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URBAN FOOD DESERTS
AND CLIMATE CHANGE IN
AFRICA'S HUNGRY CITIES

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Abstract

The underlying assumption in much of the Euro-American food deserts literature is that urban food deserts are dynamic spaces, expanding and contracting with the advent and withdrawal of supermarkets. This discussion paper argues that to tie such dynamism purely to the spatial behaviour of formal food retail outlets is both narrow and inappropriate in the African context, where the use of the food deserts concept requires a sophisticated understanding of the multiple market and non-market food sources, of the spatial mobility and dynamism of the informal food economy, of the changing drivers of household food insecurity and the local conditions that lead to compromised diets, undernutrition and social exclusion. The paper discusses the case of Cape Town, South Africa, where supermarkets command a significant share of food retailing and have been expanding into all areas of the city. After tracing the spatial expansion of supermarkets in the last two decades, the paper examines the nature of the food interactions between modern retail, the informal food economy and food access in poor urban neighborhoods from the perspective of consumer households. It argues that the concept of urban food deserts needs to be reformulated and redefined to fit African realities since there is very little evidence that the growth of supermarkets across the city and in low-income areas is eliminating urban food deserts. The paper also addresses one of the major silences in the food deserts literature; that is, the relationship between climate change and urban food security.

Keywords

food deserts, climate change, food security, urban, informal economy, supermarkets, consumers

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Introduction

Research on the nature and extent of urban food insecurity in British and North American cities has led to the notion of “urban food deserts” to describe economically and socially-deprived inner-city areas (Besharov et al 2010, Ghosh-Dastidar et al 2014, Gordon et al 2011, Jiao et al 2012, Martin et al 2014, Walker et al 2010, Wrigley 2002). One of the early definitions from this body of work describes urban food deserts as “areas of relative exclusion where people experience physical and economic barriers to accessing healthy food” (Cummins and Macintyre 2002: 436). The idea of the food desert has become integrally connected to the spatial behaviour of the supermarkets that dominate the urban food system in European and North American cities (Apparicio et al 2007, Guy et al 2004, Larsen and Gilliland 2008, Russell and Heidkamp 2011). Where supermarkets are present, it is suggested, consumers are able to make healthier food choices because of the variety and quality of fresh produce. Where they are not, as in many low-income and deprived areas of cities, diets tend to be less varied and lead to poor health outcomes.

Mead (2008: 335) argues that the “steady suburbanization of major food retailers is creating food deserts in city centers as these retailers follow people into ever expanding suburbs.” The result is that people with low incomes in the city centres have “poor access to vegetables, fruits and other whole foods.” Ghosh-Dastidar et al (2014) measure the relationship between distance to store, food prices and obesity rates of primarily African-American residents in low-income neighbourhoods. The study found that placing a supermarket in a food desert alone would not necessarily reduce obesity rates because the price of healthy food was an equally significant factor. Martin et al (2014) examined the access to high quality food items and food prices in a US small town. They hypothesized that fewer large supermarkets and high food prices correlates positively with limited access to healthy food in smaller towns. While all of this research is important in terms of the health outcomes with regard to access to supermarkets and food prices, it does not

challenge the central role of the supermarket in the construction of urban food deserts.

The Euro-American concept of the urban food desert has gained only limited traction in Africa and the Global South more generally (Battersby 2012a, Battersby and Crush 2014, Bridle-Fitzpatrick 2015, Gartin 2012, Nickanor 2013). In part, this is because the international focus on rural poverty and food security has meant that urban food insecurity is largely invisible to researchers and policy-makers (Crush and Frayne 2011). Supermarkets are recent entrants to food retailing in many countries and cities in the South and tend to target middle- and high-income consumers (Reardon et al 2003). However, where they have a longer history and are present in much greater numbers (as in many Latin American countries and in South Africa), the obvious question is whether the conventional supermarket-driven idea of the food desert can be applied to analysis of African cities. And, if not, would it be better to abandon the idea of the food desert or redefine and delink it conceptually from the absence or presence of supermarkets?

Because the conventional definition of urban food deserts refers only to spatial and economic exclusions from the food system and the role of supermarkets, several authors have argued for a broader definition. Shaw (2006, 2014), for example, suggests that if we use the causes and attributes of such spaces of exclusion to define urban food deserts, a number of different types of food deserts can be identified. She identifies three categories: ability-related, assets-related and attitude-related urban food deserts. Ability-related food deserts are “anything that physically prevents access to food which a consumer otherwise has the financial resources to purchase and the mental desire to buy” (Shaw 2006: 241). Personal physical disability is one such barrier as it can prevent a person from opening the packaging of desired food items or entering a specific store or section of a store to purchase desired food items. Local geography such as road crossings or hilly topography may create problems for those who do not own or have access to a car to transport their food. A related element is access to public transport when it is needed. Finally, ability can be affected by

the weight of the food to be carried home and the terrain across which it has to be carried.

