



The Centre For Business Relationships,
Accountability, Sustainability and Society

WORKING PAPER SERIES No. 46

Food Deserts: Contexts and Critiques of Contemporary Food Access Assessments



Jesse McEntee



Food Deserts: Contexts and Critiques of Contemporary Food Access Assessments

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Abstract

Food deserts are an attractive metaphor, but because defining this phrase and actually identifying food deserts is a contentious endeavour, it is more revealing to discuss related terms. Inherent in the debate around food deserts (i.e. how they are defined, if and where they exist), is the topic of /access/. The central purpose of this paper is to demonstrate that access is a more accurate and less misleading concept than food deserts when it comes to highlighting food inequalities. Social exclusion, choice, food security, and public health are fields drawn upon. In addition food desert applications that utilize GIS to identify food deserts are reviewed. Utilizing these findings as a platform, I propose that food security studies have entered a post-modern food security paradigm, which can readily be seen in US-based community food security efforts. Progressing beyond the initial attention-grabbing nature of the food desert term, a conceptually thin foundation is discovered that impedes universal understanding and acknowledgment that areas of inadequate food access exist. Food access, on the other hand, is an established phrase that has evolved and been applied in different arenas to address food security. Food access is a readily understood concept that can be tailored to specific applications; whether it is physical, economic, or informational food access. For this reason, it is proposed that access is a more accurate and less misleading concept than food deserts when it comes to highlighting food inadequacies.

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Published by

The Centre for Business Relationships, Accountability, Sustainability & Society (BRASS)
Cardiff University
55 Park Place
Cardiff CF10 3AT
United Kingdom
<http://www.brass.cf.ac.uk>

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ISBNs 978-1-906644-04-8 (print)
978-1-906644-05-5 (web)



Introduction

The first application of the ‘food desert’ phrase is claimed to be by a resident of public housing that used it to “capture the experience of what it was like to live in a deprived neighbourhood where food was expensive and relatively unavailable” (*Cummins and Macintyre 2002a: 2115*). Since then, it has been widely used by politicians to highlight poverty, social exclusion, and areas with inexistent and/or poor food retail provision (*Acheson 1998; Hughes 2000; Social Exclusion Unit 1998*), as well as by academics who have attempted to quantify the problem (*Wrigley et al. 2002; Guy et al. 2004; Smoyer-Tomic et al. 2006; Cummins and Macintyre 1999*). The food desert phrase is often debated, attributable to this term’s broad use and resultant applicability. The literature can be presented in a two-tiered hierarchical application in the form of descriptions of access. The first tier is a general portrayal of areas where the population experiences inadequate access to healthy and affordable food and are subject to “compound social exclusion” (*Wrigley 2002: 2038*). The second tier is a precise application, identifying food deserts through quantification of physical, economic, and/or knowledge-based access indicators; these methods vary from study to study. These techniques can be in-depth and often thoroughly assess local food access and the subsequent identification of food deserts, but lack the broad applicability of first tier uses, which tend to be streamlined throughout the literature. Food deserts are an attractive metaphor, but because defining this phrase and actually identifying food deserts is somewhat contentious (*e.g. Cummins and Macintyre 2002b*), it is more revealing to discuss terms that are related to the phrase.

Inherent in the debate around food deserts (i.e. how they are defined, if and where they exist), is the topic of *access*. The central purpose of this paper is to demonstrate that access is a more accurate and less misleading concept than food deserts when it comes to highlighting food inequalities. Certain social and health principles can constructively inform our understanding and perspective of food access. Social exclusion, choice, food security, and public health are a few fields that I draw upon. In addition to this critique of first tier applications of food deserts, I evaluate second tier applications, namely those that utilize GIS to identify food deserts. Utilizing these critiques as a platform, I propose that food security studies have entered a post-modern food security paradigm, which can readily be seen in US-based community food security efforts.

Origin of Food Deserts

One of the earliest articles that mentioned food deserts was by Lang and Caraher (1998) in the context of access to healthy foods and corresponding public health education policies. Guy and David (2004) solidified the application by identifying potential urban food deserts in Cardiff and provided general food desert criteria: 1) physically and 2) economically disadvantaged, 3) have poor nutrition, 4) geographically disadvantaged, and 5) live in areas with a limited supply of foods. The authors proceeded to identify two food desert areas of Cardiff utilizing a specific methodology involving distance from retailers, deprivation scores, performance indicators to measure effectiveness of delivery of grocery retailing, and a food price index. Shaw (2006) continued the open-ended nature of the term, alluding to the fact that food deserts remain undefined and applied a unique food desert classification scheme involving 234 semi-structured interviews to inquire into the obstacles faced by individuals in accessing grocery stores. Shaw ultimately proposed a food desert classification that assessed the ‘ability, assets, and attitude’ of individuals based on a high, medium, or low rating system. Hendrickson et al. (2006) is one of the few studies that included rural areas in their analysis. The authors identified food deserts in urban areas as those communities “with ten or fewer stores and no stores with more than 20 employees” (no parallel criteria provided for rural settings) (p. 372) and carried out focus group discussions, administered consumer surveys, and performed an inventory of food stuffs. Each of these studies *describes* food deserts as areas of general inadequacy in retail provision. They all also *identify* potential food deserts, but do so using methodologically unique criteria, impeding comparison between studies.

Social Exclusion

A central pillar of the food desert debate over the past decade has been the notion of social exclusion. This phrase has been repeatedly referred to in food desert and food access literature, especially those based in the UK (e.g. Shaw 2006, Whelan et al. 2002, Cummins and Macintyre 2002a, Guy and David 2004, Furey et al. 2001, Wrigley et al. 2003). The UK Social Exclusion Task Force defines social exclusion as :

“when people or places suffer from a series of problems such as unemployment, discrimination, poor skills, low incomes, poor housing, high crime, ill health and family breakdown. When such problems combine they can create a vicious cycle.

