is also consistent evidence that taxation and subsidy intervention influence dietary behaviour⁶². Mexico, for example, implemented taxation of sugar-sweetened beverages and other so-called junk foods, and many other countries have or are actively pursuing taxes on sugar-sweetened beverages to combat both obesity and dental disease⁵⁶. Early results from

⁵⁶ Roberto CA, Swinburn B, Hawkes C, Huang TTK, Costa SA, Ashe M, et al. Patchy progress on obesity prevention: emerging examples, entrenched barriers, and new thinking. *The Lancet*. 2015;385(9985):2400-9.

⁵⁷ Roberto CA, Pomeranz JL. Public Health and Legal Arguments in Favor of a Policy to Cap the Portion Sizes of Sugar-Sweetened Beverages. *Am J Public Health*. 2015;105(11):2183-90.

⁵⁸ Hawkes C, Smith TG, Jewell J, Wardle J, Hammond RA, Friel S, et al. Smart food policies for obesity prevention. *The Lancet*. 2015;385(9985):2410-21.

⁵⁹ Afshin A, Penalvo J, Del Gobbo L, Kashaf M, Micha R, Morrish K, et al. CVD Prevention Through Policy: a Review of Mass Media, Food/Menu Labeling, Taxation/Subsidies, Built Environment, School Procurement, Worksite Wellness, and Marketing Standards to Improve Diet. *Curr Cardiol Rep*. 2015;17(11):1-12.

⁶⁰ Mandle J, Tugendhaft A, Michalow J, Hofman K. Nutrition labelling: a review of research on consumer and industry response in the global South. *Glob Health Action*. 2015;8:25912. PubMed PMID: 25623608. Pubmed Central PMCID: PMC4306755. Epub 2015/01/28.

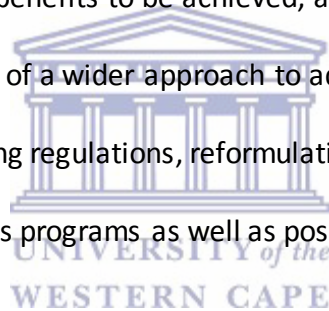
⁶¹ Mayne SL, Auchincloss AH, Michael YL. Impact of policy and built environment changes on obesity-related outcomes: a systematic review of naturally occurring experiments. *Obes Rev*. 2015;16(5):362-75.

⁶² Niebylski ML, Redburn KA, Duhane T, Campbell NR. Healthy food subsidies and unhealthy food taxation: A systematic review of the evidence. *Nutrition*. 2015;31(6):787-95.

the sugar taxation in Mexico indicate that in 2014 the purchase of soda and other taxed drinks had dropped by 10% compared with the previous year, whereas the purchase of bottled water rose by 13%, showing that people were indeed substituting the unhealthy for the healthy⁶³.

Sugar taxes have been implemented in Denmark, Finland, France, Hungary, Ireland and Norway, based on substantial scientific evidence that has shown that decreasing sugar-sweetened beverage consumption reduces the prevalence of obesity and obesity-related diseases and that a tax on sugar sweetened beverages reduces the obesity rate^{64,65}.

However, in order for full health benefits to be achieved, a tax on sugar-sweetened beverages would need to be part of a wider approach to address obesity that includes for example food labelling, advertising regulations, reformulation of foods and drinks by industry and consumer awareness programs as well as possible subsidies on healthy foods.



In order to monitor different factors influencing the food environment, the International Network for Food and Obesity / non-communicable Diseases Research, Monitoring and Action Support (INFORMAS)⁶⁶ has developed a set of modules. It includes a framework to monitor, assess, and provide input on improving food environment related policies. Known as the Government Healthy Food Environment Policy Index (Food-EPI), this approach puts forward seven policy domain areas which “address the key aspects of food environments

⁶³ Colchero MA, Popkin BM, Rivera JA, Ng SW. Beverage purchases from stores in Mexico under the excise tax on sugar sweetened beverages: observational study. *Bmj*. 2016;6;352:h6704. doi: 10.1136/bmj.h6704.

⁶⁴ Hu FB. Resolved: there is sufficient scientific evidence that decreasing sugar-sweetened beverage consumption will reduce the prevalence of obesity and obesity-related diseases. *Obes Rev*. 2013;14(8):606-19. doi:10.1111/obr.12040.

⁶⁵ Cabrera Escobar MA, Veerman JL, Tollman SM, Bertram MY, Hofman KJ. Evidence that a tax on sugar sweetened beverages reduces the obesity rate: a meta-analysis. *BMC Public Health*. 2013;13(1):1-10.

⁶⁶ Swinburn B, Vandevijvere S, Kraak V, Sacks G, Snowdon W, Hawkes C, et al. Monitoring and benchmarking government policies and actions to improve the healthiness of food environments: a proposed Government Healthy Food Environment Policy Index. *Obes Rev*. 2013;14;Suppl 1:24-37. doi: 10.1111/obr.12073.

that can be influenced by governments to create readily accessible, available and affordable healthy food choices”⁶⁶. These domains are food composition, food labelling, food promotion, food provision, food retail, food prices, and food trade and investment. ‘Good practice statements’ have been developed for each of these domains and are used as benchmarks when assessing or rating existing policies in a given jurisdiction. Currently, this rating process is taking place in South Africa and results should be available soon.

Current national policy context

Poverty and food insecurity in South Africa have a unique and long history that has been traced back and linked to colonialism and the legacy of Apartheid: “The former [colonialism] disrupted the African production and indigenous knowledge on food security. The latter [apartheid] designed a system that generally created unfavourable conditions for black people in all aspects of livelihood”⁶⁷. Currently, under a rights based system such as South Africa’s, the government “must provide an enabling environment in which people can adequately produce or procure food for themselves and their families⁶⁸.” Section 27 of the South African Constitution states that “everyone has the right to have access to sufficient food and water”, and points out that “the state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of each of these rights.” As a result, the South African government as ‘duty bearers’ are obliged to respect peoples’ rights, protect these rights, and do all they can to fulfil/realize these rights,

⁶⁷ Empowerment for Food Security Programme. VVOB vzw Formulation Report September. Pretoria: Direct Aid Project; 2015 Available from <http://www.kzndae.gov.za/Portals/0/Rural%20Development/Food%20Security/FINAL%20formulation%20report%20Food%20Security%20-%206%20sept.pdf>

⁶⁸ South African Human Rights Commission. The Right to Food Campaign. [homepage on the Internet]. c2014 [cited 2014 Aug 08]. Available from <http://www.sahrc.org.za/home/index.php?ipkContentID=112&ipkMenuID=94>

which means that decision makers must generate conditions in which everyone can be as healthy as possible, without discrimination⁶⁹.

Rapidly changing local food environments in South Africa have led to the call for labelling and fiscal policy measures to address the availability, acceptability, and affordability of healthy versus less-healthy foods; and for improvements in the implementation of regulations for the marketing of foods and beverages to children⁴¹. Since 1994 South Africa has taken some positive policy steps at the national level to address issues related to NCD prevention and/or healthy food access. In 2011, the South African Minister and Deputy-Minister of Health convened a summit on the *Prevention and Control of Non-Communicable Diseases*⁷⁰ (in preparation for the global UN High Level Meeting on NCDs, as mentioned in the introduction to this chapter). The summit included various governmental departments, researchers, private sector, and civil society stakeholders, and resulted in a declaration that endorsed action aimed at various risk factors (behavioural, environmental, and structural). Subsequently, the national government has released their *Strategic Plan for Non-Communicable Diseases, 2013- 2017*⁷¹, which provides a short-term framework to reduce the burden of NCDs, including actions related to specific targets identified and agreed upon at the 2011 Summit. The plan outlines interventions/actions addressing unhealthy diets, specifically reducing salt intake in line with WHO's supported interventions on salt intake reduction in the sub-Saharan Africa region⁷² and food taxes on unhealthy food (foods high in fats and sugar) and food subsidies on healthy food (fruits and vegetables), as "very" cost

⁶⁹ World Health Organization. Fact Sheet No.323: The Right to Health. c2015 [cited 2014 Aug 08]. Available from

<http://www.who.int/mediacentre/factsheets/fs323/en/>

⁷⁰ National Department of Health. Summit on Prevention and Control of Non-Communicable Diseases [homepage on the Internet]. c2011 [cited 2012 Nov 01]. Available from <http://www.doh.gov.za/eventlist.php?eid=5>

⁷¹ Department of Health. Strategic Plan for the Prevention and Control of Non-Communicable Diseases, 2013-2017. Pretoria: Department of Health, Republic of South Africa, 2012.

⁷² Sookram C, Munodawafa D, Phori PM, Varenne B, Alisalad A. WHO's supported interventions on salt intake reduction in the sub-Saharan Africa region. *Cardiovascular Diagnostics Ther*. 2015;5(3):186-90. doi:10.3978/j.issn.2223-3652.

effective. It goes on to point out that dietary changes are needed in South Africa if NCDs are to be effectively combated, and that food environments play a key role in this. The plan advocates for a legislative approach to improving food environments, including legislation/regulations to reduce trans fatty acids; regulations to reduce salt in processed food; consideration to be given to the banning of junk food advertisements to children during key television programmes; the taxation of undesirable processed foods and the exemption of healthier choices from taxation; and the better control of food and nutrient supplements.

Regarding the reduction of salt intake: voluntary measures have been discussed with the appropriate consumer and industry groups and a comprehensive salt reduction plan including legislative measures has been implemented⁷³. The Department of Health has approved regulations which have come into effect in 2016⁷⁴. In addition, a new advocacy group has been established along with an educational campaign by the Heart and Stroke Foundation to communicate about the harms of high salt consumption. Similarly, regulations relating to trans-fats in food already exist as of 2010⁷⁵, while new food labelling and advertising legislation came into being in March 2012. Encouragingly, the current South African Minister of Health, Dr. Aaron Motsoaledi, stated that “...Africans are eating more and more junk processed foods instead of their traditional diet,” and affirmed his desire to regulate junk food starting with reducing salt in bread and eliminating trans fats⁷⁶.

Additionally, in his 2016 budget speech, South African Finance Minister Pravin Gordhan has

⁷³ Delobelle P, Sanders D, Puoane T, Freudenberg N. Reducing the Role of the Food, Tobacco, and Alcohol Industries in Noncommunicable Disease Risk in South Africa. *Health Education & Behavior*. 2016 April 1, 2016;43(1 suppl):70S-81S.

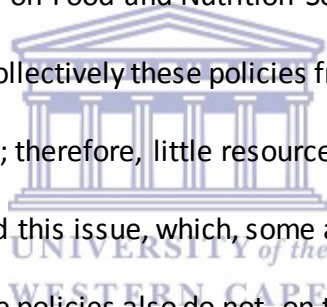
⁷⁴ Foodstuffs, Cosmetics and Disinfectants Act 1972 (No. R. 214): Regulations relating to the reduction of sodium in certain foodstuffs and related matters., No. R. 214 (2013).

⁷⁵ Foodstuffs, Cosmetics and Disinfectants Act 1972 (No. R. 249): Regulations Relating to Trans-Fat in Foodstuffs, No. R. 249 (2010)

⁷⁶ The Guardian, Lawrence F. Alarm as corporate giants target developing countries [homepage on the Internet]. c2011 [updated 2011 Nov 23; cited 2012 May 01]. Available from <http://www.guardian.co.uk/global-development/2011/nov/23/corporate-giants-target-developing-countries>.

also revealed plans to introduce a tax on sugar-sweetened beverages, similar to the sin taxes on alcohol and tobacco⁷⁷. The sugar tax has been implemented from 1 April 2018 and is levied on soft drinks, fruit juices, energy drinks and vitamin waters, informed by research indicating that a 20% tax on sugary drinks could bring in an estimated R7-billion in additional revenues each year and reduce obesity among 220 000 adults^{78,79}.

Other relevant national level policies, programmes and strategies that shape provincial and community level actions impacting food environments include the Integrated Food Security Strategy⁸⁰, the Integrated Nutrition Programme⁸¹, the National School Nutrition Programme⁸², the National Policy on Food and Nutrition Security⁸³, and the National Development Plan⁸⁴. However, collectively these policies frame food insecurity as primarily a rural and food production issue; therefore, little resources are allocated to municipalities to address urban concerns around this issue, which, some argue is where the majority of focus is currently needed⁸⁵. These policies also do not, on the whole take into account environmental issues or spatial contexts around access, focusing rather on household level issues such as income generation, government safety nets, nutritional programmes, and on increasing production⁸⁶. A recent review of actions taken in South Africa towards combatting NCDs reveals that increased attention is being paid to NCDs in South Africa, but



⁷⁷ Mail and Guardian, Donnelly L. Gordhan announces sugar tax [homepage on the Internet]. c2016 [updated 2016 Feb 24]. Available from <http://mg.co.za/article/2016-02-24-budget-speech-2016-gordhan-introduces-sugar-tax>

⁷⁸ Tugendhaft A, Manyema M, Veerman LJ, Chola L, Labadarios D, Hofman KJ. Cost of inaction on sugar-sweetened beverage consumption: implications for obesity in South Africa. *Public Health Nutr.* 2015;1-9.

⁷⁹ Manyema M, Veerman LJ, Chola L, Tugendhaft A, Sartorius B, Labadarios D, et al. The potential impact of a 20% tax on sugar-sweetened beverages on obesity in South African adults: a mathematical model. *PloS one.* 2014;9(8):e105287. doi:10.1371/journal.pone.0105287.

⁸⁰ Department of Agriculture. The integrated food security strategy for South Africa. Pretoria: Department of Agriculture, Republic of South Africa, 2012.

⁸¹ Department of Health. Integrated Nutrition Programme Pretoria: Department of Health, Republic of South Africa, 2002.

⁸² Department of Education. National School Nutrition Programme. Pretoria: Department of Education, Republic of South Africa, 1994.

⁸³ Department of Social Development, Department of Agriculture, Forestry and Fisheries. National Policy on Food and Nutrition Security. Pretoria: Department of Social Development, Department of Agriculture, Forestry and Fisheries, 2014.

⁸⁴ National Planning Commission. National Development Plan 2030: Our future - make it work. Pretoria: The Presidency, Republic of South Africa, 2012.

⁸⁵ The African Urban Food Security Network. Publications – Urban Food Security Series [homepage on the Internet]. c2016 [cited 2016 Feb 03]. Available from <http://www.afsun.org/publications/>

⁸⁶ Battersby J, Hayson G, Marshak M, Kroll F, Tawodzera G. South African Cities Network Programme: A study on current and future realities for urban food security in South Africa (Draft 3). 2015; doi: 10.13140/RG.2.1.4224.6487

that “this heightened focus has to be strengthened and sustained over the next decades to combat the current trend and achieve a real reduction in the NCD-related burden¹⁴”, and that added rigorous measures are required to continue to address the common risk factors of NCDs in South Africa.

Policy coherence

All government departments and their respective policies have the potential to affect the health of the population/s they serve. While health may not be the main aim of all these policies, their implementation has the potential to either have a positive, or negative affect on population health. Consequently, the World Health Organization has said that policy coherence across differing government sectors is vital, and that when it comes to the promotion of health, various government department policies should complement rather than contradict each other.⁸⁷



In South Africa a lack of policy coherence is apparent. One such example is the contradictory nature of the current national trade and investment policy, and our national health policy, with trade and foreign direct investment promoting the influx of large amounts of processed foods and sugary beverages, giving free rein to fast food companies like McDonalds and Burger King. In more recent documents, there has been an increasing call for inter-sectoral approaches which have yet to have been realized. Inter-sectoral approaches are advocated for in both the *South Africa Declaration on the Prevention and Control of Non-Communicable Diseases*⁷¹ and the *National Strategy for Prevention and Control of Obesity*⁸⁸.

⁸⁷ World Health Organization. Social determinants of health – Key Concepts [homepage on the Internet]. c2016 [cited 2016 Feb 03]. Available from http://www.who.int/social_determinants/thecommission/finalreport/key_concepts/en/

⁸⁸ Department of Health. Strategy for the Prevention and Control of Obesity in South Africa 2015-2020. Pretoria: Department of Health, 2015.

These types of approaches have been successfully used in initiatives such as the *Health Promoting Schools Programme*, which was developed in response to a shared policy concern across the health and education sector. The approach is obviously more problematic when dealing with sectors with conflicting interests, e.g. between health policy and trade and investment. As pointed out in the *Report of the Commission on Social Determinants of Health*, “trade policy that actively encourages unfettered production, trade, and consumption of foods high in fats and sugars to the detriment of fruit and vegetable production is contradictory to health policy.”⁸⁹

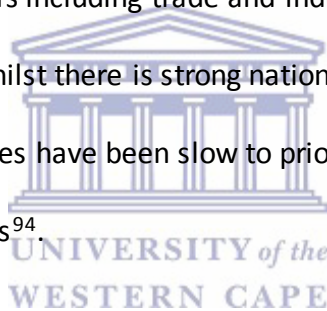
Reducing obesity and promoting health in general, including healthy food choices, can directly benefit from a systems approach including ‘upstream’ policy actions beyond the traditional health sector⁹⁰. Health-in-All Policies (HiAP) is one such approach and has been defined as a way in which the impact of policies on health outcomes and determinants as well as on health systems are considered, putting special emphasis on the distribution of these impacts⁹¹. The HiAP approach was adopted in South Australia, where the regional government mapped the core business and policy directions of local state departments against research showing what works in combating obesity. “Negotiations then developed high-level policy commitments to address factors promoting healthy weight which predominantly changed ways of working rather than requiring new expenditure and also assisted departments in meeting their own goals.”⁹⁰ Through this initiative, buy-in and an increased level of commitment to a broader range of policy actions from traditionally non-

⁸⁹ Marmot M, Friel S, Bell R, Houweling TAJ, Taylor S. Closing the gap in a generation: health equity through action on the social determinants of health. *The Lancet*. 2008;372(9650):1661-9.

⁹⁰ Newman L, Ludford I, Williams C, Herriot M. Applying Health in All Policies to obesity in South Australia. *Health Promot Int*. 2016;31(1):44-58. doi:10.1093/heapro/dau064.

⁹¹ Ollila E. Health in All Policies: from rhetoric to action. *Scand J Public Health*. 2011;39(6):11-8. doi:10.1177/1403494810379895.

health departments was achieved. In the South African context, HiAP could be advocated for, and monitored by the establishment of an independent-of-government Health Promotion Foundation (HPF)⁹². HPFs work across sectors to support government and contribute to the development of evidence-based policy in collaboration with government, academia and civil society. HPFs have successfully influenced population health in countries such as Thailand and Australia, and in South Africa the Health Promotion and Development Foundation Network has lobbied for the establishment of an HPF, which unfortunately so far has not materialized. Another approach to promote NCD prevention in South Africa would be guided by the establishment of a multi-stakeholder national health commission that actively engages other sectors including trade and industry, agriculture, education, sports, and arts and culture⁹³. Whilst there is strong national commitment and civil society support for this initiative, Provinces have been slow to prioritise and implement action plans in this area over the last few years⁹⁴.



Conclusion

Improving dietary patterns and reducing chronic diseases will require a sustained public health effort that includes the consideration of environmental factors and conditions in which people live and make choices. Overall, positive policy steps have been made at the national level; however, most have been critiqued for lack of action. Existing efforts addressing NCD prevention, their proximal determinants and contributing environmental factors have to be strengthened and sustained in order to combat the current trend and

⁹² Perez AM, Ay o-Yusuf OA, Hof man K, Kalideen S, Maker A, Mokonoto D, et al. Establishing a health promotion and development foundation in South Africa. *S Afr Med J*. 2013;103(3):147-9. doi: 10.7196/samj.6281

⁹³ Hof man K. Non-communicable diseases in South Africa: A challenge to economic development. *S Afr Med J*. 2014;104(10):647. doi:10.7196/samj.8727

⁹⁴ Pinkney-Atkinson V. Civil Society Status Report 2010-2015: Mapping South Africa's Reponse to the Epidemic of Non-Communicable Diseases. South African NCDs Alliance. 2015. doi:10.13140/RG.2.1.5073.6088

achieve a real reduction in the NCD-related burden. Additional rigorous measures are also required to continue to address the common risk factors of NCDs in South Africa. The South African government should develop a coordinated, specific plan/approach to making healthy foods more available, affordable, and acceptable, and existing related policies should be more effectively implemented.



CHAPTER 5 – Snapshots of urban and rural food environments in high-, middle-, and low-income settings: Lessons learned from an implementation perspective

Background

Non-communicable diseases (NCDs) account for more than two-thirds of global deaths (Beaglehole R, 2011), making them the leading cause of preventable death worldwide (WHO, 2015). Additionally, these diseases are predicted to increase in prevalence (Beaglehole R, 2011), with the largest increase expected to occur in low- and middle-income countries (LMIC), where currently already 80% of global NCD deaths occur (WHO, 2010). This global increase has been linked to an observed change in diet at the population level (Ng, et al., 2014) (Lim, et al., 2012), particularly in LMICs (MS, N, & T, 2015) (Mungal-Singh, 2011) (Vorster, Kruger, Wentzel-Viljoen, Kruger, & Margetts, 2014) (Popkin B. , 2001). This change in diet, dubbed the 'nutrition transition', is characterised by a shift from traditional diets (based largely on staple grains or starchy roots, legumes, vegetables and fruits, and minimal animal foods), towards a more palatable, affordable, and heavily marketed 'western' diet (made up of more energy-dense, nutrient deficient, processed foods, with more added sugar, salt and fat, and more foods of animal origin) (Popkin B. , 1994) (Swinburn, et al., 2011).

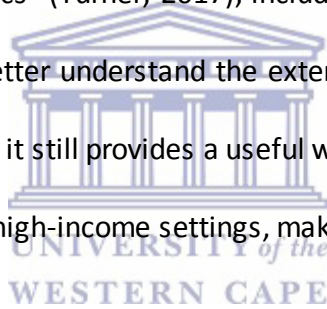
A growing body of research implicates a swiftly changing food environment dominated by the 'western' diet as a primary contributor to the observed increasing levels of NCDs, over and above individual factors such as knowledge, attitudes, and behaviours (Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008) (Ledikwe, et al., 2006) (Pérez-Escamilla, et al., 2012). Thus,

local food environments, defined here as “the interface that mediates one’s food acquisition and consumption within the wider food system... encompass(ing) multiple dimensions such as the availability, accessibility, affordability, desirability, convenience, marketing, and properties of food sources and products” (Turner, 2017) play a key role in individual, family, and population-level health.