An asset-related food desert involves the absence of financial assets, thus preventing consumption of desirable food that is otherwise available (Shaw 2006). These assets are both monetary and non-monetary: for example, monetary assets include the funds both to pay for transport to and from the shop as well as to purchase the desired food. Non-monetary assets include refrigerated storage space and access to cooking facilities in the dwelling. There is considerable evidence that access is the key dimension of food insecurity in the cities of the Global South. While there is a common view that urban agriculture can achieve improved food access and security (Poulsen et al 2015), in many Southern African cities and poor neighbourhoods, the prospects for urban agriculture are limited (Crush et al 2011, Frayne et al 2014). In a predominantly cash environment, with high rates of unemployment, households are continually vulnerable to food insecurity. Furthermore, with limited cash resources, healthy food choices often take second place to cheaper, energy-dense foods.

Third, there are attitude-related food deserts. Here, Shaw (2006) is referring to “any state of mind that prevents the consumer from accessing foods they can otherwise physically bring into their home and have the necessary assets to procure.” The range of attitudes that can influence access to healthy foods in the urban food desert include “culturally based prejudices against certain foods, lack of knowledge as to how to prepare and cook some foods, or unwillingness to find time in a time-poor but cash-rich lifestyle to cook fresh vegetables” (Shaw 2006: 242). What this essentially negative conceptualization leaves out in its focus on prejudice is the issue of preference. An attitude-related food desert may also exist when people have certain food preferences (cultural or otherwise) that they are unable to meet. Furthermore, as the “nutrition transition” literature makes clear, prejudices and preferences are not simply a matter of personal choice (Popkin et al 2012).

Despite Shaw’s (2006) efforts to expand the understanding of urban food deserts, much of the research in this area continues to emphasize the importance of supermarkets in the creation and elimination of food deserts. Battersby and Crush (2014) suggest that a simple focus on modern retail does not adequately capture the complex realities of the food system and urban food deserts in African cities. They argue that the use of the food deserts concept in Africa requires a sophisticated understanding of the multiple market and non-market food sources, of the spatial mobility and dynamism of the informal food economy, of the changing drivers of household food insecurity and the local conditions that lead to compromised diets, undernutrition and social exclusion. They go on to redefine urban food deserts as “poor, often informal, urban neighbourhoods characterized by high food insecurity and low dietary diversity, with multiple market and non-market food sources but variable household access to food” (Battersby and Crush, 2014: 149).

With the definitions of Shaw (2006) and Battersby and Crush (2014) in mind, this paper examines the case of Cape Town, South Africa, where supermarkets command a significant share of food retailing and have been expanding into all areas of the city. After tracing the spatial expansion of supermarkets in the last two decades, the paper examines the nature of the food interactions between modern retail, the informal food economy and food access in poor urban neighborhoods from the perspective of consumer households. It shows that supermarkets have a growing presence in poorer areas of the city and that many poor households source food from supermarkets. Yet, levels of food insecurity are also extremely high in these neighbourhoods. In other words, in contradiction of the food deserts literature, the mere presence or absence of supermarkets is insufficient to say whether a food desert exists or not. This paper argues that the concept of urban food deserts needs to be reformulated and redefined to fit African realities since there is very little evidence that the growth of supermarkets across the city and in low-income areas is eliminating urban food deserts.

The paper also addresses one of the major silences in the food deserts literature; that is, the relationship between climate change and urban food security. There is a growing literature on the impacts of climate change on African cities but very little of it examines whether and how climate change impacts on the food security of the urban poor (Frayne et al 2012, Ziervogel and Frayne 2011). According to Battersby (2012b), the challenge is one of scale mismatch, where climate change is likely to impact on processes and relationships only indirectly connected to the urban area per se. The food deserts literature is extremely situational and micro-scale in emphasis and therefore falls prey to the problem of spatial mismatch, failing to incorporate any consideration of large-scale environmental change. In this paper we suggest how the ways in which climate change associated events may compromise rural, peri-urban and urban food production, directly affecting the different dimensions of food security (availability, access, stability, utilization) as well as threatening the limited assets of the urban poor.

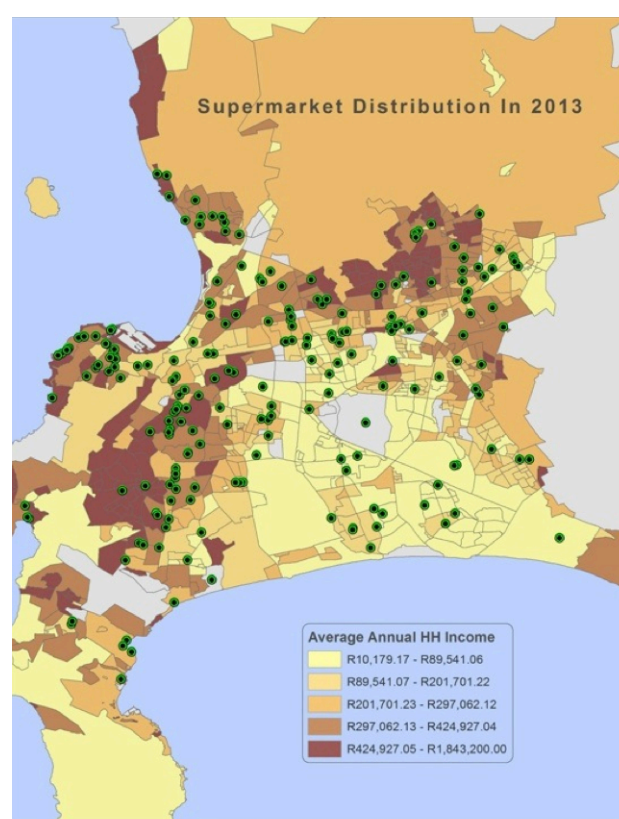
We draw here on data from two household surveys in Cape Town conducted by the African Food Security Urban Network (AFSUN) in 2008 and the Hungry Cities Partnership (HCP) in 2013. The 2008 survey was conducted in three low-income areas of the city: Ocean View (N=226), Brown's Farm in Philippi (Ward 34) (N=389) and Enkanini and Kuyasa in Khayelitsha (Ward 95) (N=394) (Battersby, 2011). The HCP survey was conducted in December 2013 when a city-wide representative sample of 2,504 households was surveyed.

