HOME GROWN IN THE DESERT:

Encouraging Sustainable Food Consumption in Urban Food Deserts

by

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ABSTRACT

This thesis aims to develop an understanding of the underlying conditions in urban food deserts and then proposes urban agriculture as a means of ameliorating food insecurity and encouraging sustainable food consumption. A thematic analysis approach is employed to find common themes and patterns across the literature collected and analyzed from secondary sources. The research identifies several underlying factors that led to the existence of urban food deserts. The key issue of food insecurity plays a crucial role in preventing the development of sustainable consumption habits. Thus, the issues of urban food deserts are discussed in relation to the six dimensions of food security (access, availability, utilization, stability, agency and sustainability). Urban agriculture demonstrates a strong potential to address all of the underlying issues in urban food deserts and encourage sustainable food consumption in the long run. A thorough analysis of three urban agricultural movements – community gardens, farmers' markets and community supported agriculture – reveals the benefits and challenges of each movement. Overall, urban agriculture can improve access and availability of affordable healthy foods. It can also address the lack of a stable food system and enhance a sense of agency among disenfranchised communities. Most importantly, urban agriculture promotes a sustainable food system that meets all three pillars of sustainability (environmental, social and economic) to encourage sustainable consumption habits. Despite these many benefits, urban agriculture continues to face many challenges such as social exclusionary practices, landownership disputes and underinvestment. As a grassroot initiative, urban agriculture requires more top-down interventions to significantly address food insecurity and unsustainability. The thesis concludes by recommending policy instruments which are important in the efficient establishment and continued success of urban agricultural systems and their mission to promote sustainable consumption habits.

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LIST OF ABBREVIATIONS

CBPP	Center on Budget and Policy Priorities
CUESA	Center for Urban Education about Sustainable Agriculture
CSA	Community Supported Agriculture
DBCFSN	Detroit's Black Community Food Security Network
EBT	Electronic Bank Transfer
EPA	Environmental Protection Agency
FAO	Food and Agriculture Organization
GHG	Greenhouse Gases
HLPE	High Level Panel of Experts
HRSA	Health Resources and Services Administration
IFAD	International Fund for Agricultural Development
IPCC	Intergovernmental Panel on Climate Change
NCSL	National Conference of State Legislatures
NOAA	National Oceanic and Atmospheric Administration
NYLARJP	New York Law School Racial Justice Project
SMFM	Sommerville Mobile Farmers' Market
SNAP	Supplemental Nutrition Assistance Program
TFP	Urban Agriculture Incentive Zone Program
UHI	Urban Heat Island
UN	United Nations
UNICEF	United Nations Children's Fun
USDA	United States Department of Agriculture
WFP	World Food Programme
WHO	World Health Organization

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CHAPTER 1: INTRODUCTION

The consumption of food as an area of sociological and political research is relatively recent, despite the importance of food in our everyday lives. Food often carries with it deep social meanings; it has the power of bringing pleasure and facilitating social interaction, but it can also be the cause of displeasure, social divisions and health issues. As a vital part of human life, food continues to be surrounded by controversies and consequences around the globe. Behind food exists hunger, malnutrition, and poverty, but also power. The role of food is paramount in human life and is increasingly becoming a concern in light of the high rates of food insecurity and the unsustainable food system.

Although the United States of America (U.S) is a developed country, there are also millions of U.S. citizens who face the challenges of food insecurity every day. Urban food deserts are a consequence of racially biased policies and the industrialization of the U.S. food system. There are four defining characteristics of urban food deserts: distance to the nearest full service grocery store, low-income residents, high poverty rates and low private vehicle ownership. All of these are barriers to obtaining affordable healthy foods. The United States Department of Agriculture (USDA) estimates that there are around 6,500 food deserts located in the U.S. and around 23.5 million people live in low-income areas that are more than a mile from a grocery store (Dukto et al, 2012).[1] Solutions to address urban food deserts should primarily aim to establish community food security, and they should also encourage sustainable consumption practices.

There is a myriad of reasons why individual consumers may or may not choose to consume sustainably. Some of these include, but are not limited to, access, money, lack of information and education, culture, and lack of demand and supply. Local food environments in the U.S. are becoming increasingly more sustainable, where urban agriculture initiatives are promoting sustainable practices. This development is not equally distributed, as many communities in the U.S. are located in urban food deserts that are not privy to the same

[1] This information is from 2012 and a little outdated, however, it is also the most recently published information on urban food deserts by the USDA.

sustainable food systems. There are many reasons explaining why people eat the way they do, and it is highly dependent on their surrounding environment. Urban food deserts represent an interesting situation where it is not so much about choosing what they want to eat, and more so eating what is available in the area. Food insecurity in urban food desert communities is often ignored or overlooked when promoting sustainable food consumption. Much research is focused on improving sustainable consumption among middle class or wealthy communities, but sustainable development needs to be accessible at all income levels.

The main purpose of this thesis is to answer the question: how can sustainable food consumption be encouraged in urban food deserts? Although the question seems simple, the answer must account for the fact that urban food desert residents are already facing barriers to accessing foods, let alone sustainable foods. I aim to identify the underlying issues of food insecurity in urban food deserts, followed by recommendations to addressing these very issues. This research can help foster a better understanding of why urban food deserts experience unhealthy food environments and how to address the issues in a sustainable way. This thesis is divided into three main sections. First, chapter two contains a literature review where definitions of urban food deserts, food insecurity, sustainable food consumption and urban agriculture are presented. This provides a general overview of the concepts and themes discussed throughout the rest of the thesis. Chapter three provides an in-depth analysis of food insecurity in urban food deserts. Using the six dimensions of food security put forth by the Food and Agriculture Organization (FAO), this chapter highlights the extent to which urban food desert residents experience food insecurity in their communities.[2] Each dimension represents an unsustainable aspect of urban food deserts that can be addressed with the following recommendations proposed in chapter four. Chapter four introduces three urban agricultural movements: community gardens, farmers' markets and community supported agriculture (CSA) as solutions to first addressing food insecurity and thus encouraging sustainable food consumption. These solutions are proposed because of their potential in the sustainable development of communities. Each urban agricultural movement is discussed under the three pillars of sustainability: environmental,

[2] The six dimensions of food security are Access, Availability, Utilization, Stability, Agency and Sustainability (HLPE, 2020)

social and economic. This structure helps to foster an understanding of their role in encouraging sustainable food consumption in urban food deserts. Food cooperatives are also introduced as an expansion of successful urban agriculture where investment could lead to a community owned supermarket. The final sections of chapter four outlines six policy recommendations that are key in the efficient, transparent and successful establishment of urban agricultural systems across the U.S. in urban food deserts. Grassroot movements continue to demonstrate the power of individuals in enacting change, but the reality is that further change cannot happen without government support. These policy recommendations aim to address the lack of laws and governance regarding urban agricultural systems and to reprioritize community needs.

Urban agriculture not only improves the health and wellbeing of these communities, but it also supports transitions to environmentally sustainable food consumption and agricultural production (Treuhaft and Karpyn, 2010). It encompasses all three pillars of sustainability and demonstrates the potential to ameliorate food insecurity and encourage sustainable food consumption. Local availability of affordable healthy foods will lower consumption of highly processed foods that are bad for both health and the environment. An equally important benefit of introducing urban agriculture is the presence of safe open public spaces. This allows community members to gather, encouraging a sense of unity and empowering communities to participate in social change (Brown and Jameton, 2000). Finally, opening new local food markets also contributes to revitalizing the neighborhood by providing new jobs, opportunities, attracting new businesses and generating additional spending in the local economy (Treuhaft and Karpyn, 2010). Urban food desert residents are disproportionately facing challenges in their local food environments which puts them more at risk than other members of the population. These communities are in need of solutions to food insecurity. Urban agriculture offers sustainable solutions that empower communities to control their own food environments and provides the necessary tools to develop sustainable consumption habits.

1.2 METHODOLOGY AND PROCEEDINGS

This study will provide a qualitative analysis of the underlying issues in urban food deserts along with an analysis of various alternative food movements. The research will be guided by the following questions:

1. How can sustainable food consumption be encouraged in urban food deserts?
2. What are the food insecurity issues in urban food deserts?
3. How do various alternative food movements fulfil the requirements of the three pillars of sustainability?

Each question introduces a unique analysis and yet their inherent overlaps are crucial to developing a response to the primary research question. One of the challenges faced in this paper is that there is no definitive or objective answer to the question. This very challenge is what drove the approach for this project.

Furthermore, the aim of this paper was to analyze general patterns in an attempt to identify universal solutions. As such, secondary data was collected to make up the research for this project, as opposed to primary research. Using primary data would have significantly narrowed the research question to cover only one area, rather than urban food deserts as a whole. Books, journal articles and reports from institutions like the USDA and the FAO were used to compile data. A thematic analysis approach was employed when analyzing the research collected from these sources. This was done to find common themes and patterns across the literature.

The USDA provided general background information to help set the stage for the rest of the research. For example, the Food Access Research Atlas (2020) provided information on urban food deserts across the U.S., including features such as low-income residents, population size, vehicle ownership, and SNAP participation, among others. Additionally, information such as SNAP authorized retailers and farmers' markets accepting SNAP benefits were all gathered from USDA databases. The FAO provided a conceptual understanding of food insecurity that was employed throughout the thesis. Journal articles were collected and reviewed to provide secondary data and specific examples of issues in urban food desert communities and how to address the issues. Through this research, general patterns between urban food desert across the

U.S. were found and used to develop a response that could cover the majority of urban food desert situations.

CHAPTER 2: LITERATURE REVIEW

2.1 ORIGINS OF URBAN FOOD DESERTS

For many individuals in the United States going grocery shopping is simply a short drive to the nearest grocery store to pick up what they need. However, for some U.S. residents, grocery shopping has become a major indicator of socio-economic inequalities. In 2014, 14 percent of all U.S. households experienced food insecurity on some level and an estimated 23.5 million people live in food deserts (Raponi, 2017). The term *food desert* originated in 1990s Scotland to describe ageing villages where grocery stores were closing little by little (Walker et al, 2009). Since then, the term food desert has had several definitions, but they all point to the same problem: a lack of access to affordable healthy foods.

In the UK, where the term originates, the central issue was the absence of food where small and declining neighborhoods found themselves losing grocery stores as populations left small towns for big cities. Part of the difficulty in understanding the term urban food desert in the U.S. comes from the fact that food is still prevalent in many areas that are designated food deserts, where the "the proliferation of convenience stores and gas stations ensure that some type of food is accessible to almost all residents" (Blanchard and Matthews, 2008: 202). This brings up an interesting conversation on the types of foods available and their impact on the residents of urban food deserts.

Urban food deserts are generally understood as census tracts that have limited access to affordable healthy foods (Dukto et al, 2012). [3] The United States Department of Agriculture (USDA) characterizes food deserts as census tracts 'featur[ing] large proportions of households with low-incomes, inadequate access to transportation, and a limited number of food retailers providing fresh produce and healthy groceries for affordable prices (low-access)" (Dukto et al, 2012: 1). In the U.S. this definition covers both urban and rural food deserts, however, for the purpose of this paper, I will focus solely on urban food deserts. From this definition, three characteristics of urban food deserts can be extracted. First of all, low-income is characterized by

[3] "Census tracts are subdivisions of a county, containing between 1,000 and 8,000 people" (USDA, 2009, p 5).

"either a poverty rate equal to or greater than 20 percent, or a median family income that is 80 percent or less of the metropolitan area's median family income" (Dukto et al, 2012: 5). The inclusion of income levels is a key aspect in defining food deserts since it represents another barrier to accessing affordable healthy foods, not just distance to a supermarket.

The second characteristic is inadequate access to transportation where urban food deserts residents have low rates of vehicle ownership and limited public transportation. The USDA identifies low vehicle availability in a tract "if more than one-hundred households report having no vehicle and are more than 0.5 miles from the nearest supermarket" (USDA, 2019). Inadequate transportation is a major barrier in accessing affordable healthy food, especially considering the third characteristic of urban food deserts: low-access. The distance to the nearest supermarket and large grocery store defines whether a census tract is low-access or not. In an urban setting, low-access is when at least 500 people or 33 percent of the population in the census tract lives more than 0.5 or 1 mile away from a supermarket or a grocery store. It is worth mentioning that organizations determine urban food deserts differently depending on the context of their work and/or the actual situation of urban food deserts. For example, the city of Baltimore acknowledges that low-access to a grocery store in an urban neighborhood could be as little as ¼ of a mile away because "for families without their own transportation, one-quarter mile is a likely upper limit of a walkable distance carrying groceries" (Truant and Neff 2015: 432). A report by The Food Trust, a non-profit organization based in Philadelphia, on food inequalities across the U.S. found that despite the recent increases in food production, "people living in low-income neighborhoods and minority neighborhoods face much greater challenges finding healthy food, especially those who lack good transportation options to reach full-service grocery stores" (Treuhaft and Karpyn, 2010: 13). More often than not, the option for affordable healthy food is either too expensive, too far away, or the options are too limited. (Treuhaft and Karpyn, 2010; Hendrickson, 2006).

Furthermore, the term supermarkets is used throughout this paper to mean "food retailers that offer a variety of nutritious, affordable retail foods [with] annuals sales of at least $2 million and contain all major food departments [...] including fresh meat and poultry, produce, dairy, dry and packaged foods, and frozen foods" (USDA, 2009: 15). It is important to make the distinction

between large grocery stores and smaller convenience stores because of the different foods that either store offers.

Between the years 2010 and 2015 there was a net increase of low-income and low-access tracts across all categories. In other words, the number of food deserts across the U.S. increased by an average of 447.24 tracts (including both rural and urban food deserts nationwide). In 2015, the USDA recorded 39.4 million people, or 12 percent of the U.S. population, lived in a low-income, low-access tract, although this number does not account for those with vehicle availability. Those with access to a private vehicle do not necessarily experience the same barriers to food access as those without, even in a low-income and low-access tract.