Documenting (or mapping) food environments, and key aspects of these environments can be a very valuable exercise towards gaining insights into how and why people make food acquisition choices. More specifically, a primary purpose of mapping the food environment is to gain insights into the context in which food acquisition choices are made; i.e. to better understand where people procure their food and what types of food and food-related information they are exposed to within these settings and their communities (Glanz, 2009). This focus on contextualization is especially valuable when considering how best to implement diet-related NCD interventions in specific settings, and how to best allow for the maximum levels of sustainability of intended intervention outcomes. To date, the mapping of food environments (and food environment research in general) has primarily been carried out in high-income country (HICs) settings in response to the documented high prevalence of obesity and associated diet-related NCDs in these locations. However, as these diseases are becoming more and more prevalent in LMICs, there is an urgent need to develop and accelerate this research to address the cause and spread of these diseases in those parts of the world (Turner, 2017).

Consequently, a LMIC-specific conceptual framework [the ANH-FEWG food environment conceptual framework] (Turner, 2017) has been developed that outlines separate, yet inter-

related domains relevant to the documenting and understanding of food environments in these settings; including 1) the external food environment (including all exogenous dimensions, such as food availability, prices, vendor and product properties, and marketing and regulation), and 2) the personal food environment (including all endogenous dimensions such as accessibility, affordability, convenience and desirability at the individual level). These two domains, and the dimensions therein, directly relate to, and influence each other, leading to food acquisition and consumption, and ultimately health and nutrition outcomes. The framework is designed to specifically place, and guide food environment research in LMIC settings, and to “align theoretical and conceptual constructs with existing and emerging methods and metrics” (Turner, 2017), including the use of geospatial and outlet observation methods to better understand the external food environment and its associated dimensions. However, it still provides a useful way to observe and map food environments in middle- and/or high-income settings, making comparisons between settings possible.



In this Chapter, the focus is on the external food environment (and its associated dimensions) by systematically creating snapshots of selected urban and rural food environments in three countries: South Africa, Uganda, and Sweden. The overall aim of this effort was to: 1) identify and describe existing external food environment-related characteristics using the ANH framework, and 2) explore how the presence and nature of these characteristics could potentially impact the implementation of intervention strategies in a larger NCD-related research project.

Methods

A semi-structured checklist and a systematic pre-defined process was used to carry out observations of the external food environment, capturing the characteristics that would be most relevant from the perspective of NCD interventions.

Environmental component as part of a broader study

An ongoing EU HORIZON 2020 funded study, titled a *People centred approach to self-management and reciprocal learning for the prevention and management of type 2 diabetes* (SMART2D) (Guwatudde & al, 2018) seeks, in part to understand the relationship between local food environments and food acquisition behaviours, and how this ultimately plays a role in managing type 2 diabetes (T2DM) among socio-economically disadvantaged populations in three different locations (or study sites): a rural population in a low-income country (Uganda); an urban population in a middle-income country (South Africa); and an urban, primarily immigrant population in a high-income country (Sweden). SMART2D strongly focuses on *contextualization* as a key factor in project implementation, recognizing the importance of understanding the environment in which participants function on a daily basis as key to intervention impact and sustainability across all study sites (Guwatudde & al, 2018) (Saulnier D. , 2015). To this end, the systematic mapping and observation of local external food environments guided by an adapted tool took place in all three study sites.

Sample (site) selection

In addition to the existing SMART2D study sites as outlined above, a corresponding (either urban or rural) setting was purposefully selected within each country making one urban and one rural setting for food environment observation per country. These additional settings

were selected in consultation with local researchers and (in some cases) local government officials to, as best as possible reflect the socio-demographic characteristics of the original SMART2D site, and serve to identify and highlight differences between the two settings in each country. Local demographic data sources were also referenced. These additional settings were also purposefully selected based on size and proximity to the original site, in order to facilitate data collection.

Data collection tool

Observations of local external food environments were carried out using a modified EPOCH (Environmental Profile Of a Community's Health) tool and methodology. EPOCH seeks to capture, in a concise but generalizable form, those environmental factors that may be associated with chronic disease risk factors, specifically heart disease (Chow, et al., 2010). EPOCH was adapted, with permission, for the purposes of this study, to make it more relevant for documenting food environments from the perspective of NCD prevention interventions (including type 2 diabetes) and food acquisition or diet, specifically focusing on self-management.

The original EPOCH is a two-part tool consisting of a direct observation of different aspects of the built environment (infrastructure and services; commercial and shopping areas; grocery stores; tobacco retailer; restaurants; and pharmacy services) and a survey tool on community awareness, attitudes and social norms (Chow C. , 2009). To address our specific research objectives, only the following sections under part 1 were included in the adapted tool:

- ‘Community observation walk’ – a walk in a commercial or central shopping district designed to systematically observe and record food environment-related factors within a 1km stretch considered by community members to be the main commercial district for services and facilities; and
- ‘Assessment of a grocery store’ – in which the presence, price, and quality of fruits and vegetables, and certain packaged food products are noted (this assessment was subsequently modified to include different types of outlets and retitled ‘Food retail outlet assessment’).

An additional section, i.e. a ‘Community-wide tally of food retail outlets’ was added to the above adapted EPOCH sections, and was carried out in each setting as a third section/tool. This was done in order to gain insights into food retail outlet availability and distribution across the entire community.



A more detailed description of all three of these tool components follows:

Community Observation Walk (see Appendix 1)

The identification of the areas for observation in each setting, as well as the starting point for each observation walk was predetermined in consultation with local researchers and/or community members and allowed for the maximum area (within the 1km recommended distance) to be observed along the busiest local thoroughfare of the community. The walk was either along one length of a street, or involved multiple turns or was along more than one street (or side of the street) in order to stay within the busy area of the community. The route of the walk was mapped out using Google Maps prior to the day of observation with

the map being printed out and attached to the questionnaire. The timing of the walk was during daylight/regular working hours. Walk starting and ending times were also noted.

Relevant factors observed included a count of:

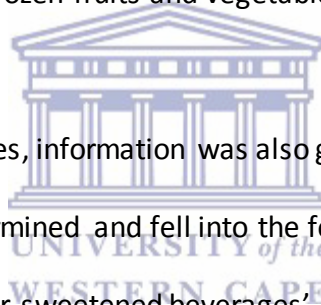
1. Advertisements – Types of advertisements noted included those promoting junk food, sugar sweetened beverages, tobacco products, alcoholic drinks, and those that promoted health for commercial or non-commercial reasons. Advertisements included those on poster boards, pasted on walls, pasted on bus stops, pasted on buses or cars, and those on shop windows or just inside windows and that are clearly visible by people walking by the shop. If there were multiple advertisements of the same type stuck one on top of each other, this was counted as one advertisement. If two or more advertisements were adjacent to each other on a single surface, then this was counted as two or more advertisements if they were 1 or more metres apart.
2. Food retail outlets –Types of food retail outlets included supermarkets, independent grocers, convenience stores, informal vendors (table-top and brick-and-mortar), mobile informal vendors, markets (collections of informal vendors), stores that sell alcohol, butchers, bakeries, delis, pubs/bars, fast food restaurants, and other sit-down restaurants.

Food Retail Outlet Assessment

The purpose of the *Food Retail Outlet Assessments* (see Appendix II) was to systematically observe, record, and gain insights into the retail spaces in which community members were

most likely to acquire their food. Food retail outlets were categorized as either supermarkets, small independent grocers, convenience stores, informal vendors (table-top and brick-and-mortar), mobile informal vendors, or markets (collections of informal vendors). Two of each of these types of outlets were identified and observed along the predetermined *Community Observation Walk* routes. If this was not possible, the nearest outlet/s to the walking route was identified and observed.

All fruits and vegetables available in the retail outlet were noted, as well as the general quality of the produce. The per-kilogram price was recorded for the cheapest, not-on-sale item. The presence and price of frozen fruits and vegetables were also noted.



In addition to fruits and vegetables, information was also gathered on certain packaged food items. These items were predetermined and fell into the following groupings: 'grains', 'dairy', 'confectionaries', or 'sugar-sweetened beverages'. Each grouping contained three food products, e.g. 'confectionaries' included 'one package of biscuits', 'one packet of chips', and 'one chocolate bar'. The cheapest packaged food product in each category was selected for detailed observation. If two products were priced the same, the 'healthiest' option was selected and observed for the grains and dairy products, and the 'unhealthiest' option was selected and observed for the confectionary and sugar sweetened beverages products. Criteria for defining 'healthy' and 'unhealthy' were predetermined and dependent on the specific product, with resulting guidelines being included in the data collection form for investigators to reference in the field. All food product items were subsequently categorized as either 'healthier' (fruits and vegetables), 'less-healthy' (confectionaries and sugar-sweetened beverages), or 'other' food items (grains, and dairy). Detailed product

packaging information was recorded for each packaged item, including cost, product name and weight, the presence of an ingredients list, nutritional information (and the extent of this information), and any health and/or nutritional claims visible on the product packaging.

The presence of in-store food related advertising, as well as tobacco and alcohol was also observed and recorded.

Community Food Retail Outlet Tally

The *Food Retail Outlet Tally* (see Appendix III) was developed and used to identify and count all the different types of food retail outlets (as categorised above) surrounding the area in which the 1km *Community Observation Walk* was conducted; i.e. the centre and/or most frequented part of town. The community area, and the specific boundaries in which the tally took place was identified by the research team (primarily guided by local researchers) in each country. All food retail outlets within these areas were identified and tallied using a predetermined walking route, i.e. a walking route that would be the most efficient in covering the entire community area. A map, including the predetermined walking route was printed out for each area and carried with during tallying. When a food retail outlet was identified, it was both tallied on the *Food Retail Outlet Tally* form, as well as its approximate location noted on the map. The use of map services accessed via mobile devices was also recommended and used by investigators in the field for navigation purposes.

Data collection process

Two external food environment assessments were carried out per country, one in an urban setting and one in a rural setting. One 'external food environment assessment' included one

Community Observation Walk, two Food Retail Outlet Assessments per retail type, and one Community Food Retail Outlet Tally.

Before data collection took place in all three countries, the adapted EPOCH tool was piloted in Cape Town, South Africa with final amendments being made as a result. Additionally, before data collection took place in each country, and as part of local country-specific training, the tools were piloted in each setting with minor adaptations being considered.

In-country orientation workshops attended by local researchers (and which were personally overseen by the first author) took place in all three settings just prior to data collection.

Workshops took place over approximately 1-1.5 days. A standard training manual outlining the data collection process was used across all three sites. Local researchers were already somewhat familiar with the tools and observation protocols as they had been part of the adaptation process. Therefore, in-country workshops were designed to reorient researchers to the purpose and processes related to the observation and address any specific local issues or concerns. Data collection in each country was carried out by a team made up of the first author and local investigators in each country (two in Uganda and one in Sweden). Local researchers had a background in health-related research and were familiar with the communities to be assessed.

Ethical considerations

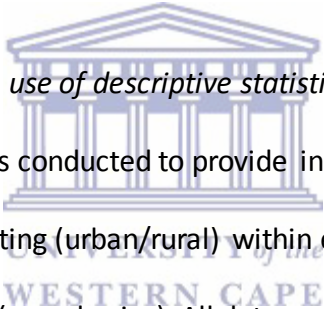
Ethical approval to conduct all research activities was sought and granted through the University of the Western Cape (Cape Town, South Africa), as well as through local partnering academic institutions – Makerere University (Uganda) and Karolinska Institutet

(Sweden). Additionally, the modified EPOCH tool was also included in the SMART2D's ethical applications and approvals at Karolinska Institutet.

As all research activities were primarily observational in nature, there was limited interaction with 'human subjects'. However, for all *Food Retail Outlet Assessments*, the store owner and/or manager was approached beforehand and permission to conduct observations was sought. Letters of ethical approval from the local partnering academic institution in each country were carried by the investigators.

Data analysis

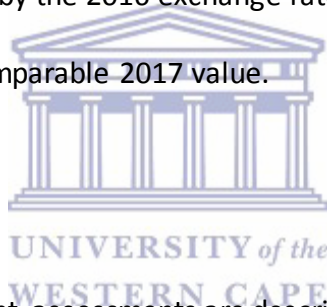
Overall analysis approach and the use of descriptive statistics



Descriptive statistical analysis was conducted to provide insights into the food environment-related characteristics at each setting (urban/rural) within each country site, keeping in mind the limited number of sites (sample size). All data were collected using paper instruments in the field, and later double-entered into (and managed using) REDCap (Research Electronic Data Capture) (REDCap, n.d.). Subsequently, data were downloaded into Microsoft excel 2016 which was used for data analysis purposes. Study variables were analysed descriptively by totals, percentage and means where relevant. Since the sample was limited, small differences have bigger implications for the results. To compensate for this, the highest and lowest counts are presented next to the mean in each table. The variables are presented by the different store types observed in the setting, by type of setting (urban/rural) and as country totals. Additionally, for each site, an overview map has been created to show the dispersion or spread of the food retail outlets.

Price estimations in international dollars

In order to allow for the results to be more comparable, the local costs/currencies were converted to International Dollars using purchasing power parity exchange rates. The exchange rates for 2017 were available for South Africa and Sweden through the Organisation for Economic Co-operation and Development's website (OECD, OECD, 2018). The local currency was divided by the exchange rate (6.060 and 9.125 for South Africa and Sweden respectively), resulting in the International Dollar value. The 2017 exchange rate was not available for Uganda, so the 2016 exchange rate from the World Bank (The World Bank, 2018) was used. The inflation value from 2016 to 2017 was 2.1 % for UGX (OECD, 2018). The UGX rate was divided by the 2016 exchange rate (1098), and 2.1% of that was added in order to bring it to a comparable 2017 value.



Results

Results from the food environment assessments are described below according to the external food environment domains as outlined and defined in the ANH-FEWG food environment conceptual framework (Turner, 2017); i.e. availability, price, vendor and product properties, and marketing and regulation.

Availability

Presence and distribution of food retail outlets

Generally, food retail outlets were more evenly dispersed in the urban when compared to the rural settings in the South African and Ugandan sites (see Figures 1-4). The South African rural setting was characterized by clustered food retail outlets, predominantly formal surrounded by informal vendors (see Figure 2). The Ugandan rural setting was similar;

however, a greater dispersion of food retail outlets was observed overall (see Figure 4). The opposite was true for Sweden: the outlets in the rural area were more evenly spread out when compared to the urban setting, though predominantly located along the main street (see Figure 6). In the urban setting, the outlets were concentrated in a central (retail) area, as well as two streets with some outlets on the periphery of the community (see Figure 5).

Figure 1: Distribution of food retail outlets in urban South Africa

Figure 2: Distribution of food retail outlets in rural South Africa

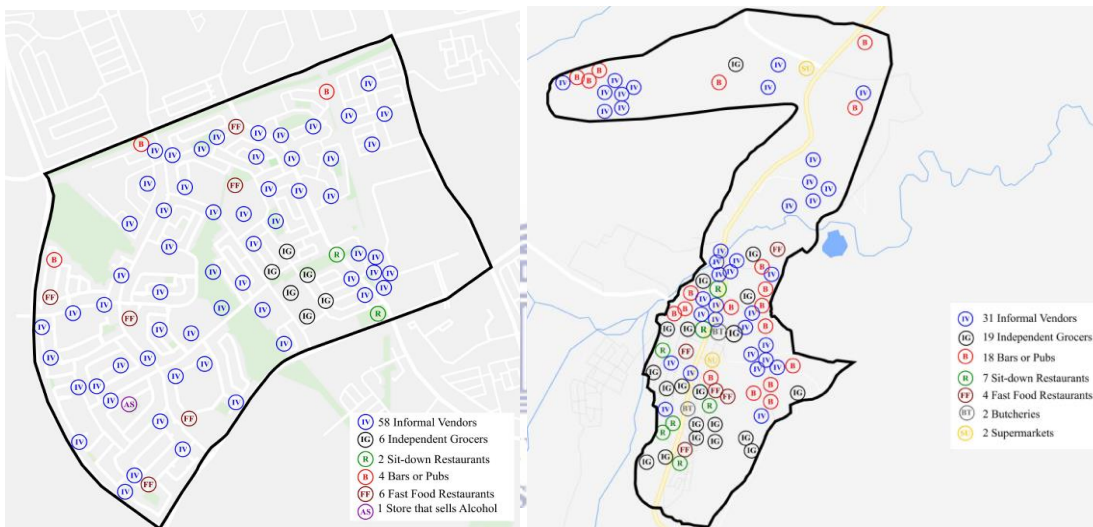


Figure 3: Distribution of food retail outlets in urban Uganda

Figure 4: Distribution of food retail outlets in rural Uganda

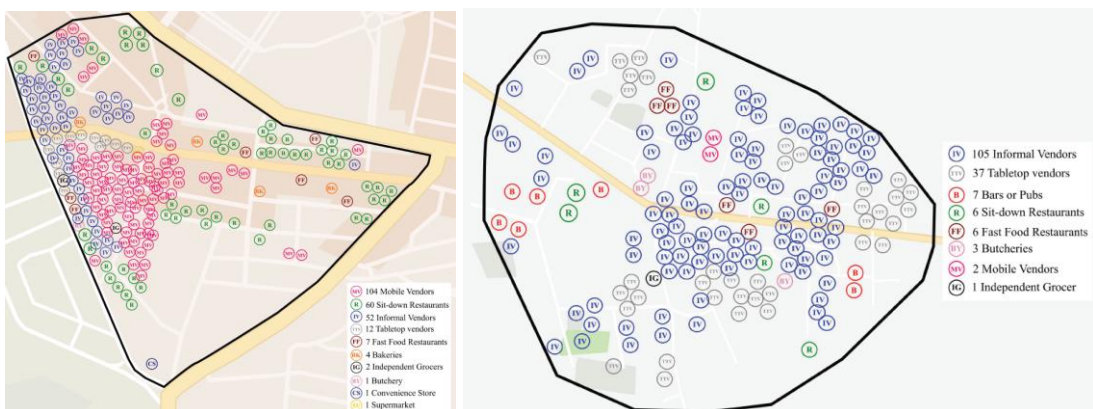


Figure 5: Distribution of food retail outlets in urban Sweden

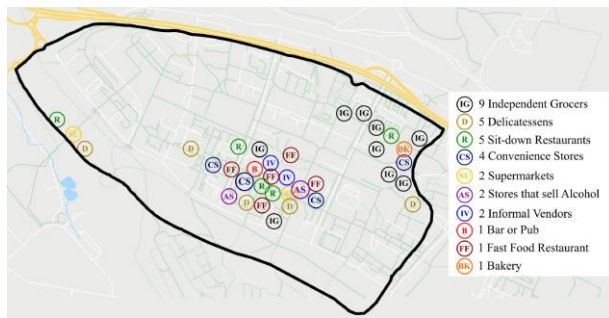
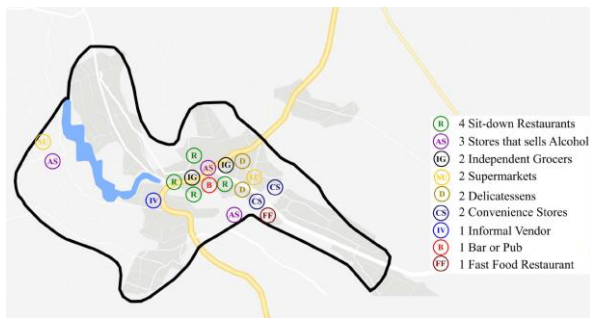
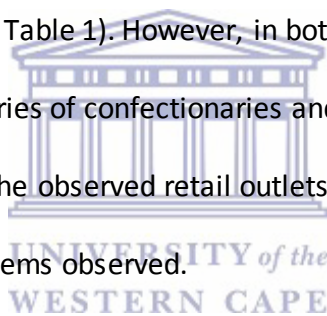


Figure 6: Distribution of food retail outlets in rural Sweden



Presence of food items in food retail outlets

In the South African urban setting, more products ('healthier', 'less healthy', and 'other') were made available across all observed urban retail outlets when compared to those observed in the rural setting (see Table 1). However, in both settings, the 'less healthy' food items observed under the categories of confectionaries and sugar-sweetened beverages were made available at more of the observed retail outlets when compared to fruits and vegetables and the 'other' food items observed.



Findings from both Ugandan settings reflected, to some extent those from the South African site in that more food options ('healthier', 'less healthy' [with the exception of soda and energy drinks], and 'other' [with the exception of bread]) were made available by retail outlets in the urban setting when compared to the rural setting (see Table 1).

This was not the case when it came to the food retail outlets observed in the Swedish settings (see Table 1). All food items ('healthier', 'less healthy' [with the exception of a chocolate bar], and 'other') were made more available in the rural setting when compared to the urban. However, this could be explained by the fact that more outlets observed in the

rural setting in Sweden offered a larger variety of observed food items when compared to those in the urban; also because there were more convenience stores in the urban that did not sell fruits and vegetables. Overall, supermarkets in both Swedish settings offered the largest variety of food options when compared to the other observed food retail outlet types.

Table 1: Availability of food items by study site and setting

Food items	South Africa			Sweden			Uganda		
	Urban 8; Rural 11; Total 19 n (%)†			Urban 7; Rural 6; Total 13 n (%)			Urban 11; Rural 7; Total 18 n (%)		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
'Healthier' items:									
Fruits	5 (62,5)	7 (63,6)	12 (63,2)	4 (57,1)	5 (83,3)	9 (69,2)	8 (72,7)	2 (28,6)	10 (55,6)
Vegetables	5 (62,5)	6 (54,5)	11 (57,9)	4 (57,1)	5 (83,3)	9 (69,2)	7 (63,6)	3 (42,9)	10 (55,6)
'Less healthy' items:									
Biscuits	7 (87,5)	7 (63,6)	14 (73,7)	6 (85,7)	6 (100)	12 (92,3)	6 (54,5)	3 (42,9)	9 (50)
Chips	7 (87,5)	8 (72,7)	15 (78,9)	6 (85,7)	6 (100)	12 (92,3)	5 (45,5)	0 (0)	5 (27,8)
Chocolate bar	7 (87,5)	5 (45,5)	12 (63,2)	6 (85,7)	5 (83,3)	11 (84,6)	5 (45,5)	1 (14,3)	6 (33,3)
Non-diet soda	7 (87,5)	6 (54,5)	13 (68,4)	6 (85,7)	6 (100)	12 (92,3)	6 (54,5)	4 (57,1)	10 (55,6)
Fruit drink	7 (87,5)	6 (54,5)	13 (68,4)	6 (85,7)	6 (100)	12 (92,3)	7 (63,6)	3 (42,9)	10 (55,6)
Energy drink	7 (87,5)	6 (54,5)	13 (68,4)	6 (85,7)	6 (100)	12 (92,3)	6 (54,5)	4 (57,1)	10 (55,6)
'Other' items:									
Breakfast cereal	7 (87,5)	6 (54,5)	13 (68,4)	4 (57,1)	5 (83,3)	9 (69,2)	5 (45,5)	1 (14,3)	6 (33,3)
Bread	6 (75)	5 (45,5)	11 (57,9)	4 (57,1)	6 (100)	10 (76,9)	4 (36,4)	4 (57,1)	8 (44,4)
Pasta	7 (87,5)	5 (45,5)	12 (63,2)	4 (57,1)	6 (100)	10 (76,9)	7 (63,6)	1 (14,3)	7 (38,9)
Milk	7 (87,5)	6 (54,5)	13 (68,4)	4 (57,1)	4 (66,7)	8 (61,5)	5 (45,5)	2 (28,6)	7 (38,9)
Yoghurt	7 (87,5)	3 (27,3)	10 (52,6)	3 (42,9)	6 (100)	9 (69,2)	5 (45,5)	2 (28,6)	7 (38,9)

† % denotes the proportion of urban, rural or total number of stores as applicable for each column

With regard to the availability of fruits and vegetables, supermarkets played a notable role in providing a larger selection of fresh fruits and vegetables in the South African and Swedish settings, apart from one informal vendor in the urban Swedish setting (see Tables 2 & 3). Supermarkets played a less crucial role in this regard in Uganda where open air markets offered the greatest variety in both the urban and rural settings.