Social exclusion can happen as a result of problems that face one person in their life. But it can also start from birth. Being born into poverty or to parents with low skills still has a major influence on future life chance” (Social Exclusion Unit 2008)

The origins of the term can be found in Lenoir (1974) and modern day applications consistently refer to individuals and groups who are excluded in some way from participating in society (Bossert *et al.* 2007). No precise definition of *social exclusion* exists, but that in itself is likely why it has had such success in its wide application (not unlike the *food desert* phrase). Another reason for its wide acceptance is probably due to *social exclusion's* relativity. People can experience social exclusion for a number of reasons; poverty, unemployment, illness (physical and mental), but these states are judged in relation to the rest of society. Therefore, how do we decide who is and is not socially excluded? A useful concept to answer this question is *agency*. That is, who is doing the excluding? The excluded individual or society? Atkinson (1998) pointed out that “exclusion implies an act, with an agent or agents,” (p.14) and emphasizes that social exclusion, poverty, and unemployment are habitually equated, though they should not be. After all, one who is socially excluded is not always poor or unemployed and vice versa. Thus, social exclusion, in addition to being a relative and somewhat vague term, can have different meaning, depending on the action of the agent. A simple example relating to food access would be the difference between a people who choose to eat unhealthy food versus someone who is forced to eat unhealthy food; assuming both actors have knowledge about what food is healthy, the latter lacks the ability to choose.

Social exclusion in British cities was publicly recognized after the election of a Labour government in 1997. The Social Exclusion Unit report, *Bringing Britain Together* (1998), articulated how social exclusion was intensifying throughout Britain with many areas of the country benefiting from a rising standard of living, while the poorest neighbourhoods became increasingly worse off. The level of health in poorer areas followed this pattern, with inequities continually widening. Wrigley (2002) cites the *Bringing Britain Together* report along with the *Independent Inquiry into Inequalities in Health* report (Acheson 1998) (which discusses

increasing food poverty and linkages between a healthy diet rich in fruits and vegetables with higher socioeconomic groups) as bonding the health inequalities and social exclusion debates in the UK, affirming that :

“health consequences of under-nutrition caused by lack of access to food, particularly of foods integral to a healthy diet, in poor neighbourhoods in British cities became a key focus for research and policy intervention” (Wrigley 2002: 2031).

Poor health was accepted as a sign of social exclusion as a result of the *Bringing Britain Together Report*. Part of the problem was the “erosion” of basic retail provisioning (Wrigley et al. 2002: 2103) which began to be addressed through retail planning policy and retailers in the 1990s in Britain. However, a disconnect in retail planning approaches existed in Britain regarding how these policies should promote social inclusion. Small-scale local approaches were promoted – ‘local retail strategies’ – in the consultation report of Policy Action Team (PAT) 13 (DoH 1999) and subsequently embraced by the Department of the Environment, Transport and the Regions, which resultantly made identifying and addressing food deserts a priority (Wrigley 2003: 153); this spawned the now ubiquitously quoted phrase by Government Minister Beverly Hughes that established a 500 meter radius as a criteria for adequate retail provision:

“I want to see planners put more emphasis on developing local solutions to solve problems of social exclusion from services. This will involve defining the food shopping needs of local people within a retail strategy and identifying ‘food deserts’—areas that lack retail services within say a 500-metre radius” (Hughes 2000)

Simultaneously, major corporate retailers began to promote food access through redevelopment of city-centre parcels that would house large stores (Wrigley et al. 2002; Wrigley 2002). Resulting from a scarcity of tried and true methodologies for identifying food deserts, Wrigley et al. (2003) conducted a before/after study of retail provisioning in the UK city of Leeds. Researchers found that large scale retail intervention actually benefited residents by halving their walking distance and increasing consumption of healthy foods. In the end, Wrigley et al. (2003) placed onus on advocates of local retail strategies (akin to those promoted in the PAT 13 report)

to demonstrate how this type of intervention affects access. Local small-scale retailing options are continually touted as a likely remedy to food accessibility in both the US and UK (*PAT 13 1999; Shaw 2006; Anderson et al. 2007*), but few studies have proven this. In reality, at least two studies have highlighted dissatisfaction among residents with small scale retailers (*Kirkup et al. 2004; Wrigley et al. 2002*). Although the Leeds before/after study successfully observed behaviour pre and post construction of a large retailer in an urban setting, this type of opportunity is rare and somewhat difficult to recreate. Nevertheless, this study showed that a non-health-intervention approach (in this case, a large-scale retail provisioning approach), can have an effect on people's consumption of healthy food. There is substantial discussion in UK-based literature about area and individual based approaches to social problems (*e.g. see Cummins and Macintyre 2002a; Wrigley et al. 2003*). This is similar to public health intervention strategies of some social services in the US. For instance, public education that encourages people to make healthy dietary choices (bottom-up/individual-based) usually fails if healthy food is not readily accessible. Top-down/area-based approaches can also falter (*i.e. a government initiated healthy foods school lunch initiative that struggles to financially survive due to inadequate education about why these foods are beneficial*).