The very existence of urban food deserts in such a rich country proves to be quite paradoxical. McMichael (2009) poses the question: how is it that a country desperate to get rid of agricultural surplus' in the 40s - 70s is now incapable of providing affordable and nutritious food to 54.4 million residents? The situation raises some critical questions about the current food system in the U.S. and points to the increasing need to address these problems in a sustainable manner. Studying urban food deserts brings to light how many Americans are facing food insecurity as a consequence of the U.S. food system. The unique nature of limited access to affordable healthy foods highlights a different type of food insecurity than hunger and famine and draws attention to the whole definition of food security. Food security is achieved "when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life" (HLPE, 2020: 10). In an attempt to address food insecurity, the government has several food assistance programs. For example, the Supplemental Nutrition Assistance Program (SNAP) is a government funded program that "provides important nutritional support for low-wage working families, low-income seniors and people with disabilities living on fixed incomes, and other individuals and households with low-incomes" (CBPP, 2019). Each state is responsible for deciding who and how many people are eligible for SNAP benefits, but in general, the gross monthly income must be below or at 130 percent of the poverty line (CBPP, 2019). The monthly allowance of SNAP comes in the form of an electronic bank transfer (EBT) card that functions as a debit card, where the benefits are loaded automatically at the start of each eligible month. The EBT card can be used at SNAP eligible grocery stores, convenience stores, and even some

farmers markets (USDA, 2019). An estimated 22.29 percent of all U.S. households in low-income, low-access census tracts that are 0.5 miles away from a grocery store were SNAP participants in 2010 (USDA, 2020c).

The maximum allowance received under SNAP is calculated using the Thrifty Food Plan (TFP), "a model spending plan appropriate for people on a tight budget" (Wilde, 2013: 179). The USDA revises the plan every couple of years to reflect current economic conditions. Interestingly enough, the TFP accounts for more meat and dairy products than is nutritionally recommended because for Americans, having sufficient quantities of meat and dairy are regarded as essential for an adequate diet (ibid.). Understanding how the TFP works provides a clearer picture of how SNAP benefits are calculated and distributed. Finally, benefits, in the form of EBT credits can be spent at any authorized retailer, which "include[s] almost any store that sells a range of grocery items for use at home, including traditional grocery stores, supermarkets, food warehouses, specialty food stores, corner stores and convenience stores" (Wilde, 2013: 185). There are two criteria for a store to become a SNAP authorized retailer, either the store stocks a required variety of stable food items (Criterion A), or has "more than 50 percent of its total gross retail sales from the sales of staple foods" (Criterion B) (FNS, 2016). Many food stores in urban food deserts, based on the above two criteria, should not be eligible SNAP retailers because they do not stock enough food staples. However, when looking at the SNAP store locator tool, SNAP retailers are everywhere and, in fact, the USDA found that many urban food desert residents do not even shop at their closest SNAP retailer because the closest SNAP retailers are convenience stores (Dukto et al, 2012). Consequently, the USDA established a third criteria, explaining that "stores that do not meet Criterion A or Criterion B are still considered for authorization if they are in an area where SNAP clients have significantly limited access to food" (Gold, 2016). This clause highlights the dire situation of urban food desert residents. Studies have indicated that foods at local convenience stores tend to be more expensive and less nutritious than foods offered in grocery stores (Treuhaft and Karpyn, 2012; Rundle et al, 2009; Wilde and Hatfield, 2013). Allowing some convenience stores to become SNAP retailers allows residents to shop there more freely. However, it is not a sustainable solution to the problem of the lack of affordable healthy foods. In fact, one may argue that it worsens the situation since residents may no longer be inclined to shop at grocery stores further away where there are affordable healthy

food options. Instead, residents may opt to shop close by to save on transportation costs and time, at the risk of impacting their health.

2.1.1 How Urban Food Deserts Originated in the United States

There are two principal explanations for the formation of food deserts. The New York Law School Racial Justice (NYLSRJP) report illustrates how the lack of grocery stores in certain neighborhoods is not an accident, but rather the result of years of policies "shaping the segregated landscape of American cities" (NYLSRJP, 2006: 6). The process of *redlining* has paved the way for many social and economic injustices that are still extremely prevalent today. The practice of redlining began first with the Homeowners Loan Corp. and then the Federal Housing Administration in the 1930s and 40s under President Roosevelt's New Deal policies (ibid). Color-coded maps were drawn to designate neighborhoods "where it was safe to insure mortgages" (Gross, 2017). These maps were racially biased and thus Black Americans were prevented from accessing low-interest loans as a result of the "government sanctioned redlining, restrictive housing covenants, and discrimination" (New York Law School Racial Justice Project, 2006: 6). At the same time, the New Deal conveniently offered low-interest loans to be given to middle-class white families to help them move from the cities to the suburbs (also known as the "white flight"), while Black Americans remained in the cities. Consequently, supermarkets also followed the "white flight" and settled where they had the space to expand, while avoiding what they believed to be unprofitable land (Morales, 2011). These practices, which have been named "supermarket redlining", demonstrate how corporations have had an impact on local food environments (Morales, 2011). Denying Black Americans housing loans ensured a racial separation between neighborhoods and also greatly disadvantaged Black communities. Supermarket redlining further exacerbated the situation and inadvertently helped create food desert communities.

Throughout the 1980s, cities continued to lose grocery stores because of their inability to compete with the mega supermarkets in the surrounding suburbs that attracted more customers (Walker et al, 2009: 876; Curtis and McClellan, 1995; Guy et al, 2004; NYLSRJP; 2006). The emergence of Walmart in the 1980s transformed the food distribution system by creating the

concept of "one-stop shopping" (McLaughlin and Gomez, 2015: 353). Walmart provided, and continues to provide, customers with low prices, groceries, apparel and merchandise, essentially eliminating the need for small independent stores. The resulting consolidation of grocery stores meant that Walmart bought out smaller family owned retailers and quickly became the biggest U.S. food retailer (McLaughlin and Gomez 2015; Hauter, 2012). Due to their sheer size, these mega-supercenters continued to develop in the suburbs, exacerbating the segregation of urban communities and middle-class suburbs. The movement of grocery stores from the cities to the suburbs is the reason why vehicle availability is a key concern in urban food desert discussions. In this situation, those with cars and time have the opportunity to shop at these large grocery chains and those without are left "in a void" (Furey et al, 2001). Overtime, the increasing scarcity of supermarkets in the inner cities created these food deserts that are perpetuating the problems of food insecurity across the U.S.

The continued existence of urban food deserts indicates how overlooked they are in U.S. government policies. That is to say, urban food deserts are often not taken into account when policymaking decisions are made based on citywide criteria, often neglecting community level concerns and needs (Cohen et al, 2012). This same neglect exists in the U.S. food system which represents flaws in a globalized system – where increased efficiency in food processing has negatively impacted food desert residents' health and the consolidation of grocery stores has decreased the availability of healthy affordable food.

2.1.2 Food Deserts: A Multilayered Impact on Society

As put by the FAO (2020) "sociocultural aspects of food choices notwithstanding, people generally eat what they can afford" (FAO, 2020: 67). In the case of the average consumer, consumption choices are a result of habits and preferences. For urban food desert residents, consumption choices are built on their perceived costs and benefits of that choice. The local food environments also play a huge role in shaping consumer consumption behavior. Generally, "food environments refer to the physical, economic, socio-cultural and policy conditions that shape access, affordability, safety and food preferences" (HLPE, 2020: 12). In the context of urban food deserts, the local food environment is the result of the historically segregated policies and

the corporate interests discussed above. There is also growing evidence that dietary patterns can be determined by the local food environment. The High Level Panel of Experts (2020) report that "food environments typically overlap with food supply chains, consumer behaviors and diets. Consumer behaviors respond to food environments and are comprised of individual awareness and decisions on where and what foods to acquire, prepare and eat. These individual decisions ultimately shape diets in terms of quantity, quality, diversity, safety and adequacy of food" (HLPE, 2020: 12). Shopping for urban food desert residents can be plagued by questions of is this worth the price, will my family eat it, is it energy dense to keep me full, etc. All of these questions have one thing in common, consumers are evaluating the costs and benefits of each item. Unfortunately, these decisions do not often lead consumers to healthy and nutritious diets, but rather one of unsustainable energy-dense, highly processed cheap foods. The lack of affordable healthy food options is both a cause and a symptom of continued food insecurity. Looking at consumers' behavior in urban food desert opens up opportunities for proposing grassroot solutions to unsustainable food consumption practices.

Studying urban food deserts through the lens of food insecurity draws attention to the environmental, economic and social unsustainability experienced in these communities. The concept of food insecurity is one that has broadened and evolved over time to offer a better understanding of various situations many households may face. The 1996 World Food Summit established that "food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (Report of the World Food Summit, 1996; HLPE, 2020). Until recently, the FAO definition of food security was categorized into four categories: access, availability, utilization and stability (HLPE, 2020). All four of these aspects are crucial to food security across the globe. Recent developments in food security research has recognized the importance of agency and sustainability as standalone dimensions of food security (HLPE, 2020).

As it stands, there are very few parts of the world that are food secure and even countries that are considered rich, like the United States, are not immune to food insecurity (FAO, IFAD, UNICEF, WFP and WHO, 2020). According to the latest report on the State of Food Security and Nutrition in the World (2020), 1% of the population cannot afford an energy sufficient diet,

and 1.7% cannot afford a healthy diet (FAO, IFAD, UNICEF, WFP and WHO, 2020). In the U.S., "around 14% of American households were food insecure at some point in 2014" (Blackwell, 2016: 1). Moreover, the onset of the new global pandemic, COVID-19, has considerably worsened food insecurity for the most vulnerable as they have lost their ability to earn an income. Today, largely as a result of COVID-19, an estimated 23 percent of American households are food insecure (Schanzenback and Pitts, 2020; Silva, 2020). This itself should be cause for greater concern from the U.S. government, however, the topic of urban food deserts is largely absent in policies and there are few long-term solutions in place to alleviate food insecurity. In 2009, the USDA found there are around a total of 6,500 food deserts where "23.5 million people lack access to a supermarket within a mile of their home" (Treuhaft and Karpyn, 2010: 7; USDA, 2009). Many urban food deserts suffer from a serious lack of availability of healthier foods, and it is not difficult to understand that many families choose affordable and fast food when they do not have the time nor money to buy fresh and local produce. As mentioned, food deserts have "an imbalance of food choices" (Mari Gallagher Research and Consulting Group, 2014). There is an abundance of convenience stores that sell high-fat, high-sugar, processed foods as well as fast food restaurants, but little to no access to healthy and affordable foods. Access to healthy and sustainable food alternatives such as local agriculture and shorter supply chains plays a large role in promoting health, revitalizing local economies, and encouraging environmental sustainability.

Addressing the issue of sustainable food consumption in U.S. food deserts can help urban food deserts become healthy and sustainable themselves. At the moment however, "inequities in community likelihoods in obtaining high-quality fresh food can affect the extent to which such foods are made available either in certain communities or society-wide" (Neff et al, 2015: 83). For example, some store owners may be reluctant to stock healthier food choices because there is a perceived low demand for such foods in urban food desert communities (Gittelsohn et al, 2008; Neff, 2015). This same feedback loop can work for the revitalization of these communities as well. By simultaneously encouraging sustainable food consumption and sustainable practices, the demand for both can increase. These new developments can create new jobs, lifting food deserts out of poverty while also ensuring environmental sustainability and serving future generations by reducing their impact on the environment. Currently, food insecurity costs the U.S. "$167.5

billion dollars a year in health care, educational attainment, criminal justice, and emergency food assistance" (Chilton et al, 2015: 110). Policies that target food security in food deserts could alleviate these negative effects and strengthen the health and autonomy of local communities on many levels.

Concerns in addressing the issue of food deserts does not only come from the lack of nutritious foods and alarming rates of non-communicable diseases, but also because it points out the environmental unsustainability of the current U.S. food system. As mentioned, individuals in food deserts have "increased exposure to energy-dense foods readily available at convenience stores and fast-food restaurants" (Walker, 2009: 877). The foods provided at these venues are the epitome of the global food system -- cheap, mass-produced, packaged in plastic, and generally unsustainable. Accordingly, the agricultural sector is one of the biggest contributors to climate change through excessive greenhouse gas (GHG) emissions, degradation of land, water pollution, etc. Furthermore, fast food restaurants and highly processed foods also use a lot of packaging which does not decompose easily. Transportation and long supply chains also adds to pollution and GHG emissions. Highly-processed foods that are cheaper and more accessible are also littered with environmentally unsustainable ingredients such as High Fructose Corn Syrup, which in itself is extremely unhealthy and environmentally unsustainable (Goran, 2012; Francis, 2015). The overall aim of increasing sustainable food consumption in food deserts is not only to offer affordable healthy foods that reduce rates of obesity and diabetes, but also to tackle the very real risks of environmental unsustainability that are currently threatening agricultural production itself (FAO, 2017). As an industry, agriculture is one that simultaneously contributes to climate change, while also being one of the most affected by climate change. Increased sustainable food consumption have the potential to encourage a transition to sustainable agricultural practices.

2.2 SUSTAINABLE CONSUMPTION AND URBAN AGRICULTURE

Sustainable food consumption and urban agriculture are intrinsically linked. The nature of the practices underpinning urban agricultural movements inherently encourage sustainable food consumption. Built on the three pillars of sustainability – environmental, social and

economic – urban agriculture also has the potential to sustainably develop urban food desert communities while also addressing food insecurity. These grassroot initiatives, which often originate from within the community itself, also offers solutions to the biggest challenge faced by urban food desert residents. Food insecurity, as discussed, stems from a multitude of environmental, social and economic injustices. Therefore, throughout this thesis, sustainable development in urban food deserts is encouraged as a means for these communities to overcome these challenges.