Supermarket Expansion in Cape Town

The literature on supermarket expansion in the Global South identifies South Africa as a country of "first wave" expansion in the 1990s (Dakor 2012, Reardon et al 2003). Continued growth and infilling has continued since the turn of the century. By 2003, the supermarket sector constituted 50–60% of national food retail and had

reached 68% by 2010 (Battersby and Peyton 2014). Research on the expansion of supermarkets in Cape Town illustrates not only that the absolute number of supermarkets has continued to increase but that physical access is still highly unequal (Battersby and Peyton 2014, Peyton et al 2015). For example, people in high-income neighbourhoods had almost eight times as many supermarkets per household as those in low-income areas. However, as Figure 1 clearly shows, supermarkets are also expanding into lower-income areas, often as anchor tenants in new shopping malls.

FIGURE 1: Map of Spatial Distribution of Supermarkets in Cape Town

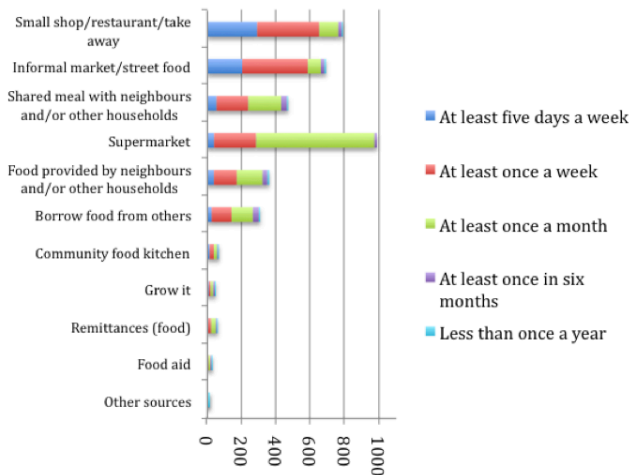


Source: Battersby and Peyton 2014, p. 160.

Does the greater concentration of supermarkets in Cape Town's middle- and higher-income areas mean that low-income households are excluded from geographical access or is the expansion of supermarkets into low-income areas making their products more accessible? In the 2008 AFSUN survey, households in the selected three poor areas of Cape Town were asked where they normally

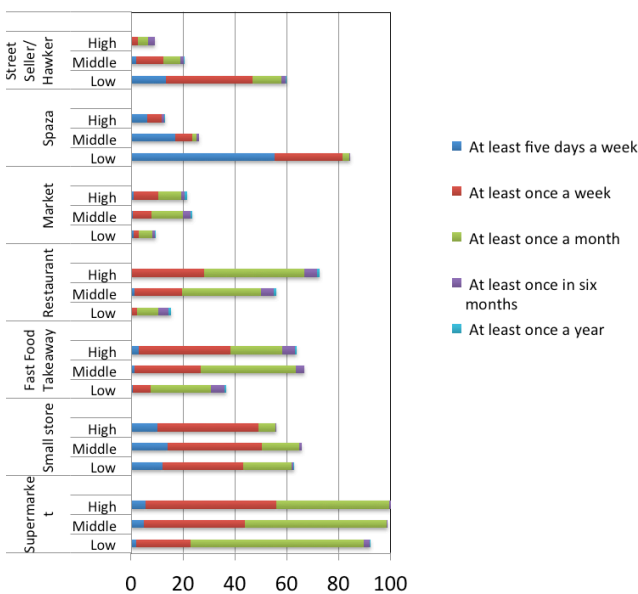
obtained their food and how often. Supermarkets were easily the most important source, patronized by almost all households, followed by small retail outlets and then the informal food economy (Figure 2). Urban agriculture was insignificant by comparison. The 2013 HCP survey data confirmed the importance of supermarkets to poor urban households, as well as those in middle- and high-income areas. The vast majority of households in all three income terciles sourced food from supermarkets (Figure 3).

FIGURE 2: Food Sources for Poor Urban Households, 2008



Source: Frayne et al (2009: 33)

FIGURE 3: Food Sources by Income Tercile, 2013



Source: Caesar and Crush 2015

The other significant finding in both 2008 and 2013 is that poorer households tend to patronize more than one food source, albeit with different frequencies (Figures 2 and 3). Only 20% of low-income households surveyed in 2008 shopped at supermarkets at least once a week. On the other hand, around 60% bought food from small retail outlets and informal vendors at least once a week. A similar pattern emerged in the 2013 survey, with lower-income tercile households frequently purchasing food at other outlets including spaza shops and street vendors (both parts of the informal food economy), small stores and, to a lesser extent, fast-food outlets. Patronage frequencies varied with income. Informal food sources are patronized on an almost daily basis by low-income households while the majority shop at supermarkets once a month.