Table 2: Availability of fruits by observed retail outlet type, study site, and setting⁹⁵

		Supermarket		Independent Grocer		Convenience store		Informal vendor		Mobile vendor		Market		
		U	R	U	R	U	R	U	R	U	R	U	R	
Urban, Rural	n=	SA	2	2	3	2	2	2	2	2	0	2	0	0
		SW	2	2	2	2	2	2	1	0	0	0	0	0
		UG	2	0	2	2	2	0	2	3	2	1	1	1
Fresh fruit availability		SA	2	2	0	1	1	0	2	2		2		
		SW	2	2	1	2	0	1	1					
		UG	2		0	0	1		2	1	2	0	1	1
Fruits visible from outside the shop		SA	0	2	-	1	0	-	1	2		2		
		SW	0	0	0	0	-	0	1					
		UG	0		-	-	1		2	1	2	-	1	1
Average number of fruits (min,max)		SA	14 (9,19)	24 (9,15)	-	9 (9)	7 (7)	-	5,5 (4,7)	2,5 (2,3)		1,5 (1,2)		
		SW	28,5 (26,31)	25 (23,27)	12 (12)	16 (4,28)	-	4 (4)	48 (48)					
		UG	17 (13,21)		-	-	1 (1)		2 (2,2)	3 (3)	2 (2,2)	n/a	27 (27)	10 (10)

*Conversion rates:
 - signifies unavailability of that item
 ■ A black box indicates that the retail outlet is not present.

Table 3: Availability of vegetables by observed retail outlet type, study site, and setting

		Supermarket		Independent Grocer		Convenience store		Informal vendor		Mobile vendor		Market		
		U	R	U	R	U	R	U	R	U	R	U	R	
Urban, Rural	n=	SA	2	2	3	2	2	2	2	2	0	2	0	0
		SW	2	2	2	2	2	2	1	0	0	0	0	0
		UG	2	0	2	2	2	0	2	3	2	1	1	1
Fresh vegetable availability		SA	2	2	0	3	1	0	2	1		0		
		SW	2	2	1	2	0	1	1					
		UG	2		0	0	0	2	1	0	1	1	1	1
Vegetables visible from outside the shop		SA	0	2	-	3	0	-	1	1		-		
		SW	0	0	0	0	-	0	1					
		UG	0		-	-	-	2	1	-	1	1	1	1
Average number of vegetables (min,max)		SA	35,5 (24,47)	27 (23,31)	-	11 (4,25)	14 (14)	-	12,5 (12,13)	1		-		
		SW	42,5 (41,44)	42 (39,45)	5 (5)	17,5 (12,23)	-	5 (5)	50 (50)					
		UG	12 (2,22)		-	-	-	3 (1,5)	5 (5)	n/a	1 (1)	65 (65)	11 (11)	

*Conversion rates:
 - signifies unavailability of that item
 ■ A black box indicates that the retail outlet is not present.

Regarding the 'less healthy' food items observed: confectionaries and sugar-sweetened beverages had a high presence across all study sites except for rural Uganda (see Table 1).

⁹⁵ SA = South Africa, SW = Sweden, UG = Uganda.

Price

Fruit was observed as being cheaper in the urban settings when compared to the rural across all sites and outlet types (this was not the case for vegetables), except for informal vendors which were consistently the opposite for all observations made in all three settings.

Observations from the South African site revealed the lowest per-kilogram cost of both fruits and vegetables could be found at supermarkets in the urban setting (see Table 4). In the rural setting, the lowest costs for both were observed in the independent grocer, with supermarkets offering similar produce at just over double the price. Convenience stores offered fruits and vegetables at the highest prices in the urban setting, with informal vendors not too far behind. The informal and mobile vendors observed offered produce at similar prices in the urban settings.

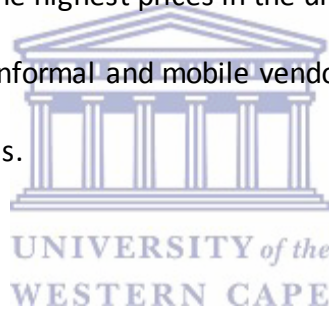


Table 4: Cheapest observed food items - South Africa

	Fruit	Veg	Bread	Milk	Chips	Soda	Energy drink
-- (Intl.\$)†--							
Urban							
Supermarket	1,15 /kg orange‡	0,66 /kg carrot	0,99 (600g) brown and white	1,15 (1l) medium fat	0,49 (20g)	0,79 (500ml)	1,32 (500ml)
Independent Grocer	-	-	1,82 (700g) brown	0,83 (1l) full cream	0,08 (22g)	0,66 (300ml)	1,65 (500ml)
Convenience store	1,65 /kg satsuma	1,24 /kg cabbage	1,90 (700g) brown	1,02 (250ml) full cream	0,17 (20g)	1,24 (500ml)	0,64 (440ml)
Informal vendor	1,32 /kg orange	1,24 /kg carrot	1,90 (700g) brown	1,65 (1l) full cream	0,08 (20g)	1,49 (440ml)	1,65 (500ml)
Mobile vendor							
Market							
Urban average	1,37 /kg	1,05 /kg	1,65	1,16	0,20	1,05	1,32 /kg
Rural							
Supermarket	1,65 /kg Orange	0,66 /kg cabbage	0,99 (600g) brown	0,82 (250ml) full cream	0,49 (30g)	0,82 (300ml)	1,15 (440ml)
Independent Grocer	0,82 /kg apple	0,58 /kg onion	1,57 (600g) brown	1,15 (250ml) full cream	0,08 (16g)	0,82 (330ml)	1,15 (400ml)
Convenience store	-	-	1,57 (600g) brown	1,16 (250ml) full cream	0,56 (14g)	1,49 (330ml)	1,82 (500ml)
Informal vendor	1,65 /kg banana	2,48 /kg onion	-	-	0,17 (20g)	-	-
Mobile vendor	1,65 /kg bananas	-	-	-	-	-	-
Market							
Rural average	1,44 /kg	1,24 /kg	1,38	1,04	0,33	1,04	1,37

† Conversion rates: SA: /6.060; SW: /9.125; UG: /1098, +2.1%

‡ 0, 66 lemon, replaced since lemons are used as a condiment.

- signifies unavailability of that item

■ A black box indicates that the retail outlet is not present.

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In Uganda, supermarkets were only present in the urban setting where they offered 4 out of the observed 7 food items at the lowest price (see Table 5). In the rural setting, both informal vendors and independent grocers offered the lowest prices on the observed items.

Table 5: Cheapest observed food items - Uganda

	Fruit	Veg	Bread	Milk — (Intl.\$)†—	Chips	Soda	Energy drink
Urban							
Supermarket	1,02 /kg orange	0,47 /kg cabbage	1,86 (500g) white	1,02 (200ml) full cream	0,37 (24g)	0,84 (320ml)	1,67 (320ml)
Independent Grocer	-	-	-	0,78 (200ml) not specified	0,32 (24g)	1,16 (300ml)	2,09 (250ml)
Convenience store	7,81 /kg apple	-	2,33 (500g) white	1,86 (250ml) full cream	0,47 (24g)	0,93 (330ml)	1,86 (320ml)
Informal vendor	1,82 /kg guava‡	0,93 /kg ntula (green leafy)	-	-	-	-	-
Mobile vendor	1,86 /kg tangerines	-	-	-	-	-	-
Market	1,40 /kg papaya	1,40 /kg sweet potato	1,40 (100g) white	1,49 (1l) full cream	-	0,93 (330ml)	1,86 (320ml)
Urban average	2,58 /kg	0,93	1,86	1,29	0,39	0,97	1,87
Rural							
Supermarket							
Independent Grocer	-	-	2,04 (500g) white	0,47 (15ml) full cream milk powder	-	0,93 (320ml)	0,18 (320ml)
Convenience store							
Informal vendor	0,93 /kg orange	0,37 /kg eggplant	2,91 (500g) brown	-	-	0,93 (300ml)	1,86 (320ml)
Mobile vendor	-	0,93 /kg cabbage	-	-	-	-	-
Market	1,86 /kg banana	0,28 /kg eggplant	-	-	-	-	-
Rural average	1,39 /kg	0,53	2,48	1,07 §	-	0,93	1,02

† Conversion rates: SA: /6.060; SW: /9.125; UG: /1098, +2.1%

‡ 0.47 lemon, replaced since lemons are used as a condiment.

§ the average was calculated from the two supermarkets. The other value was 1.67 for 500ml whole milk.

- signifies unavailability of that item

■ A black box indicates that the retail outlet is not present.

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In the Swedish observations, not only did urban supermarkets offer the largest variety of food options, but also made the observed items available at the lowest price (see Table 6). This was not the case in the rural setting, where supermarkets only offered the lowest prices on 4 of the 7 food items observed; independent grocers offered the lowest prices on the remaining 3 items.

Table 6: Cheapest observed food items - Sweden

	Fruit	Veg	Bread	Milk	Chips	Soda	Energy drink
— (Intl.\$)†—							
Urban							
Supermarket	0,76 /kg watermelon	0,77 /kg onion	0,65 (250g) brown and white	0,85 (1l) 0,5% low fat	0,65 (40g)	0,87 (330ml)	0,43 (250ml)
Independent Grocer	2,08 /kg bananas	1,10 /kg onion	0,66 (240g) white	1,21 (1l) 1,5% reduced fat and 3% fat	1,10 (40g)	1,10 (330ml)	1,10 (250ml)
Convenience store	-	-	-	-	0,55 (40g)	0,77 (330ml)	1,10 (250ml)
Informal vendor	1,09 /kg bananas	0,77 /kg cabbage	-	-	-	-	-
Mobile vendor							
Market							
Urban average	1,31 /kg	0,88 /kg	0,66	1,03	0,77	0,91	0,88
Rural							
Supermarket	1,75 /kg satsuma	0,76 /kg cabbage	0,87 (500g) brown	0,98 (1l) 1,5% reduced fat and 3% fat	1,10 (200g)	0,76 (330ml)	0,76 (250ml)
Independent Grocer	1,42 /kg bananas	0,88 /kg onion	0,36 (330g) brown and white	1,21 (1l) 3,2% fat full cream	0,55 (25g)	0,77 (331ml)	0,55 (250ml)
Convenience store	3,28 /kg apple ‡	1,85 /kg onion	1,52 (260g) crisp bread, brown	1,32 (1l) 0,5% low fat and 3% fat	0,98 (35g)	1,49 (330ml)	2,41 (250ml)
Informal vendor							
Mobile vendor							
Market							
Rural average	2,15 /kg	1,16 /kg	0,92	1,17	0,88	1,00	1,24

† Conversion rates: SA: /6.060; SW: /9.125; UG: /1098, +2.1%

‡ 1,85 lemon, replaced since lemons are used as a condiment.

- signifies unavailability of that item

■ A black box indicates that the retail outlet is not present.

Vendor and product properties

Vendor typology

Uganda had the most fast food vendors (formal and informal) (48), compared to South Africa (27) and Sweden (6). In Uganda, the rural setting had three times as many fast food outlets (36) than the urban setting (12). Similarly, the South African rural setting had twice as many fast food outlets (18) than in the urban setting (9). In Sweden, the numbers were much lower, although more were observed in the urban setting (5) than the rural (1). By far the largest number of independent grocers were found in the rural South African setting

(25), followed by the Swedish urban setting (9), and the urban South Africa setting (6). In Sweden, there was only one informal vendor observed in each setting (see Table 7).

Table 7: Food retail outlet tally by study site and setting

Food Retail outlet type	South Africa		Sweden		Uganda	
	Urban	Rural	Urban	Rural	Urban	Rural
Food retail outlets						
Supermarket	2	9	3	2	3	0
Independent Grocer	6	25	9	2	4	2
Convenience Store	0	1	4	2	5	0
Stores with specialty products						
Butcher /meat store	6	3	0	0	0	9
Bakery	0	0	1	0	7	0
Deli/specialty Food Store	1	0	4	2	0	0
Stores that sell alcohol	3	5	2	4	2	3
Food service outlets						
Pubs/Bars	5	17	1	1	2	12
Fast Food vendors	9	18	5	1	12	36
Other sit-down restaurant	2	9	6	4	68	20
Informal food retail outlets						
Informal Vendor -table top	17	112	1	1	18	62
Informal Vendor -brick and mortar	49	35	0	0	52	164
Mobile Vendor	5	1	0	0	117	3
Market	0	0	0	0	1	1

(Note: figures in this table represent the outlets noted in both the 'Food retail outlet tally' as well as the 1km 'Observation walk').



Notably, there were more than 3 times as many pubs/bars in the South African rural setting (15), when compared to its urban counterpart (17). Similarly, in Uganda there were 12 pubs/bars observed in the rural setting, compared to the 2 observed in the urban setting. A similar pattern was observed when it came to fast food vendors (18 in South African rural, 9 in urban; 36 in Uganda rural, 12 in urban).

Informal food retail outlets vastly outnumbered formal food retail outlets in both the South African and Ugandan settings, especially in the rural settings at both sites (see Table 7).

Product/food quality

Supermarkets observed in the Swedish settings had the least amount of damaged fruits when compared to supermarkets observed at the other two sites (see Table 8). The supermarkets observed in the South African settings seemed to offer the most amount of damaged fruits and vegetables, when compared to all other retail outlet types in these settings – this was also the case for markets in both Ugandan settings. There were no damaged fruits or vegetables (when observed) in convenience stores across all 3 sites and settings.

Table 8: Damaged fruits and vegetables by study site and setting⁹⁶

		Supermarket		Independent Grocer		Convenience store		Informal vendor		Mobile vendor		Market	
Urban, Rural		U	R	U	R	U	R	U	R	U	R	U	R
Total number of outlets mapped	SA	2	2	3	2	2	2	2	2	0	2	0	0
	SW	2	2	2	2	2	2	1	0	0	0	0	0
	UG	2	0	2	2	2	0	2	3	2	1	1	1
More than 3 types of fruit appear to be damaged, number of outlets	SA	2	2	-	0	0	-	0	2	-	0	-	-
	SW	0	0	0	1	-	0	1	-	-	-	-	-
	UG	2	-	-	-	0	-	0	1	0	-	1	1
More than 3 types of Vegetables appear to be damaged, number of outlets	SA	1	2	-	0	0	-	0	0	-	-	-	-
	SW	0	1	0	2	-	0	1	-	-	-	-	-
	UG	1	-	-	-	-	-	0	1	-	0	1	1

- signifies unavailability of that item

■ A black box indicates that the retail outlet is not present.

Marketing and regulation

Advertising/promotion

Observations of food product advertising were made in the community as well as inside of the observed food retail outlets. Advertisements promoting a healthy lifestyle in the community were also observed and noted. Additionally, both health and nutrition claims made on product packaging were observed and considered as promotional in nature.

⁹⁶ SA = South Africa, SW = Sweden, UG = Uganda

Overall, observed advertisements in all communities promoting the purchase and/or consumption of unhealthy foods, drinks, and tobacco products vastly outnumbered those promoting healthy lifestyle options. In fact, advertisements promoting healthy lifestyle choices were non-existent in both Ugandan settings, only observed 3 times in the South African settings, with the vast majority (26) being observed in the Swedish settings (see Table 9). This relationship was reversed for advertisements promoting the purchase and/or consumption of unhealthy foods, drinks, and tobacco products: the most in Uganda (247), less in South Africa (111), and the least in Sweden (81) (see Table 10). When observed, advertisements promoting a healthy diet (again, primarily found in the Swedish settings) were overwhelmingly commercial in nature (i.e. for profit).

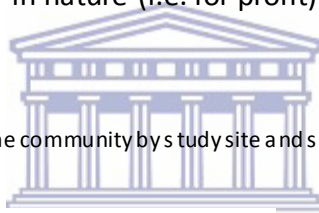


Table 9: Health Promotion (advertising) in the community by study site and setting

Type of promotion	South Africa		Sweden		Uganda		Total
	Urban	Rural	Urban	Rural	Urban	Rural	
Diet (non-commercial)	0	0	1	0	0	0	1
Diet (commercial)	0	1	6	10	0	0	17
Physical activity (non-commercial)	0	0	4	0	0	0	4
Physical activity (Commercial)	0	0	1	1	0	0	2
Signs prohibiting Smoking	0	0	2	1	0	0	3
Smoking cessation	0	2	0	0	0	0	2
Alcohol Cessation	0	0	0	0	0	0	0
Totals	0	3	14	12	0	0	29
Country total	3		26		0		

Table 10: Product promotion (advertising) in the community by study site and setting

Type of Ad	South Africa		Sweden		Uganda		Total
	Urban	Rural	Urban	Rural	Urban	Rural	
'Junk Food'	15	27	36	20	21	2	121
Sugar sweetened beverages	30	8	10	4	27	170	249
Cigarette/ Tobacco product	1	0	1	1	0	0	3
Alcoholic Drinks	15	15	2	7	6	21	66
Total	61	50	49	32	54	193	439
Country total	111		81		247		

The amount of cigarette advertisements observed was low across all three study sites and settings, especially when compared to advertisements promoting the purchase and/or consumption of 'junk food' and sugar-sweetened beverages.

When compared to all other product categories, sugar-sweetened beverages had the most observed instances of nutrition claims on their packaging; and the second most health claims, after grains.

In-store advertising

Overall, supermarkets had the highest number of advertisements as well as for the most product categories, followed by convenience stores and small independent grocers – informal vendors only had advertisements in a few cases (see Figures 7-12). In South Africa, all the supermarkets as well as one convenience store observed had advertisements for fruit and veg (see Figures 7 & 8). The market in urban Uganda had 1-2 ads in most of the product categories, whereas in the rural area the market had no ads at all (see Figures 5 & 6). Urban South Africa had the most in-store ads followed by the urban and rural Swedish sites (see Figures 1, 3 & 4). The only other outlet with fruit and veg advertisements was a supermarket in urban Uganda (see Figure 5). The most common and the largest number of ads were for sugar sweetened beverages and junk food (Figures 10-15). The outlets in Sweden had the most ads for tobacco products.