Sustainable food consumption is only a small part of sustainable development. To better understand its development as concept, it is important to first discuss the evolution of the concept of sustainable development. In 1972, the Limits to Growth report predicted that the earth's resources are finite and cannot support the exponential economic and population growth (Jackson and Webster, 2016). A team of experts at the Massachusetts Institute of Technology was asked to forecast "what pressures the planet would experience if the same growth trends continued for the next 100 years" (Jackson and Webster, 2016: 5). The results exposed a future environmental crisis so disastrous that the team published the data hoping that it would "spark a debate in all societies… and lead [us] to consider the need for concerted action now if we are to preserve the habitability of this planet for ourselves and our children" (Jackson and Webster, 2016: 5). Although heavily criticized when it was first released, the report is viewed by others as the founding text for environmental movements (Jackson and Webster, 2016). Following this publication was the Brundtland Commission's 1987 report on the environment and development calling for "a new era of economic growth – growth that is forceful and at the same time socially and environmentally sustainable" (United Nations, 1987: 7). In this report, it was emphasized that economic growth is compatible with sustainable development, unlike the Limits to Growth (Ekins, 1993).

The Brundtland Report identified sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations, 1987: 37). This definition of sustainable development was received with more positive engagement than the Limits to Growth report, mostly from the business and industry sector who had refused to acknowledge the potential risks of their continued growth (Ekins, 1993). Furthermore, the United Nations Conference on Environment and Development in

1992 established the Agenda 21, a nonbinding action plan, which called for the "integration of environment and development concerns [which] will lead to the fulfilment of basic needs, improved living standards for all, better protected and managed ecosystems and a safer, more prosperous future" (United Nations, 1992). Agenda 21 urged countries to come together to promote and research sustainable development patterns, and that developed countries should take the lead in achieving these patterns. The Agenda 21 also included that countries should focus on the need for "higher standards of living through changed lifestyles [that] are less dependent on the Earth's finite resources and more in harmony with the Earth's carrying capacity." (United Nations, 1992). The 21 in Agenda 21 referred to the optimistic target of achieving the development goals by the 21st century. Unsurprisingly, the goals were not met and the new targets of the eight Millennium Development Goals (MDGs) were established. Under these goals, social issues such as poverty, equality and education were emphasized. Both the Agenda 21 and the MDGs, there was little focus on environmental goals. The Sustainable Development Goals (SDGs) succeeded the MDGs, developing a collection of 17 goals to be achieved by 2030. It is important to outline these efforts because, "there is unsettling evidence that society is tracking the standard run of the original [Limits to Growth] study" (Jackson and Webster, 2016: 17). In other words, the unsustainable economic growth and overuse of resources are currently on track with the projections that the study predicted in 1972, indicating that the environmental crisis is imminent. The issue of food insecurity in urban food deserts is a sustainable development issue. The current food system has played a prominent role in the creation of urban food deserts and the option to consume sustainably is considerably hindered. Not to mention, even for the average consumer, the sustainable consumption of food has become an extremely complex task to achieve due to the nature of agricultural production and consumption today.

In 1992, Baker noted that "the current patterns of consumption and production in industrialized countries is one of the major causes of global environmental degradation" (Baker, 1996: 2). The creation of Agenda 21 and later the Sustainable Development Goals, tried to address these issues, but there still is work to be done. Today, it is impossible to discuss sustainable consumption without looking at food production. Introducing the concept of an "ecological footprint provides a useful representation of the sustainability dimension in that it takes into account not only what people consume, but also how it is produced, processed,

transported and used" (FAO, 2020: 9). Finding sustainable alternatives for food consumption will not only reduce the environmental impact of agriculture, it will also mitigate the effects of climate change and address issues such as food insecurity, loss of livelihoods, and loss of biodiversity (FAO, 2017).

Urban agriculture plays a key role in encouraging sustainable food consumption, largely due to its own sustainable practices. As an alternative food movement, urban agriculture opposes the current global food system by offering locally sourced foods, typically grown organically. On the other hand, industrialized agriculture is composed of long and complex international supply chains. A few corporations have a monopoly certain technology and seed types, while smaller family farms are failing to compete against large industrialized farms (McMichael, 2009; Hauter, 2012). The industrialization and intensification of agriculture has had devastating effects on the environment which have been extensively documented by the FAO. After the energy sector, "agriculture is [also] the second largest sector contributing to GHG emissions. FAO estimates that agriculture, forestry and land-use change generate one-fifth of GHG emissions" (FAO, 2020: 23). Agriculture's contribution to GHG emissions is not just limited to the production of land, chemical productions, transportation, storage, processing and retailing are also big emitters (FAO, 2020). In the U.S. alone, food production accounts for 68% of GHG emissions and between 10-30% of a U.S. household's carbon footprint comes from food. In fact, this number increases in lower-income households such as in food deserts (Center for Sustainable Systems, 2019). In 2017, cars emitted 41% of the total GHG emissions and heavy duty trucks accounted for 23% (Center for Sustainable Systems, 2019). As for waste, according to the EPA, 80.1 million tons of containers and packaging were generated in 2017 (EPA.gov, n.d). Furthermore, global food systems

> increasingly face other environmental stresses that interact with climate change and affect food security and nutrition outcomes in complex ways [i.e.] biodiversity loss, water scarcity, deforestation, land degradation, soil fertility loss and pollution. [...] More than one-third of the terrestrial land surface is now under agricultural cultivation or used for animal husbandry. [...] Agriculture uses significant amounts of water and is responsible for an average 70 percent of total freshwater withdrawals. (FAO, 2020: 23)

Agricultural production and food consumption are intrinsically linked to climate change in that harmful agricultural processes contribute to worsening effects of climate change. The FAO highlights how the worsening conditions of climate change will disproportionately affect those who are food insecure (FAO, 2017). While their reports focus mostly on the African and Asian continents, the concerns can also be applied in the U.S. The impacts of climate change on agricultural production can be felt worldwide, but the hardest hit areas will always be where populations have higher rates of poverty and low-access to foods. The biggest concern of climate change is the impact on food production and thus prices. Fluctuations in agricultural sectors due to climate change play a large role in the production outcomes. For example, natural disasters can seriously impact the rate of production of crops, producing less food will exacerbate the issues of food insecurity. Furthermore, the rate of production also has a big impact on the price of food because less production means less offer on the market and an increased demand, thus resulting in higher prices (Neff, 2015). For food desert residents who are highly susceptible to price changes, this can mean the difference between having a meal or not.

The most challenging part about tackling climate change through agricultural production and consumption is the fact that the food system is so complex and globalized that it is impossible to simply change one single aspect at a time. Every innovation or development impacts every other aspect of the supply chain. Not to mention, as individuals, the sustainable consumption of food has become one of the more difficult things to achieve due to the complexity and length of supply chains today. Authors like Michael Pollan have urged their readers to "consider their dietary choices in light of climate change" (Johnston and MacKendrick, 2015: 1; Pollan, 2008). But, what does this mean? Pollan is calling on consumers to choose what they eat based on the environmental impact of a particular food. This is suggested as "a politicized form of food consumption which involves the regular purchase of foods and/or modification of the diet with the deliberate purpose of contributing to the collective good" (Johnston and MacKendrick, 2015: 2). As a matter of fact, when only looking at fossil fuel use, the FAO (2020) has estimated that if the population would adopt a "healthy diet that includes sustainability considerations would reduce by 3% the fuel consumption related to the food system in the United States of America" (FAO, 2020: 105). These recommendations place a heavy burden on the consumer to make the "right" choice while detracting from big

unsustainable industries. While these choices may be an option for the average U.S. consumer who has the requisite economic resources and access to sustainable alternatives, residents in urban food deserts do not have these same options. Currently, “food environments are uneven in quality across different locations. [...] Lack of nutrition education, loss of traditional knowledge and food practices, limited access to affordable fresh and nutritious foods and targeted advertising of ultra-processed foods all contribute to poor-quality food environments” (FAO, 2020: 20). Urban agriculture offers a potential solution as a means of reversing these unhealthy food environments. Switching to healthy and sustainable consumption is a crucial step to mitigating the effects of the food system on climate change and a promising solution to food insecurity in urban food deserts.

Urban agriculture is defined as “growing fruits, herbs and vegetables and raising animals in cities, a process that is accompanied by many other complementary activities such as processing and distributing food, collecting and reusing food waste and rainwater, and educating, organizing and employing local residents" (Cohen et al, 2012: 12). These include, but are not limited to, community gardens, farmers’ markets and Community Supported Agriculture (CSAs). The urban agriculture movement is vastly different from the current large-scale, highly industrialized food system, as it “seeks to relink food production and food consumption through emphasizing a local foodshed that promotes regional economies, sustainable growing practices, and social justice” (Meenar and Hoover, 2012: 144; Krishnan et al, 2016). The point of encouraging this type of consumption is to distribute power more equitably so that communities can meet their needs.

Sustainable urban agriculture is encouraged because it embodies the six dimension of food insecurity: “productive and prosperous; equitable and inclusive; empowering and respectful; resilient; regenerative; and healthy and nutritious” (FAO, 2020: XV). Furthermore, urban agriculture offers more sustainable options by creating shorter supply chains that are tailored to those who are in need, and by including consumers in the food production processes. A distinguishing feature of urban agriculture is its “integration into the urban economic and ecological system” (Krishnan et al, 2016: 326). Urban agriculture has the advantage of turning previously unused land into something that benefits the whole community. For example, community projects of turning vacant parking lots into community gardens, promoting access to

healthy food, and offering food education. These projects are often the result of increasing interests among residents to help develop a healthy, sustainable community and improve food security (Hachmyer, 2017: 109; Meenar and Hoover, 2012). Nonetheless, it is difficult to promote or even encourage sustainable food consumption in communities with underlying socioeconomic factors that cause residents to prioritize convenience and price over sustainability. As such, there is little market for sustainable food consumption in many urban food deserts across the U.S. This is not to say that there are not any that exist, in fact, many non-profit organizations have introduced urban agricultural initiatives to address issues of food insecurity and unsustainability, with the added benefits of introducing affordable healthy foods. Major cities with high rates of food desert areas are seeing many non-profit organizations and even community residents making the effort to bring food to the community via urban agriculture.

CHAPTER 3. SUSTAINABILITY PROBLEMS IN URBAN FOOD DESERTS

An individual or community's local food environment plays a crucial role in the food security of that community. In urban food deserts, it is well known that poor local food environments offer energy-dense unhealthy foods that are a byproduct of an unsustainable global food system. The key issue of food insecurity is the inability for consumers to make environmentally, socially and economically sustainable choices. Before first proposing urban agriculture to encourage sustainable food consumption, it is essential to understand how the local food environment leads to food insecurity and thus hinders the ability to consume sustainably. As such, this chapter will approach issues of sustainability through the lens of food insecurity. The six dimensions of food insecurity (access, availability, utilization, stability, agency, and sustainability) allow for a much broader and inclusive approach to the unique situation of urban food deserts.

For the purpose of this paper, the following sections will be divided into first access and availability, which are discussed together. Then I will address utilization and stability, respectively. Finally, I will discuss agency, followed by sustainability. In this way, a clear understanding of food deserts as a food security issue can be properly developed. Furthermore, the issue of food security in food deserts introduces discussions of a more sustainable food system and food consumption. Encouraging sustainable food consumption throughout U.S. urban food deserts not only focuses on environmental concerns, it also includes improving social and economic concerns.

3.1 AVAILABILITY AND ACCESS

Availability of food has been the primary concern in food security issues since the concept was first defined at the World Food Conference in 1974 as "availability at all times of adequate world supplies of basic foodstuffs by way of appropriate reserves, including emergency reserves" (United Nations, 1974). Historically, food availability is the first and foremost issue that has been addressed in the case of food security. Less than a decade after the World Food

Conference, the addition of access to the definition of food security in 1983 ensured that "all people at all times have both physical and economic access to the basic food that they need" (United Nations, 1987). The addition of access broadened the understanding of food security to include socio-economic conditions. To begin with, the FAO defines food availability, under the context of food security, as "the availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid)" (FAO, 2006). This factor ensures that food is actually available to all people since, under the Universal Declaration of Human Rights in 1948, food was declared as a basic human right (United Nations, 1948). In the context of the U.S., the very term "urban food desert" is quite misleading since it assumes that there is little to no food available. These communities are food insecure primarily because healthy food is either too expensive or unavailable in local retailers. The lack of availability of nutritious foods, or "food of appropriate quality," is a key defining aspect of urban food deserts. The main problem in urban food deserts is that the available food has little nutritional value and has proven to increase rates of obesity, diabetes and other cardiovascular diseases (Walker et al, 2010). Some of the challenges that affect availability and access are "lack of affordable healthy food, poverty, income inequality, gender, class, race, weak infrastructure for distribution, concentration in retail markets, and increased distance between production and consumption" (HLPE, 2020: 22). Along with food availability, access to food is the second key characteristic of food insecurity. According to the FAO, economic and physical access to food is determined by individual access "to adequate resources for acquiring appropriate foods for a nutritious diet" (FAO, 2006). In fact, the very definition of food deserts is based on their access to food. Although much of the FAO's resources are not focused on the U.S., food insecurity remains highly prevalent in many parts of the U.S.

3.1.1 Lack of Grocery Stores as a Barrier to Access and Availability

The very fact that the definition of food deserts measures their distance to the nearest grocery store demonstrates the inherent lack of food availability in urban food desert. Convenience stores, gas stations and fast food restaurants are highly prevalent in these areas, but they do not stock food a sufficient quality. The Food Trust non-profit organization in

Philadelphia compiled a list of findings in the disparities between urban food deserts and other areas in terms of access to supermarkets. In their report they examine a total of 113 studies, published before 2012, regarding the distribution of supermarkets and access to healthy foods in urban food deserts. The findings were "remarkably consistent: people living in low-income neighborhoods, minority neighborhoods, and rural communities face much greater challenges finding healthy foods, especially those who lack good transportation options" (Treuhaft and Karpyn, 2012: 13). On a national level, studies have found that low-income zip codes have an average of 25 percent less chain supermarkets stores than middle-income zip codes (Treuhaft and Karpyn, 2012). As a matter of fact, zip codes with a predominantly Black population have around half of the number of chain supermarkets compared to White zip codes, and another study found that about "8 percent of Blacks live in a tract with a supermarket, compared to 31 percent of Whites" (Treuhaft and Karpyn, 2012: 13). These discrepancies in access to supermarkets are consistent across food desert literature (Nelson and Banks, 2018, Treuhaft and Karpyn, 2012, Shaffer, 2002; Wilde et al, 2018; Gerber et al, 2017; Hendrickson et al, 2006; Abel and Faust, 2018; Dukto et al, 2012).