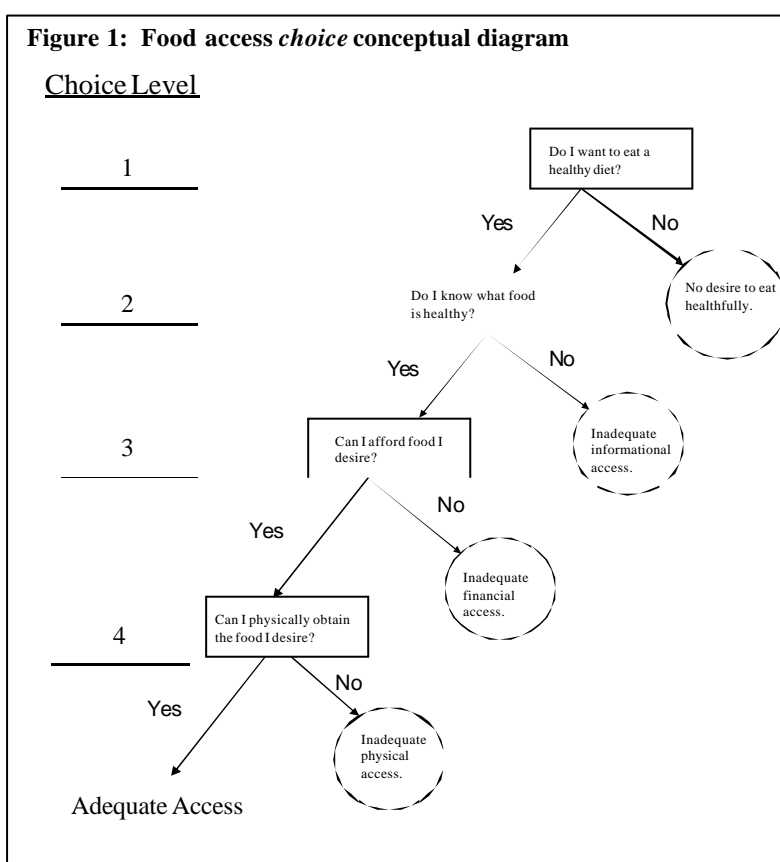
Retail Choice

Consumers are not passive actors whose actions are dictated by retailer (large or small) decisions. Instead, a relationship exists between these two actors (the consumer and retailer) and often involves a third actor, the purchaser. In this paper, I examine the role of the consumer and aim to determine the factors that influence consumer satisfaction with food choice and ultimately, access; the basis for this being that an individual may be simultaneously satisfied with their ability to access food and their own health status, regardless of a nutrition expert's opinion, who may arrive at a different conclusion.

Choice is paramount to this discussion. If a person is satisfied with their local food provisioning choices, then it may be safe to assume they are not experiencing inadequate food access. However, it is well-established that eating certain foods can improve health and reduce chronic health problems (*e.g. Morland et al. 2002*). If a respondent to a food access survey indicated

they ate red and cured meats every day and were satisfied with their food choices and health, they could be judged to be inadequately informed and lacking nutritional knowledge; a situation I revisit later. The food desert analogy is fundamentally about choice and can be envisaged as a four-level decision making tree with four levels of accompanying questions (see Figure 1). The tree begins at choice level 1, asking whether the individual wants to eat a healthy diet; if they do, they progress onto the second tier.

If the subject does care, but does not know what food is healthy, they suffer from a lack of nutritional knowledge, therefore lacking the ability to *choose* healthy food.



If they cannot afford healthy food, they suffer from inadequate financial access. If they can afford the healthy food they desire to buy and can physically reach it, and then they have adequate access and choice. This is a simplistic diagram, but it conveys the essence of choice and how it loosely fits within the food desert debate's generally accepted three types of access; informational, economic, and physical. For instance, even though an expert in nutrition may have the informational, financial, and physical means to make and

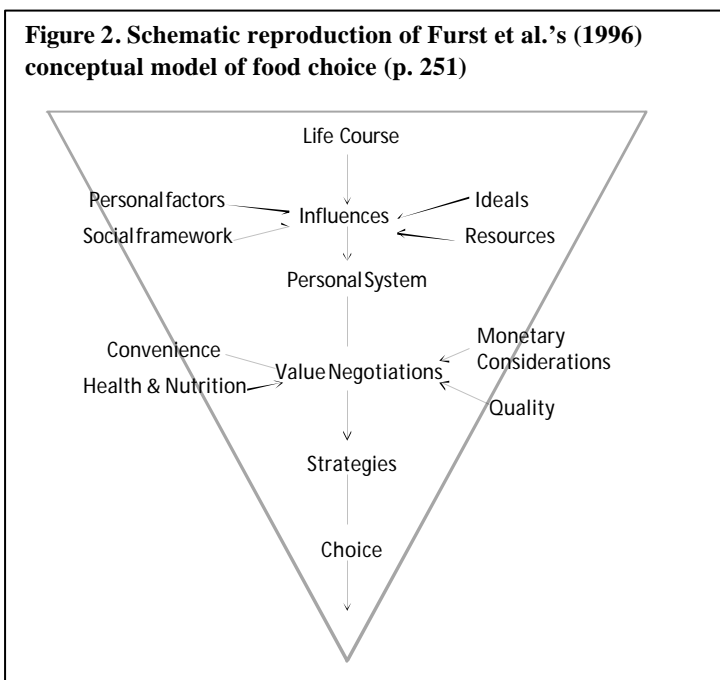
follow through on healthy choices, they still may not because of other factors, such as time, stress, taste, etc..., but the important factor is that they chose to eat that way with full knowledge and ability at all four levels of choice.

Food choice is often referred to in food retailer and access literature (Whelan et al. 2002, Cummins and Macintyre 2002a, Anderson et al. 2007, Hendrickson et al. 2006, Furey et al. 2001,

Baker et al. 2006, Furst et al. 1996, Skerratt 1999, Wrigley et al. 2002, Wrigley 2002, Guy and David 2004). Yet choice is never defined; rather, it is used to define or describe other concepts. For example, Guy and David (2004) use choice to define one of their five food desert criteria:

“They [the population that live in a food desert] will be geographically disadvantaged because of the lack of choice of food stores in the area” (Guy and David 2004: 223).