The evidence from both the 2008 and 2013 surveys in Cape Town suggests that all households, including low-income ones, can access supermarkets either in their own neighbourhoods or through use of public and private transport. However, while over 50% of high-income households shop at supermarkets at least once a week, only 20% of low-income households do the same. The question is whether this is a result of differential geographical access or of the availability of alternative, possibly cheaper, food sources in low-income neighbourhoods. The 2013 survey suggests that many poorer households strategically engage with supermarkets by purchasing supplies in bulk on payday and thus lower the average costs they pay for staples, especially mealie meal (maize flour). Their daily food purchasing needs are largely met by neighbourhood vendors in the formal and informal sectors.

Food Insecurity in Cape Town's Food Deserts

Accessibility to supermarkets and the presence of alternative food sources in Cape Town's low-income areas suggest that there is no shortage of food, and even good quality food, in these areas of the city. Does this mean that they are not therefore "areas of relative exclusion where people experience

physical and economic barriers to accessing healthy food”? (Cummins and Macintyre 2002: 436).

The AFSUN and HCP approach to this question is to examine the ability-related, assets-related and attitude-related forms of exclusion (Shaw 2006) through a focus on food security outcomes at the household level, where food security is defined as “a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 2002).

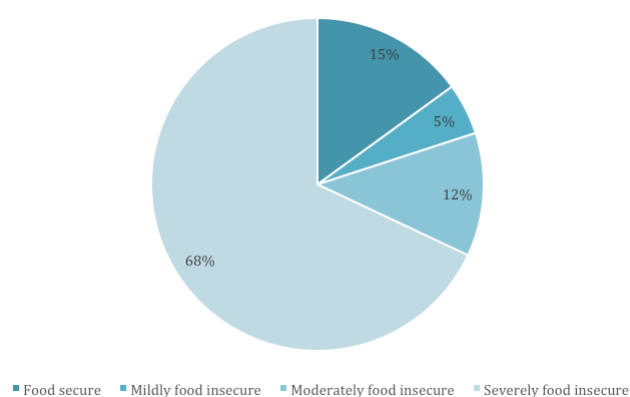
Both surveys used three common food security measurements designed by the Food and Nutrition Assistance (FANTA) project (Bilinsky and Swindale 2007, Coates et al 2007, Swindale and Bilinsky 2006) including: (a) the Household Food Security Access Scale (HFIAS) in which households are allocated to categories according to weighted responses to nine questions providing a score between 0 (complete security) and 27 (complete insecurity); (b) the Household Food Insecurity Access Prevalence (HFIAP) indicator which groups scores on the HFIAS scale into four main categories, i.e. severely food insecure, moderately food insecure, mildly food insecure and food secure; and (c) the Household Dietary Diversity Scale (HDDS) which asks what foodstuffs household members ate in the previous day. All food items are placed in one of 12 food groups, giving a maximum score of 12 and a minimum of 0.

In 2008, the HFIAS score for the three low-income neighbourhoods combined was a relatively high 10.7 (compared with only 4.7 in similar Johannesburg neighbourhoods, for example) (Frayne et al 2010). In terms of the HFIAP, 68% of households were severely food insecure while only 15% were totally food secure (Figure 4). The prevalence of food insecurity also varied across the three survey areas (Figure 5).

Household food insecurity was highest in the informal settlements of Wards 95 (in Khayelitsha) and 34 (in Philippi) with 80% and 71% of

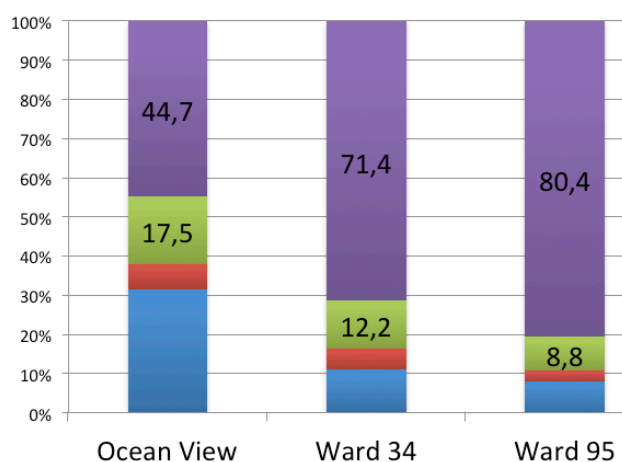
households severely food insecure respectively. The 2013 HCP survey of the city as a whole found that low-income households are the most food insecure and that very few households in the middle- and higher-income terciles were food insecure (Figure 6). More than 50% of households in the lowest-income tercile were severely food insecure, compared with less than 20% and 10% respectively in the middle- and upper-income terciles.