In Baltimore, for example, 40.4% of the population lives in a low-income, low-access tract 0.5 miles away from a grocery store (USDA, 2020c) and "46 percent of lower-income neighborhoods have limited access to healthy food compared to 13 percent of higher-income neighborhoods" (Treuhaft and Karpyn, 2012: 8). In an analysis of 685 census tracts (across Forsyth County, North Carolina; Baltimore, Maryland; and Manhattan and the Bronx, New York), it was found that low-income neighborhoods had half as many supermarkets as the wealthiest neighborhoods and four times as many smaller grocery stores in the three states (Moore and Roux, 2006). Across these three states, the number of total stores per population were quite similar, but the distribution varied greatly. Primarily White areas were found to have slightly fewer but large stores, where roughly 42 percent of stores in predominantly White areas were 2500 square feet or more, compared to only 19 percent of stores in predominantly Black areas (Moore and Roux, 2006: 327). Additionally, the percentage of supermarkets, natural food stores and specialty food stores were more common in predominantly White neighborhoods compared to predominantly Black or Hispanic neighborhoods (Moore and Roux, 2006: 328).

Studies on other local settings demonstrated very similar trends. In Los Angeles, California, "predominantly White areas have 3.2 times as many supermarkets as populations with an African-American majority and 1.7 times as many supermarkets as populations with a Latino majority" (Shaffer, 2002: 12). Overall, a key finding in 2002 Los Angeles was that "the higher concentration of poverty within a community, the fewer the supermarkets" (Shaffer, 2002: 11).

In Atlanta, Georgia, affluent White neighborhoods have better access to grocery stores than Black neighborhoods which indicate that race plays an important role in income disparities and where one lives (Treuhaft and Karpyn, 2012: 14; Helling and Sawicki, 2003). Additionally, throughout California and New York, there are fewer outlets in lower-income neighborhoods that offer access to healthy foods compared to the number of outlets that sell unhealthy foods. In California, low-income neighborhoods "have 20 percent fewer healthy food sources than higher-income ones" (Treuhaft and Karpyn, 2012: 14; Rundle et al, 2009). In an investigation of New York City's food environment, Rundel et al found that the "density of unhealthy food outlets was much higher than density of healthy food outlets [and] almost all subjects lived within a half-mile of an unhealthy food outlet, with an average density of 31 such outlets per square kilometer" (Rundle et al, 2009: 444). Healthy food outlets, on the other hand, averaged at about 4 outlets per square kilometer (ibid).

Finally, an in depth study about one particular low-income Black community in West Louisville Kentucky found that "there is one supermarket for every 25,000 residents, compared to the county average of one supermarket for every 12,500 residents" (Treuhaft and Karpyn, 2012: 14). Throughout these studies, convenience stores are consistently more available and accessible than supermarkets. Even though they do sell food, convenience stores tend to offer low quality, energy-dense foods and few affordable healthy options (Treuhaft and Karpyn, 2012; Rundle et al, 2009; Shaffer, 2002; Hendrickson et al, 2006; Weatherspoon et al, 2013; Wilde and Hatfield, 2013). Many times, the options for fruits and vegetables in the local corner stores are either very limited or non-existent. Some of the common types of stores found were "'mom and pop' corner markets or [...] ethnic stores such as Hispanic or Middle Eastern specialty stores [that] tended to be small and often lack air conditioning and refrigeration [...] also lacked the space necessary to stock a wide variety" (Hendrickson et al, 2004: 373). There are a few reasons

why a convenience store might not stock healthful items, for example, "small retailers may not have access to fresh-food suppliers, refrigeration equipment or marketing resources to publicize healthier options" (Wilde and Hatfield, 2013: 104). Acknowledging these barriers is key to understanding the lack of access and availability of affordable healthy food despite the high number of food stores in urban food deserts.

Throughout these studies there is a clear consensus that both on a local and national level, low-income minorities communities have less access to healthy food outlets compared to White affluent neighborhoods. Discrepancies in access are the result of the residential segregation policies of redlining as well as the proliferation of big supermarket chains, both of which negatively impacted the food environment of these neighborhoods.

3.1.2 Vehicle Ownership and Public Transportation

Vehicle ownership is a crucial aspect of the American way of life[4] and yet an estimated 8.7 percent of Americans lack access to a vehicle and 33 percent only have access to one vehicle in 2018 (data.census.gov, 2018). Although this 8.7 percent seems marginal, evidence points to disparities in vehicle ownership and income where low-income and low-access communities have lower rates of vehicle ownership (Wilde et al, 2017; Treuhaft and Karpyn, 2012). The issue of distance to a supermarket is aggravated by the lower rates of vehicle ownership in urban food deserts. In fact, "in block groups [neighborhoods] with a supermarket less than 0.5 miles away, 15.3 percent of households lacked vehicle [and] for block groups, with a nearest supermarket between 1 and 10 miles away, 4.7 percent of households lacked a vehicle" (Wilde et al, 2018: 34). Although these numbers do not apply to just food desert communities, they do demonstrate increased barriers to accessing affordable healthy food caused by not owning a vehicle. This is especially a concern when grocery stores are further away. Generally, the distance to supermarket correlated positively with vehicle ownership, but "lack of a vehicle may be a problem for the small but non-negligible fraction of those households that are at least 1 mile

[4] As well as a necessity because of the lack of reliable extensive networks of public transportation (Abel and Faust, 2018)

from the nearest supermarket" (Wilde et al, 2018: 34). In Moore and Roux's (2006) study across 685 tracts in North Carolina, Maryland and New York, they found that "predominantly Black and Hispanic neighborhoods had lower median incomes and proportionately more people without a vehicle than did predominantly White census tracts" (327). Consequently, the odds of being food insecure were higher for those households who use another household's vehicle or another type of public transportation (Wilde et al, 2017).

For this reason, the distance of 0.5 miles to the closest supermarket in the urban food desert definition was included. In the low-income tracts, distance was measured as accessibility by car but also by walking. The 2009 USDA report on "Access to Affordable and Nutrition Food" assumed a speed of around 2 miles per hour for walking, thus an approximately 15 minute walk to a supermarket at a distance of 0.5 miles. This same report found that "vehicle ownership rates among those living in urban areas was 87.8 percent [and that] those with low-incomes are less likely to own a vehicle" (USDA, 2009: 5). For a grocery shopping trip, a half an hour round trip including all groceries on foot is a considerable distance. This is especially the case in food deserts with aging populations or in many cities where relatively high crime rates, or the increasing potential for extreme weather events, can inhibit an individual's ability to walk to a grocery store (Zepeda et al, 2014; Hendrickson et al, 2004; Weatherspoon et al, 2013; Hoover; 2013).

Most people, however, continue to rely on a private vehicle or carpool to get their groceries. In fact, further research showed that "93 percent of those who live in low-income areas with limited access traveled to the grocery store in a vehicle they or another household member drove" (USDA, 2009: 3). One of the reasons is that the nearest supermarkets that offered affordable, healthy food were too far to walk to at 0.5 or 1 mile. Second, statistics have shown that urban food desert residents are more likely to drive to work compared to their middle-class counterparts in urban communities. Thus, many would shop for groceries on their way back from work (ibid). This also explains why on average, "people living in low-income areas with limited access spend significantly more time (19.5 minutes) traveling to a supermarket than the national average (15 minutes)" (ibid: 3). For those households who do not own a vehicle, the other alternatives are public transportation such as metros or buses which are unfortunately a rare option in food deserts (Abel and Faust, 2018; Gottlieb and Fischer, 1996).

Assessments in Lexington, Kentucky; Seattle, Washington; Los Angeles, California; Austin, Texas and Detroit, Michigan are among a few to highlight public transportation challenges that served as a major barrier for residents to access grocery stores (Treuhaft and Karpyn, 2012; Abel and Faust, 2018; Bolt et al, 2019; Weatherspoon et al, 2013). In Austin, Texas, Abel and Faust (2018) developed a model to determine the impact of public transportation on food desert communities. They used data from 2010 Northeast Austin due to the high rate of unemployment (30 percent), low median income of $31,994, and low private vehicle ownership (only 50 percent) (ibid). They found that as a resident's willingness to walk decreased, public transportation played an increasingly important role (ibid). In the case where residents were willing to walk around 1 mile to a grocery store, the implementation of a bus route would completely eliminate the food desert, granting residents access to affordable healthy foods (ibid). This example demonstrates how a lack of public transportation acts as a barrier to accessing food in urban food deserts.

Detroit, Michigan is one of the cities most affected by urban food deserts where 29.38 percent of the city's population lives in a low-income, low-access tract at 0.5 miles away from a grocery store (USDA, 2020c). Figure 1 displays the areas in 2015 Detroit that are low-income, low-access tracts. In green, the low-income, low-access tracts are 1 mile away from a grocery store, and the orange represents low-income, low-access tracts at 0.5 miles away from a grocery store.

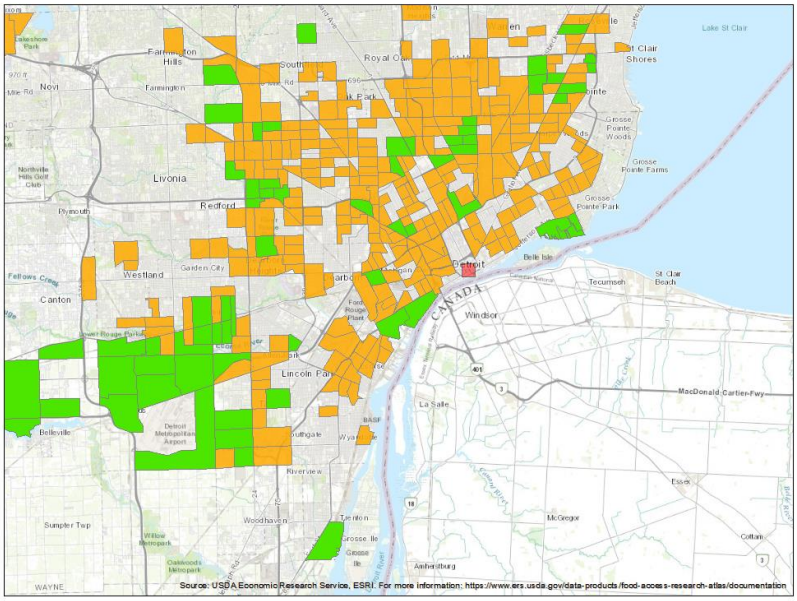


Figure 1 Detroit, Michigan: low-income, low-access at 1 mile (green) and low-income, low-access at 0.5 miles (orange) in 2015 (USDA Food Access Research Atlas)

Weatherspoon et al (2013) highlight that "food access problems in Detroit are complicated by an inadequate public transport system and a high proportion of disabled persons" (91). The entirety of Detroit covers a span of 139 square miles and the public transport system is "limited to a small light rail train covering a three mile loop in the downtown area and a limited number of bus routes connecting Detroit" (Weatherspoon et al, 2013: 91). Additionally, a 2017 Detroit Metropolitan Area Communities Study found that 34 percent of residents do not own a car, and 63 percent own or share a vehicle with another household, where Black residents were 19 percent less likely to own a vehicle than Whites (Gerber et al, 2017). Overall, the most common form of transportation was driving (60 percent[5]), and the second most common form of transportation was walking (13 percent) (Gerber et al, 2017). Many food desert residents are constrained by the lack of vehicle access and public transportation and must do their grocery shopping within their census tract, therefore limiting their access to healthy and affordable food. Consequently, Michigan also has the fifth highest incidence of obesity in the U.S. (CDC, 2019).

[5] 60 percent were daily drivers and 80 percent were occasional drivers (Gerber et al, 2017).

Weatherspoon et al (2013) specifically focused on the small neighborhood of Piety Hill in eastern Detroit. The food desert is predominantly Black (91.9 percent), has a mean income that is lower than 95.6 percent of all U.S. neighborhoods and around 49 percent of households do not own a vehicle (ibid). In the neighborhood, "the single food retail outlet was a windowless, gated corner store with a single sign that advertised liquor, beer/wine and lotto tickets [...] it took 56-66 minutes to reach the nearest regional big-box supermarket and 72 minutes or more to reach the nearest Wal-Mart" (ibid: 93). Although this neighborhood was in the center of Detroit, each trip to the closest supermarkets required at least a two hour round trip composed of walking to a bus stop, taking the first bus and transferring to a second bus (ibid). The lack of public transportation in this particular part of the Detroit neighborhood is detrimental to the residents. Detroit represents an extreme case of food insecurity where improving access to transportation could significantly improve the quality of life for low-income residence.