Choice is an important term and requires close examination for one to understand its role in assessing food access. Explorations of consumer choice also exist in nutrition literature. Furst et al.’s (1996) investigation embodied different dimensions’ of choice; the influence of life course



experience, value negotiations, and behavioural strategies. Value negotiations included some parallels to food retailer and consumer choice literature, including monetary considerations and nutrition beliefs. Socialization, attitude, nutritional knowledge, symbolism, customs, beliefs, and values influence a “synergistic relationship” of biological, ecological, and sociocultural environments, which determine an individual’s food

behaviour (Parraga 1990). Social factors of food choice have been recognized as equal to, or possibly more important than, biological bases for food choice (Rozin 1980). Furst et al.’s (1996) conceptual model of the food choice process (p.251) (outlined in Figure 2) differs in two ways from Figure 1. Firstly, it represents a manifestation of emotional (cultural and “personal” factors) as well as resource-based influences in food choice. Secondly, the model does not present a decision-making process, but an amalgamation of factors that influence choice. Both figures, however, could be applied to almost any resource, not just food, with only minor adjustment. Figure 1 serves as a superior guide in the context of food access assessment because

it depicts a hierarchy of choice barriers, implicitly including the myriad qualitative components emphasized by Furst et al. (1996).

Revisiting the notion of the three types of access associated with food deserts (informational, economical, and physical) yields a significant conceptual obstacle. Physical and economic access research have been overemphasized, while at the same time overlooking the “social and cultural constraints on access” (Kirkup et al. 2004: 512) (I group these under the informational access umbrella), which Kirkup et al. (2004) support in their UK research. They found interview respondents placed more emphasis on the importance of retail choice that offered flexibility and options, and rejection of the idea that physical distance is a key determinant of access. However, in their attempt to promote food access as an element that can be assessed through people’s satisfaction with choice, the researchers have overlooked some integral considerations. They assert that studies which examine variations in choice and perceived choice could unearth new areas of disadvantage. Yet, as the authors themselves admit, choice is often perceived rather than real. It would appear, because of the subjective nature of choice, on both inter and intra personal levels, choice offers an important consideration when assessing informational access (e.g. knowledge of healthy food, opinions about food access), but it does not deliver a complete picture. Despite this critique, the authors made an important discovery: choice, as an informational and social indicator, is as an important determinant of access as the far more heavily relied upon indicator of physical and economic access. Nevertheless, physical access continues to be relied upon as an indicator in contemporary food access and desert studies.

Evolution of Food Security into Community Food Security

Retail choice presumes a market-based structure for obtaining food. Retail provisioning discussions mentioned in this paper have focused on the experiences of Western Europe and the US. Choice can be used to articulate different degrees of food access, but there is a significant body of parallel literature that grounds the concept of food access that is separate from the consumer perspective. In this section, I provide an overview of the food security and community food security concepts, their conceptual evolution, and their present-day setting.

Food security is a phrase that has been in use for decades to describe people's ability to obtain food. Almost 200 unique definitions exist (Smith et al. 1992). Article 25 of the United Nations 1948 Declaration of Human Rights states that everyone has the right to a standard of living that includes adequate access to food (United Nations 1948), but it was not until the World Food Conference in 1974, which itself was prompted by world food crises, that the goal to eliminate hunger and food insecurity was galvanized on a global scale. Food security frames many of today's approaches to addressing food poverty and hunger, as well as access.

Maxwell (1996) describes three "important and overlapping" shifts in thinking about food security in the context of post-modernism. Firstly, there is a shift from thinking of food security on a global/national scale to one of an individual/household one. This period (~1975 – 1985) represents the gradual realization that hunger could exist despite adequate food stuffs and therefore, *access* to food was just as important as absolute *supply* in ensuring people were nutritionally satisfied. For our purposes, the key factor to highlight here is the acknowledgement of access' importance. Sen (1981) is generally credited as being responsible for initiating this realization through his work on entitlements and how they impact and relate to how one can access food; if a person is starving, it is:

"the result of his inability to establish entitlement to enough food; the question of the physical availability of the food is not directly involved" (p.8).

Access became a critical ingredient in tackling food security, both conceptually and literally. Two food security definitions underscored by Maxwell (1996) exemplify the change in thought over the course of a decade (1975 – 1985). The first is from the UN Report of the World Food Conference held in 1975:

"Availability at all times of adequate world supplies of basic food-stuffs...to sustain a steady expansion of food consumption...and to offset fluctuations in production and prices" (UN 1975 taken from Maxwell 1996: 156)

This definition's foci are largely macro in nature:

“global supplies of basic food stuffs...”

Contrastingly, the World Bank policy study of 1986 defined food security as:

“...access by all people at all times to enough food for an active, healthy life.” (World Bank 1986: 1, from Maxwell 1996: 157)

Access and health have replaced notions of global supplies in this definition. The World Bank food security definition continues to be one of the most widely cited.

The second paradigm shift discussed by Maxwell is that which transitions from a 'food first' perspective to one of livelihood. This shift took place after 1985 and was defined by a transition away from a Maslow (1954) type approach to food security to one that recognized livelihood security was a necessary condition for food security. That is, people facing food insecurity take into account not just readily available food supplies, but also other competing influences such as giving up food for relatives and future livelihood; thus the inclusion of a temporal element. The third shift that Maxwell discusses is the move from objective to subjective approaches to food security. Traditional quantitative measurements have been used to gauge food security, such as caloric intake. However, as the author points out, this is problematic because determining what caloric intake is (in)adequate requires judgment on the part of the researcher and these objective measures do not account for qualitative elements, such as food quality, habits, and cultural acceptability. Resultantly, we are left with a new food security policy which takes on a post-modern nature that has dictated much of today's food security discussion and a shift from macro to micro perspectives:

“Instead of a discussion largely concerned with national food supply and price, we find a discussion concerned with the complexities of livelihood strategies in difficult and uncertain environments, and with understanding how people themselves respond to perceived risks and uncertainties”
(Maxwell 1996: 160).

If we adopt the assertion of Carr (2006) that food security is one “part of broad, multi-objective strategies that must be understood and addressed in their complexity,” then we are still without a generally agreed upon food security definition. Could the broad applicability and utilization of *food security* limit this term’s efficacy (Maxwell 1996)? Maxwell and Smith (1992) reviewed definitions of food security and determined that the supporting characteristic of each was;

“secure access at all times to sufficient food” (p.8).