Figure 3: In-store advertisements in urban South Africa

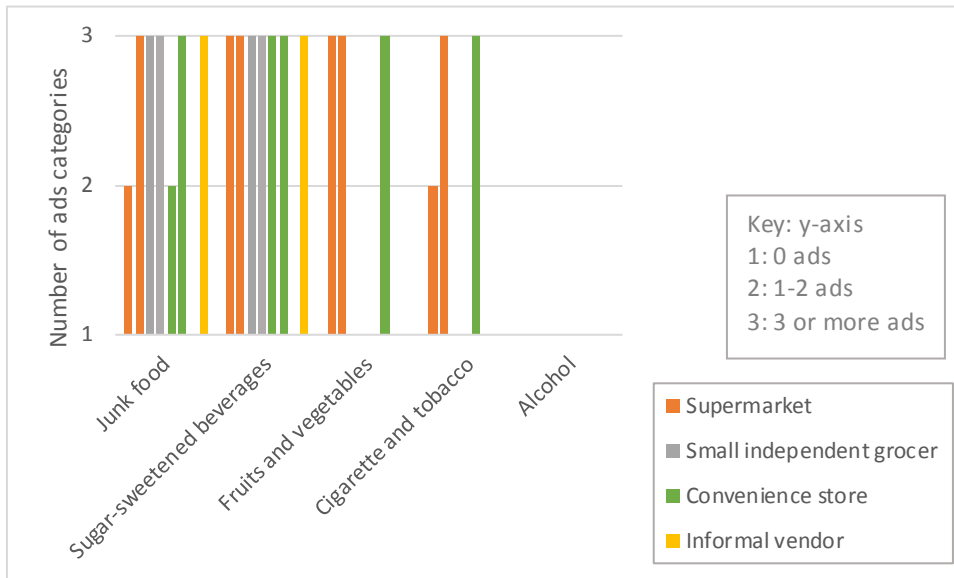


Figure 4: In-store advertisements in rural South Africa

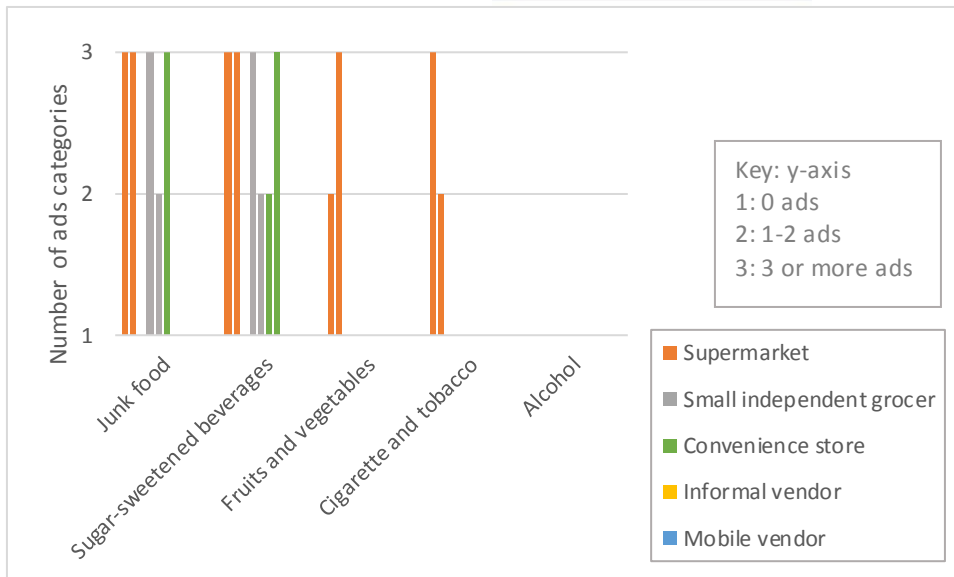


Figure 5: In-store advertisements in urban Uganda

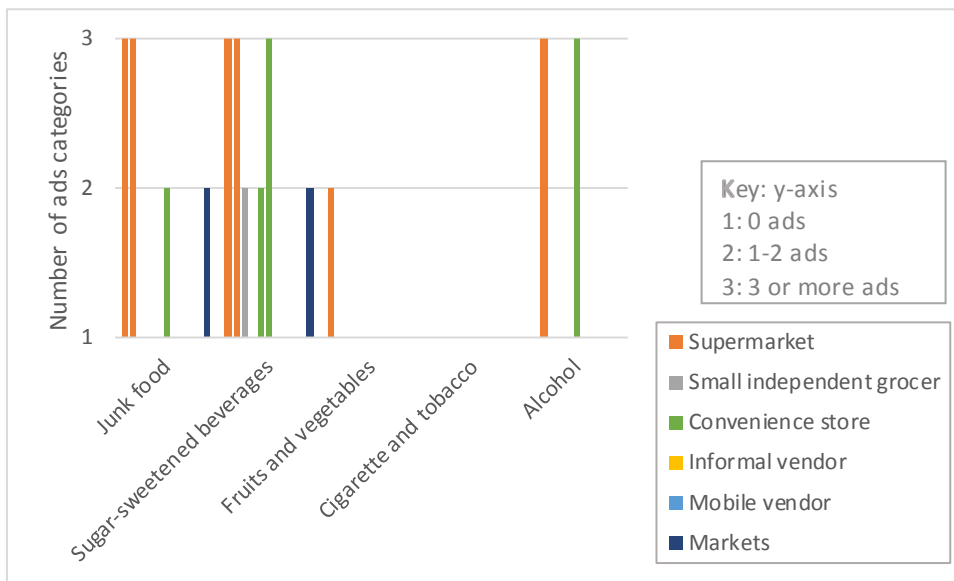


Figure 6: In-store advertisements in rural Uganda



Figure 7: In-store advertisements in urban Sweden

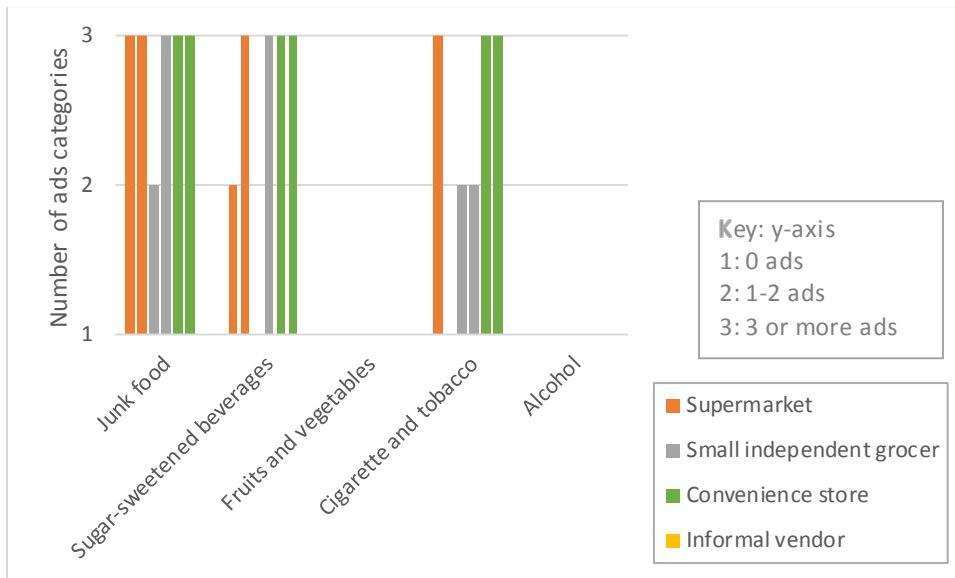


Figure 8: In-store advertisements in rural Sweden



Product labelling

In South Africa, product packages observed at all food retail outlets in the rural area provided more information on the nutritional value of the product when compared to packaged products observed in the urban setting (see Table 11). In both the urban and rural

settings, convenience stores were most likely to stock packaged products with nutritional labelling.

Table 11: Packaged food product labelling - South Africa

	Products with a package	Nutrition info in local language	Presence of ingredients list	Presence of nutrition information panel	Presence of additional nutrition info	Presence of nutrition claim	Presence of health claim
Urban							
Supermarket	n=22	20 (90.9%)	17 (77.3%)	17 (77.3%)	2 (9%)	10 (45.5%)	7 (31.8%)
Independent Grocer	n=21	18 (85.7%)	16 (76.2%)	16 (76.2%)	4 (19%)	7 (33.3%)	3 (14.3%)
Convenience store	n=22	21 (95.5%)	19 (86.4%)	19 (86.4%)	7 (31.8%)	10 (45.5%)	5 (22.7%)
Informal vendor	n=11	10 (90.9%)	9 (81.8%)	9 (81.8%)	5 (45.5%)	5 (45.5%)	3 (27.3%)
Mobile vendor							
Market							
Urban total	n=76	69 (90.8%)	61 (80.3%)	61 (80.3%)	18 (23.7%)	32 (42.1%)	18 (23.7%)
Rural							
Supermarket	n=22	20 (90.9%)	19 (86.4%)	18 (81.8%)	3 (13.6%)	9 (40.9%)	3 (13.6%)
Independent Grocer	n=18	18 (100%)	15 (83.3%)	15 (83.3%)	3 (16.7%)	6 (33.3%)	5 (27.8%)
Convenience store	n=20	20 (100%)	17 (85%)	20 (100%)	6 (30%)	7 (35%)	5 (25%)
Informal vendor	n=3	2 (66.7%)	2 (66.7%)	2 (66.7%)	0 (0%)	1 (33.3%)	0 (0%)
Mobile vendor	n=0	0	0	0	0	0	0
Market							
Rural total	n=63	60 (95.2%)	53 (84.1%)	55 (87.3%)	12 (19.0%)	23 (36.5%)	13 (20.6%)

The categories presented in this table are not mutually exclusive.



Similar to the South African observations, product package labels observed in the rural Ugandan setting provided more information on the nutritional value of the product when compared to packaged products observed in the urban setting (see Table 12). Although supermarkets were not too far off, independent grocers seemed to stock the highest percentage of packaged products that had nutritional information labelling.

Table 12: Packaged food product labelling - Uganda

	Products with a package	Nutrition info in local language	Presence of ingredients list	Presence of nutrition information panel	Presence of additional nutrition info	Presence of Nutrition Claim	Presence of Health Claim
Urban							
Supermarket	n=22	21 (95.5%)	17 (77.3%)	15 (68.2%)	3 (13.6%)	3 (13.6%)	9 (40.9%)
Independent Grocer	n=14	12 (85.7%)	10 (71.4%)	11 (78.6%)	2 (14.3%)	3 (21.4%)	2 (14.3%)
Convenience store	n=17	17 (100%)	14 (82.3%)	14 (82.3%)	1 (5.9%)	3 (17.6%)	5 (29.4%)
Informal vendor	n=0	0	0	0	0	0	0
Mobile vendor	n=0	0	0	0	0	0	0
Market	n=4	3 (75%)	3 (75%)	3 (75%)	0 (0%)	0 (0%)	1 (25%)
Urban total	n=57	53 (92.9%)	44 (77.2%)	43 (75.4%)	6 (10.5%)	9 (15.8%)	17 (29.8%)
Rural							
Supermarket							
Independent Grocer	n=17	17 (100%)	15 (88.2%)	12 (70.6%)	2 (11.8%)	4 (23.5%)	5 (29.4%)
Convenience store							
Informal vendor	n=8	8 (100%)	8 (100%)	5 (62.5%)	0 (0%)	1 (12.5%)	1 (12.5%)
Mobile vendor	n=0	0	0	0	0	0	0
Market	n=0	0	0	0	0	0	0
Rural total	n=25	25 (100%)	23 (92.0%)	17 (68%)	2 (8%)	5 (20.0%)	6 (24.0%)

The categories presented in this table are not mutually exclusive.

With regards to product labelling in Sweden, there were no noteworthy differences between the urban and rural observations, or between retail outlets within these settings.



Discussion

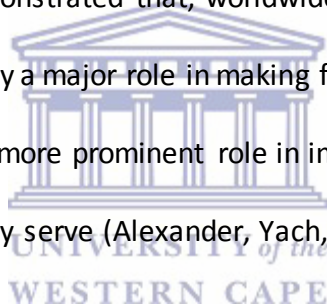
From the perspective of NCD intervention, specifically focusing on self-management of diabetes, in part through food acquisition and diet, the main results include: 1) the availability and dispersion of food retail outlets in all three settings; 2) the abundant presence of informal vendors in the South African and Ugandan settings, as well as the role supermarkets play in making all observed food items more available in almost all settings; and 3) the observed aggressive marketing of unhealthy foods in the South African and Ugandan settings versus the Swedish.

Availability

Generally, and somewhat expected, food retail outlets were found to be more evenly dispersed in the urban when compared to the rural settings at the South African and Ugandan sites. This was not the case for the retail outlets observed in the Swedish settings.

Vendor and product properties

Informal vendors vastly outnumbered formal food retail outlets at both the South African and Ugandan sites (especially in the rural settings), indicating an important role being played by these vendors in making food items (healthy or otherwise) available to consumers in these settings. It has been demonstrated that, worldwide, the informal sector (as well as other small-sized enterprises) play a major role in making food items available to the public, and consequently need to play a more prominent role in improving the nutritional status and health of the populations they serve (Alexander, Yach, & Mensah, 2011).



Supermarkets were often found to offer the widest variety of fresh fruits and vegetables (although of the lowest quality in both the South African and Ugandan settings), and also frequently offered these food items at lower prices when compared to other observed food retail outlets. However, supermarkets also played a role in making 'less healthy' items more available and affordable in a lot of the settings. The impact of the ever-increasing presence of supermarkets on the food environment and resulting health of the communities in which they operate is still debated in the literature: Some have argued that the introduction of these retail outlets into these communities has been positive because of their ability to offer lower food prices and bring in fresher and safer food options (Reardon & Minten, 2011). However, others have pointed out that the larger unit sizes offered by supermarkets may be

unaffordable for the poorest, and that these outlets are often situated in inconvenient locations in poor-resourced settings (e.g. not easily accessible via public transportation) (Battersby, Marshak, & Mngqibisi, 2017). Additionally, and as found in this study, these food retail outlets also play a role in making less healthy food options available to communities that otherwise would not have access to the food items – thus accelerate the nutrition transition (Battersby & Peyton, 2014).

Marketing and regulation

Advertisements promoting less healthy food and beverage products, as well as those promoting tobacco products (observed most in Uganda, then SA, then Sweden) vastly outnumbered those promoting health (observed most in Sweden, then SA, then Uganda) across all study sites and settings. Additionally, the 'less healthy' food product items observed at retailers were more likely to have a health and/or nutrition claim on their packaging. Food advertising plays a significant role in influencing food acquisition behaviours, especially when it comes to children. More particularly, evidence shows that the marketing of unhealthy food and non-alcoholic beverages to children results in negative health outcomes, including higher levels of overweight and obesity (Cairns, Angus, & G., 2009) (Escelante de Cruz, 2004) (Hastings, McDermott, Angus, Stead, & Thomson, 2006) (Hastings G, 2003) (Livingstone, 2006) (McGinnis, Gootman, & Kraak, 2006) (Dalmeny, Hanna, & Lobstein, 2003). However, food marketing is amenable to intervention at the policy level, as is the case with tobacco advertising and promotion: in tobacco control, guided by the Framework Convention on Tobacco Control (WHO, FCTC, 2003), coordinated, evidence-based policies have resulted in lower consumption rates. Policies regulating the advertisement and promotion of tobacco products are present in all three study sites and

associated settings, and as a result our mapping efforts found very little tobacco advertising present in these communities. Similarly, stronger government policies and actions that increase the healthiness of food environments (such as taxes on less healthy food products, consumer friendly package labelling regulations, and advertising/promotion restrictions on unhealthy food and beverage items) could go a long way in changing the food-related landscapes in these settings, and ultimately in reducing diet-related NCDs (Hawkes, Jewell, & Allen, 2013).

Implications for NCD interventions

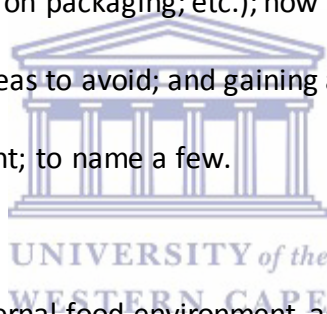
These study findings have implications when considering issues of accessibility to healthy foods as part of the self-management of diabetes, or any other diet-related NCDs.

Promoting supportive physical environments, and the implementation of peer support initiatives are two key community-based strategies adopted as part of the SMART2D study in order to better facilitate self-management efforts (Guwatudde & al, 2018). The findings from the modified EPOCH assessment will inform the facilitator discussion guides for peer support in South Africa and Sweden, where the environmental component of the intervention is stronger. This is mainly in the form of exercises that encourage interaction among participants with each other or their care companions (friends or family who are a part of their care process) on different aspects related to a healthy dietary lifestyle. Some examples include: how to navigate their respective food environments in terms of affordable healthy foods i.e., where can participants expect to look for healthier food options (formal vs. informal vendors; supermarkets vs convenience stores; etc.) at the most affordable prices; ways to overcome issues related to the availability (or lack thereof) of vendors stocking healthier food products, e.g. ride-sharing initiatives or co-ops among

participants; or plan for the creation and maintenance of a community (or household) garden.

In more general terms, these findings could guide the development of context-specific pointers to enable populations to proficiently navigate their food retail environments.

Pointers may include: how to find the best deals on healthy food items (coupons; identifying times of the week/month when certain items may go on sale); in-store demonstration or training to read nutritional information on packaged products (i.e. what ingredients to look for; how to read nutritional information; how to be discerning about health and nutrition claims made on packaging; etc.); how to navigate supermarket aisles to find healthier items and which areas to avoid; and gaining a better understanding of in-store advertising and product placement; to name a few.

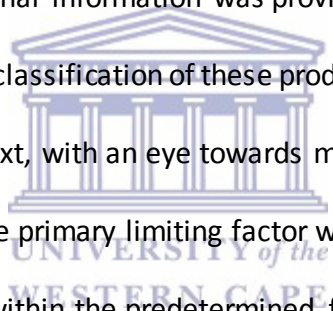


Although findings from these external food environment assessments are meant to inform the implementation of specific intervention strategies within specific settings, their nature ultimately speaks to the need for more effective regulations that would address key food environment-related factors on a larger scale. Well-informed intervention-level strategies may only be impactful for study participants. If wider-spread and sustainable impacts with regard to diet-related NCD outcomes are to be realized in these settings (and beyond), policy-level interventions are required.

Methodological considerations

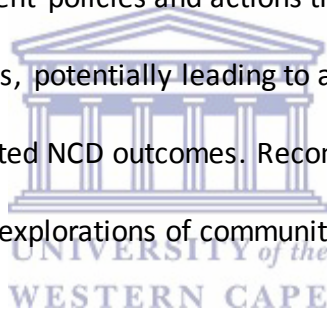
This food environment mapping effort was conducted at existing study sites in three countries and just two settings per country (1 urban and 1 rural) were included. The settings

were spread across different area sizes, and had varying populations, income levels, and demographics, among other things and were not selected to be representative of other similar settings in each country. Thus, findings are not generalizable. Rather, the EPOCH tool was adapted to take a 'snapshot' that would be representative of each study setting. The adaption also reoriented the tool towards an NCD perspective – a greater focus on fruits and vegetables was included, including the noting of all fruits and vegetables available in selected retail outlets, and the recording of the cheapest fruit and vegetables (within categories) at said outlets. The adapted tool also allowed for the collection of more detailed product specific information to help determine whether the items were indeed 'healthier' or 'less healthy' and what nutritional information was provided by these products to consumers. Issues regarding the classification of these products presented themselves and were accounted for in each context, with an eye towards maximum consistency across the three study sites and settings. The primary limiting factor with regard to the packaged products was that certain items within the predetermined food categories are not consumed equally as part of local diets in the three countries. This was pre-empted as much as possible by consulting with local, in-country partners when selecting food items to be included in these categories. However, this still means that price and availability comparisons can be misleading since a high price or lack of availability may reflect that it is a luxury item, rather than reflecting poor availability of a 'staple' item. Overall, taking an NCD perspective when adapting the EPOCH tool helped to limit the amount of data to be collected and was a clear frame to work within, allowing for more relevant in depth information to be collected as well as an effective overview of the external food environments in the mapped settings.



Conclusion

Findings serve to highlight the need to better identify and understand local external food environments towards better contextualization of diet-related NCD intervention strategies. The availability and dispersion of food retail outlets; the large presence of informal vendors in the South African and Ugandan settings, and the role of supermarkets in making all observed food items more accessible; and the observed aggressive marketing of unhealthy foods in the South African and Ugandan settings versus the Swedish are relevant to develop and implement context-relevant intervention strategies. Although findings are meant to inform intervention initiatives within specific study settings, their nature also speaks to the need for more effective government policies and actions that would improve the 'health' aspect of these food environments, potentially leading to a more wide-spread and sustainable reduction in diet-related NCD outcomes. Recommendations for future research opportunities include qualitative explorations of community perspectives on navigating these local food environments.



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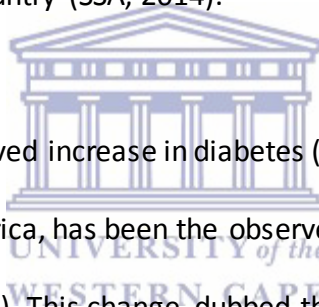
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CHAPTER 6 – Community perspectives on local food environments, diet, and the self-management of diabetes in urban and rural South Africa: A Photovoice study

Background

Diabetes, a serious disease resulting in significant morbidity and early mortality, is a major global concern that is currently on the rise: global prevalence rates among adults have increased from 4.7% in 1980 to 8.5% in 2014 (Mathers & Loncar, 2006), with the World Health Organization predicting that by the year 2030, 366 million individuals will be living with the disease (Wild, Roglic, Green, Sicree, & King, 2004). Following the current trends of other non-communicable diseases (NCDs), this upsurge in diabetes has increasingly been observed in low- and middle-income countries (LMICs) (WHO, 2016). South Africa is no exception, with diabetes being the 4th leading underlying cause of death, contributing to around 6% of all deaths in the country (SSA, 2014).



A major contributor to this observed increase in diabetes (as well as other diet-related NCDs) in LMICs, such as South Africa, has been the observed change in diet at the population level (Popkin B. , 2001). This change, dubbed the ‘nutrition transition’, is characterised by a move from traditional diets (i.e. those based largely on staple grains or starchy roots, legumes, vegetables and fruits but minimal animal foods) towards a ‘western’ diet consisting of more energy-dense, processed foods, with more added sugar, salt and fat, and more foods of animal origin (Popkin B. , 1994).

Implicated in this degradation of diet are changing local food environments, defined here as “the interface that mediates one’s food acquisition and consumption within the wider food system... encompass(ing) multiple dimensions such as the availability, accessibility, affordability, desirability, convenience, marketing, and properties of food sources and products” (Turner, 2017). A growing body of research implicates a swiftly changing food

environment dominated by the 'western' diet as a primary contributor to the observed increasing levels of chronic diseases, over and above individual factors such as knowledge, attitudes, and behaviours (Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008). Simply put: unhealthy food environments foster unhealthy diets. With food environments in South Africa increasingly being dominated by food retail outlets vending the 'western' diet (Ledger, 2017), it is no wonder that we are experiencing an increase in diet-related NCDs.

Consequently, there has been a call for the primary prevention of diabetes through multi-level interventions across the country (Bradshaw, Norman, Pieterse, & Levitt, 2007) (Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008) (Ledikwe, et al., 2006) (Pérez-Escamilla, et al., 2012), including interventions that attempt to alter the social and physical environment in a way that works towards achieving widespread reductions in the incidence and prevalence of the disease (Colagiuri, Colagiuri, Yach, & Prammings, 2003). In order to best tailor such interventions, it is wise to first understand how the social and physical environments play a role in shaping diet, especially from the perspective of those living in these environments/communities. To this end, this study aims to gain qualitative insights into how those self-managing their diabetes interact with, and navigate their local food environments in both an urban and rural setting; and more specifically, what (and how) aspects of these physical environments influence their food acquisition behaviours.

Methods

The research outlined in this article was carried out as part of an ongoing larger, multinational study on diabetes self-management conducted in South Africa. This larger study, titled *People centred approach to self-management and reciprocal learning for the*

prevention and management of type 2 diabetes (SMART2D) aims to strengthen capacity for T2DM prevention and management, partly by taking into account the need for both community perspectives and participation. SMART2D advocates for contextualization as a key factor in project implementation, recognizing the importance of understanding the environment in which participants function on a daily basis as key to intervention impact and sustainability (Saulnier, 2018).

To this end, the study outlined in this Chapter adopted an established community based participatory research methodology known as Photovoice to better understand diabetic community members' perspectives on their food environments in both an urban and rural setting in South Africa. An approach developed primarily for use with underserved populations, Photovoice is a tool for understanding a social problem from the perspectives of community members (Wang & Burris, 1997). Essentially, as part of this approach community members become co-researchers as they are asked to take photographs that best answer or address key questions dealing with a particular health-related issue – in this case, the role of food environments and diet in diabetes self-management. Through the process of 'participatory analysis' (Wang, Yi, Tao, & Carovano, 1998), participants identify common issues and themes through their photographs and other means, and record the findings.