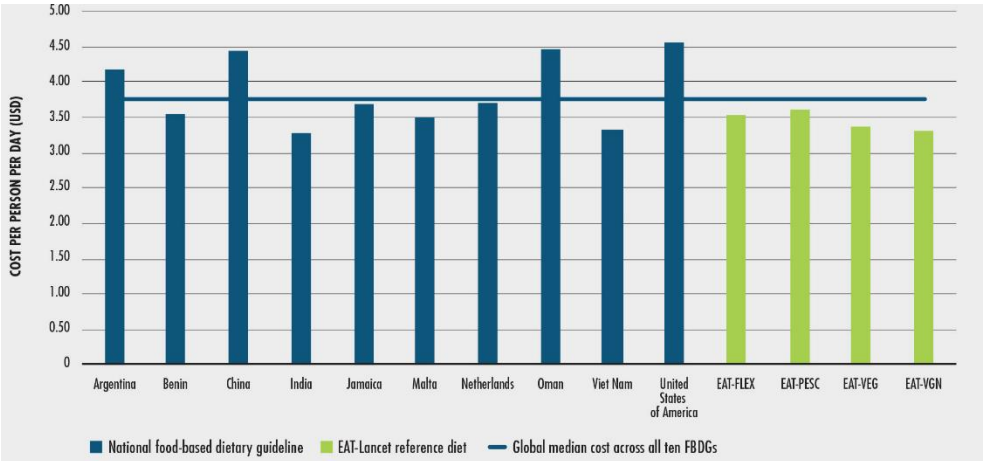
For example, in Chicago, Illinois, among the 312 low-income, low-access tracts that are 0.5 miles or farther away from the nearest supermarket, 166 of those are low vehicle access tracts. Meaning that equal or more than to 100 housing units do not have a vehicle. In the U.S. in general, 46.2 percent of all U.S. households without a vehicle were at a distance of 0.5 miles of a supermarket. Of that total, 6.4 percent of all low-income households are between 0.5 to 1 mile from the nearest supermarket, which is bordering on the walkable distance to a supermarket (USDA, 2009). Where walkability is defined as "1) high, if a supermarket is within a half mile; 2) medium, if a supermarket is between 0.5 and 1 miles; and 3) low, if the nearest supermarket is more than a mile away" (ibid: 17). For those who lack a private vehicle and have little access to public transportation, farmers' markets are low on the list of priorities.

3.1.3 Food Costs

Price is a crucial factor that impacts purchasing behaviors of consumers. In fact, the proliferation of mega farms and mass produced foods has served to lower the overall cost of food over time (Hauter, 2012). Yet many food desert residents are not privy to these extremely low food prices. As discussed, there is clear evidence that supermarket prices are all around cheaper than smaller convenience stores (Fan et al, 2018; Jetter and Cassady, 2006). The USDA reported

that in 2000, the average price of foods in a supermarket were 10 percent lower than those of smaller food stores (USDA, 2009). In a recent study, Fan et al (2018) analyzed data on food prices on a nationally representative sample and found that overall, stores located in low-access census tracts charge higher prices (0.9 percent) than their high-access counterparts, all the while providing less food availability (2.6 percent) (Fan et al, 2018). Although this 0.9 percent may seem marginal, this number increases for those who are required to shop within their census tract. Fan et al 2018 found that "for households who are constrained to buy food within their resident tracts, the price is 9.2 percent higher in low-access tracts than high access counterparts [implying] that those households who are constrained to shop within their resident census tracts are much more affected by living in a food desert" (ibid: 24).

The cost of healthier foods is, on average, more expensive than unhealthy foods which effectively "encourage[s] low-income Americans to consume an unhealthy diet" (Jetter and Cassady, 2006: 39; Wilde and Hatfield, 2013). The most recent FAO report (2020) on "The State of Food Security and Nutrition in the World" highlights the various costs of a healthy diet around the world. Figure 2 illustrates the cost of a healthy diet per person per day across the globe, and the U.S. has been ranked as the country as the most expensive. This is a consequence of the growing price disparity between highly energy-dense foods with minimal nutrition and foods with a higher nutritional value. The FAO report (2020) found that particularly between 2004 and 2008, this price differences had increased considerably, where energy-dense foods have become more and more affordable in supermarkets.



NOTES: The figure shows the average cost of a healthy diet across different possible definitions. The blue bars show the cost of a healthy diet across the 170 countries analysed by applying the ten national FBDGs that are used to cost the healthy diet in Section 2.1. The horizontal blue line represents the global cost of a healthy diet in year 2017 (USD 3.75), estimated as the median cost of the ten FBDGs and shown in Table 7. The green bars denote the average global cost of a healthy diet by applying the four variants of the EAT-Lancet diet: the flexitarian (FLX), the pescatarian (PSC), the vegetarian (VEG) and the vegan (VGN) diet. See Table A4.1 for a description of these diets. See Box 10 for the definition of the three diets and Box 11 for a brief description of the cost methodology. For the full methodological notes and data sources, see Annex 3.
SOURCE: Herforth, A., Bai, Y., Venkat, A., Mahrt, K., Ebel, A. & Masters, W.A. 2020. *Cost and affordability of healthy diets across and within countries.* Background paper for *The State of Food Security and Nutrition in the World 2020.* Rome, FAO.

Figure 2 Average Cost of a Healthy Diet (FAO, 2020)

In "Food Policy in the United States" Park Wilde also found that the price of food has generally increased since the early 1980s; however, "price increases were fastest for fruits and vegetables and slowest for non-alcoholic beverages" (Wilde and Hatfield, 2013: 112). Other foods such as meat, dairy and other (processed foods) stayed relatively consistent from 1981 to 2013 (Wilde and Hatfield, 2013).

Price fluctuations can also have detrimental effects on access to health. According to Dodge (2013), "the ability to access nutritious, safe, affordable, and enjoyable food is a prerequisite for health; so even a small shift in food prices could mean that already vulnerable populations are at increased risk for chronic disease" (1). Jetter and Cassady (2006) compared the price of a healthier market basket (see Appendix 1) to the TFP basket at the local level in Sacramento and Los Angeles, California and found that the healthier basket was always significantly more expensive. The study itself was conducted in low-income neighborhoods throughout 2005 to account for seasonal fluctuations of prices (Jetter and Cassady, 2006). For an average of 2 weeks, the TFP basket was around $194, whereas the healthier one was $230 (ibid). Location also played a role in the price, in Sacramento for example, the healthier basket was between 17 percent and 19 percent higher than the TFP basket, and in Los Angeles it was between 18 percent and 22 percent higher (Jetter and Cassady, 2006). The price disparities

between healthy foods and their non-healthy alternative, if available, are not shocking. Organic and whole grain foods are in general more expensive than their thrifty alternatives (Hauter, 2012). For higher-income individuals, access to healthy alternatives is "as easy as their access to a supermarket" (Jetter and Cassady, 2006: 42). In Sacramento, large supermarkets almost always had a variety of healthy alternatives stocked for consumers. This was not the case in the small independent grocery stores located in lower-income neighborhoods. Even if they were stocked with healthy options, the price difference is more than enough to prevent low-income families from purchasing those healthy choices and thus the demand for such foods is much lower. In any case, the study conducted in Sacramento and Los Angeles only analyzed the price comparisons between healthy foods (where available) and their non-healthy alternatives. Other authors have further argued that the prices at smaller independent grocery stores are more expensive in general, regardless of whether or not the customer is buying healthy or unhealthy foods (Treuhaft and Karpyn, 2012; Rundle et al, 2009; Shaffer, 2002; Hendrickson et al, 2006; Weatherspoon et al, 2013; Wilde and Hatfield, 2013).

A study conducted by Hendrickson et al in 2004 looked at access to fruits and vegetables in four food deserts in Minnesota. They compared food availability and prices between two urban food deserts (urban area #1 and urban area #2) and the market price as defined by the TFP. It was found that "53 percent of the foods present in one urban Minneapolis neighborhood [urban area #1] was significantly more expensive than the market based price of foods" (Hendrickson et al, 2004: 375). In the other urban neighborhood (urban area #2), "32 percent of foods were significantly more expensive than the market based price" (ibid: 375). For example, the market price per pound of apples was $0.92, while in the urban area #2 they were $1.44, and they were not available in urban area #1 (ibid). The authors of the paper also compared the mean type of vegetables available in both urban food deserts and supermarkets in the respective adjacent neighborhoods. On average, there were six different types of vegetables and three different types of fruits available in urban area #1. The adjacent supermarket, meanwhile, had 66 types of vegetables and 37 fruits (ibid). In urban area #2, there was an average of 14 types of vegetables and seven types of fruits, whereas the supermarket had 56 types of vegetables and 36 types of fruits (ibid).

Some participants of the Minneapolis study commented, in subsequent interviews, that they would prefer to have more affordable variety, and also to improve the quality of food provided in urban convenience stores. One participant in Hendrickson et al's study claimed, "their fruit looks really nasty, mushy, like it's been sitting for a while, and it's expensive when you go into these little corner stores" (ibid: 377). This sentiment was shared by at least one other participant who said, "I want to see fresher fruits and vegetables and more choices in the stores because they're limited in stores as to what you can buy" (ibid: 377). Based on the survey that was taken during the study, "members of the urban communities disagreed with the following statements 'healthy food choices in my community are affordable' and 'people in my community never go hungry'" (ibid: 378). The unfortunate reality, as demonstrated in this study, is that urban food deserts are provided with more expensive, lower quality, and less healthy food than their respective affluent neighborhoods.

3.1.4 Supplemental Nutrition Assistance Program (SNAP)

Participation rates in SNAP are a crucial factor to consider when discussing access and availability of affordable healthy foods. As of April 2020, there were 42,995,224 SNAP participants and each participant received $181.50 for that month (USDA, 2020d). As shown in Figure 3, the number of SNAP participants has been steadily rising since at least 2002.

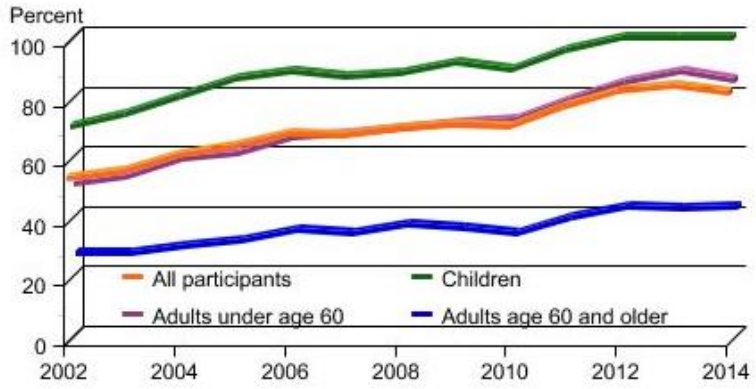


Figure 3: SNAP Participation Rates by Group, 2002-2014 (USDA, 2020d)

Studying SNAP users provides insightful information on the rates of food insecurity in the U.S., revealing several shortcomings with the nationwide program meant to address these problems. To begin with, while the program does offer monetary support to help households afford groceries, this does not address the problem of the lack of access and availability of affordable healthy foods in urban food deserts.

Research by the USDA in a report titled "Where do Americans usually Shop for Food and How Do They Travel to Get There?" found that on average, households are "2.2 miles from the nearest SNAP-authorized supermarket or super-center" (Ver Ploeg et al, 2015: 6). Consequently, 66 percent of SNAP households use their own vehicles to get food, while 34 percent use other means of transportation such as someone else's vehicle, carpooling, walking, biking or public transportation (ibid). The latter households, who most likely do not own a private vehicle, actually do not shop at the nearest SNAP-authorized retailer. Despite being an average of 0.5 miles away, these households choose to do their primary shopping at stores that are 0.9 miles away on average (ibid). In general, among 53 percent of those who were SNAP recipients found that there were no SNAP authorized retailers within 0.25 miles of their home, and 30 percent found that there was no SNAP retailer within 0.5 miles, which can greatly impact the shopping behaviors of individuals. These findings clearly demonstrate that while SNAP may help with affording food, the problem of availability and access remains since most households continue to travel far to do their shopping.

Data on SNAP participants is further relevant because of how it affects the consumption habits of many food desert residents. For example, USDA data shows that "SNAP participants who did not shop at supermarkets purchased less non-canned fruit, non-canned vegetables, and milk than SNAP participants who shopped frequently at a supermarket" (USDA, 2009: iv-v). In other words, SNAP participants who shopped in convenience stores consumed less fruits, vegetables and milk, compared to SNAP participants who went to grocery stores. This is largely due to the fact that fresh fruits and vegetables are not always available in convenience stores that are located within the food desert census tracts. Interestingly, "studies have indicated that SNAP households relative to their eligible non-participating counterparts have lower diet quality" (ibid: 152). This represents an interesting case whereby using SNAP to help pay for groceries

correlates with eating less healthy diets. According to Gustafson, the overall SNAP program could benefit from more promotion of healthier diets (ibid: 152).

Gustafson's report (2017) is one of the first to examine consumption rates at the individual level for SNAP and SNAP eligible households. She found that "households participating in SNAP may be disproportionally impacted by both the neighborhood food environment and factors affecting what stores they shop in. SNAP households of differing racial composition report residing in areas with limited access to stores accepting SNAP benefits" (Gustafson, 2017: 152). These findings are consistent with the SNAP retailer eligibility criteria, where a store must sell all food groups to be eligible to accept SNAP. Furthermore, a study in 2006 found that "more than 166,000 outlets were authorized [SNAP retailers], but only approximately 34,000 met the supermarket definition criteria" (USDA, 2009: 15). This demonstrates that even if there are SNAP retailers closer to urban food desert residents, it may not stock all the foods necessary or desired for an affordable healthy diet, thus explaining why they need to travel further distances. As of 2019, the number of SNAP retailers has increased to about 248,000 (CBPP, 2019). Figure 4 below outlines the share of SNAP benefit redemptions in 2019.

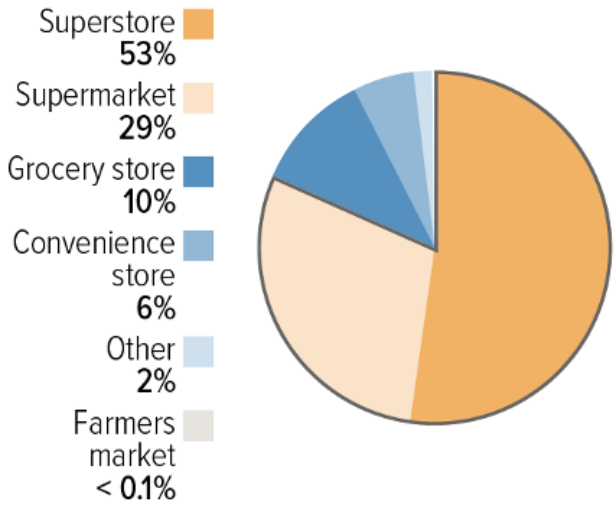


Figure 4: Share of SNAP Benefit Redemptions by Store Type, 2019 (USDA, 2019)

While around 53 percent of SNAP sales took place in large supercenters, the majority of participating stores actually fell into the category of convenience store or small grocery store (CBPP, 2019). This shows that even though there are plenty of SNAP retailers, many of them, especially in urban food deserts, are still convenience stores that do not offer affordable healthy foods. The overall consensus is that SNAP fails to provide adequate relief from food insecurity issues (USDA, 2009; Gustafson, 2017; Ver Ploeg et al, 2015; Raponi, 2017).