A sufficient amount of food is necessary for a healthy and active life and security is determined by one’s vulnerability to risk. Thus, food security is not just about food, but about livelihood and perception (Maxwell and Smith 1992, Carr 2006). While this description of food security fits the post-modern framework (i.e. decentralized, rejection of meta-narratives, etc.) and certainly appears to be a “cornucopia of ideas” (Maxwell 1996: 155), it also has some commonalities with our previous discussion of the three types of access propagated in recent examples of food desert and food access literature. Specifically, both discussions attempt to account for the subjective elements of food access, which are largely reliant upon the individual’s own perception (Carr 2006). The shift from global/national foci to household/individual food security has been followed by a new concept - community food security.

If we see pre-1980s definitions of food security as classically modern in that they were built on notions of top-down approaches to governance, reliance upon the scientific method, and domination over nature, then latter definitions began to follow a post-modern track with a focus on diversity and participatory dynamics. The increasingly popular community food security (CFS) approach of North America typifies these principles. A CFS perspective views the food security problems on a community-wide level, instead of at the individual or household level. The CFS movement brings private and public sectors together to solve food security problems, encouraging communities to be self-reliant when it comes to food, instead of dependent on food entitlements; such is the case with traditional American food programs (Allen 1999). The Community Food Security Coalition promulgated a CFS approach in 1995 with the Community Food Security Empowerment Act, which sought to promote CFS by assembling a diverse group of stakeholders who were all interested in supporting the goals of this new approach to food

security. The purpose of CFS was to bring about comprehensive methods to addressing food security that were not as traditional in nature as food security goals. As Allen (1999) articulates:

“As opposed to the concept of hunger, which measures an existing condition of unfulfilled needs and is defined in terms of an individual’s food insecurity, community food security embodies a community-based and prevention-oriented framework that focuses on both immediate and long-term food security”
(p.119)

Food security’s markers tended to be focused on individual and household indicators like poverty and hunger; CFS aims to evaluate and utilize community resources to address food security with “system-based issues of hunger, access, quality, and availability” as a central focus (Gottlieb and Fisher 1996). Community-based systems with local decision-making and regional agriculture typify CFS while traditional hunger-focused food security is not concerned with modes of production (Allen 1999). The Community Food Security Coalition identifies six basic principles of CFS on their website:

- 1) Low-income food needs: Focused on addressing needs of low-income people and reducing hunger.
- 2) Broad goals: Addresses many system-wide food-related elements, ranging from poverty to farmland.
- 3) Community focus: Build community-wide resource base.
- 4) Self-reliance/Empowerment: Ability to provide for one’s food needs.
- 5) Local agriculture: Increasing ties between farmer and consumer.
- 6) Systems-oriented: Interdisciplinary projects. (CFSC 2008)

This organization defines CFS as:

“...a condition in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance and social justice” (CFSC 2008).

If the food security definitions post-1985 has been increasingly post-modern in nature, the CFS paradigm follows this trajectory. The goals listed on the CFSC website would make it difficult to form a CFS theory, which some have advocated is essential in progressing forward to understand exactly what CFS is (*Anderson and Cook 1999*). However, like traditional *food security* with its myriad definitions, perhaps community food security experiences such wide-spread buy-in because of the fact its definition and application are so loosely interpreted. For the purpose of this paper, I am concerned with *food access*, which became a central tenant of latter definitions of food security, but is implicitly assumed in CFS definitions. Though food security definitions have begun to recognize access, in implementation, food access has not proven to be a driving force behind US food assistance programs. The United States Department of Agriculture's Current Population Survey Food Security Supplement (CPC-FSS), the most commonly used tool to measure food insecurity (*Hamilton et al. 1997; Bickel et al. 1999; Andrews et al. 2000; Nord 2002*), asks households about the state of food security they experienced during the past twelve months (*Nord 2002*). The fifteen questions of this survey inquire into experiences of household members, such as degree of worry about food running out and children not eating because a lack of food (*Nord 2002*). None ask about accessing food, though economic access could be implied through affordability questions.

Measuring food access can involve numerous variables. Most importantly, perhaps, are subjective indicators that account for opinion and perception. Inclusion of such indicators represents a substantial challenge; how do we create a telling combination of objective and subjective variables to measure food security and/or access? If we envision a continuum of food security indicators, on one end we would see strictly quantitative measures, such as anthropometric status, and on the other end, we would have strictly qualitative measures that inquire into consumer opinions on retail choice. Currently, it would appear that (community) food security definitions and assessments are leaning towards the latter end of the spectrum in an attempt to account for all possible influences on food security. A central point that we can take away from this overview of food security literature is that acknowledgement and examination of food access is not new. In fact, it has been included in food security literature for almost 30 years. What make today's assessments of access novel are the attempts to measure food access through this community-level lens.

Health and Access

A primary motivating factor for investigating the conceptual basis of food access in this paper is to incorporate health outcomes in food security assessments. That is, food security assessments like the USDA's CPC-FSS are not satisfactory because it does not address access or health (i.e. a respondent could be deemed to be food secure, although their eating habits promote perpetually *bad* health as a result of ignorance to healthy food options); instead focusing on security. This is a conceptually murky area because if we determine food security and adequate access based on whether or not people worry about obtaining enough food, then we ignore what I call the *health loophole*. That is, how do we account for those individuals that have no problem obtaining food (physically or financially), but are still nutritionally delinquent? In answering this question we return to the issue of *choice*. It is not assumed that all humans have the desire to have a nutritious diet, but that humans lacking the choice to enjoy a healthy diet are victims of societal disparities.