FIGURE 4: Household Food Security Status, 2008



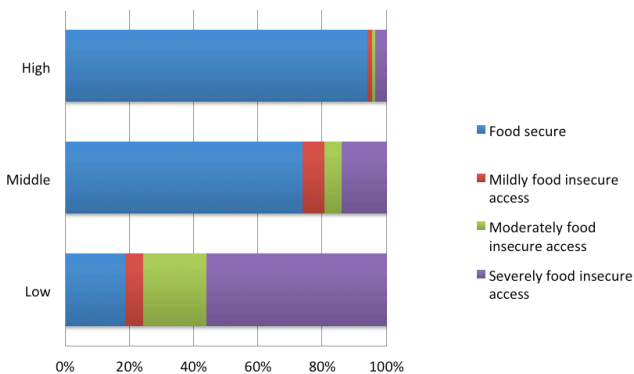
Source: Battersby 2011

FIGURE 5: Household Food Security Variations, 2008



Source: Battersby 2011

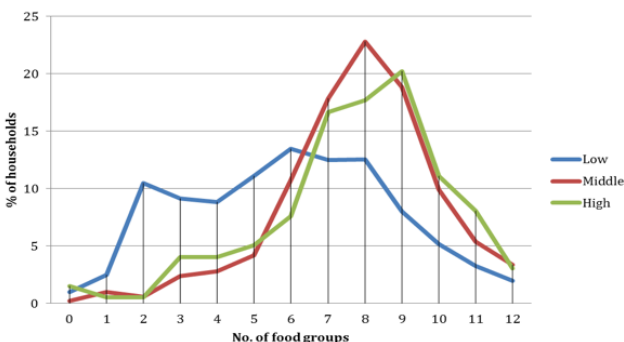
FIGURE 6: Levels of Food Insecurity by Income Terciles, 2013



Source: Caesar and Crush 2015

The HHDS scores followed a similar pattern. The mean HHDS score in the three poor neighbourhoods in 2008 was 6.33 out of 12. Of the four most commonly consumed foodstuffs, three are largely non-nutritive: foods made with oils/fats (consumed by 72% of households), sugars (83%) and tea and coffee (88%). The other, consumed by over 90%, was cereals (in the forms of mealie meal and wheat in bread). This suggests that although the average diet may have caloric adequacy, it is deficient in vitamins and other micronutrients. In the 2013 HCP survey, there were clear differences between households by income tercile, with those in the lowest-income tercile having the lowest mean HHDS and the greatest proportion of households with low scores (Figure 7).

FIGURE 7: Household Dietary Diversity by Income Terciles, 2013



Source: Caesar and Crush 2015

What these findings suggest is that low-income areas in Cape Town qualify as food deserts as defined by Battersby and Crush (2014: 149) and fit

the profile of assets-related food deserts elaborated by Shaw (2006). More work is certainly needed on Shaw’s (2006) attitude-related urban food deserts. In areas of a city like Cape Town characterized by asset-related urban food deserts it is hard to disentangle issues of food affordability from food preference. In other words, is the fact that people cannot afford to eat the foods they prefer purely responsible for unhealthy eating? This is certainly the view of Temple and Steyn (2009, 2011), who see food prices as the primary barrier to healthy patterns of eating (and by extension to the creation of attitude-related food deserts where people cannot eat what they prefer). Alternatively, are attitudes and preferences themselves actually changing and being reshaped by broader forces such as the so-called “nutrition transition” towards unhealthy high-fat, energy-dense diets?

Temple et al (2006) have compared the food preferences of high school pupils from different socio-economic areas of Cape Town and found that food was brought to school by 41-56% of pupils and that 69% purchased food at or near the school. Pupils from high socio-economic areas were twice as likely to bring food to school although “unhealthy” foods brought to school outnumbered “healthy” ones by 2 to 1. Among those who purchased food at school, 70% purchased no healthy items at all. Pupils were aware of what foods were healthy and unhealthy yet continued to purchase unhealthy foods. A separate study of primary school pupils in the area found that most of the lunchboxes brought to school contained white bread with processed meat, while the most frequent purchases at or near schools comprised chips (including french fries) (Abrahams et al 2011). These studies are only indicative and focus on only one population group but they do indicate that preferences for unhealthy foods are strong among the young. In other words, in terms of attitude-related food deserts, it is not so much prejudice against healthy foods as preference for unhealthy foods that is characteristic. Steyn and Labadarios (2011) further show that there is a growing preference for fast foods among poor South African urban consumers, a phenomenon that Igumbor et al (2012) attribute to the growing advertising clout of large food processing corporations.

Changing Climates in the Food Desert

Understanding the impacts of climate change on urban food security is a conceptual and methodological challenge “not least because climate change is a long-term event whereas food security – particularly for poor households – is an immediate and daily concern” (Frayne et al 2014: 26). There are at least three ways, however, in which this connection can be made: first, a climate-change-induced reduction in agricultural production and productivity may increase food prices and market volatility (which affects food availability, accessibility and stability (Frayne et al 2014: 28).

Second, urban and peri-urban food production losses may result in direct household food supply shocks and local price increases (affecting food availability, accessibility, stability and utilization). Much of Cape Town’s fresh vegetable supply, for example, comes from a farming area within the city, the Philippi Horticultural Area (PHA) (Brown-Luthango 2015). The PHA is already under intense pressure from developers wishing to transform the area into housing estates. Longer-term, if the developers are unsuccessful, climate change could well impact on the volume of fresh produce emanating from the area, which would necessitate the import of more expensive substitutes.