As of 2010, farmers' markets have opened up to SNAP participants and "between October 2010 and September 2011, SNAP sales at farmers' markets nationwide topped $11.7 million" (Bell et al, 2013). By 2019, SNAP sales at farmers' markets nationwide reached $22.9 million (USDA, 2020a). However, SNAP authorized sales at farmers' markets could be higher if more participants were aware that this was an option. Despite the impressive growth in SNAP sales at farmers' markets, in fact less than 0.1 percent of SNAP sales occurred at a farmers' market in 2019. Zepeda et al (2014) conducted a study on the mobile farmers' market participation in certain urban food deserts across the country. The authors found that one of the key things holding many people back from shopping at markets was that they did not know whether the markets accepted SNAP or not (Zepeda et al, 2014). Expanding awareness about SNAP acceptance in farmers' markets can potentially improve participation and ameliorate food security conditions in urban food deserts.

Unfortunately, even though the SNAP program is meant to alleviate food insecurity in the U.S., the program is facing threats of defunding. The percentage of U.S. households that suffer from food insecurity rose from 11 percent to 14 percent as a result of the 2008 economic recession (Raponi, 2017). This number did decrease to 10.5 percent in 2019, but the ongoing Covid-19 pandemic has worsened food security to such an extent that an estimated 23 percent of households have experienced food insecurity at some point during 2020 (Schanzenback and Pitts, 2020; Silva, 2020). Despite this, "the U.S. Congress cut spending on [SNAP] by $800 million in 2014, and by a total of $8.6 billion by the next decade" (Raponi, 2017: 11). In addition to inadequately providing nutrition to households in need, the program is serving less and less citizens who desperately need it, especially in light of the ongoing pandemic. The current program in place to help people out of poverty is not sustainable. Welfare programs are generally unpopular in the U.S., therefore support from the government to ameliorate food insecurity is

rather lacking. In the book *Feeding Cities*, Raponi suggests that "providing food aid and ensuring food security has been largely viewed as a voluntary act of charity within the United States" (Raponi, 2017: 11). This sentiment partially explains the continued existence of food deserts and the reasons for the continued cutting of the SNAP budget. Throughout the following chapter, urban agriculture is analyzed in its ability to provide food security in a more sustainable and reliable way than food assistance programs. The encouragement and development of sustainable food consumption not only benefits the environment but will ensure that food desert residents will no longer face food insecurity if the government continues cutting funding for the SNAP program.

For the moment, food availability and access continue to be the biggest and most obvious threats to food security in the U.S. Urban food desert residents suffer from a lack of affordable healthy foods and the current food assistance programs in place like SNAP are not effective if the local food environment issues are not addressed first. The following sections will continue to analyze urban food deserts under the lens of food insecurity. This approach highlights the importance of encouraging sustainable food consumption within these communities.

3.2 UTILIZATION

The third aspect to food security considers the utilization of food whereby individuals can reach a state of nutritional well-being where all physiological needs are met "through adequate diet, clean water, sanitation and health care" (FAO, 2006: 1). The question of nutrition is actually quite recent in the FAO definition of food security, having been added at the World Food Summit in 1996 (FAO, 2006: 1). It was previously believed that as long as individuals had access to food, they were no longer food insecure. Nonetheless, this definition did not take into account the impact of changing eating habits that have come to define American life. The so-called "Western diet", characterized by the high intake of processed foods, fats, sugars and lack of whole grains, fruits and vegetables, has had a detrimental impact on the health of an individual (Lockie and Williams, 2010). Highly processed and energy-dense foods are convenient for the busy work life that many Americans face every day, especially in situations where individuals may work multiple jobs and do not have the time for a home cooked meal, but they are also

detrimental to their health. Evidence also points to increasing prices in healthy diets, which has played a large role in prompting many individuals to consume unhealthy foods (Wilde and Hatfield, 2013; FAO, 2020). The rising levels of obesity and other diet-related diseases expose some of the challenges facing the utilization aspect of food security (HLPE, 2020). These issues are even more evident in urban food desert communities who are disproportionately affected by malnutrition (Walker et al, 2010; Treuhaft and Karpyn, 2012; Weatherspoon et al, 2013; Hendrickson et al, 2004; USDA, 2009). High levels of diet-related illness also point to a lack of affordable healthy food. Due to the limited food choices, nutrition is a serious issue rising in urban food deserts. In fact, Michelle Obama created the Let's Move program as the First Lady in 2011 as an attempt to increase recognition and address the health risks and increased malnutrition in urban food deserts (letsmove.obamawhitehouse.archives.gov, 2011).

The creation of food deserts, as discussed in Chapter 2, outlines how discriminatory practices were integrated in political decision-making processes. The segregation of neighborhoods because they were inhabited by people of color inadvertently led to a decrease in investment in urban neighborhoods, leaving many with just convenience stores and fast food restaurants nearby. Other challenges that affect utilization of food include, but are not limited to, lack of safe drinking water, lack of access to reliable information on nutrition, and unsustainable diets (HLPE, 2020).

3.2.1 Lack of Nutrition: Infrastructure

A great part of literature has focused on the link between health-related issues and lack of accessibility to affordable healthy foods (Walker et al, 2010; Treuhaft and Karpyn, 2012; Weatherspoon et al, 2013). Unfortunately, a consequence of living in an urban food desert is "that residents have increased exposure to energy-dense food" (Walker et al, 2010: 877). Fruits, vegetables and whole grains are key foods that should be part of a healthy diet, and yet these are the foods that are often not available or of poor quality in food desert retailers. In general, the USDA found that in 2000, "fresh produce was less available in large grocers located in high-poverty areas [...] and, on average, supermarkets and large grocery stores offer lower prices and more variety than other store types" (USDA, 2009: 15). Minneapolis has a rather high rate of

urban food deserts where 23.4 percent of the population lived in 73 low-income, low-access census tracts at 0.5 miles away from a grocery store (USDA, 2020c). Hendrickson et al (2004) found that "stores located in areas [in Minneapolis] with high concentrations of poor residents are likely to stock foods that are of lesser quality but are more effective at filling up the family" (Hendrickson et al, 2004: 372). The study examined the foods in grocery stores in food desert communities within Minneapolis which provide an insightful account of the availability of the types of foods. Through interviews, the authors note that fresh fruits and vegetables "were considered highly desirable by poor urban residents but were not purchased regularly because they were seen to be an impractical and unaffordable means of providing the family with enough bulk to satisfy hunger" (Hendrickson et al, 2004: 372). Overall, the key finding from the study was that the quality of food in urban food desert communities in Minneapolis were more often than not "inferior and inedible" (Hendrickson et al, 2004: 378).

Studies in Los Angeles and Sacramento, California found similar trends of low quality produce in urban food deserts. Jetter and Cassady (2006), as discussed above in Section 3.1, compared the market-based price of the healthier basket and the TFP basket. One of the variables they looked at was the availability of healthier foods in chain supermarkets compared to smaller convenience stores. They found that "the items most likely to be missing were whole wheat breads and grain products and low-fat cheese [...] all items that were never available were recorded for stores located in very low- or low-income neighborhoods" (Jetter and Cassady, 2006: 41). In general, even when healthier options were available, the nutritional content still differed from those found in chain supermarkets because convenience stores only stocked the discount brand that was of lower quality (Jetter and Cassady, 2006: 42).

The Food Trust organization found that in Detroit, where 29.38 percent of the population lives in a food desert area, "produce quality is lower in low-income communities of color compared to more affluent neighborhoods" (Treuhaft and Karpyn, 2012: 8; USDA, 2020c). In 2007, the grand majority (92 percent) of Detroit's SNAP retailers were convenience stores, liquor stores, dollar stores, but not supermarkets (Weatherspoon et al, 2013). Although these above examples occurred in three different cities over different years, they all reached the same conclusion – fruit and vegetable consumption is scarce in food desert communities, which leads to higher rates of obesity, diabetes and other diet-related diseases.

Also, despite the lack of chain supermarkets, there is a proliferation of fast food restaurants in urban food desert communities. They are so ubiquitous that several local governments have attempted to put a ban on the installment of new fast food restaurants in certain zones (Nelson and Banks, 2018). The reason for these initiatives was that "[t]he inequitable distribution of resources for healthy lifestyle choices across neighborhoods is one factor fueling poor health outcomes experienced in low-income communities, which in urban America tend to be heavily populated by racial minorities" (ibid: 41). A consistent finding across food desert literature is that lower-income and lower socioeconomic status correlated with a higher rate of fast food restaurants (Nelson and Banks, 2018; Treuhaft and Karpyn, 2012; Weatherspoon et al, 2013; Rundel et al, 2009; Shaffer, 2002; Neff et al, 2015)

In south Los Angeles, for example, 45 percent of all restaurants are fast food restaurants, compared to the more affluent west Los Angeles, where only 16 percent of restaurants were fast food ones. In response to these findings, the Ordinance No. 180130 was passed in Los Angeles in 2008. It requires that any new establishment must be at least 0.5 miles away from an already existing fast food establishment (Nelson and Banks, 2018). Similarly, in Pasadena, Texas, approximately 42 percent of restaurants are fast food and around 66 percent of adults were obese in 2010 (Nelson and Banks, 2018). Restricting further development of fast food restaurants was suggested as one policy intervention to reduce unhealthy eating habits, but Pasadena residents were more in favor of improving access to affordable healthy foods rather than restricting unhealthy food (Nelson and Banks, 2018). The latter case demonstrates more appropriate response to the lack of affordable healthy foods. Additionally, a close analysis of literature regarding the link between increased exposure to fast food restaurants and health outcomes found "a positive yet weak relationship between fast food availability, consumption and obesity" (ibid: 41). While this paper is not focused on the impact of fast food restaurants on people's health, it is still important to recognize where many residents of food deserts consume their food. Fast food restaurants are not only detrimental to people's health, but they are unsustainable for the environment with regards to production methods, pollution and plastic use among other issues. Moving away from eating at fast food restaurants will improve the overall health of many residents and will also encourage sustainable consumption habits.

The reality though, is that efforts to reduce the amount of fast food do little to improve and increase access to grocery stores or healthy food. It is worth noting that there exists a parallel between predominantly minority communities and a lack of affordable healthy foods. Fast food restaurants are much more prevalent in communities of color and low-income communities, and as a result, "Black, Hispanics and individuals of lower-incomes experience higher obesity rates than non-Hispanic Whites" (Nelson and Banks, 2017: 41). In some cases, zoning restriction can harm these vulnerable communities, if such policies are implemented without the appropriate support to improve access to affordable healthy food.

Worryingly, the lack of affordable and nutritious foods are not the only concerns that many Americans are facing today. Polluted drinking water in Flint, Michigan has disproportionately impacted the largely Black and minority populated city. Flint is a city hit particularly hard by systemic racism and disinvestment. Following a dramatic decrease in population after local industries died out, 57 percent of the remaining population are Black, and a staggering 41.6 percent of the population live in poverty (Sadler et al, 2019; Sim, 2016). Furthermore, 42 percent of Flint's residents live in urban food deserts (USDA, 2020c). To this day, Flint continues to be a city suffering from lack of access to healthy and affordable food (Sadler et al, 2019). In Sadler et al's (2019) study on store avoidance and favorability, the authors found that on average individuals travel 3.38 miles to do their shopping and 60 percent of the participants bypassed the stores in their neighborhood. The participants tended to avoid the stores in their neighborhoods because they were convenience stores that had higher prices, less availability and worse quality foods than the big chain supermarkets located further outside their community (Sadler et al, 2019). In addition to the limited food access, the City of Flint changed its water source from Detroit to the Flint River in 2014, leading to a massive public health crisis that is still ongoing today (Ruckart et al, 2019). According to Ruckart et al, "around 140,000 individuals were exposed to lead and other contaminants in drinking water" (Ruckart et al, 2019: 1). On the surface the water crisis seems to be the result of government mismanagement. However, a deeper look at Flint's history exposes the harsh reality of how disinvestment culminated in a public health crisis. Sadler and Highsmith (2016) explain that "white flight, metropolitan political fragmentation, and persistent racial discrimination transformed this once economically vibrant although deeply divided city into one of the poorest, most racially

segregated metropolitan regions in the United States" (ibid: 2). The practice of redlining was extremely popular in Flint's history, where Black families were relegated to dilapidated and polluted neighborhoods near factories while dedicated White neighborhoods were considered an investment (ibid). By 1948 it was clear that uneven development within the city had led to huge disparities in public health between white neighborhoods and black urban neighborhoods (ibid).

Continued disinvestment in the city by the state government from the 50s until 2015 further deteriorated the infrastructure and living conditions in Flint for urban Black neighborhoods (ibid). Racially motivated policies in Flint that favored wealthy White neighborhoods "reflect a deliberate intent to fragment the metropolis and disinvest in the central city, which in turn created concentrated disadvantage for minority residents and the poor" (ibid: 8). Not only were urban food deserts created, but these disadvantaged neighborhoods also experienced a devastating infrastructure crisis and diminished public health services. As a result, environmental injustice is rampant in Flint, Michigan, where continued disinvestment encouraged governors to look for cheaper water sources for the city (Kennedy, 2016). Switching Flint's water provider from the Detroit Water and Sewerage Department to the Karegnondi Water Authority was projected to save the city around $200 million over the next 25 years. After this decision, Detroit Water and Sewage gave Flint a deadline of one year before terminating its service to the city and as an interim source Flint officials turned to the Flint River despite warnings about the quality of the water (ibid). Sim's (2016) and Hanna-Attisha et al's (2016) report on the Flint water crisis illustrates how Black communities suffered disproportionately to the crisis compared to White and more affluent communities. Figure 5 shows the distribution of elevated blood lead levels (BLL) in children and water lead levels in Flint where red represents higher BLL and blue represents low BLL.