Participants

Urban Photovoice participants were recruited from the existing SMART2D study cohort based on existing SMART2D study participant eligibility criteria; i.e. male or female adults aged 30-75 years old, residing in the selected areas for at least 6 months prior to study

enrolment, being able to provide written informed consent, being the only person selected from the same household, and being diagnosed with T2DM. For this study, participants were also sampled from a second study cohort in a rural site in South Africa in order to compare findings between these settings. This rural study cohort was part of a separate study titled the *Prospective Urban Rural Epidemiology* (PURE) study – a large prospective observational study designed to investigate the relative contribution of societal influences on individual lifestyle choices and cardiovascular disease risk factors in low-income and middle-income populations. The sampling frame used for the PURE study is reported elsewhere (Teo, Chow, Rangarajan, & Yusuf, 2009). For the purposes of this study, a random list of diabetic PURE study participants was generated, and used to recruit rural participants. The same selection criteria were observed across the two study sites. The target sample size for each site was 10 participants.



Procedures

Before taking any photographs, participants took part in workshops in which they were oriented to the aims and objectives of the study, as well as Photovoice as a research tool. One workshop was convened per site and conducted in English as well as the local language (isiXhosa). A brief training on photographic techniques was also provided during these workshops and discussions held on the meaning and perception of food, places of daily food acquisition, and frequency of acquisitions. Key terms relevant to the study were also defined and discussed, including 'food environment', which was broadly defined as community factors that directly relate to the availability, accessibility, affordability, desirability, convenience, and marketing of food.

As part of the workshops, participants were asked two key questions about their local food environment: 1) 'What in your community makes it easier for you to eat healthy'; and 2) 'What in your community makes it harder for you to eat healthy'. Participants were issued with journals and responded to these questions by writing exhaustive lists in these journals and selecting the top two factors in answer to each question (total of four factors). They were then asked to go out into their communities and take photographs that best represented these top factors (total of four photographs). Photographs were numbered and assigned a title and a caption, which were recorded in their journals. Each title and caption described the contents of the photograph and why the participant felt that this part of their local food environment either made it easier or harder for them to eat healthy.



Data Analysis

Photograph titles and captions that were written in isiXhosa were translated into English, and then back-translated into isiXhosa. The resulting English texts were analysed using a theoretical, or deductive thematic analysis approach (Braun & Clarke, 2006), in which the existing constructs of availability, accessibility, affordability, desirability, convenience, and marketing were considered. These constructs were based on an established definition of a food environment, more specifically the dimensions therein that mediate one's food acquisition and consumption (Turner, 2017). These constructs were used to not only guide participant discussion and photography, but also as guiding themes in the analysis process. Steps in the thematic analysis approach included: 1) familiarization with the data – data sets were read through multiple times to familiarize coder with the material; 2) coding – existing constructs/themes based on the above mentioned definition of food environments were coded for (the coder also made allowances for emergent themes); 3) searching for

prominent themes – prominent themes were identified based on the frequency of which they were raised by the participants; and 4) reviewing identified themes – texts associated with themes, and the possibility of overlap between them, were reviewed and finalized. The photographs themselves were not included in the analyses presented in this Chapter, as their primary purpose was to act as a visual representation of the perspectives of participant community members. However, photographs are still presented in this Chapter as results in order to provide visual context to themes shared.

Ethical clearance for this study was obtained through the University of the Western Cape's Higher Degrees Committee. Informed consent was sought and granted from each participant. Participants from both sites received refreshments and a small incentive for their participation.



Results

In the rural site, 9 community members participated in the workshop and subsequent Photovoice activity, 8 of whom were female. In the urban site 8 community members participated, all of whom were female. The target sample of 10 participants for each site was not achieved due to unforeseeable circumstances on the morning of the workshops that prevented certain invited participants from attending. The overrepresentation of females in both groups was not intentional but was merely a reflection of the larger study samples. However, it is known that in these settings it is primarily women who make household food acquisition choices, and thus have to interact and familiarize themselves with their local food environments.

Rural results

The 9 rural participants produced a total of 17 titled and captioned photographs representing what in their communities makes it easier to eat healthy, and 18 representing the factors that make it harder. All rural participant feedback fell primarily into four themes: accessibility, affordability, availability, and desirability.

Accessibility

During the workshop, many rural participants discussed the problem of long distances to travel to access healthy foods. This theme was also a major point raised through their photographs and accompanying captions. Specific feedback focused primarily on long distances to local supermarkets and surrounding informal fruit and vegetable vendors, which were often the primary/only source of fruits and vegetables. As part of this concern were the high costs of the often-multiple forms of public transportation needed to access these outlets. Participants also reported the somewhat long distances needed to access local 'spaza' shops (smaller, convenience-type retail outlets, often run out of someone's home) which, in most instances do not even stock healthy foods [see Figure 1].

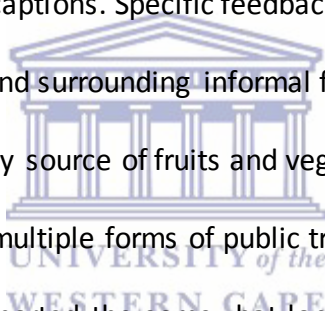


Figure 9: 'Distance' (Rural)



Caption: *“It is difficult for me to eat healthy because the stores are far. So I have to spend money on transport. The spaza shop do not sell healthy food. Even the distance to fetch water is too far.”*

Additionally, almost all rural participants mentioned the household production of food (livestock and/or fruit and vegetable gardens) as either a positive or negative factor in their acquisition of healthy foods – positive, because home gardens allowed them to access healthy fruits and vegetables at very little expense, and household owned livestock gave them access to meat, milk, and/or eggs [see Figure 2]; negative, because 1) of current drought conditions making it almost impossible to grow anything in their home gardens, and having a negative impact on livestock as far as milk and egg production goes (as well as death of cattle due to no “green grass” to eat) [see Figure 3], and 2) a lack of fencing around their gardens which would otherwise protect their crops from wandering livestock [see Figure 4].

Figure2: 'My poultry farm' (Rural)



Caption: *"Protein was recommended by the doctor, he said I can have my starch with veggies and protein so I do not buy meat or eggs."*

Figure3: 'Cow and grass' (Rural)



Caption: *"In summer I get milk from the cows but in winter it is dry and the cows do not produce enough but I still get it from them."*

Figure4: 'Fence' (Rural)



Caption: *"I have a garden and I used to grow vegetables in it. I do not grow them anymore because of my fencing. If I grow anything in this garden my neighbour's goats get inside and eat everything. My neighbours do not do anything about that. So I decided to just leave it until I get enough money to mend my fence."*

Affordability

Although government grants were mentioned as assisting the participants financially, the high cost of healthy foods was still a concern [see Figure 5]. Rural participants indicated that 'specials' on certain food items, particularly at month-end helped greatly in acquiring healthy foods [see Figure 6]. More local retail options for food (primarily 'spaza' shops) were reported as "very expensive" and as not stocking healthy items [see Figure 8]. Overall feedback suggested high levels of knowledge regarding where to shop for the best deals.

Figure 10: 'Government support grant' (Rural)



Caption: "Government is trying by all means to make things easier by supporting us financially; however, that money is not enough. The prices of food is very high and I have other commitments that needs money."

Figure6: 'Low prices' (Rural)



Caption: "Big supermarkets, like Shoprite make it easier for us to eat healthy because they always have specials on their items. Before I go to the store, I always check what's on special, especially the vegetables."

Figure 7: 'Specials in supermarkets' (Rural)



Caption: "In town it is easy to buy healthy stuff at reasonable prices. Even if it is not a month-end they have specials and I like buying things on specials."

Figure 8" 'Spaza shops' (Rural)



Caption: "Local spaza shops are expensive and they do not sell vegetables so it is hard for me to eat healthy if I will depend on them."

Availability

As previously pointed out, supermarkets were almost always mentioned in a positive light, primarily because of their stocking of fruits and vegetables [see Figure 7]. However, some rural participants mentioned during the workshops and as part of their extended lists of what hinders them from acquiring healthy foods, that rotten produce in these outlets was a concern. 'Spaza' shops were always mentioned in a negative light by rural participants, primarily because they did not stock healthy items, but also because of the high cost of items stocked in these outlets [see Figure 8].

Desirability

In addition to (and often included in) the above outlined themes, a theme involving issues of 'food safety' emerged from rural participant feedback. Although not included in their final list of the top two things in their local food environments that make it harder for them to acquire healthy foods, concerns were raised by multiple participants regarding the poor quality of produce available to them in both the supermarkets and local food retail outlets, as well as the fact that packaged products that are in their price range are often past their expiration dates, making them less desirable for consumption, but more affordable.

Urban results

The 8 urban participants produced a total of 16 titled and captioned photographs representing what in their communities makes it easier to eat healthy, and 15 representing the factors that make it harder. All urban participant feedback fell primarily into four themes: accessibility, affordability, convenience, and an emergent theme involving household dynamics.

Accessibility

Similar to those living in the rural setting, supermarkets were seen by the urban participants as an aspect of their food environment that made it easier for them to access healthier food options. The proximity of these food retail outlets to their homes, as well as the lower prices of food were given as the main reasons for this [see Figure 9].

Figure 9 "Supermarket" (Urban)



Caption: "It is easy for me to shop as I do not have to go to town as Shoprite, Goal and Boxer are nearby. And also if you do not have money you can get specials at the stores."

Similar to the rural participants (although not raised quite as much) those living in the urban setting reported household food gardens as both a positive and negative aspect of their food environment. One participant reported that "It is easy to plant the food myself in my plot. I got plot at home." However, most participants shared their concerns regarding the lack of space for gardening in their communities, as well as the unproductive land which did not allow them to grow produce [see Figure 10].

Figure 10 "Piece of Land" (Urban)



Caption: "In this picture I want to show how much land is left for me to plant vegetables. And the soil is infertile as we throw rubbish on it and is also sand soil which is unhealthy for the plants to grow easily"

The presence of multiple transportation options was mentioned as a factor that assisted urban participants in accessing food at malls and larger market places [see Figure 11].

However, the cost of this transportation was mentioned as a barrier to access by a number of participants – this seemed to be primarily for those who reported limited or no employment within the household [see Figure 12].

Figure 11 "Transport" (Urban)



Caption: "Transport is accessible to travel to the malls and market places. I am staying far away from the taxis and buses, [transport] makes it more easier for me to go around."

Figure 12 "Transport" (Urban)



Caption: "I have no money to get the transport because I'm not working."

Contrary to what was reported in the rural setting, informal food outlets (i.e. fruit stalls and 'spaza' shops) were always mentioned as a factor that made it easier for participants to access healthier food options in the urban setting [see Figure 13].

Figure 13 "Street Vendor" (Urban)



Caption: "I prefer to have a fruit and veg street vendor that makes it easy for me to buy vegetables in the street. It makes it easy for me to cook because I don't have to go to town to get vegetables. It is also good for people like me to have veggies for my health as I am diabetic."

Affordability

Lack of employment and a steady income was raised multiple times by urban participants as a barrier to accessing healthy food [see Figure 14]. Primary concerns under this theme included the high prices of healthy food items, transportation costs to acquire these food items, and not being able to afford to maintain a garden to grow some of these food items.

Figure 14 "Hard" (Urban)



Caption: "It is hard for me to eat healthy because I cannot afford to buy healthy food as it is expensive. I am unemployed."

Convenience

Fast food outlets (whether corporate or informal) were mentioned by a number of urban participants as something within their community that did not make it easy for them to eat healthy [see Figures 15 & 16]. Not only the presence of these outlets, but also the advertising of their food options, their low cost, and their convenience were all reasons given for this. Although these types of outlets were present in the rural setting, this was not raised by the rural participants as either a positive or negative aspect of their local food environment.



Figure 15 "Fast Food" (Urban)



Caption: "Even when I don't want to eat unhealthy foods, I end up eating them because of the cravings and because they are closer to me, I see it everyday"

Figure 16 "Tshisanyama" (Urban)



Caption: "I know the things I am supposed to eat but what it's difficult"

Household dynamics (emergent theme)

Preparing and enjoying meals within the home was mentioned as something that both assisted, and hindered urban participants in eating a healthy diet. Some participants felt that they could control what went into the meals: “What makes it easy, is when I cook, I am careful of the things I put in which are not recommended by the doctors and then I dish my portion aside so that it doesn’t get mixed with other people’s.” However, this was also mentioned as sometimes out of their control, especially when others prepared the meals. One participant pointed out that “At home we celebrate each one’s birthday. We have cake, braai etc. which is not easy for me to say no to; the tempting nice food stimulates the need to eat” [see Figure 17].



Figure 17 "Family Support" (Urban)



Caption: “They buy for me, it is difficult because they do not ask what they should buy me.”

Overall results

Overall, it was clear during all interactions with participants from both sites that they shared a high level of knowledge and awareness regarding healthy food options. When asked to

give examples of healthy food items available to them in their communities, the list included those recommended for consumption by local government authorities. Participants (predominantly those from the urban site) also pointed out that they were instructed to eat these foods by the healthcare professionals with whom they had interacted at their local healthcare facilities, especially in relation to their self-management of diabetes. However, this level of knowledge did not always seem to translate into healthy eating habits, primarily as a result of the themes outlined above. When asked what food means to them, common answers from the participants included 'health', 'life', 'energy', 'home', and 'sharing'.

With regard to navigating their food environments, it was also apparent from very early on that the study participants were very aware of the cost of healthy and non-healthy food items, and which food retail outlet had the best prices at what times of the month. Most participants reported that they would shop at a supermarket once a month (usually at month end when salaries and/or government grants become available) for staple and/or more bulk-type items; and then supplement these items on a more daily basis with purchases made at nearby 'spaza' shops (although because of higher prices and lower quality food items at these retail outlets, purchases here were often only made when necessary).

Discussion

The 3 A's – Accessibility, availability, and affordability

The accessibility, availability, and affordability of healthy food items were raised by participants at both sites as the major concerns related to eating a healthy diet as part of

their self-management of diabetes. The following four aspects related to these themes (and raised multiple times by participants) are worth touching on:

1. Supermarkets

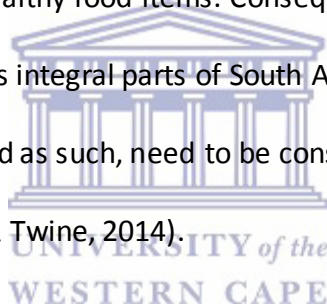
As supermarkets have become more and more commonplace in both urban and rural communities across South Africa (Battersby, 2017), the impact of their presence in local food environments, and more particularly the food security and health of those living in these communities has been debated. Some have argued that the introduction of these retail outlets into these environments/communities has been positive because of their ability to offer lower food prices and bring in fresher and safer food options (Reardon & Minten, 2011). However, others have pointed out that the larger unit sizes offered by supermarkets may be unaffordable for the poorest, and that these outlets are often situated in inconvenient locations (e.g. not easily accessible via public transportation) (Battersby, Marshak, & Mngqibisi, 2017) – a concern raised by mainly the rural participants. Others have come to similar conclusions, particularly in urban settings: *“The distribution of supermarkets is shown to be highly unequal and the distance of low-income from high-income areas hinders access to supermarkets for the urban poor. ...supermarkets in low-income areas typically stock less healthy foods than those in wealthier areas and, as a result, the supermarkets do not increase access to healthy foods and may, in fact, accelerate the nutrition transition”* (Battersby & Peyton, 2014).

In this study, supermarkets were mentioned by the majority of participants as something that helped combat the barriers of accessibility, availability, and affordability. In some instances, particularly in the rural setting, participants spoke about supermarkets as the

only place where they could purchase fruits and vegetables (however, issues of accessibility were still raised here).

2. Informal sector outlets

It was reported that the informal sector, primarily through 'spaza' shops and table top-type vendors, played a major role in shaping participants' food environments and subsequent endeavours to acquire healthy food items in both settings. In the urban setting, these retailers seemed to play a larger role in supplying healthier food options to participants; while in the rural setting, participants reported that these retailers were often too expensive and seldom stocked healthy food items. Consequently, both formal and informal retailers need to be considered as integral parts of South African food environments (particularly in urban settings) and as such, need to be considered as a key part of any food policy strategy (Pereira, Cuneo, & Twine, 2014).



3. Fast food outlets

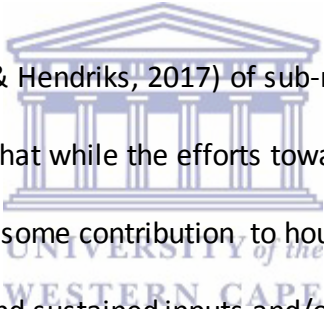
Although not raised as a concern by the rural participants, the presence of fast food outlets and the advertising and low cost of their food options were raised by those living in the urban setting as a concern to their health. It has been demonstrated that along with the introduction of supermarkets and associated malls, fast food outlets are becoming more and more prevalent in low-income communities in South Africa – especially in urban environments (Battersby, 2017). It is also worth pointing out here that, although not mentioned as a concern by the rural participants, at the time of this study there were 11 fast food outlets observed within the rural town centre, as compared to 3 observed in the

immediate retail centre in the urban setting (these observations were not made as part of the data collection process, but rather informally by workshop facilitators).

4. Household production of food

Almost all rural participants mentioned the household production of food, whether a home garden, or the keeping of pigs, chickens, or cattle, as part of their food environment, and seemed to rely heavily on this as an accessible source of healthy food in their diets.

Although mentioned a number of times by the urban participants, home gardens were not as prominent a theme for them as it was for those living in the rural setting.



A recent key review (Misselhorn & Hendriks, 2017) of sub-national food security research conducted in South Africa found that while the efforts towards the household production of food have “the potential to make some contribution to household and community food security, they require extensive and sustained inputs and/or support to do so”. Similar to the findings presented in this Chapter, authors of this recent review found factors impeding the creation and successful management of home food gardens included fragmented and inconsistent service provision, such as the distribution of tools without adequate training; difficulty accessing key inputs, like inadequate land and access to water; and cost-related limitations resulting in the inability to purchase seeds, protect gardens from local livestock, and secure enough water for irrigation purposes.

Regarding urban food gardens specifically, the review found mixed messages. Two studies stood out here: the first (Reuther & Dewar, 2006), conducted in peri-urban Cape Town concluded that, although urban agriculture holds potential livelihood benefits, long-term

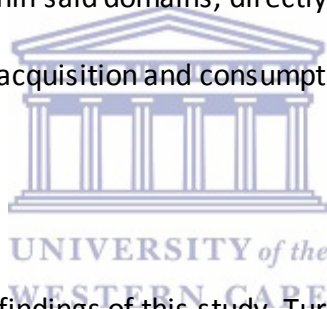
inputs needed to make it sustainable are unavoidable; and the second (Crush & Caesar, 2014), conducted in Kwazulu-Natal found urban agriculture made only a small contribution to food security, with only 11% of households citing agriculture as a regular food source. Additionally, a number of studies included in the review called for government to assist in meeting the challenges to urban agriculture by “delivering agricultural assets and land space as well as skills development, educational support, and the removal of institutional barriers” (Misselhorn & Hendriks, 2017). More research looking into the validity of home gardens as a means to improve levels of food security and nutrient intake in urban settings has been called for (Galhena, Freed, & Maredia, 2013) (Kang'ethe, Grace, & Randolph, 2007).

The challenges to maintaining a sustainable home garden reported by both rural and urban participants are in line with findings from other studies (Aliber & Hart, 2010) (Faber & Laurie, 2011) (PSC, 2008) (Misselhorn & Hendriks, 2017) and thus should be seriously considered from a policy and public health intervention perspective when addressing nutrition and health in South Africa.

Similar issues related to the accessibility, availability, and affordability of healthy food items have been reported by other studies conducted in both urban and rural areas of South Africa over the years (Temple & Steyn, 2009) (Temple, Steyn, Fourie, & De Villiers, 2010) (Love, Maunder, Green, Ross, & al., 2001) (Faber & Laubscher, 2008): it seems that these barriers are still a reality faced by those residing in these settings today.

External vs personal food environment

In line with the aforementioned definition of food environments, i.e. the interface that mediates peoples' acquisition of foods within the wider food system (Turner, 2017), Turner et al. further define the food environment in a conceptual framework that outlines separate, yet inter-related domains of the food environment: 1) the 'external food environment' (including all exogenous dimensions, such as food availability, prices, vendor and product properties, and marketing and regulation), and 2) the 'personal food environment' (including all endogenous dimensions such as accessibility, affordability, convenience and desirability at the individual level). Turner et al. point out that the two domains, and the dimensions within said domains, directly relate to, and influence each other, ultimately leading to food acquisition and consumption, and health and nutrition outcomes.



For example, and relevant to the findings of this study, Turner et al. point out that:

“Availability refers to whether a vendor or product is present or not within a given context, and is included within the external food environment domain. Availability always precedes accessibility (i.e. a food cannot be accessible if it is not available). Accessibility is relative to individuals, and falls within the personal food environment domain. Accessibility is highly dynamic and can include distance, time, space and place, daily mobility, and modes of transport that collectively shape individual activity spaces.”

Also:

“Prices refer to the cost of food products, and are included within the external food environment domain. Prices interact with individual purchasing power to determine affordability within the personal food environment domain... and... are sensitive to fluctuations in food availability and accessibility.”

Already pointed out as findings in this study are the concerns of accessibility, availability, and affordability in both the urban and rural settings. Although two of the three fall within Turner et al.’s ‘personal food environment’ domain, they are all directly related to, and largely determined by exogenous, or external factors (i.e. accessibility determined by availability, and affordability determined by pricing). It is also worth noting here that certain aspects of accessibility, although placed in the ‘personal food environment’ domain, are out of the control of the individual – for example, the distance between household and food retail outlet, or the public transportation options available to the individual and needed in order to access healthy foods. The exogenous dimensions of the food environment, i.e. those that determine the endogenous, are all largely determined and shaped by external factors such as private and public sector policies, and as such are ‘open’ to change through targeted and well informed intervention endeavours that attempt to alter the social and physical environment in a way that works towards achieving widespread reduction in the risk of unhealthy food acquisition and resulting consumption patterns.

A note on Photovoice

As a community-based research methodology, Photovoice proved to be an effective tool in helping the community members involved come to a better understanding of how different factors within their physical environment shape their food acquisition behaviours and

ultimately their diets and health. It also proved effective in helping participants effectively communicate which of these environmental factors either hinder or facilitate their acquisition of healthy foods as part of their self-management of diabetes. This methodological approach, particularly the workshops, seemed to provide the opportunity and relatively safe space for participants to discuss their concerns regarding their diabetes and how best to self-manage the disease, particularly when it came to diet and the disconnect between the diet advice received from health care professionals and the reality faced on a day to day basis by the participants when trying to make healthy food choices.