Thirdly, climate change and associated extreme weather events could mean damage to capital assets that promote food security, affecting accessibility and utilization (Cartwright et al 2012, Frayne et al 2014). Cape Town is highly exposed to such extreme events (severe flooding in informal settlements is now a regular winter rainfall occurrence), which can quickly erode capital assets such as shelter and put even greater pressure on the household food budgets of residents of urban food deserts (Battersby 2012b, Joubert 2013). Levels of food insecurity were already higher among households in informal shacks than formal housing, even in the same area. And it is informal housing that is more likely to be damaged or destroyed during heavy rains.

In the remainder of this section, we examine the first of these three impacts; that is, how climate change affects agricultural systems far removed from the city which then significantly reduces the food security of residents of Cape Town’s food deserts. Southern Africa has seen a warming trend consistent with global temperature rises, along with a greater frequency of below-normal rainfall years, and a higher number of drought years in the last few decades (Bellprat et al 2015, Ziervogel and Frayne 2011). In 2015 and early 2016, Southern Africa’s high-productivity commercial farming areas were ravaged by the most severe drought in decades. Food prices began to rise precipitously. In Cape Town, vegetables cost 21% more and fruit 13% more than they had a year earlier. The prices of the staple foods relied on by low-income households were also marching upwards. The cost of potatoes, for example, had more than doubled (Dentlinger and Dano 2016). The full impact of the drought on the urban poor will require systematic research, although reports have already begun to emerge of changes in purchasing patterns towards lower-cost, less-healthy processed foods (Dentlinger and Dano 2016) and hungry children (some as young as three) begging in the streets for money to buy chips (McCain 2016).

As a possible clue to impacts, it is worth examining what happened in Cape Town during the last sudden and dramatic round of food price increases in 2007–2008. There is now a large literature examining the causes and impact of the 2007–2008 global food price crisis on Africa (Verpoorten et al 2013). In Cape Town, food inflation between October 2007 and October 2008 reached 17%, almost 5% higher than the general rate of inflation (Battersby 2012b). The AFSUN survey in 2008 asked households in the selected three low-income areas of the city about the impact of the food price increases. Seventy-six percent said that their economic conditions had deteriorated in the previous year and only 11% said that they had improved. Households were also asked if they had gone without food due to food price increases and how frequently. Eleven percent had gone without every day, 35% more than once a week and 35% about once a month. Only 28% were unaffected. The other common response to

food price increases was to adjust consumption patterns. Dietary diversity declined as households focused on purchase and consumption of energy-dense, high carbohydrate foodstuffs.

Conclusion

This paper has argued that, suitably modified and nuanced, the concept of the urban food desert is applicable to Cape Town's low-income areas. While a more detailed mapping of the geography of these food deserts is a task for the future, the three areas of the city surveyed by AFSUN in 2008 certainly fit the Africa-centric definition proposed by Battersby and Crush (2014). In addition, there is sufficient evidence from the 2013 HCP survey to suggest that food deserts extend across all low-income areas of the city. However, we break from the Euro-American research literature in decentering the role of supermarkets where its absence and presence defines food deserts. Most poor households in Cape Town purchase food at supermarkets and this trend will only intensify as supermarkets spread their reach into low-income areas.

However, access to supermarkets certainly does not eliminate food deserts in Cape Town. These are areas of severe food insecurity and low dietary diversity with heavy dependence on a limited range of foods of high calorific value but low nutritional value. In explaining the reasons for the city's food deserts, the paper draws on Shaw's (2006) typology of food deserts. Most of Cape Town's food deserts fit the proposed assets-related definition since it is the absence or shortage of assets that forces households into a state of chronic insecurity. However, there is some evidence that a redefined attitudes-related definition also has purchase, particularly if the emphasis is placed on preferences (both for healthy foods that are inaccessible and unhealthy foods that are rich in salt and fat) rather than prejudices.

The underlying assumption in much of the Euro-American food deserts literature is that these are dynamic spaces, expanding and contracting with

the advent and withdrawal of supermarkets. As we have argued, to tie such dynamism purely to the spatial behaviour of formal food retail outlets is both narrow and inappropriate in the African context. At the same time, it is important not to lose sight of the fact that food deserts as defined here for cities like Cape Town are also dynamic. The difference is in the drivers of change, and of the intensification and amelioration of food insecurity. This paper provides a snapshot of the nature of Cape Town's urban food deserts in 2008 and 2013. However, this provides little insight into one of the major potential drivers of transformation and the entrenching of food deserts; that is, climate change. Extrapolating from data on household responses to food price shocks in 2008, it is abundantly clear that, in the absence of appropriate adaptation strategies, climate change and associated extreme weather events will have an increasingly negative impact on all dimensions of food insecurity in the African city.

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References

- Abrahams, Z., de Villiers, A., Steyn, N., Fourie, J., Dalais, L., Hill, J., Draper, C. and Lambert, E. (2011). "What's in the Lunchbox? Dietary Behaviour of Learners from Disadvantaged Schools in the Western Cape, South Africa" *Public Health Nutrition* 14:1752-1758.
- Apparicio, P., Cloutier, M. and Sheamur, R. (2007). The Case of Montreal's Missing Food Deserts: Evaluation of Accessibility to Food Supermarkets" *International Journal of Health Geographics* 6:4.
- Battersby, J. (2011). *The State of Urban Food Insecurity in Cape Town* Urban Food Security Series No. 11. Cape Town: AFSUN.
- Battersby, J. (2012a). "Beyond the Food Desert: Finding Ways to Speak about Urban Food Security in South Africa" *Geografiska Annaler Series B* 94: 141-159.