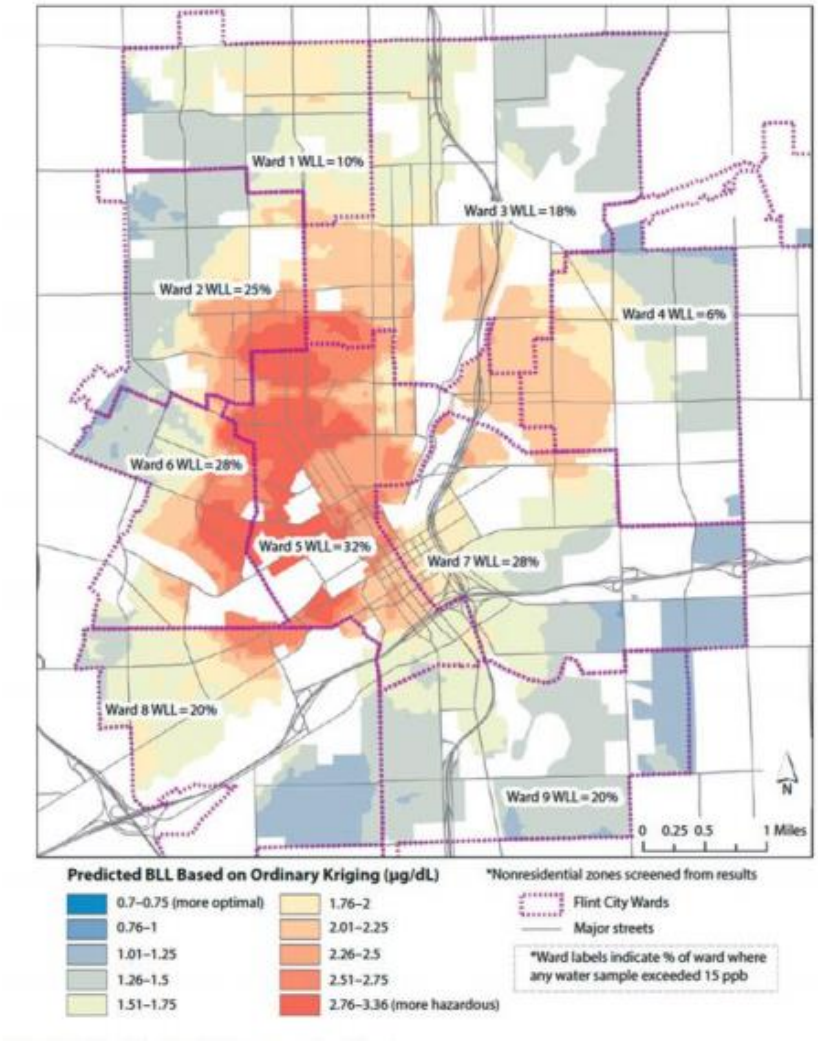


Figure 5: Predicted Surface of Child Blood Lead Level and Ward-Specific Elevated Water Lead Level After (Post) Water Source Change From Detroit-Supplied Lake Huron Water to the Flint River: Flint, MI, 2015 (Hanna-Attisha et al, 2016)

The areas in Flint where "the highest water lead levels were recorded (shaded red) had the highest population of African American children" (Sim, 2016). In contrast, the neighborhoods north and south (shaded blue, green) of the city, "where most middle-class citizens reside, observed a decreasing trend of the BLLs as these residents could afford certain prevention efforts in response to the use of the Flint River water, notably purchasing bottled water" (Sim, 2016). Both authors concluded that children's blood lead levels were elevated after changing the water source, and that the levels increased more for children in socioeconomically

disadvantaged neighborhoods (Sim, 2016; Hanna-Attisha et al, 2016). Preexisting urban food desert conditions also worsened the health outcomes where. In socioeconomically disadvantaged communities with minority populations, Flint children were already suffering from risks that "increased their lead exposure: poor nutrition, concentrated poverty, and older housing stock" (Hanna-Attisha et al, 2016: 286). The lack of available grocery stores and thus limited water alternatives in urban food deserts in Flint have been detrimental to residents, exacerbating the water crisis conditions for urban food deserts compared to the affluent White neighborhoods of Flint. The most affected areas (shaded red) are those that have experienced significant changes in demographics and increase in poverty (Sadler and Highsmith 2016; Hanna-Attisha et al, 2016). Furthermore, it is worth asking: if Flint were a rich White city, would the government have reacted quicker and more efficiently to the issue? As discussed, the city of Flint has faced a history of systemic racism and disinvestment, which ultimately led to the water crisis. A report of the incident released after a year-long investigation found a common theme discussed in public hearings and testimonies, that "predominantly white cities like Ann Arbor or Birmingham would have been treated differently by the state" (Almasy and Ly, 2017; Eligon, 2016). These actions and discussions expose a continued lack of concern for the disadvantaged urban residents of Flint, who are disproportionately minority populations. For urban food desert communities that are already facing a lack of affordable healthy foods, a water crisis further degrades their living conditions and food security.

Flint is not the only city facing an unequal water crisis. A recent study on the "Geographies of Insecure Water Access", Meehan et al (2020) reported that 73 percent of households who lacked a piped water connection were located in cities (ibid). More significantly, the authors discovered "that unplumbed households are more likely to be headed by people of color, earn lower incomes […] [and] rent their residence" (ibid: 2). The findings show that these households are more likely to be financially insecure and cannot improve their water conditions. As opposed to Flint, a city suffering from high unemployment and poverty rates, Meehan et al (2020) point to the fact that the highest rates of unplumbed households occurred in some of the most affluent cities (ibid).

3.2.2 Lack of Nutrition: Behavior

A less discussed, but equally important factor in the lack of a healthy diet for many is behavioral attitudes. In Hendrickson et al (2004) it was shown that while many food desert residents did not buy healthier foods, they did want to and were prevented from doing so due to price and lack of accessibility. However, it can also be the case that people either believe that they already do eat healthy, that they do not trust the organizations selling healthy alternatives, or that simply do not want to eat a healthier diet. In fact, Zepeda et al (2014) found that many people believed that they already ate the recommended number of servings of fruits and vegetables. "51 percent of participants believed that they ate enough fruits and vegetables, while only 8 percent of them ate five or more servings a day" (Zepeda et al, 2014: 63). This implies that there is a gap in understanding what consists of a healthy diet, which can be addressed via increased access to information. A second reason is the lack of trust. Again, in Zepeda et al's (2014) study, the authors found that participants in the focus group believed the organization running the farmers' markets to be for-profit and therefore did not trust them and hence did not want to shop there.

Habit and preferences also play a role when it comes to buying food, and urban food deserts have particularly unsustainable habits. For many Americans "hav[ing] a sufficient quantity of animal foods seems like an essential part of the definition of an adequate diet" (Wilde, 2013: 181). Other times, many individuals simply do not want to eat healthy foods. One author mentioned that when she worked for an organization that brought a food truck to a neighborhood, she asked her neighbor why she did not go, and the neighbor's response was "because they don't sell no food! All they got is birdseed [...] I don't want that stuff. It's not food. I need to be able to feed my family" (Guthman, 2015: 273). It is clear here that even in the event of accessible or available fruits and vegetables or other healthy foods, many consumers choose to not eat a healthier diet. Understanding some individual reactions to initiatives such as food trucks or farmers markets is key to improving the effectiveness of these projects.

Education can influence individual's eating habits, but it also does not guarantee results. Through urban agricultural initiatives information can be provided on a myriad of topics such as gardening, nutrition, healthy living, and sustainability, among other things, which are important

tools for improving community food security. In theory, the utilization dimension of food insecurity can be addressed via implementing educational programs in urban food desert communities. Whether or not individuals choose to partake in these programs is another question.

3.2.3 Healthcare

Urban food deserts are also medically underserved for the same reasons that they are food insecure: segregation, redlining, poverty. A consequence of the local food environment in urban food deserts is higher rates of diet-related diseases. The proliferation of energy-dense and nutrition less food combined with the lack of affordable healthy foods is detrimental to the public health of urban food desert communities (Huizar et al, 2020; (Dukto et al, 2012; HRSA, 2020; USDA, 2009; Abel and Faust, 2018; Gottlieb, 1996).The Health Resources and Services Administration (HRSA) created a map that highlights regions across the U.S. that are medically underserved. The following three maps are of Detroit, New Orleans and Philadelphia, where the blue highlighted areas are those that are deemed medically underserved.

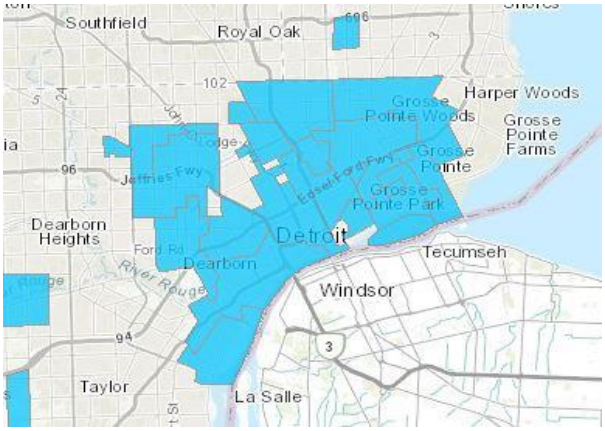


Figure 6: Medically underserved areas in Detroit, Michigan (HRSA, 2020)

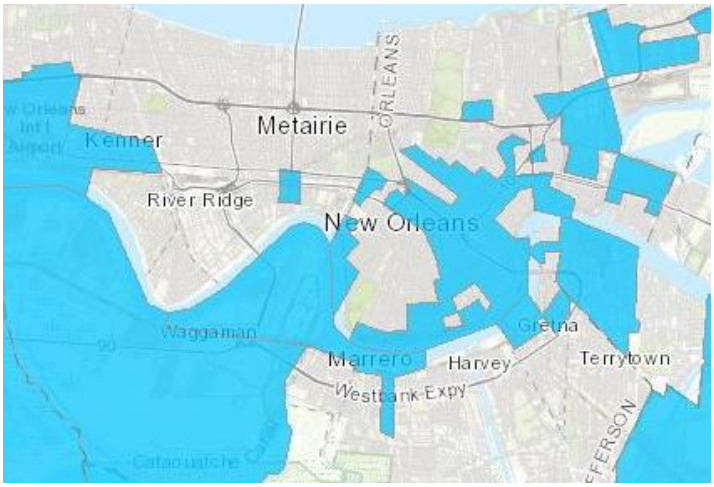


Figure 7: Medically underserved areas in New Orleans, Louisiana (HRSA, 2020)

Figure 8: Medically underserved areas in Philadelphia, Pennsylvania (HRSA, 2020)

According to the HRSA, a medically underserved area is a group of tracts, whether urban or rural, where there is a shortage of personal health services (HRSA, 2020). In these cases, food deserts that lack access to proper nutrition are also those lacking access to proper healthcare. This implies that many do not and cannot receive the care that they need to treat diet-related

diseases developed from living in a food desert. A lack of proper healthcare in many urban food deserts further adds to the negative impact that food insecurity has on the residents.

The utilization of food is a key component of food security. A lack of an adequate diet in urban food deserts are commonly the result of an inadequate infrastructure, but attitudes and behaviors can also play a role. The unique example of Flint, Michigan exposes how historic systemic racism and disinvestment have harmed urban food deserts. The water crisis, which was primarily an effort to cut down water costs in a dying city, further disproportionately affected disenfranchised communities where preexisting risk factors only contributed to the damage. It is difficult to address issues such as infrastructure from the position of a grassroot organization such as urban agriculture. Rather, policy reforms and instruments are needed to reprioritize policy-making decisions that impact community level concerns.

The other aspect of attitudes and behaviors illustrate how a lack of nutrition education and information can impact an individuals' opinion on how they eat. Although attitudes towards foods contribute less to food insecurity than infrastructure does, the former does have an impact on the health of individuals and communities. Increased rates of malnutrition and resulting diet-related diseases are detrimental to health and support unsustainable patterns of consumption. Education and information have the potential to address some of these challenges, but people's behavior and habits are difficult to change without effective intervention. The lack of access to affordable healthy foods is the biggest barrier to achieving a healthy and sustainable utilization of food in urban food deserts.

3.3 STABILITY

Stability, although less discussed in urban food desert literature, is becoming an increasingly concerning aspect of food insecurity due to the rising threats of climate change and other crises. The FAO determined that "to be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (economic or climatic crisis) or cyclical events (seasonal food insecurity)" (FAO, 2006: 1). Recent years have seen examples of all the potential shocks outlined in the definition, which serves to reaffirm the importance of encouraging sustainable

development and consumption (HLPE, 2020). A stable food system is especially important in urban food deserts that are often the most affected by the impacts of unprecedented events. This section will analyze the impact of climate change, economic shocks and the ongoing COVID-19 pandemic on food security in urban food deserts.

3.3.1 Climate Change

Climate change is a pressing concern that needs to be addressed, if only for its effects on food security. The effects are detrimental to agricultural production, thus posing the very serious question of how to feed the continually growing world population. According to the USDA, "the effects of climate change are threatening the nation's food supply, with increased occurrences of droughts and wildfires that may affect the cost of food in the future and disproportionately harm low-income communities and communities of color." (Blackwell, 2016: 2; Anderson, 2015). The living conditions of those who are already food insecure due to low-access to food will worsen drastically. One of the biggest reasons is reduced access to foods, loss of livelihoods, and destruction of infrastructure (Anderson, 2015; Neff, 2015; Blackwell 2016; Brown et al, 2015). The increased frequency and intensity of extreme weather events is linked to rising global temperatures as a result of human activity (IPCC, 2018). Throughout this section, the impact of climate change and natural disasters on urban food desert communities will be discussed.