Importance of Qualitative Measures

I have built a foundation in this paper that purports the notion that any assessment of food access is going to have to include qualitative measures that would be obtained from interviews, surveys, and focus groups. There is a large body of literature that examines access to food retailers in conjunction with epidemiological indicators. Morland (2006) found the presence of convenience stores was associated with higher prevalence of obesity. Similarly, Zenk et al. (2005) showed that presence of supermarkets may have an impact on the quality of diet consumed among lower-income women. Studies such as these may draw on interview data, but do not use this information for gauging respondent perceptions of food access and security. This is a methodological problem because it excludes the most potentially important data component: the agency that people feel they have over their actions. Nevertheless, if chronic health problems, like obesity and diabetes, are found to occur at higher rates in areas with a particular retail provisioning scheme, then we can begin to hypothesize about why this is. We might conjecture there is less fruit and vegetable consumption because chronic diseases occur at higher rates in these areas. Also, we could propose that people residing in these areas are dissatisfied with their food options, though this could not be validated without qualitative inquiry into the nutritional

knowledge of the study population. If people choose an unhealthy diet, it can be with or without sufficient nutritional knowledge to make an informed choice (see Figure 1). If a person chooses to eat unhealthy food despite knowing the ingredients to a healthy diet, then it can be presumed they are making an informed choice. If unhealthy eating habits are a result of ignorance to what the contents of a healthy diet are, then a choice is not being made. Dibsall et al.'s (2003) study findings articulate this point. Researchers found that participants of their mailed survey considered fruit and vegetables to be affordable in the quantities they habitually purchased; 5 percent felt they ate unhealthfully, while just 18 percent claimed to eat the recommended daily amount of fruits and vegetables. We could hypothesize that these residents experience inadequate informational access, which would assume that they would eat healthfully if they had this nutritional knowledge.

For all individuals, regardless of whether they lack informational access or not, dietary factors are not the only considerations when selecting food (Steptoe et al. 1995; Lawrence et al. 2007; Drewnowski 1997). The Food Choice Questionnaire created by Steptoe et al. (1995) accounts for a number of variables in addition to health, such as sensory appeal, mood, and familiarity. This effect reflects post-modern food security definitions in that it attempts to account for the diversity involved in food choices. For those that do not have the basic nutritional knowledge about healthy food, they cannot evenly weigh health considerations alongside the other factors. However, sometimes it is an issue of *interest*, not just knowledge, in health that can make a difference in what types of food are consumed. This was the conclusion of Zandstra et al. (2001), who found that health interest was associated with a lower intake of fat and an increased consumption of fruit and vegetables (Roininen and Tuorila 1999). Both the US (US FDA 2008) and UK (Food Standards Agency 2008) have robust dietary guidelines administered by the government, but why some people fall through the cracks from a public education standpoint is not an aim of this paper. Links between motivation/interest in health and consumption of certain food are apparent; another important reason to consider is attitude towards diet. Barker et al. (1995) found that as social privilege increased, so did an awareness of diet and health issues along with negative attitudes towards fat. These types of findings (ones that depict the poor health status of lower-income people because of minimal fruit and vegetable consumption) are not new (James et al. 1997). Conversely, in Dibsall et al.'s (2003) study, researchers discovered

that low-income participants did not not consume healthy foods because of affordability or physical access issues (an assumption made by many of the food access studies reviewed earlier in this paper), but instead was an issue of motivation. In addition, Pearson et al. (2005) found that price, socio-economic deprivation, and lack of local supermarkets did not affect fruit and vegetable intake. However, because lower-income people eat less healthfully than those who are wealthier, they die earlier (Lobstein 1999). Is it fair to assume this is an issue of *attitude* or *ability*? It is my argument that access to food is an issue of being adequately equipped with nutritional knowledge and satisfaction with choice.

Efficacy of Food Deserts

Access can be defined in different ways depending on the context. Physical and economic access have been measured in an array of previous studies (Shaw 2006; Whelan et al. 2002; Dubowitz et al. 2007; Guy and David 2004; Wrigley 2002; Donkin et al. 1999; Donkin et al. 2000; Wrigley et al. 2002) (see Table 1). The food desert metaphor has captured the attention of both food justice advocates and opponents. All studies that have investigated food deserts, implicitly and explicitly, rely on the concept of access. Because food desert's meanings and methodologies lack consistency, locating food deserts is a challenge. Therefore, how can we expect food desert literature and identification strategies to progress and evolve? While the food desert concept has become increasingly popular, it is limiting because of semantic infancy. If we were to try to use food deserts instead of food access to discuss physical, economic, and informational food inadequacy, we would be stifled by the lack of general understanding and biased nature of the term. I posit that food access is a more meaningful and accurate term than food deserts when it comes to highlighting food inequalities because of its more developed and generally understood meaning.

GIS Methodologies: Second Tier Applications

To further my argument that food access is a more meaningful concept than food deserts, I review quantitative GIS-based studies that have explored food access and food deserts. Five-hundred meters is commonly cited as an acceptable distance that urban residents can live from a food retailer before experiencing inadequate food access (Whelan et al. 2002; Clarke et al. 2002;

Wrigley et al. 2002; Guy and David 2002). This distance was first cited by UK Government Minister Beverly Hughes and was estimated to represent a five to seven minute walking travel time (*Donkin 1999*); beyond which an individual was determined to be living in a food desert. Rurally focused food access studies cannot abide to such a short distance limit since most people live beyond 500 meters from a food retailer and rely on an automobile and not on walking. Kaufman (*1999*) identified rural food deserts through a “net accessibility ratio” (a ratio of store sales to potential food spending), concluding that over 70 percent of the low-income population of the Lower Mississippi Delta had inadequate food access. Morton and Blanchard (*2007*) defined rural food deserts using GIS software as counties in which all residents live more than 10 miles to the nearest supermarket chain or supercenter (measured as Euclidean distance). Geographical access is determined by ones physical ability to obtain food. This often involves mobility and transportation issues and can be different depending on the setting (e.g. urban versus rural). I do not assume geographical access is limited to formal commercial entities, such as supermarkets or grocery stores, as some researchers have done (e.g. *Morton and Blanchard 2007*), since food can be accessed from these outlets as well as informal entities such as farmers markets, community supported agriculture, and small scale agriculture (personal or community gardens).