- Battersby, J. (2012b). "Urban Food Security and Climate Change: A System of Flows" In B. Frayne, C. Moser and G. Ziervogel, (eds.) *Climate Change, Assets and Food Security in Southern African Cities* London: Earthscan, pp. 35-56.
- Battersby, J. and Crush, J. (2014). "Africa's Urban Food Deserts" *Urban Forum* 25: 143-151.
- Battersby, J. and Peyton, S. (2014). "The Geography of Supermarkets in Cape Town: Supermarket Expansion and Food Access" *Urban Forum* 25: 153-64.
- Bellprat, O., Lott, F., Gulizia, C., Parker, H., Pampuch, L., Pinto, I., Ciavarella, A. and Stott, P. (2015). "Unusual Past Dry and Wet Rainy Seasons over Southern Africa and South America from a Climate Perspective" *Weather and Climate Extremes* 9: 36-46.
- Besharov, D., Bitler, M. and Haider, S. (2010). "An Economic View of Food Deserts in the United States" *Journal of Policy Analysis and Management* 30: 153-176.
- Bilinsky, P. and Swindale, A. (2007) *Months of Adequate Household Food Provisioning (MAHFP) for Measurement of Household Food Access: Indicator Guide*. Washington, DC: Food and Nutrition Assistance Project, Academy for Education Development.
- Bridle-Fitzpatrick, S. (2015). "Food Deserts or Food Swamps?: A Mixed-Methods Study of Local Food Environments in a Mexican City" *Social Science & Medicine* 142: 202-213.
- Brown-Luthango, M. (ed.) (2015). *State/Society Synergy in Philippi, Cape Town* Cape Town: African Centre for Cities.
- Caesar, M. and Crush, J. (2015) "Cape Town's Urban Food Deserts" Paper presented at Commonwealth Geographical Bureau Workshop, Kingston, Jamaica, 14-16 April 2015.
- Cartwright, A., Parnell, S., Oelofse, G. and Ward, S. (eds.) (2012). *Climate Change at the City Scale: Impacts, Mitigation and Adaptation in Cape Town*. London: Routledge, 2012.
- Coats, J., Swindale, A. and Bilinsky, P. (2007). *Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access: Indicator Guide (Version 3)*. Washington DC: Food and Nutrition Technical Assistance Project, Academy for Educational Development.
- Crush, J. and Frayne, B. (2011). "Urban Food Insecurity and the New International Food Security Agenda" *Development Southern Africa* 28: 527-544.
- Crush, J., Hovorka, A. and Tevera, D. (2011). "Food Security in Southern African Cities: The Place of Urban Agriculture" *Progress in Development Studies* 11: 285-305.
- Cummins, S. and McIntyre, S. (2002). "Food Deserts: Evidence and Assumption in Health Policy-Making" *British Medical Journal* 325: 436-438.
- Dakor, E. (2012). "Exploring the Fourth Wave of Supermarket Evolution: Concepts of Value and Complexity in Africa" *International Journal of Managing Value and Supply Chains* 3: 25-37.
- Dentlinger, L. and Dano, Z. (2016). "Mother of Two Forced to Leave Groceries at Till" *Cape Argus* 24 March 2016. At www.iol.co.za/news/south-africa/western-cape/mother-of-two-forced-to-leave-groceries-at-till-2001283.
- FAO (2002). *The State of Food Insecurity in the World 2001*. Rome: FAO.
- Frayne, B., Battersby-Lennard, J., Fincham, R. and Haysom, G. (2009) "Urban food security in South Africa: Case study of Cape Town, Msunduzi and Johannesburg" Development Planning Division Working Paper Series No.15. Midrand, South Africa: DBSA.
- Frayne, B., McCordic, C. and Shilomboleni, H. (2014). "Growing Out of Poverty: Does Urban Agriculture Contribute to Household Food Security in Southern African Cities?" *Urban Forum* 25: 177-189.
- Frayne, B., Moser, C. and Ziervogel, G. (eds.) (2012). *Climate Change, Assets and Food Security in Southern African Cities*. London: Earthscan.
- Frayne, B., Pendleton, W., Crush, J., Acauah, B., Battersby-Lennard, J., Bras, E., Chiweza, A., Dlamini, T., Fincham, R., Kroll, F., Leduka, C., Mosha, A., Mulenga, C., Mvula, P., Pomuti, A., Raimundo, I., Rudolph, M., Ruysenaar, S., Simelane, N., Tevera, D., Tsoka, M., Taawodzera, G. and Zanamwe, L. (2010). *The State of Urban Food Insecurity in Southern Africa*. Urban Food Security Series No. 2. Cape Town: AFSUN.
- Gartin, M. (2012). "Food Deserts and Nutritional Risk in Paraguay" *American Journal of Human Biology* 24: 296-301.
- Ghosh-Dastidar, B., Cohen, D., Hunter, G., Zenk, S., Huang, C., Beckman, R. and Dubowitz, T. (2014). "Distance to Store, Food Prices, and Obesity in Urban Food Deserts" *American Journal of Preventive Medicine* 47: 587-595.
- Gordon, C., Purciel-Hill, M., Ghai, N., Kaufman, L., Graham, R. and Van Wye, G. (2011). "Measuring Food Deserts in New York City's Low-Income Neighborhoods" *Health and Place* 17: 696-700.
- Guy, C., Clarke, G. and Eyre, H. (2004). "Food Retail Change and the Growth of Food Deserts: A Case Study of Cardiff" *International Journal of Retail and Distribution Management* 32: 72-88.
- Igumbor, E., Sanders, D., Puoane, T., Tsolekile, L., Schwarz, C., Purdy, C., Swart, R., Durao, S. and Hawkes, C. (2012). "'Big Food,' the Consumer Food Environment, Health, and the Policy Response in South Africa" *PLoS Medicine* 9(7): 1-7.