Conclusions

It appears that, from a diet perspective, the self-management of diabetes in these particular urban and rural settings is not a simple or easy endeavour, and that the environments in which these participants live play a critical role in shaping food acquisition behaviours, and ultimately health and nutrition outcomes. Levels of knowledge regarding healthy diets among study participants were high, and a general want to eat healthy was communicated; however, study findings indicate that local food environments did not facilitate the regular, easy access to desired healthy food items.

These findings are not unique, in that similar issues around the accessibility, availability, and affordability of healthy food items in both urban and rural settings in South Africa have been reported. It is clear that these issues persist and need to be addressed. Government has a key role to play in influencing these environments through targeted initiatives such as effective pricing policies, consumer subsidies, and support for locally-oriented agricultural initiatives, and by so doing improve individual and public health in these settings.

Findings from this study have implications beyond the self-management of diabetes, and extend to the self-management and reduction of all diet-related NCDs.



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CHAPTER 7 – SUMMARY, DISCUSSION, CONCLUSION & RECOMMENDATIONS

This chapter provides a summary overview of the study; outlines a summary of South African-related study findings; and recommends possible public health policy and/or intervention solutions (as well as an implementation mechanism). What can be learned from the quantitative observations made at the international sites with regard to South Africa's current situation in the nutrition transition is also discussed. This chapter also includes feedback from key stakeholders / decision makers from both the urban and rural settings on study findings and relevant intervention- and/or policy-relevant recommendations.



7.1 Study aims and methods used

This thesis aimed to answer the research question: What role do local food environments play in promoting or inhibiting access to healthy foods as part of the self-management of T2DM in urban and rural communities in South Africa, and what can be learned from an international perspective? To this end, specific research objectives included, to:

1. Understand the current national-level policy context with regard to the observed rise in NCDs, their proximal determinants (specifically an observed change in diet patterns), and contributing environmental factors;

2. Identify the current food-related environmental factors associated with the onset and/or management of T2DM in an urban and a rural setting (as well as in four additional international settings in order to provide an international perspective);
3. Explore community perspectives on the role the local food environment plays in the self-management of T2DM in an urban and a rural setting; and, consequently
4. Recommend intervention- and/or policy-related actions that can be implemented based on study findings.

A review/scan of relevant policies and literature was conducted in order to address the first research objective (findings presented as part of thesis literature review section in Chapter 2, and in Chapter 4). Quantitative data were systematically collected at an urban and rural site in South Africa through the creation of an 'environmental profile' in an attempt to address the second research objective. Tools used to develop said environmental profile included a 'community observation walk' (a walk designed to systematically observe and record food environment-related factors within a 1km stretch considered to be the main commercial district for services and facilities), and a 'food retail outlet assessment' (in which the presence, price, and quality of fruits and vegetables, and certain packaged food products were noted at different types of food retail outlets). Urban and rural environmental profile data from poor-resourced were also collected as part of a larger study at two other international sites (urban settings in Uganda and Sweden) and used as part of this thesis to provide an international perspective. Included in the third objective was the collection of qualitative data at the same urban and rural sites in South Africa using a community based participatory research method known as PhotoVoice. This involved a facilitated process in which community members discussed what aspects of their food

environment either facilitated or hindered their access to healthy foods; and then documented these aspects through photography and text. Finally, intervention and/or policy-related recommendations were developed based on study findings, and in consultation with relevant decision makers / government stakeholders from these settings through interviews. Government stakeholders were selected based on their roles/responsibilities with regard to food security and/or health within their government department. Five questions were used to facilitate these discussion: What do you think are the key concerns when it comes to food security in your jurisdiction?; What policies are already in place to address these concerns?; What additional policies do you think are needed to (better) address existing key concerns?; Is there anything new that you learned from the research that I shared with you?; and How do you think this research can be used to support existing and/or future policies and/or intervention strategies?



7.2 Summary findings, discussion, and intervention- and/or policy-related recommendations

Regarding summary findings relevant to research objective #1: As outlined in Chapters 1 and 4 of this thesis, the nutrition transition is evident in South Africa, where a steady increase in the per capita food supply of fat, protein, sugar, salt, and total calories has been observed (Kennedy, Nantel, & Shetty, 2004). Additionally, the situation with regard to food environments (a key environmental determinant of diet-related NCDs) is rapidly catching up with high-income countries, in that the 'western' diet is largely becoming more and more accessible to all segments of society, including the most vulnerable. 'Big Food', and their use of various strategies to increase the availability, affordability, and acceptability of their (largely) packaged processed products vended increasingly through retail outlets

(predominantly supermarkets) in all settings, have contributed significantly to this shift in diet and to the increased burden of diet-related NCDs in South Africa (Igumbor, et al., 2012).

Currently, under a rights-based system such as South Africa's, the government has the duty to counter these industry efforts in taking measured steps in promoting enabling environments in which people can adequately produce or procure healthy food for themselves and their families. As pointed out in Chapters 2 and 4 of this thesis, South Africa has (and is) taking steps towards this end. However, these steps have been slow and uncoordinated. Additionally, and as raised by a stakeholder in an interview, existing policies and initiatives are poorly communicated and not well understood in these communities, a concern that has been raised before (Prinsloo & Pillay, 2004). This poor communication was also experienced as part of the policy scan conducted as part of this thesis, and included in Chapter 2: even when knowing what one is looking for, it was extremely difficult and time consuming to find the relevant policies and the current level of their implementation.

Thesis findings under research objective 1 indicate that sustained, evidence-based policy, programmatic, and strategic efforts that are well-communicated, need to be effectively coordinated and implemented in order to combat the current trend and achieve a real reduction in the current NCD-related burden. This sentiment was also communicated by a stakeholder, who felt that no additional policy approaches are needed, as what is currently in place is not effectively being implemented; rather, what is needed is increased levels of coordination between relevant government entities, with an increased focus on implementation at the local level. Additionally, government views on food security need to

move away from a predominantly productionist perspective (Haysom, 2015), and take into account context (i.e. move away from the existing rural-bias in policy making (Battersby J. , 2012)).

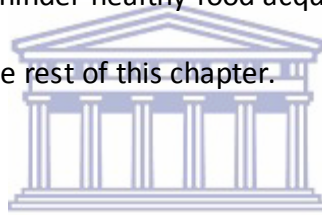
Regarding findings relevant to research objective 4: Findings from stakeholder interviews included the following themes:

1. The perceived general lack of understanding regarding the healthiness of food among their constituents / community members;
2. The greater need for policy implementation and the coordination of relevant stakeholders in the process; and
3. The need for local contextualization and coordination when implementing existing policy and/or intervention strategies, as well as when considering new ones.



Specific, relevant feedback from the interviewed stakeholders has been incorporated in this chapter when discussing possible policy- and/or intervention-related solutions to the concerns raised by this thesis. However, it is also worth pointing out at this point that feedback from a number of interviewed stakeholders reflected a feeling that the primary concern was not necessarily the environment that was the cause of increased rates in diet-related NCDs, but rather that community members are “ignorant” regarding what healthy food options are, and lacked the knowledge needed to make “smart choices on what to purchase” (above theme #1). However, findings from this thesis suggest that levels of knowledge regarding what healthy food is, and how to navigate food environments (i.e. where and when to purchase healthy food options) was high among study participants; and

that local food environments (i.e. issues regarding the affordability, availability, and accessibility) did not facilitate the regular, easy access to desired healthy food items, and thus need altering accordingly. These findings are in line with international research that increasingly implicates rapidly changing food environments in increasing levels of chronic diseases, over and above individual factors such as knowledge, attitudes, and behaviours (Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008) (Ledikwe, et al., 2006) (Pérez-Escamilla, et al., 2012). These particular findings suggest that, in order to effect change in the current nutrition transition and have a positive impact on reducing diet-related NCDs, policy approaches are needed that take into account the importance of food environments, and their ability to either promote or hinder healthy food acquisition behaviours. Specific recommendations are made in the rest of this chapter.



The following sections summarize findings relevant to research objectives 2 and 3, based on the ANH-FEWG food environment domains (Turner, 2017), and make intervention- and/or policy-related recommendations based on these findings, complemented by stakeholder feedback (towards achieving research objective #4). Government stakeholders are referred to as 'stakeholders' when their specific input is mentioned where necessary in this chapter.

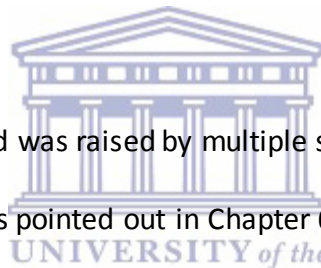
7.2.1 Availability & accessibility

Quantitative findings revealed that, generally, food retail outlets were more evenly dispersed in the urban compared to the rural setting. The rural setting was characterized by clustered food retail outlets, predominantly formal, surrounded by informal vendors.

Qualitative feedback reflected this, describing the long distances to local supermarkets and

surrounding informal fruit and vegetable vendors, which were often the primary/only source of fruits and vegetables in the rural setting – as part of this concern were the high costs of the often-multiple forms of public transportation needed to access these outlets.

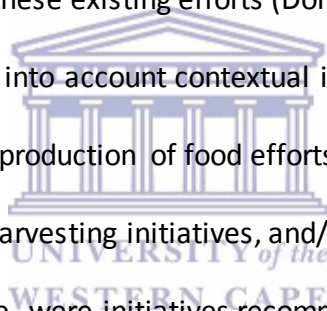
In the urban setting, more food products in general were made available when compared to the rural setting. However, in both settings, the ‘less healthy’ food items observed (chips, soda, chocolates, etc.) were made more available (i.e. found in more retail outlets) when compared to healthier options (fruit and vegetables) – something that has previously been found in similar settings (Pereira, Cuneo, & Twine, 2014).



The household production of food was raised by multiple study participants, especially those living in the rural setting. As pointed out in Chapter 6, the literature is not conclusive on whether home gardens in urban settings are beneficial (Crush & Caesar, 2014) (Reuther & Dewar, 2006) (Galhena, Freed, & Maredia, 2013) (Kang'ethe, Grace, & Randolph, 2007), and feedback from the urban stakeholders that were interviewed seemed to echo this sentiment. However, study findings and the literature (Misselhorn & Hendriks, 2017) (Aliber & Hart, 2010) (Faber & Laubscher, 2008) (PSC, 2008) reveal that the household production of food in rural settings, IF supported by extensive and sustained efforts that take into account the unique needs of those living within a given community, could be a sustainable, accessible source of healthy food.

Resulting policy and/or intervention recommendations

Policies and intervention strategies that focus on, and facilitate an increase in the household production of food (particularly in the rural area), have the potential to alleviate some of the difficulties experienced by community members with regard to the issues around the availability and accessibility of healthy food (Baiphethi & Jacobs, 2009). Current efforts by the national government to support rural communities do exist, as per communication from a rural stakeholder. These efforts include financial and infrastructure support. However, stakeholders reported these efforts as fragmented and inconsistent – something that has been found and reported on in the past (Misselhorn & Hendriks, 2017). Specific guidelines and/or regulations, directly informed by context and administered by local authorities, are needed to guide and coordinate these existing efforts (Dorosh & Mellor, 2013) (Prinsloo & Pillay, 2004). If efforts fail to take into account contextual issues, and deal with these concerns accordingly, household production of food efforts may actually lead to food insecurity (Webb, 2011). Water harvesting initiatives, and/or the introduction or upgrading of existing irrigation infrastructure, were initiatives recommended by stakeholders during interviews (and are part of national water supply extension commitments), and have been shown to be effective in increasing levels of water security, and consequently food security in similar settings (Sinyolo, Mudhara, & Wale, 2014) (Pereira, Cuneo, & Twine, 2014). However, in order for such initiatives to be effective, they should be context-specific and coordinated, with interdepartmental coordination and implementation to take place at the local level (Hart, 2010) in both urban and rural settings. Additionally, responses should also move beyond the promotion of agriculture in rural settings as the sole contributing factor to food security, and include initiatives focused on the retail sector (Pereira, Cuneo, & Twine, 2014). Local authorities should set up and administer, or encourage the development of local co-ops. These collectives could facilitate and support the running of local ‘stokvels’ (or



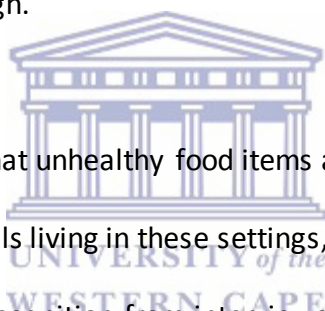
grocery collectives) through which community members pool resources to increase buying power and social capital by purchasing food staples in bulk from local retailers (predominantly formal in nature) once a month and distributing them among 'stokvel' members (Pereira, Cuneo, & Twine, 2014). Additionally, as per a rural stakeholder suggestion: co-ops could also support the selling of locally grown produce to community members where they live at lowered costs; as well as facilitate and encourage the production of local produce to a level where it could be sold outside of the community, thus providing a source of external income for the community. This would be in line with the National Department of Agriculture, Forestry and Fisheries' Integrated Food Security and Nutrition Programme's stated aim to not only assist in the development of community food production initiatives, but also encourage the marketing of surplus garden produce, providing employment and income-generating opportunities (Prinsloo & Pillay, 2004).



7.2.2 Prices and affordability

Quantitative findings indicated that the cheapest fruits and vegetables could be found at supermarkets in the urban setting; whereas in the rural setting, the lowest costs for both were observed in independent grocers (as defined in Chapter 5), with supermarkets offering similar produce at just over double the price. Informal vendors in both settings offered fruit and vegetables at comparatively higher prices. This observed difference in price between the formal and informal sectors has previously been attributed to the sheer amount of product that formal retailers are able to vend due to their supply chain mechanisms, as well as due to their existing relationships with large food producers (Battersby & Peyton, 2014) – both advantages that the informal sector do not enjoy.

Qualitative findings revealed the high cost of healthy food, as well as the low cost of unhealthy food items, as significant barriers to healthy food access. Similar findings have been found by others (Faber, Schwabe, & Drimie, 2009) (Schönfeldt, Gibson, & Vermeulen, 2010) (Brinkman, de Pee, Sanogo, Subran, & Bloem, 2010). One such study conducted in the Western Cape, found that for a household of five occupants, the increased cost associated with eating a healthier diet would be more than R12,000 per year, equating to over 30 % of the total household income for most (Temple & Steyn, 2011). Additionally, government social grants were raised by participants as assisting in the acquisition of healthy foods, but were reported as not being enough.



Overall, thesis findings indicate that unhealthy food items are still more readily available and more affordable for individuals living in these settings, when compared to healthier food options. There was also a recognition from interviewed stakeholders that high prices of healthy food, and the low costs of unhealthier food, was a major concern.

Resulting policy and/or intervention recommendations

Food pricing policies should be aligned with desired national health outcomes by helping to make healthy eating choices the easier, cheaper options. Guided by the National Strategy for the Prevention and Control of Obesity in South Africa, government has already taken policy measures to increase the price of certain unhealthy food items: certain basic foodstuffs (including brown bread, dried beans, maize meal, milk eggs, fish, certain fruits & Veg, and others - 19 items in total) are zero rated. Also, a 'sugar tax' was introduced in April, 2018 which brings into effect a tax rate of R0.022 (2.2 cents) per gram of sugar. There is

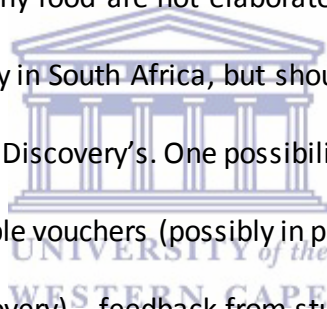
consistent evidence that taxation and subsidy intervention influence food acquisition and dietary behaviour (Niebylski, Redburn, Duhaney, & Campbell, 2015). Mexico, for example, implemented a tax on sugar-sweetened beverages, with early results indicating that the purchase of soda and other taxed drinks had dropped by 10%; whereas the purchase of bottled water rose by 13%, showing that people were indeed substituting the unhealthy for the healthy (Colchero, Popkin, Rivera, & Ng, 2016). Sugar taxes have also been implemented in Denmark, Finland, France, Hungary, Ireland and Norway, based on substantial scientific evidence that has shown that decreasing sugar-sweetened beverage consumption reduces the prevalence of obesity and obesity-related diseases and that a tax on sugar sweetened beverages reduces the obesity rate (Hu, 2013) (Cabrera Escobar, Veerman, Tollman, Bertram, & Hofman, 2013).



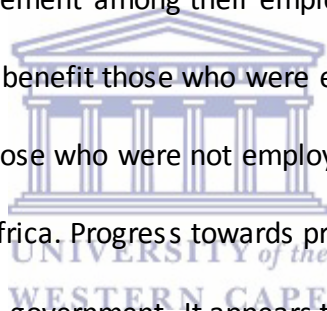
Additionally, one of the actions within the national Strategy for the Prevention and Control of Obesity in South Africa (2015-2020) (DOH, 2015), is to explore expansion of rebates on healthy food purchases as part of creating demand for healthy food. In the United States of America, studies have shown not only the greater effects of food policies related to bans/restrictions on unhealthy foods, but also positive results from mandates offering healthier foods, and altering purchase/payment rules on foods purchased using low-income food vouchers (Mayne, Auchincloss, & Michael, 2015).

There is precedent for healthy food rebate systems in South Africa, but only in the private insurance sector. Discovery, a South African health insurer, offers rebates on healthy food items from 10% to 15% for members of its Vitality programme (a programme designed to

promote healthy living) (Discovery , 2018). A list of healthy food items was decided on by a panel of nutritionists, physicians, and behavioural scientists based on nutrition guidelines from South Africa and the United States (Sturm, An, Segal, & Patel, 2013). Research has shown that participation in this rebate programme has led to an increase in purchases of healthy food items, and to decreases in purchases of less-healthy food items (Sturm, An, Segal, & Patel, 2013). Although private in nature, and catering to a specific demographic of South Africans (i.e. those that can afford private insurance), this initiative shows that a rebate programme for healthy foods can be implemented in South Africa, and result in positive outcomes. Government efforts to “expand” rebates on healthy food purchases as part of creating demand for healthy food are not elaborated on in the Strategy for the Prevention and Control of Obesity in South Africa, but should include a thorough analysis of private sector responses, such as Discovery’s. One possibility is to bolster social grants with the provision of fruit and vegetable vouchers (possibly in partnership with a local supermarket chain, just like Discovery) – feedback from study participants indicated that social grant funds are not enough as it is, and usually get spent on other, seemingly more pressing/immediate concerns. Similar findings have been reported with regard to social grant funds being relatively small and not being directed towards food purchases in low-income South African households, thus lowering the ability of social grants to contribute to food security in these households (Caesar, Crush, & Hill, 2013) (Mokwena, 2016). A food-specific voucher that could only be used to acquire certain types of food items (possibly at supermarkets where most social grant checks are currently being picked up (Steyn L. , 2012)) could ensure that government assistance would do more than just take the edge of hunger, by having a direct, measurable, positive impact on food security in these settings.



Food voucher schemes are not new: similar programmes were first introduced in the United Kingdom in the 1950s as a means of meeting the needs of a social programme to ensure food security; and has since been running in over 31 countries worldwide, including South America, India and China. (Social Development, 2001). When compared to cash transfers and/or other non-voucher initiatives, food-specific voucher programs have been shown to have a greater nutritional impact, be the most cost-effective option (when supermarkets are involved), and increase caloric availability and diet diversity among participants (T.M. Fraker, 1995) (Yen, 2010) (Hidrobo, Hoddinott, Peterman, Margolies, & Moreira, 2014). A similar food voucher scheme was proposed in South Africa in 2001, but would be reliant on private companies, as employers, to implement among their employees (Social Development, 2001). This, of course would only benefit those who were employed by participating companies, and would exclude those who were not employed – a major segment of those who are food insecure in South Africa. Progress towards programme implementation was pending a firm commitment from government. It appears that no further action was taken.



7.2.3 Vendor properties/typology

As supermarkets are becoming more commonplace in both urban and rural communities across South Africa (Battersby, 2017), the impact of their presence in local food environments, and more particularly the food security and health of those living in these communities has been debated: Some have argued that the introduction of these retail outlets into these environments/communities has been positive because of their ability to offer lower food prices and bring in fresher and safer food options (Reardon & Minten, 2011). Both quantitative and qualitative findings from this thesis corroborate this (to some

extent), finding that, in both urban and rural settings, supermarkets were present and were observed and reported as playing a crucial role in making healthy foods available and more affordable. Qualitative inquiry revealed that study participants from both settings mostly shopped at supermarkets once a month for larger food items (usually staples), supplementing these items with purchases made from informal vendors on a more frequent basis – something that has been observed before (Skinner & Haysom, 2016) (Crush & Frayne, 2011). Quantitative findings indicated that supermarkets played a notable role in providing a larger selection of fresh fruits and vegetables in both the urban and rural setting, even though their produce was of lower quality (i.e. bruised and/or damaged in some way) when compared to the other retail outlets observed. However, quantitative findings also indicated supermarkets played a role in making ‘less healthy’ items more available and affordable in both settings; and others have pointed out that the larger unit sizes offered by supermarkets may be unaffordable for the poorest, and that these outlets are often situated in inconvenient locations (e.g. not easily accessible via public transportation) (Battersby, Marshak, & Mngqibisi, 2017) – a concern raised by mainly the rural participants.

Overall, in this study, supermarkets were mentioned by the majority of participants as something that helped combat the barriers of accessibility, availability, and affordability. In some instances, particularly in the rural setting, participants spoke about supermarkets as the only place where they could purchase fruits and vegetables.

In both the rural and urban settings, informal vendors played a major role in shaping food environments, and ultimately access (or lack thereof) to healthy food options. This has also


been shown to be the case in similar settings worldwide, and consequently these vendors should be encouraged to play a more prominent role in improving the nutritional status and health of the populations they serve (Alexander, Yach, & Mensah, 2011) (Pereira, Cuneo, & Twine, 2014). Quantitative findings indicated that in the rural setting, informal vendors were observed clustering around existing supermarkets and independent grocers in the town centre, and scarcely noted outside of that (i.e. around the locations where people actually resided). Additionally, informal vendors in the rural setting, more particularly those that were located in the residential areas of this setting, were reported as stocking only unhealthy food options, and as being very expensive. In the urban setting, informal vendors were observed as being more spread out in the community, and not so much in any central location. They were also reported by urban study participants as stocking healthier food options.



It's probably worth noting here that, while this study cannot speak to the impact that the introduction of formal food retail sector (in the shape of supermarkets in this instance) is having on the informal sector, it does point out that it appears that these informal retailers are currently playing a crucial role in making healthier food options more accessible and affordable to community members living in the urban setting; and that there is the potential for these retailers to play a larger role in making healthier food options more accessible and affordable to those living in the rural setting. Also, worth noting here is that table top style informal vendors were observed as clustering outside of the supermarkets in the rural setting, possibly indicating that the informal sector in this setting seems to be piggy-backing off the formal sector's presence, rather than being pushed out by it.