Economic access has been discussed by researchers as being an important factor in identifying inadequate food access. A price index was created by Donkin et al. (*1999*) to compare prices of food in a cluster of shops; a z-score was assigned to every item and store to highlight relatively expensive items and store locations. The mean prices of food were compared with the income level of the local population to determine how it related to the average cost of a standard weekly shopping list of items. For instance, in Donkin et al.’s British study, they found that physical access was not much of a problem, but economic access was; a healthy diet for a young man on income support would cost over 50 percent of his weekly income. A similar type of study was carried out in the US by Hendrickson et al. (*2006*) where researchers discovered that in areas with the highest poverty, food costs were typically higher and the quality of food was inferior.

There is a sizeable amount of literature that explores access, not just from a food perspective, but in relation to other health-related community resources, such as healthcare (*Lovett 2002*),

recreation (*Huston et al. 2003*), education (*Talen 2001*), and employment (*Weber 2003*). Access has been on the radar screen of many in the US since the case of *Hawkin v. Town of Shaw* (1972) when a legal precedent was set that guaranteed access to essential public services (*McLafferty 1982*). Similarly to qualitative descriptions of food deserts and access, spatial and geographical constraints are factors that scholars have over-emphasized, implicitly obviating other important considerations, such as informational and attitudinal access. For instance, Emily Talen's (2001) assessment of spatial inequities on access to schools included socioeconomic status, but did not adjust for attitudinal factors that may have skewed her results, such as popularity of certain schools and frequency of rides being provided by parents. Talen's results supported the "unpatterned inequity" thesis; the notion that while areas of inequity may exist, there is no discriminatory configuration of results (*Mladenka and Hill 1977*). Another illustration of this would be if one measured distance from every residence in a town to the closest retailer and correlated it with income level to find that there is no statistically significant correlation between these two factors; that is, income level is not an indicator of distance to food retailers. However, if the analysis was taken a step further to look at the attitudes or knowledge of respondents, the researcher may discover preferences for certain stores exist for some otherwise unobservable reason, thus refuting the unpatternable inequity thesis. Physical access is potentially the easiest type of access to measure simply because it does not always entail collection of primary data and human subjects.

Most research has assessed physical access through attributes of locations or individuals, what Kwan et al. (2003) has termed *place* and *personal* accessibility. From a mapping perspective, an example of personal accessibility would be using point data that contains individual attribute information, such as daily consumption of fruits and vegetables. Place accessibility would be placing a 500 meter buffer around a food retailer to determine its service area – a "zone-based aggregate spatial framework" (*Kwan et al. 2003*). Essential to this discussion is how we take a geographically focused and designed set of tools, such as a GIS, and employ it to incorporate traditionally non-geographical data, such as opinion, choice, or satisfaction. In a theme issue of *Environment and Planning A* entitled *Qualitative Research and GIS* (*Kwan and Knigge 2006*), guest editors Mei-Po Kwan and LaDona Knigge compiled a series of articles exploring the "broader epistemological and theoretical questions associated with the use of GIS in qualitative

research” to address the lack of methodical research in this area. To compound the challenge of qualitative GIS, place and individual accessibility (income, knowledge, and attitude) are not static, but always changing. In regards to individual accessibility, this fact may be even more so. Information influences choice and options and now that humans are increasing their exposure to information (e.g. integration of internet into daily life), these choices and opinions are even more dynamic. Moore et al.’s (2008) study is a step in the right direction as it compares perception and GIS based measurements of food environments.

Geographic information systems (GIS) have taken on a substantial role in most current accessibility studies. GIS is utilized to not only show geographical information, but often it precedes statistical analysis. For instance, Pearce et al. (2006) used GIS to measure the distance from every meshblock to 16 specific community resources over a road network. Subsequently, indices of community resource accessibility were built for the entire country of New Zealand; this consisted of a quintile assignment for each meshblock (an indicator of relative distance travelled). Pearce et al.’s (2007) study serves as a perfect example of how GIS has made possible analyses that a decade ago would have been impossible simply because they would have required prohibitory amounts of time. Measuring distance over a road network with accuracy by hand with a ruler and paper map for 38,350 census meshblocks would be a substantial time commitment. Building from their previous study, Pearce et al.’s (2007) research goes beyond a presentation of relative geographic distance and performs a non-parametric Spearman’s rank correlation analysis between access quintiles and deprivation quintiles to show that access to community resources was actually better in deprived areas. Statistical analysis is not always used in GIS applications that assess physical access. Morton and Blanchard (2007) used GIS software to create centroids and measure distance to certain retailers. Lovett et al. (2002) utilized the graphical benefits of a GIS to illustrate travel times and public transport routes to surgeries in East Anglia, UK.

Table 1. review of existent food access studies that utilize GIS/mapping techniques

Author	Study
Morton and Blanchard (2007)	Used GIS to identify populations that reside within a given distance from supermarkets/supercenters. Those who live outside of a 10 mile radius are considered to have low-access.
Apparicio et al. (2007)	Identified food deserts using GIS with 3 variables: proximity, diversity (number of stores), and 3) variety in terms of cost.
Bodor et al. (2007)	Household distances to food retailers measured.
Burns and Inglis (2007)	Used accessibility analyst (develop by the Centre of International Agricultural Tropica (CIAT) for ArcViewGIS 3.2.)
Pearce et al. (2007)	Mmeasured road distance between population weighted centroid and closest facility (Network Analyst).
Liese et al. (2007)	Food outlets mapped.
Hendrickson et al. (2006); Eikenberry and Smith (2005)	Used GIS to identify the number of stores in each neighborhood using store addresses.
Smoyer-Tomic et al. (2006)	Minimum distance and coverage methods used. Measured population-weighted centroids of postal codes to supermarkets.
Pearce et al. (2006)	Created weighted centroid and calculated travle time to community resources, including food stores, over a road network.
Shaw (2006)	Mapped retail grocery provision.
Zenk et al. (2005)	GIS used to measure Manhattan distance to closest supermarket from census tracts.
Guy and David (2004)	Used GIS to apply a Euclidean buffer around food stores.
Witten et al. (2003)	Measured access over road network using an extension similar to Network Analyst.
Clarke et al. (2002)	Mapped retailers and applied Euclidean buffer.
Donkin et al. (2000)	Food index created for food retailers. Retailer locations mapped using GIS.
Donkin et al. (1999)	Food shops were mapped indicating food price index value. GIS was also used to show Manhattan distance buffer of 500 meters.
Kaufman (1999)	GIS used to calculate accessibility measures: created centroids to represent store and household locations.