- Jiao, J., Moudon, A., Ulmer, J., Hurvitz, P. and Drewnowski, A. (2012). "How to Identify Food Deserts: Measuring Physical and Economic Access to Supermarkets in King County, Washington" *American Journal of Public Health* 102: e32-e39.
- Joubert, L. (ed.) (2013). *Rising Waters: Working Together on Cape Town's Flooding*. Cape Town: African Centre for Cities.
- Larsen, K. and Gilliland, J. (2008). "Mapping the Evolution of "Food Deserts" in a Canadian City: Supermarket Accessibility in London, Ontario, 1961-2005" *International Journal of Health Geographics* 7(1): 16.
- Martin, K., Ghosh, D., Page, M., Wolff, M., McMinimee, K. and Zhang, M (2014). "What Role Do Local Grocery Stores Play in Urban Food Environments? A Case Study of Hartford-Connecticut" *PLoS One* 9(4): e94033.
- McCain, N. (2016). "Kids Begging Out of Hunger" *People's Post* 23 February 2016.
- Mead, M. (2008). "The Sprawl of Food Deserts" *Environmental Health Perspectives* 116(8): A335.
- Nickanor, N. (2013). "Food Deserts and Household Food Insecurity in the Informal Settlements of Windhoek, Namibia" PhD Thesis, University of Cape Town, Cape Town.
- Peyton, S., Moseley, W. and Battersby, J. (2015). "Implications of Supermarket Expansion on Urban Food Security in Cape Town, South Africa" *African Geographical Review* 34 36-54.
- Popkin, B., Adair, L. and Ng, S. (2012). "Global Nutrition Transition and the Pandemic of Obesity in Developing Countries" *Nutrition Reviews* 70: 3-21.
- Poulsen, M., McNab, P., Clayton, M. and Neff, R. (2015). "A Systematic Review of Urban Agriculture and Food Security Impacts in Low-Income Countries" *Food Policy* 55: 131-146.
- Reardon, T., Timmer, C., Barrett, C. and Berdegue, J. (2003). "The Rise of Supermarkets in Africa, Asia and Latin America" *American Journal of Agricultural Economics* 85: 1140-1146.
- Russell, S. and Heidkamp, C. (2011). "Food Desertification: The Loss of a Major Supermarket in New Haven, Connecticut" *Applied Geography* 31: 1197-1209.
- Shaw, H. (2006). "Food Deserts: Towards the Development of a Classification" *Geografiska Annaler: Series B* 88: 231-247.
- Shaw, H. (2014). *The Consuming Geographies of Food: Diet, Food Deserts and Obesity*. London: Routledge.
- Steyn, N. and Labadarios, D. (2011). "Street Foods and Fast Foods: How Much Do South Africans of Different Ethnic Groups Consume?" *Ethnicity and Disease* 21: 462-466.
- Swindale, A. and Bilinsky, P. (2006). "Development of a Universally Applicable Household Food Insecurity Measurement Tool: Process, Current Status, and Outstanding Issues" *Journal of Nutrition* 136:1449S-1452S.
- Temple, N. and Steyn, N. (2009). "Food Prices and Energy Density as Barriers to Healthy Food Patterns in Cape Town, South Africa" *Journal of Hunger & Environmental Nutrition* 4: 203-13.
- Temple, N. and Steyn, N. (2011). "The Cost of a Healthy Diet: A South African Perspective" *Public Health Nutrition* 14: 1752-1758.
- Temple, N., Steyn, N., Myburgh N. and Nel, J. (2006). "Food Items Consumed by Students Attending Schools in Different Socioeconomic Areas in Cape Town, South Africa" *Nutrition* 22 (2006): 252-258.
- Verpoorten, M., Arora, A., Stoop, N. and Swinnen, J. (2013). "Self-Reported Food Insecurity in Africa During the Food Price Crisis" *Food Policy* 39: 51-63.
- Walker, R., Keane, C. and Burke, J. (2010). "Disparities and Access to Healthy Food in the United States: A Review of Food Deserts Literature" *Health and Place* 16: 876-884.
- Wrigley, N. (2002). "Food Deserts' in British Cities: Policy Context and Research Priorities" *Urban Studies* 39: 2029-2040.
- Ziervogel, G. and Frayne, B. (2011). *Climate Change and Food Security in Southern African Cities*. Urban Food Security Series No. 8. Cape Town: AFSUN.