Resulting policy and/or intervention recommendations

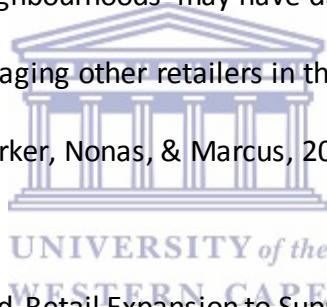
Existing policy approaches to combat food insecurity in South Africa and the informal sector tend to neglect the role of the informal retail sector in the food system, leaving this sector largely misunderstood from a policy perspective (Skinner & Haysom, 2016) (Battersby, Maya, & Mngqibisa, 2016). Thus, greater consideration of the role informal vendors play in both urban and rural food environments, and their ability to provide healthy food options (and not only their ability to provide livelihoods) is needed – especially in rural settings.



Nationally, plans are currently in place to increase the access and availability of vegetables and fruits by not only expanding household, local and community food gardens, but also by exploring opportunities to establish local markets for improved access to vegetables and fruits (DOH, 2015); again, no details on how this is to be achieved are given. Responsibility for these efforts will be carried by multiple government entities. Based on thesis findings, and feedback from stakeholders, these plans should include incentives for informal vendors to sell healthier food options in more accessible locations, e.g. within residential parts of the rural settings, or around schools and transportation hubs in the urban setting. Although the government has many guiding documents and policies regarding informal sector players (including retailers), none of them makes reference to their role in food in/security (Skinner & Haysom, 2016). And while the National Development Plan pays considerable attention to different aspects of food security, the role of the informal sector in increasing access is largely absent (National Planning Commission, 2015).

New York City has developed two innovative ways to address similar issues faced in that jurisdiction:

In 2008, New York City implemented a programme called “NYC Green Carts”, which are essentially mobile food carts that only offer fresh fruits and vegetables in city neighbourhoods with limited access to healthy foods (NYC Health, 2018). Results have been mixed, with a primary concern being that cart operators, as ‘free market participants’ are gathering in areas that are more profitable, and not necessarily where the greatest need exists (Li, Cromley, Fox, & Horowitz, 2014). However, findings also seem to indicate that the mere presence of the carts in neighbourhoods may have driven up demand for fruits and vegetables in these areas, encouraging other retailers in the same areas to also stock fresh fruits and vegetables (Leggat, Kerker, Nonas, & Marcus, 2012).



The second initiative was the Food Retail Expansion to Support Health (FRESH) programme (NYCEDC, 2018). FRESH provides zoning and financial incentives (including real estate and sales tax benefits) to grocery stores in underserved areas of the city. In order to qualify for the program, stores must provide at least 30% of their retail/shelf space for perishable goods and at least 500 square feet of retail space for fresh produce (Sacks, Yi, & Nonas, 2015). The programme has resulted in the introduction of 11 new supermarkets, and the renovation of 7 existing ones (Sacks, Yi, & Nonas, 2015).

Although the FRESH programme has yet to be formally evaluated beyond its initial impact, and the Green Cart programme has resulted in mixed findings, they, along with other similar initiatives may serve as examples and provide lessons learned for similar efforts in South

Africa. Additionally, the NYC efforts offer an example of how a sub-provincial jurisdiction can take action based on its specific context and needs, towards improving access to healthy foods.

Additionally, as mentioned above, an organic, perhaps even symbiotic relationship seems to be developing between the formal and informal vendors in these settings, particularly in the rural setting. Initiatives to formalise these relationships (which have already been piloted, and begun to be implemented by Pick 'n Pay and local 'spaza' shops) could go a long way in allowing existing informal vendors to stock healthier food items at lower costs, by gaining access to formal food supply chains, refrigeration units, etc.



7.2.4 Marketing & regulation

Overall, observed advertisements in both settings promoting the purchase and/or consumption of unhealthy foods, drinks, and tobacco products vastly outnumbered those promoting healthy lifestyle options. “Aggressive” marketing in the urban area was also a concern raised by a stakeholder, when speaking of the misinformation that was being spread by large food companies through their advertisement efforts in the community.

Resulting policy recommendation/s

An interviewed stakeholder expressed concerns that policies regulating the industry in relation to what they can or cannot say regarding what is healthy or not, are seriously lacking; and that government regulations regarding the advertisements of unhealthy foods

in these settings would be beneficial. As outlined in Chapter 2, the primary focus of relevant food advertising policies in South Africa is on restricting the promotion of unhealthy foods to children – which focus is in line with international best practice, even when taking into account that it is self-regulated (Swinburn B, 2013) (Hawkes, Jewell, & Allen, 2013).

Heavier restrictions on the advertisement of unhealthy foods and beverages (in the community, in-store, and on product packaging) in general, including on advertisements that target purchasers (who are not usually children) are needed in urban and rural settings to curb the promotion of these items. Additionally, more initiatives from government agencies (both provincial and national) to introduce health-promoting advertisements in both settings that encourage healthier diets (among other healthy behaviours) are lacking and needed.



7.3 'Food Security Committees'

Overall, findings from the research conducted as part of this thesis serve to highlight the need to recognise that these settings are different when it comes to environmental factors that directly influence the availability and accessibility of healthy food options. As a result, potential solutions to the unique challenges faced by these communities may be different in nature. Having said that, similarities between these settings do exist (e.g. issues around the affordability of healthy food items; or the presence of both the informal and formal sector, etc.). These similarities may, or may not be taken into account by relevant national-level policy initiatives; but, more importantly, the differences may be overlooked, or not given enough weight at this level (Pereira, Cuneo, & Twine, 2014).

A possible solution, and one being recommended based on the findings of this thesis, is the creation of community-level 'Food Security Committees' (FSCs), or similar collective bodies in order to identify local food access concerns and needs, and coordinate existing efforts (and petition for new ones, if needed) to address them. Similar community-based initiatives have been shown to improve service delivery, based on grassroots experiences and skills (Boyle, 2003) (Spira & Wall, 2006).

Precedent for these kinds of community structures in South Africa exists. Community Health Committees (CHC) have existed as mandated structures for quite some time, in part to encourage the involvement of community members in the process of improving health equity and outcomes (Boulle, Makhamandela, Goremuचेche, & Loewensen, 2008), and can teach us some valuable lessons when considering the implementation of a similar community-based body. The primary role of the CHCs should be oversight and governance, along with advocacy, social mobilisation, and representation of community needs (Learning Network, 2014). Although policies exist (in varying stages of completion) in most provinces, that guide their role and structure, the committees' effectiveness (and even existence, in some instances) have been negatively impacted by the poor implementation of said policies (Haricharan, 2012) (Learning Network, 2014). As a result, not all CHCs have been successful, requiring, among others things legitimized, capacitated community direction in order to function effectively (Glattstein-Young, 2010) (Boulle, Makhamandela, Goremuचेche, & Loewensen, 2008) (Padarath & Friedman, 2008) (Haricharan, 2012). Additionally, research and experience has shown that coordination with key local decision makers, as well as

formal linkages to relevant structures at sub-district, district and higher levels is crucial to committee success (Glattstein-Young, 2010) (Learning Network, 2014).

If they are to be effectively implemented and sustained, FSCs (or a similar collective body) should take into account the lessons learned from the implementation and functioning (or lack thereof) of CHCs. Consequently, FSCs should sit at the municipality-level and be made up of local, relevant decision makers and invested community members. In fact, these newly developed committees should be community-led, with community members having the clearly defined role of oversight and governance. These collective bodies have the potential to provide the space for much needed communication and coordination between all stakeholders on relevant, local issues (such as those raised by this thesis). FSCs, for example could address issues around accessibility and affordability through the support of local co-ops and/or 'stokvels' by addressing existing challenges (such as transport concerns); encouraging the purchasing of healthier food options by these collectives through subsidies; and financially supporting the creation of these collectives, thus allowing previously excluded individuals to participate (Pereira, Cuneo, & Twine, 2014). Linkages to structures at sub-district, district and higher levels through relationships with decision makers sitting on the committees should also be formalized. Partnerships with local and/or provincial academic institutions could be developed in order to help systematically explore local healthy food accessibility concerns from the perspectives of community members (as done in this thesis). Results should be compared to existing national-, provincial- and municipal-level initiatives (like existing Integrated Development Plans that involve food security initiatives), and then used to advocate for relevant change towards improved access to

healthy food options at the community level. Committees would also play a crucial role in the better coordination of existing local government and non-government efforts. An approach like this, if implemented effectively, could serve to not only inform local level policies and initiatives, and bring about real change in communities; but also serve to provide valuable, and much needed feedback to larger provincial- and/or national level bodies and strategies. Alternatively, in settings where CHCs already exist and function effectively, FSC-relevant initiatives could be taken up by the CHC.

FSCs in Khayelitsha and Mt Frere could play a pivotal role in developing and implementing the policy and/or intervention strategies recommended by this thesis. They could also be monitored and evaluated, serving as pilots for the future expansion of similar committee bodies in similar settings.



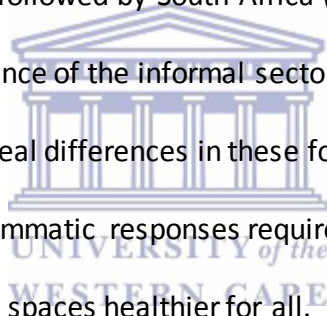
7.4 International lessons learned

Differences in observed food environmental factors across the three countries, as outlined in Chapter 5, demonstrate the different stages that these jurisdictions are at in the 'nutrition transition' (as well as policy responses); and, more specifically, where we (South Africa) are in this process. For example, when it came to advertisements observed: those promoting healthy lifestyle choices were non-existent in Uganda, only observed 3 times in the South African settings, with the vast majority (26) being observed in the Swedish settings. This relationship was reversed for advertisements promoting the purchase and/or consumption of unhealthy foods, drinks, and tobacco products: the most in Uganda (247), less in South Africa (111), and the least in Sweden (81) – this is reflective of the current policy situation in

each country. This was further reflected in the amount of tobacco advertising that we observed: Policies regulating the advertisement and promotion of tobacco products were present in all three study sites and associated settings, and as a result our mapping efforts found very little tobacco advertising present in these communities. Similarly, stronger government policies and actions that increase the healthiness of food environments could go a long way in changing the food-related landscapes in these settings, and ultimately in reducing diet-related NCDs.

Also, and perhaps also indicative of effective (zoning) policies in place: Uganda had the most observed fast food vendors (48), followed by South Africa (27), then Sweden (6).

Additionally, the significant presence of the informal sector in South Africa, and to some extent in Uganda, highlights the real differences in these food environments, as well as the unique and tailored policy/programmatic responses required by our government (and other stakeholders) to make these built spaces healthier for all.



7.5 Study limitations

Limitations to this study include the relatively small sample size of those who participated in both qualitative data collection methods (PhotoVoice activities and interviews with key decision makers / stakeholders). Additionally, quantitative data were only collected in two sites in each setting (one urban and one rural), and as such may not be generalizable to other similar sites in all settings. However, the focused nature of the data collection served to gain specific insights into policy and/or intervention implementation efforts in these sites. Subsequently, study findings were compared with other similar findings in order to place them in the larger field of study and general understanding from the literature.

7.6 New contributions from this thesis

- Existing nutrition and food environment-related policies are in place, but are lacking in that they are uncoordinated and lack effective implementation. These policies also take a predominantly productionist perspective and communicate a rural bias, thus need to take context (urban vs rural settings) into account in both language and action (implementation).
- Levels of knowledge regarding healthy diets among study participants were found to be high, and a general want to eat healthy was communicated (contrary to stakeholder thoughts). However, study findings indicate that local food environments in both the urban and rural settings, more particularly issues regarding the affordability, availability, and accessibility of healthy food items, did not facilitate the regular, easy access to desired healthy food items.
- Consequently, and based on specific study findings, specific policy- and intervention-related actions are recommended.
- Specific international study findings serve to reinforce where South Africa is (in relation to the other two countries observed) in the nutrition transition.

7.7 Conclusion and recommendations

Findings indicate that South Africa has taken relevant policy steps to promoting enabling environments in which people can adequately produce or procure food for themselves and their families. However, these steps have been slow and uncoordinated. Sustained, evidence-based policy, programmatic, and strategic efforts are needed to combat the current trend and achieve a real reduction in the current NCD-related burden.

Findings also reveal that levels of knowledge regarding healthy diets among study participants were found to be high, and a general want to eat healthy was communicated. However, study findings also indicate that local food environments in both the urban and rural settings, more particularly issues regarding the affordability, availability, and accessibility of healthy food items, did not facilitate the regular, easy access to desired healthy food items. Consequently, multiple policy and/or programmatic recommendations are shared, including:

- Localized, sustained policy and intervention strategies that facilitate an increase in the household production of food (particularly in the rural area);
- The initiation/expansion of a healthy food voucher system, with vouchers possibly being distributed along with social grants;
- Approaches that recognise and facilitate the role of the informal sector in providing healthier food options; and
- The increased regulation of the marketing of unhealthy food items.

Also recommended based on thesis findings, is the creation of local-/municipal-level 'food security committees', or similar collective bodies that take into account local context, including environmental factors that directly influence the availability and accessibility of healthy food options. Committees should be community-led, and empowered to not only coordinate existing implementation efforts, but explore and petition for new ones, if needed.

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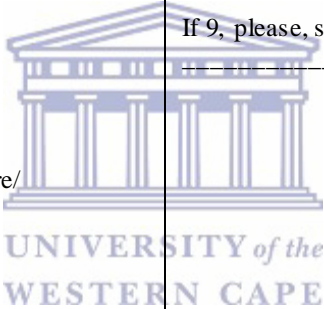
Appendix I – Community Observation Walk

Environment Profile of a Community's Health (EPOCH) SMARTD Adaption

Section: Observational Walk

COMMUNITY OBSERVATION WALK

It is ESSENTIAL that the start-point and 1km walking route of the *Community Observation Walk* is pre-planned. To identify these, local knowledge of the area is necessary and a pre-assessment of the area either by car or on foot is useful. The **start point** should be predetermined and allow for the maximum area (within the 1km recommended distance) to be observed along the busiest local thoroughfare of the community. It can be, but is not necessarily the geographical centre of the community. Record the type, address and GPS coordinates (available from Google Maps) of the start point. Photograph the start point and its surroundings.

S.NO	Questions	Response	Code
9	a) Today's date (mm/dd/yyyy)	_____	CDOW_9a
	b) Length of walk (m)	_____	CDOW_9b
	c) Start Time:	____.____	CODOW_9c
10	The Start point: a) Select a central <u>start point</u> from the following and indicate your choice (Mark one only)	<div style="text-align: center;">  <p>If 9, please, specify: _____</p> </div>	CDOW_10a CDOW_10a_others
	1. Central busy intersection 2. Central train station 3. Central bus station 4. Post office 5. Supermarket or general store/ convenience store 6. Market 7. Shopping mall 8. School 9. If other, please specify		
	b) What is the address of the starting point?		CDOW_10b
	Address: GPS:	_____ _____ . _____ . _____ _____ . _____ . _____	

Sidewalks - In this section you are assessing the completeness and quality of sidewalks on your walk.

With respect to completeness of the sidewalk, options are:

- No sidewalks - if there are no sidewalks then you do not respond to the quality question.
- Partial sidewalk – sidewalk is incomplete on both sides of street
- Complete one side –sidewalk is complete on one side of street
- Complete both sides – that is sidewalks are complete on both sides of the street.

With respect to quality or maintenance, options are:

- Give a rating of 4 if the sidewalks are very well maintained. This means the sidewalk has no bumps, cracks, holes or other obstacles to trip over
- Give a rating of 3 if the sidewalks are somewhat maintained. This means the sidewalk has few bumps, cracks, holes or other obstacles to trip over
- Give a rating of 2 if the sidewalks are undergoing repair
- Give a rating of 1 if sidewalks are poorly maintained.

11	<p>Sidewalk completeness and quality</p> <p>a) Please indicate which best describes the completeness of the sidewalk on your route. (Mark one only)</p> <p>1. No sidewalk (go to Q#13)</p> <p>2. Partial sidewalk (sections with no sidewalk)</p> <p>3. Complete sidewalk on one side</p> <p>4. Complete sidewalk on both sides</p>	<input type="checkbox"/>	CDOW_11a
	<p>b) Give a rating between 1 and 4 for the quality of the sidewalk on your route.</p> <p>1 – if poorly maintained, 2 – if undergoing repair, 3 – if somewhat maintained, 4 – if well maintained</p>	<input type="checkbox"/>	CDOW_11b
12	<p>Is electrical street lighting present on your route?</p> <p>1 = Yes 2 = No</p>	<input type="checkbox"/>	CDOW_12
13	<p>Are there any traffic lights present on your route?</p> <p>1 = Yes 2 = No</p>	<input type="checkbox"/>	CDOW_13
Road completeness and quality – Assess the road on your route.			
14	<p>Roads completeness and quality</p> <p>a) Please indicate which best describes the completeness of the roads on your route. (Mark one only)</p> <p>1. No paved roads (go to Q#15)</p> <p>2. Partially paved (sections not paved)</p> <p>3. Completely paved</p>	<input type="checkbox"/>	CDOW_14a
	<p>b) Give a rating between 1 and 4 for the quality of the road on your route.</p> <p>1 – if poorly maintained, 2 – if undergoing repair, 3 – if somewhat maintained, 4 – if well maintained</p>	<input type="checkbox"/>	CDOW_14b
<p>Advertisements and Shops:</p> <p>Observation techniques</p> <ul style="list-style-type: none"> • The aim of this section is to count and categorise advertisements and shops that you see while doing the <i>Community Observation Walk</i>. • To begin, at the <i>Start Point</i> of the walk, from a standing position slowly and systematically look in all directions around you and document the advertisements you see. Then repeat this systematic observation in all directions from a standing position on the opposite side of the street. • From the <i>Start Point</i>, walk slowly down the street, noting down all the advertisements and shops you see. It is best to stop and start as you walk such that you do not miss anything. <p>Counting advertisements:</p> <p>Categorise all advertisements you see. For example, include:</p> <ul style="list-style-type: none"> • Advertisements on poster boards, pasted on walls, pasted on bus stops, pasted on bus or cars that go by you as you do the walk • Permanent advertisements on buildings or public facilities 			

- Advertisements on shop windows and advertisements just inside windows and that are clearly visible by people walking by the shop.
- If you see advertisements pasted on boxes pressed against shop windows or on the pavement, include if advertisement is easily visible.
- If there are multiple advertisements of the same type stuck one on top of each other count as one advertisement.
- If two or more advertisements are adjacent to each other on a single surface count as two or more advertisements if they are 1 or more metres apart.
- Apply a similar rule when advertisements are clustered together for other reasons. For example, a group of shopping trolleys in a line in front of a store may all have the same advertisement and could be counted as one.
- If a posterboard is two sided, with the same or different advertisement on each side, count this as two advertisements.
- If restaurants have their own menu items pasted on the windows/ walls of their shop these ARE included as advertisements. For example, a fast food chain may advertise their 'value meal deals' on the window –include these.

15a	Advertisements	Tally	Total	
	i) Cigarette/tobacco product		┌┌┌	CDOW _15a_i
	ii) Signs that prohibit smoking		┌┌┌	CDOW _15a_ii
	iii) Health promotion (smoking cessation)		┌┌┌	CDOW _15a_iii
	iv) Health promotion (alcohol cessation)		┌┌┌	CDOW _15a_iv
	v) Junk food (this includes foods of low nutritional value, including fast food. In supermarkets, this is usually snack foods, e.g. chocolate, potato chips, donuts, and cakes, locally made fried sweets or salty snack foods. This does not include fresh fruit or vegetable snacks)		┌┌┌	CDOW _15a_v
	vi) Sweet drink / sugar-sweetened beverages (eg Coke, juices, sports drink)		┌┌┌	CDOW _15a_vi
	vii) Non-commercial Health promo (diet) (advertised sponsored by a governmental organization or a non-commercial organization)		┌┌┌	CDOW _15a_vii
	viii) Commercial Health promo (diet)		┌┌┌	CDOW _15a_viii
	ix) Non-commercial Health promo (Phys Act)		┌┌┌	CDOW _15a_ix
	x) Commercial Health promo (Phys Act)		┌┌┌	CDOW _15a_x
	xi) Alcoholic drinks		┌┌┌	CDOW _15a_xi

Counting shops and other outlets

- Each store should be put into one category only. However, there may be one exception that is for ‘stores that sell alcohol’ – if an outlet sells alcohol, mark it down as ‘supermarket’ (for example) or ‘convenience store’ (for example) and also as a ‘store that sells alcohol’
- If a store seems to fit into more than one category, categorize it into the best option available.

15b	Shops and other outlets	Tally	Total	
	i) Supermarket (chain)		□□□	CODOW_15b_i
	ii) Small independent grocer		□□□	CODOW_15b_ii
	iii) Convenience store		□□□	CODOW_15b_iii
	iv) Informal vendor		□□□	CODOW_15b_iv
	v) Mobile vendor		□□□	CODOW_15b_v
	vi) Vending machine		□□□	CODOW_15b_vi
	vii) Butcher/meat store/market store		□□□	CODOW_15b_vii
	viii) Bakery		□□□	CODOW_15b_viii
	ix) Deli/other specialty food stores		□□□	CODOW_15b_ix
	x) Stores that sell alcohol		□□□	CODOW_15b_x
	xi) Pubs/bars		□□□	CODOW_15b_xi
	xii) Fast food restaurants		□□□	CODOW_15b_xii
	xiii) Other sit down restaurants (Include all restaurants that provide seating, except for fast food restaurants and pubs/bars)		□□□	CODOW_15b_xiii
15c	Public places	Tally	Total	
	For recreation/ physical activity (e.g. park/ playground/ sport field/ public garden/ landscaped open space/ plaza square/ courtyard/ beach/ swimming pools)		□□□	CODOW_15c
16	End time	□□□ . □□□		CODOW_16

Appendix II – Food Retail Outlet Assessment




Environment Profile of a Community's Health (EPOCH) SMARTD Adaption


Section: Food Retail Outlet Assessment

No.	Question	Response	Code
1.	1.1. Date (dd/mm/yy):	<input type="text"/> <input type="text"/> <input type="text"/>	FROA_1.1_date
	1.2. Data collector name:	_____	FROA_1.1_DCname
	1.3. Country: (Sweden=SW; South Africa=SA; Uganda=UG)	<input type="text"/>	FROA_1.1_country
	1.4. Rural/Urban: (Urban=U; Rural=R)	<input type="text"/>	FROA_1.1_U/R
	1.5. Neighborhood:	_____	FROA_1.1_neigh
	1.6. Retail Outlet Type: 1. Supermarket 2. Small independent grocer 3. Convenience store 4. Informal vendor 5. Mobile vendor	<input type="text"/>	FROA_1.1_type
	1.7. If 'supermarket' above, is this outlet a chain store? 1 = Yes 2 = No	<input type="text"/>	
	1.7. Outlet name:	_____	FROA_1.1_Oname
	1.8. Ethnic or not: 1 = Yes 2 = No	<input type="text"/>	FROA_1.1_ethnic
	1.9 Outlet ID:		FROA_1.1_ID

FOOD RETAIL OUTLET ASSESSMENT

Selecting a store/s: Two of each kind of food retail outlets along the predetermined 1km observational walk will be observed. Please select the largest, most frequented outlets (those that offer the most variety of products, particularly fruits and vegetables). If a store type is not present during the 1km observation walk, the nearest one should be observed.