They did not perform any complex analysis, but presented a series of maps that show their data elements in a clear and precise manner so as to allow the reader to observe spatial overlaps in these data sets. If this data was presented in tabular format, the length of time to interpret it would be daunting. From these examples, we can conclude that GIS is not only useful for analysis, but also for presentation of information that contains trends that may otherwise go unnoticed if examined in a different format.

There are a number of authors who have explicitly mapped and/or used GIS to map and/or measure food access. Two GIS centric approaches exist. In the first, the authors have created/obtained original data and mapped it for presentation using GIS. An example of this would be Guy and David's (2004) buffer application around food retailers. A more sophisticated example would be Donkin et al.'s (2000) creation of price and availability indices. This type of analysis involves taking existing data and mapping it to identify trends and overlaps with other data elements (some of which may be original to the study at hand). The second GIS-centric approach is when statistical analysis is used to correlate one variable, such as physical distance, to another, such as socioeconomic status. Most studies that entail the creation of original data focus on physical and/or economic access. Very few have created methodologies to map qualitative data, such as responses from interviews. This may partly be due to the fact that this type of qualitative component demands substantial investment of time and resources (though not likely since a substantial number of food-related studies have included focus groups and/or interviews to obtain some idea about informational access), but is more likely to be due to the infancy of qualitative applications in GIS. Therefore, mapping qualitative data is the obstacle.

Conclusion

From the reviews and critique of food deserts and food access provided in this paper, we can make the following conclusions:

- Studies that aim to measure food deserts and food access lack uniformity, impeding comparison between them.
- Future examinations of food adequacy should assess consumer satisfaction with retail food choice as well as nutritional knowledge.

- While qualitative indicators, such as attitude, culture, nutritional knowledge, and satisfaction with choice have begun to be examined, no attempts have been made to map these elements alongside quantifiable indicators, such as physical or economic access.
- Traditional food security assessments are inadequate because they do not assess health, instead relying on conventional security measure such as income and hunger.
- Food security is beginning to follow a post-modern trajectory.
- While the food desert metaphor is attention grabbing, it is conceptually shallow in its capacity to describe areas of inadequate food access compared to the notion of food access because of its more developed and generally understood meaning.

The overall state of the field for measuring food access is one that has honed in on three types of access; physical, economic, and informational. Though a universally accepted methodology for identifying areas of inadequate food access (and food deserts) has yet to be established, I have highlighted the foundational concepts and themes that are necessary to consider as a methodology evolves.

Nevertheless, we can speak generally about the current trajectory of food access. We know that food access is following a post-modern theme outlined by Maxwell (1996). People do not act logically in a robotic manner with food as simply another input. Instead, food is one of many elements people need to survive as well as thrive physically, culturally, emotionally, and nutritionally (e.g. as accounted for in Furst et al.'s [1996] food choice process conceptual model). Food security is just as important as livelihood security and food *access* is just as important as *supply*. The present day CFS movement represents the diversity of needs on a system-wide basis addressing seemingly unrelated concepts, such as farmland preservation and job training, to strengthen community food security. From this we know that any future food access methodology is going to adopt a broad base from which a holistic picture of a community's food access can be seen; essentially, this contemporary methodology will need to incorporate a CFS framework.

Kirkup et al.'s (2004) articulation of choice as an indicator of adequate access raises some fundamental issues. Namely, if an individual is satisfied with their food situation, does that mean they have adequate access? If they lack the knowledge to make a choice about healthy food (see Figure 1), then it does not. We are in the midst of a post-modern/CFS food access paradigm; the far end of the continuum of food security indicators. Simultaneously, however, the current food access identification methodologies tend to sit at the opposite end of the spectrum, measuring and highlighting only physical and economic indicators (though some have investigated attitudes and satisfaction, none have tried to map them). Therefore, these two extremes of the spectrum must be brought together. That is, the very qualitative definitions and descriptions of food security and quantitative methods of food access must be unified in order for the qualitative to gain credibility as an important part of food access assessments. However, in developing these methods, we must prepare for all outcomes, starting with the second level of choice in Figure 1. For instance, what I have termed the *health loophole* is when researchers deem people food secure simply because they have adequate economic, physical access to food. While their stomachs and wallets may be full, they may experience nutritional inadequacy, and are therefore suffering from social exclusion. The food desert metaphor can serve as a novel tool to draw attention to people who are socially excluded. Despite this beneficial attribute, progressing beyond the initial attention-grabbing nature of the term, we encounter a conceptually thin foundation that impedes universal understanding and acknowledgement that areas of inadequate food access exist. Food access, on the other hand, is an established phrase that has evolved and been applied in different arenas to address food security. Like many well established ideas, food access has been re-interpreted over the past three decades, ranging from Sen's (1981) work on entitlements to today's applications of community food security. Food access is a readily understood concept that can be tailored to specific applications; whether it is physical, economic, or informational food access. It is primarily for this reason, I propose that access is a more accurate and less misleading concept than food deserts when it comes to highlighting food inadequacies.

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