No.	Question	Response	Code
2	List all the fresh vegetables that are available in this store.		FROA_2_cruciferous FROA_2_darkyellow FROA_2_greenleafy FROA_2_other (these codes will be applied after data collection based on the tally of each of these categories of vegetables)
3	Answer the following question with regard to the fresh vegetable display in the store. a) Are the fresh vegetables in this store easily visible from the outside of the store? 1 = Yes 2 = No	<input type="checkbox"/>	FROA_3a_Vvisible
	b) Do more than 3 types of vegetables appear to be damaged (bruised, rotten, or of poor quality)? 1 = Yes 2 = No	<input type="checkbox"/>	FROA_3b_Vdamaged
	c) Have more than 3 types of vegetables in this store been specially packaged, wrapped or boxed for sale? 1 = Yes 2 = No	<input type="checkbox"/>	FROA_3c_Vpackaged

4	List all the fresh fruits that are available in this store.		<p>FROA_4_citrus FROA_4_noncitrus</p> <p>(these codes will be applied after data collection based on the tally of each of these categories of fruit)</p>
			
5	Answer the following question with regard to the fresh fruit display in the store (or first store is multiple) that you visited to price fruit.		
	<p>a) Are the fresh fruits in this store easily visible from the outside of the store? 1 = Yes 2 = No</p> <p><input type="checkbox"/></p>	FROA_5a_Fvisible	
	<p>b) Do more than 3 types of fruits appear to be damaged (bruised, rotten, or of poor quality)? 1 = Yes 2 = No</p> <p><input type="checkbox"/></p>	FROA_5b_Fdamaged	
	<p>c) Have more than 3 types of fruits in this store been specially packaged, wrapped or boxed for sale? 1 = Yes 2 = No</p> <p><input type="checkbox"/></p>	FROA_5c_Fpackaged	

Costing and food label information (for 'specific food items')

6.1	a. Fruit		
	Record the per kg cost of the cheapest fresh fruit from each category listed below. For 'Item type' list the name of fruit observed (e.g. orange, apple, etc.). If items are not sold by kg, try to weigh the item and calculate accordingly. If this is not possible, indicate the cost of that item and how it is sold (e.g. as a single item, by the bag [try to count how many items are in the bag], etc.).		
	i) 1kg of common citrus fruit (e.g. Grapefruit, orange, tangerine, lemon, etc.)	Cost <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/> per kg	FROA_6.1ai_cost
		Item type _____	FROA_6.1ai_type
	ii) 1kg common non-citrus fruit (e.g. Apple, pear, grape, apricot, cherry, peach, plum, nectarine, prune, melon, pineapple, etc.)	Cost <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/> per kg	FROA_6.1aii_cost
		Item type _____	FROA_6.1aii_type
	iii) 1kg of frozen fruit (any type of fruit, including mixed)	Cost <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/> per bag/item	FROA_6.1aiii_cost
		Item type _____	FROA_6.1aiii_type
		Weight <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> kg	FROA_6.1aiii_weight
	b. Vegetable		
	Record the per kg cost of the cheapest vegetable from each category listed below. For 'Item type' list the name of fruit or vegetable observed (e.g. cabbage, broccoli, etc.). If items are not sold by kg, indicate the cost of that item and how it is sold (e.g. as a single item, by the bag [try to count how many items are in the bag], etc.).		
	i) 1kg cruciferous vegetable (e.g. broccoli, cabbage, cauliflower, Brussels sprouts, etc.)	Cost <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/> per kg	FROA_6.1bi_cost
Item type _____		FROA_6.1bi_type	
ii) 1kg dark yellow vegetable (e.g. carrots, yellow squash, yams, sweet potatoes, etc.)	Cost <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/> per kg	FROA_6.1bii_cost	
	Item type _____	FROA_6.1bii_type	
iii) 1kg green leafy vegetable (e.g. spinach, kale, lettuce, etc.)	Cost <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/> per kg	FROA_6.1biii_cost	
	Item type _____	FROA_6.1biii_type	

	iv) 1kg other vegetable	Cost <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/> per kg	FROA_6.1biv_cost	
	(e.g. corn, mixed vegetables, celery, eggplant, mushrooms, and beets)	Item type _____	FROA_6.1biv_type	
	v) 1kg frozen vegetable	Cost <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/> per bag/item	FROA_6.1bv_cost	
	(any type, including mixed)	Item type _____	FROA_6.1bv_type	
		Weight <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> kg	FROA_6.1bv_weight	
6.2	Specific food items Record the cost and package label information for the cheapest item available for each of the product types listed below. If two products are priced the same, select and document the healthiest option (based on the guidelines in the tool) for the 'grains' and 'dairy' products, and the 'unhealthiest' option for the 'confectionary' and 'sugar sweetened beverages' sections. See specific instructions for certain products in the questionnaire.			
	a. Specific food items - GRAINS			
i) 1 box/package of cereal	Cost <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/>	FROA_6.2ai_cost		
	Product <input type="text"/>	FROA_6.2ai_name		
	Brand name <input type="text"/>	FROA_6.2ai_brand		
	This cereal is: (mark with x) Low in sugar (<5g/100g) <input type="checkbox"/> Medium in sugar (>5.0 to <22.5 g/100 g) <input type="checkbox"/> High in sugar (>22.5 g/100 g or >27 g/serving) <input type="checkbox"/>			FROA_6.2ai_sugarlow FROA_6.2ai_sugarmed FROA_6.2ai_sugarhigh
	Contains added sugars (Y=1; N=2) <input type="checkbox"/>			FROA_6.2ai_addedsugar
	Which fibre category does the product fit into: (mark with x) Low (<3g fibre/100g) <input type="checkbox"/> Source of fibre (>3 - <6g fibre/100g) <input type="checkbox"/> High in fibre (>6g fibre/100g) <input type="checkbox"/>			FROA_6.2ai_fibrelow FROA_6.2ai_fibresource FROA_6.2ai_fibrehigh
	Weight <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> kg			FROA_6.2ai_weight
	Is there a 'less healthier' option available at the same price (e.g. higher level of sugar content / lower levels of fibre)? (Y=1;N=2) <input type="checkbox"/>			FROA_6.2ai_lesshealthy

		This bread is: (mark with x)	
		White/light bread <input type="checkbox"/>	FROA_6.2aii_type1
		Brown/wholemeal etc <input type="checkbox"/>	FROA_6.2aii_type2
		Weight <input type="checkbox"/> . <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> kg	FROA_6.2aii_weight
		Is there a 'less healthier' option available for the same price (e.g. white bread)? (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aii_lesshealthy
		If yes, note the weight <input type="checkbox"/> . <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> kg	FROA_6.2aii_LHweight
		Is the nutritional information available in the required/ local language? (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aii_language
		Ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aii_inglist
		Quantity declarations in ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aii_quantdec
		Energy (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aii_energy
		Total fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aii_totfat
		Saturated fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aii_satfat
		Trans fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aii_transfat
		Protein (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aii_protein
		Total carbohydrates (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aii_totcarb
		Total sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aii_totsugars
		Free sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aii_freesugars
		Fibre (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aii_fibre
		Sodium/salt (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aii_sodium
		Additional nutritional info (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aii_supnutrinfo

		Health claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aaii_healthclaim
		Nutrition claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aaii_nutclaim
iii) 1 package of pasta		Cost <input type="text"/> . <input type="text"/>	FROA_6.2aiii_cost
		Product <input type="text"/>	FROA_6.2aiii_name
		Brand name <input type="text"/>	FROA_6.2aiii_brand
		This pasta is: (mark with x)	
		Regular pasta (white) <input type="checkbox"/>	FROA_6.2aiii_type1
		Wholemeal pasta (brown) <input type="checkbox"/>	FROA_6.2aiii_type2
		Weight <input type="text"/> . <input type="text"/> kg	FROA_6.2aiii_weight
		Is there a 'less healthier' option available at the same price (e.g. non-whole grain)? (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_lesshealthy
		If yes, note the weight <input type="text"/> . <input type="text"/> kg	FROA_6.2aiii_LHweight
		Is the nutritional information available in the required/ local language? (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_language
		Ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_inglist
		Quantity declarations in ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_quantdec
		Energy (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_energy
		Total fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_totfat
		Saturated fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_satfat
	Trans fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_transfat	
	Protein (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_protein	
	Total carbohydrates (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_totcarb	

	Total sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_totsugars
	Free sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_freesugars
	Fibre (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_fibre
	Sodium/salt (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_sodium
	Additional nutritional info (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_supnutrinfo
	Health claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_healthclaim
	Nutrition claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2aiii_nutclaim
b. Specific food items – CONFECTIONARIES		
i) 1 package of biscuits	Cost <input type="text"/>	FROA_6.2bi_cost
	Product <input type="text"/>	FROA_6.2bi_name FROA_6.2bi_brand
	Brand name <input type="text"/>	
	Weight <input type="text"/> kg	FROA_6.2bi_weight
	Is the nutritional information available in the required/ local language? (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_language
	Ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_inglist
	Quantity declarations in ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_quantdec
	Energy (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_energy
	Total fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_totfat
	Saturated fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_satfat
Trans fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_transfat	

	Protein (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_protein
	Total carbohydrates (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_totcarb
	Total sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_totsugars
	Free sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_freesugars
	Fibre (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_fibre
	Sodium/salt (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_sodium
	Additional nutritional info (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_supnutrinfo
	Health claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_healthclaim
	Nutrition claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bi_nutclaim
ii) 1 packet of chips	Cost <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	FROA_6.2bii_cost
	Product <input type="checkbox"/> Brand name <input type="checkbox"/>	FROA_6.2bii_name FROA_6.2bii_brand
	Weight <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> kg	FROA_6.2bii_weight
	Is the nutritional information available in the required/ local language? (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_language
	Ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_inglist
	Quantity declarations in ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_quantdec
	Energy (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_energy
	Total fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_totfat
	Saturated fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_satfat

		Trans fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_transfat
		Protein (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_protein
		Total carbohydrates (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_totcarb
		Total sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_totsugars
		Free sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_freesugars
		Fibre (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_fibre
		Sodium/salt (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_sodium
		Additional nutritional info (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_supnutrinfo
		Health claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_healthclaim
		Nutrition claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2bii_nutclaim
iii) 1 chocolate bar		Cost <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	FROA_6.2biii_coost
		Product <input type="checkbox"/>	FROA_6.2biii_name
		Brand name <input type="checkbox"/>	FROA_6.2biii_brand
		Weight <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> kg	FROA_6.2biii_weight
		Is the nutritional information available in the required/ local language? (Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_language
		Ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_inglist
		Quantity declarations in ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_quantdec
		Energy (Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_energy
		Total fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_totfat
		Saturated fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_satfat

	Trans fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_transfat
	Protein (Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_protein
	Total carbohydrates (Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_totcarb
	Total sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_totsugars
	Free sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_freesugars
	Fibre (Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_fibre
	Sodium/salt ((Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_sodium
	Additional nutritional info (Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_supnutrinfo
	Health claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_healthclaim
	Nutrition claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2biii_nutclaim
c. Specific food items – SUGAR-SWEETENED BEVERAGES		
i) 1 can/bottle of non-diet soda (if multiple products are present at the same price, select Coke Classic where possible)	Cost <input type="text"/>	FROA_6.2ci_cost
	Product <input type="text"/>	FROA_6.2ci_name
	Brand name <input type="text"/>	FROA_6.2ci_brand
	This drink is: (mark with x)	
	Sugar sweetened <input type="checkbox"/>	FROA_6.2ci_sweet1
	Sweetened with artificial/other non-caloric sweeteners <input type="checkbox"/>	FROA_6.2ci_sweet2
	Made with natural 100% juice, no added sugar or artificial sweeteners <input type="checkbox"/>	FROA_6.2ci_sweet3
	Volume <input type="text"/> litres	FROA_6.2ci_weight
Is there a sugar free option available at the same price (e.g. Coke Zero)? (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_lesshealthy	
If yes, note the volume <input type="text"/> litres	FROA_6.2ci_LHweight	

	Is the nutritional information available in the required/ local language? (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_language
	Ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_inglist
	Quantity declarations in ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_quantdec
	Energy (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_energy
	Total fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_totfat
	Saturated fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_satfat
	Trans fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_transfat
	Protein (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_protein
	Total carbohydrates (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_totcarb
	Total sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_totsugars
	Free sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_freesugars
	Fibre (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_fibre
	Sodium/salt (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_sodium
	Additional nutritional info (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_supnutrinfo
	Health claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_healthclaim
	Nutrition claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ci_nutclaim
ii) 1 bottle/container of fruit juice	Cost <input type="text" value="_____.____"/>	FROA_6.2cii
	Product <input type="text" value="_____"/>	FROA_6.2cii_name FROA_6.2cii_brand

	Brand name _____	
	This drink is: (mark with x)	
	Sugar sweetened _____	FROA_6.2cii_sweet1
	Sweetened with artificial/other non-caloric sweeteners _____	FROA_6.2cii_sweet2
	100% juice, no added sugar or artificial sweeteners _____	FROA_6.2cii_sweet3
	Volume _____ litres	FROA_6.2cii_weight
	Is there a 'less healthier' option available for the same price (e.g. not 100% fruit juice)? (Y=1;N=0) _____	FROA_6.2cii_lesshealthy
	If yes, note the volume _____ litres	FROA_6.2cii_LHweight
	Is the nutritional information available in the required/ local language? (Y=1;N=0) _____	FROA_6.2cii_language
	Ingredients list (Y=1;N=0) _____	FROA_6.2cii_inglist
	Quantity declarations in ingredients list (Y=1;N=0) _____	FROA_6.2cii_quantdec
	Energy (Y=1;N=0) _____	FROA_6.2cii_energy
	Total fat (Y=1;N=0) _____	FROA_6.2cii_totfat
	Saturated fat (Y=1;N=0) _____	FROA_6.2cii_satfat
	Trans fat (Y=1;N=0) _____	FROA_6.2cii_transfat
	Protein (Y=1;N=0) _____	FROA_6.2cii_protein
	Total carbohydrates (Y=1;N=0) _____	FROA_6.2cii_totcarb
	Total sugars (Y=1;N=0) _____	FROA_6.2cii_totsugars
	Free sugars (Y=1;N=0) _____	FROA_6.2cii_freesugars

		Fibre (Y=1;N=0) <input type="checkbox"/>	FROA_6.2cii_fibre
		Sodium/salt (Y=1;N=0) <input type="checkbox"/>	FROA_6.2cii_sodium
		Additional nutritional info (Y=1;N=0) <input type="checkbox"/>	FROA_6.2cii_supnutrinfo
		Health claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2cii_healthclaim
		Nutrition claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2cii_nutclaim
iii) 1 can/bottle of energy drink		Cost <input type="text"/> . <input type="text"/>	FROA_6.2ciii_cost
		Product <input type="text"/>	FROA_6.2ciii_name
		Brand name <input type="text"/>	FROA_6.2ciii_brand
		This drink contains: (mark with x)	
		Added sugar: <input type="checkbox"/>	FROA_6.2ciii_sweet1
		Artificial/other non-caloric Sweeteners: <input type="checkbox"/>	FROA_6.2ciii_sweet2
		Volume <input type="text"/> . <input type="text"/> litres	FROA_6.2ciii_weight
		Is there a sugarfree option available at the same price? (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_lesshealthy
		If yes, note the volume <input type="text"/> . <input type="text"/> litres	FROA_6.2ciii_LHweight
		Is the nutritional information available in the required/ local language? (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_language
		Ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_inglist
		Quantity declarations in ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_quantdec
		Energy (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_energy
	Total fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_totfat	
	Saturated fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_satfat	

	Trans fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_transfat
	Protein (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_protein
	Total carbohydrates (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_totcarb
	Total sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_totsugars
	Free sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_freesugars
	Fibre (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_fibre
	Sodium/salt (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_sodium
	Additional nutritional info (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_supnutrinfo
	Health claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_healthclaim
	Nutrition claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2ciii_nutclaim
d. Specific food Items – DAIRY		
i) 1 container of milk	Cost <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> .	FROA_6.2di_cost
	Product <input type="checkbox"/> Brand name <input type="checkbox"/>	FROA_6.2di_name FROA_6.2di_brand
	Percentage fat <input type="checkbox"/> <input type="checkbox"/> .	FROA_6.2di_fat
	Volume <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> litres	FROA_6.2di_weight
	Is there a 'less healthier' option available for the same price (e.g. higher level of fat content)? (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_lesshealthy
	If yes, note the volume <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> litres	FROA_6.2di_LHweight
	Is the nutritional information available in the required/ local language? (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_language
	Ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_inglist

	Quantity declarations in ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_quantdec
	Energy (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_energy
	Total fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_totfat
	Saturated fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_satfat
	Trans fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_transfat
	Protein (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_protein
	Total carbohydrates (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_totcarb
	Total sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_totsugars
	Free sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_freesugars
	Fibre (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_fibre
	Sodium/salt (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_sodium
	Additional nutritional info (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_supnutrinfo
	Health claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_healthclaim
	Nutrition claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2di_nutclaim
ii) 1 container of yoghurt	Cost <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/>	FROA_6.2dii
	Product <input type="text"/>	FROA_6.2dii_name
	Brand name <input type="text"/>	FROA_6.2dii_brand
	Is this yoghurt: (mark with x) Plain (no sweeteners or flavours) <input type="checkbox"/> Added sugar/honey etc. (and flavour) <input type="checkbox"/>	FROA_6.2dii_flavour1 FROA_6.2dii_flavour2
	Percentage fat <input type="text"/> . <input type="text"/> %	FROA_6.2dii_fat
	Volume <input type="text"/> . <input type="text"/> <input type="text"/> <input type="text"/> litres	FROA_6.2dii_weight
	Is there a 'less healthier' option available for the same price (e.g. higher level of fat and/or sugar content)? (Y=1;N=2) <input type="checkbox"/>	FROA_6.2dii_lesshealthy

		If yes, note the volume <input type="text"/> . <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> litres	FROA_6.2dii_LHweight
		Is the nutritional information available in the required/ local language? (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_language
		Ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_inglist
		Quantity declarations in ingredients list (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_quantdec
		Energy (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_energy
		Total fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_totfat
		Saturated fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_satfat
		Trans fat (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_transfat
		Protein (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_protein
		Total carbohydrates (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_totcarb
		Total sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_totsugars
		Free sugars (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_freesugars
		Fibre (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_fibre
		Sodium/salt (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_sodium
		Additional nutritional info (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_supnutrinfo
		Health claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_healthclaim
		Nutrition claim (Y=1;N=0) <input type="checkbox"/>	FROA_6.2dii_nutclaim
In-store advertising: Assess for the presence of any junk food, fruit and vegetable, sweet drink, cigarette or alcohol advertising.			
7	Please assess this store for the presence of the following using this score: 1= None; 2 = 1-2; 3 = >=3		
	a) Junk food advertisements (Foods of low nutritional value, e.g. chocolate, potato chips, donuts, cakes, locally made fried	<input type="checkbox"/>	FROA_7a_JFadverts

	foods. This doesn't include fresh fruit or vegetable snacks)		
	b) Sugar-sweetened beverages advertisements (Non-alcoholic sweet drinks e.g. Coke, Pepsi, fruit juice, sport drinks etc.)	<input type="checkbox"/>	FROA_7b_SSBadverts
	c) Fruits and vegetable advertisements	<input type="checkbox"/>	FROA_7c_FVadverts
	d) Cigarette and tobacco advertisements	<input type="checkbox"/>	FROA_7d_Tadverts
	e) Alcohol advertisements	<input type="checkbox"/>	FROA_7e_Aadverts



Appendix III – Community-Wide Food Retail Outlet Tally



Environment Profile of a Community's Health (EPOCH) SMARTD Adaption - September, 2017

Section: Community Food Retail Outlet Tally

Counting shops and other outlets

The purpose of this exercise is to identify and tally all the different types of food retail outlets (as categorised in EPOCH) surrounding the area in which the 1km observation walk was conducted; i.e. the centre and/or most frequented part of town. Using the map that you have been provided with as a guide, all food retail outlets within this radius will need to be identified and tallied using a predetermined walking route. The use of maps accessed via mobile devices is also recommended.

- Each store should be put into one category only. However, there may be one exception that is for 'stores that sell alcohol.' E.g. If a supermarket sells alcohol, mark it down as 'supermarket' as well as a 'store that sells alcohol'
- If a store seems to fit into more than one category, categorize it into the best option available.

15b	Shops and other outlets	Tally	Total	
	i) Supermarket (chain)		□□□	CODOW_15b_i
	ii) Small independent grocer		□□□	CODOW_15b_ii
	iii) Convenience store		□□□	CODOW_15b_iii
	iv) Informal vendor		□□□	CODOW_15b_iv
	v) Mobile vendor		□□□	CODOW_15b_v
	vi) Vending machine		□□□	CODOW_15b_vi
	vii) Butcher/meat store/market store		□□□	CODOW_15b_vii
	viii) Bakery		□□□	CODOW_15b_viii
	ix) Deli/other specialty food stores		□□□	CODOW_15b_ix
	x) Stores that sell alcohol		□□□	CODOW_15b_x
	xi) Pubs/bars		□□□	CODOW_15b_xi
	xii) Fast food restaurants		□□□	CODOW_15b_xii
	xiii) Other sit down restaurants (Include all restaurants that provide seating, except for fast food restaurants and pubs/bars)		□□□	CODOW_15b_xiii