An overall impact of climate change on food access is worth discussing. The cost of food is a key limiting factor for many residents already. As discussed in Section 3.1, the cost of certain foods is a barrier that prevents many from affording healthy foods. The question of food costs will become even more concerning now that "climate and weather have demonstrable effects on food prices" (Brown et al, 2015: 76). In a report titled "Climate Change, Global Food Security, and the U.S. Food System", Brown et al (2015) outline how price fluctuations can impact society "by shaping poverty outcomes, education outcomes, education and health services, and the reserves of productive assets held by the poor" (77). The authors further argue that low-income families are at high risk of sudden food price fluctuations because they do not have the same financial reserves that middle- and high-income households do (ibid). Potential weather disruptions such as droughts, floods, hurricanes, etc. that can destroy housing, reduce

agricultural production and raise the price of foods can further reduce access to food and thus are a major factor in the continued impoverishment of many communities (ibid).

Furthermore, the current structure of the U.S. food system means that a lot of food is transported whether domestically or imported from around the globe, where food travels an average of 1,500 miles from farm to the plate in the U.S. (Wilde, 2013; CUESA, n.d). In any case, the transportation of food plays a huge role in the overall food system. Unfortunately, "transportation is particularly sensitive to extreme weather events through damages to infrastructure, such as flooding and storm surge [...] disruptions can affect food availability and food safety" (Brown et al, 2015: 62). Extreme weather events can also impact road, river and air conditions and damage or prevent food from being transported, therefore diminishing food supplies and availability in already vulnerable communities. Other events such as droughts, floods or wildfires have more of an indirect impact on urban food desert residents by impacting food production and thus food prices (Brown et al, 2015; Blackwell, 2016).

Hurricanes can have direct and disproportionate impacts on infrastructure, as well as reduced access to food and loss of livelihood in urban food deserts. The past decade has witnessed some of the most devastating hurricanes on record, which can be attributed to rising temperatures and climate change (IPCC, 2018). The U.S. has been facing increasingly damaging hurricanes since the beginning of the 21st century. Hurricane Katrina (2005) and Hurricane Harvey (2017) were the two most costly hurricanes while Hurricane Irma (2017) was the most intense since Katrina (NOAA, 2020). Hurricane Katrina, Hurricane Harvey and Hurricane Irma have all been some of the most devastating storms in U.S. history and have had disproportionate impacts on low-income minorities (Brown et al, 2015; Anderson, 2015; Wilde, 2013; Blackwell, 2016; Clay and Ross, 2020; Rose et al, 2011). Rising global temperatures have led to unprecedented natural disasters like hurricanes that are extremely catastrophic to coastal towns in the U.S. that bear the brunt of these disasters. There is a lack of literature focusing on the impact of natural disasters on food access in U.S. food deserts despite disproportionately impacting low-income and low-access tracts (Clay and Ross, 2020). In fact, after a systematic review of the

literature, Clay and Ross (2020) found that only three papers discuss food insecurity as a result of natural disasters in the U.S.[6]

It is well established that food insecurity disproportionately impacts predominantly Black and Hispanic minority households and recent natural disasters such as Hurricane Katrina (2005) and Hurricane Harvey (2017) have worsened disparities in food access for households that already experience low-access. Natural disasters in general will

> cause disruptions across all levels of the socio-ecological model. Individuals experience stress potentially due to witnessing the disaster, sheltering or evacuating, displacement or disruption to normal routines. Households may experience damage to their home, stress on familial relationships when coping with disaster impacts, or changes in household material or financial resources as a result of disaster exposure. (Clay and Ross, 2020: 2)

These sudden shocks can negatively impact food access at the individual or household level where displacements can geographically remove access to supermarkets, loss of financial resources can make it difficult to afford food, and damages to houses can remove the ability to store or cook food. At the community level, the aftermath of a natural disaster can be detrimental to an already dire situation. Clay and Ross (2020) highlight several common disruptions such as "reduction in the availability of critical lifelines such as water or electricity services [...] disruption to food supply chains, closure of damaged food stores" (ibid: 2). Such disruptions can dramatically impact access and availability of nutritious foods to all populations, but studies have shown that food desert residents who already lack access are disproportionately impacted by the aftermath of a disaster.

Hurricane Katrina was one of the worst and costliest hurricanes to have ever hit the U.S. The hurricane moved along the Gulf Coast and struck Alabama, Louisiana and Mississippi in 2005. The hurricane disrupted thousands of lives and cost the U.S. $161 billion in damages according to the National Oceanic and Atmospheric Administration (NOAA, 2020; Clay and Ross, 2020). Hurricane Katrina dramatically worsened the living conditions of many urban food

[6] In Clay and Ross's (2020) study, they conducted a search for the terms "'food insecurity AND disaster AND U.S' [which] returned 1871 peer reviewed articles. A close review of the 100 most relevant articles found 54 were not focused in the US, 36 articles focused on food or disasters but not both, four discussed food and disasters but were not food insecurity focused" (Clay and Ross, 2020: 2).

desert residents in New Orleans (Rose et al, 2011; Clay and Ross, 2020; Neff, 2015). Rose et al (2011) who studied the impact of the hurricane five years after it struck found that although "residents of predominantly Black neighborhoods experienced a relative lack of access to supermarkets before Hurricane Katrina, the storm and its aftermath worsened this disparity." Overall, residents were 42 percent less likely to access a supermarket two years after the hurricane in 2007. By 2009, the conditions had improved slightly but had not returned to pre-Katrina levels. However, "residents of African American tracts were 71 percent less likely than other city residents to have access to a supermarket" (Rose et al, 2011). This study highlights how the hurricane disproportionately affected urban food desert communities. Communities like these who experience higher levels of poverty and less access to food have a much harder time recuperating in the event of a hurricane.

The second-most costly hurricane after Katrina was Hurricane Harvey in 2017. It made landfall in the middle of the Texas coast where it stalled for around 4 days, "dropping historic amounts of rainfall over southeastern Texas" (Blake and Zelinsky, 2018). Hurricane Harvey "cost the U.S. $125 billion in damages [...] and it was the most significant tropical cyclone rainfall event in U.S. history" (Clay and Ross, 2020). Following the aftermath of Hurricane Harvey, Clay and Ross (2020) studied the rates of food insecurity across the impacted counties. The results of the survey found that "Black participants were nearly two and a half times more likely to report food insecurity than White participants. Hispanic respondents had nearly twice the odds of reporting food insecurity compared to White respondents, and respondents identifying with 'other' races had nearly four times the odds of reporting food insecurity" (ibid). Overall, the study is not a perfect representation of the impact on food desert residents, but it confirmed that certain factors such as being a minority race and economic instability were risk factors for food insecurity (ibid).

The year 2017 was catastrophic for the U.S. in terms of natural disasters One month after Hurricane Harvey devastated southeastern Texas, Hurricane Irma hit Florida in September. The National Oceanic and Atmospheric Administration (NOAA) described Hurricane Irma as "one of the strongest and costliest hurricanes on record in the Atlantic basin" (Cangialosi et al, 2018, p 1). In an interview for WLRN, the main public radio station in South Florida, climate activist Valencia Gunder highlighted the devastating impact of Irma on Miami-Dade County, where

74.34 percent of the population lives in a low-income, low-access census tract 0.5 miles away from a grocery store (USDA, 2020c). A common consequence of natural disasters is the loss of electricity resulting from broken power lines. For those who rely on food stamps to help feed themselves or their households whether during a disaster or not, a lack of electricity is devastating. As Gunder states, "the longer we don't have electricity we can't use the food stamps because it's electronic now" (Gunder, 2018). Furthermore, Hurricane Irma wiped out much of Florida's agriculture and "hundreds of millions of dollars [were] estimated to be lost in southern Miami-Dade County because farmers haven't been able to work after Hurricane Irma destroyed so much of their crops" (Margol, 2017). The agricultural sector is predicted to be one of the most impacted as a result of climate change and many low-income families depend on farm labor such as those in Miami-Dade County. In this county, urban food desert residents suffered many hardships in the aftermath of Hurricane Irma which greatly reduced the availability and access to foods. Although hurricanes are not the only natural disasters that are increasing in intensity across the U.S., they disproportionately impact urban food desert communities on a large scale. A lack of stability in the local food system can setback communities in the aftermath of a hurricane, where communities will be more focused on finding a source of food as opposed to rebuilding destroyed property.

3.3.2 Economic Crisis

Natural disasters are only one type of shock that can impact access to food. The 2008 economic recession proved to be devastating for millions of Americans in terms of food insecurity. According to the USDA, "the number of food-insecure U.S. households rose from 36.2 million in 2007 to 49.1 million in 2008" after having been at its lowest since the year 2000 (Lombe et al, 2018). Figure 8 demonstrates the percentage of food insecure households in the U.S. from 1999 to 2008.

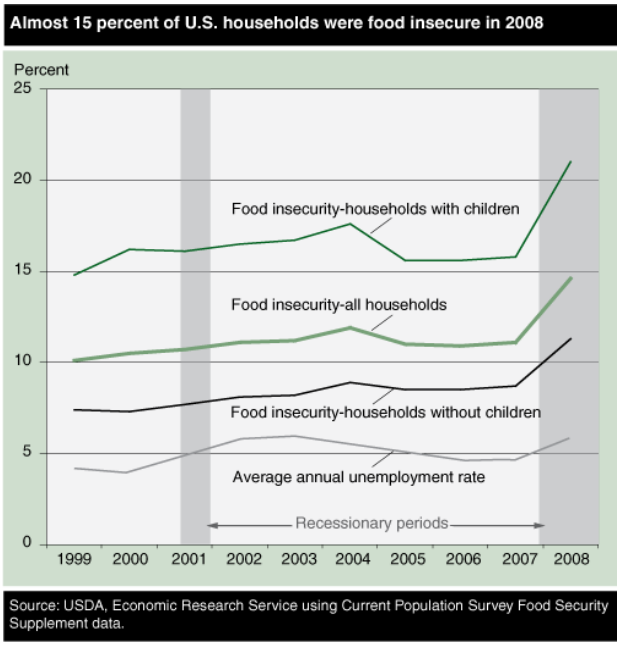


Figure 9: Percentage of household food insecurity in the U.S. from 1999 to 2008 (USDA, 2009)

There was an increase in food insecurity which was "most dramatic from 2008 to 2010, a period associated with the economic downturn" (Lombe et al, 2018: 448). The study investigated the prevalence of food insecurity in already low-income households, which are more likely to reside in urban food deserts, and found that across low-income households, food insecurity increased (Lombe et al, 2018; USDA, 2009; Vilar-Compte et al, 2015).

3.3.3 Pandemic

The ongoing COVID-19 pandemic has magnified many of the pre-existing weaknesses in the food system, including food insecurity. The FAO's definition of food stability accounts for shocks such as economic or climatic crisis and yet the spread of COVID-19 destabilized many aspects of food production and consumption. Urban food desert residents are most at risk from shocks which can easily hinder their access to foods. According to the United Nations (UN) report released this past June (2020),

> border restrictions and lockdowns are, for example, slowing harvests in some parts of the world, [and] constraining transport of food to markets. Meat processing plants and food

> markets are being forced to close in many locations due to serious COVID-19 outbreaks among workers. Farmers have been burying perishable produce or dumping milk as a result of supply chain disruption and falling consumer demand. As a result, many people in urban centers now struggle to access fresh fruits and vegetables, dairy, meat and fish. (UN, 2020: 1)

The report recognizes that low-income, low-access communities in urban settings have had their access to affordable healthy food negatively affected and thus their living conditions have been further degraded (UN, 2020). Rising unemployment rates and surges in food prices resulting from the pandemic have disproportionately affected vulnerable communities who experience greater economic instability and lower wages, especially the case in urban food deserts (Feeding America, 2020; Huizar et al, 2020). Many small businesses and public transportation, where it exists, have had to restrict business operations as a result of quarantine measures, creating barriers for residents with low-access who are on disability, chronically ill, elderly, or relying on public transportation (foodbankonline.org, 2020; Feeding America). In fact, "the rise in food insecurity prevalence has paralleled a 98% increase in the demand and reliance on receiving food from local food banks, and an increase in enrollment and service expansion of supplemental nutrition aid programs" (Huizar et al, 2020: 2). While COVID-19 has impacted everyone, regardless of socio-economic status, disadvantaged and under-served populations have felt the greatest burden. Black and Hispanic low-income households, who are more likely to reside in an urban food desert, have been and continue to be more adversely affected by the economic ramifications from widespread closures (Feeding America, 2020; Belanger et al, 2020). Additionally, chronically ill residents who suffer from obesity, diabetes or other diet-related diseases are also at higher risk of infection due to a weaker immune system and therefore less inclined to go out in public for grocery shopping (Huizar et al, 2020). Living in an urban food desert results in inconsistent access to healthcare, as well as being more likely to have a pre-existing health issues, thus increasing the severity of COVID-19 symptoms (Feeding America, 2020; Belanger et al, 2020). Unfortunately, increasing evidence has revealed that Black Americans are more likely to experience worse health outcomes as a result of COVID-19, most likely from longstanding economic and health inequalities. COVID-19 has exposed glaring inequalities in food access, and in the little time that it has spread across the world food

insecurity in the U.S. has reached an all-time high, disproportionately affecting urban food desert residents who are already at risk populations with regards to employment stability, health issues and lack of access to affordable healthy foods.

3.4 AGENCY

According to the recently published report on "Food Security and Nutrition: Building a Global Narrative Towards 2030" by the High Level Panel of Expertise (HLPE) (2020), "agency refers to the capacity of individuals or groups to make their own decisions about what foods they eat, what foods they produce, how that food is produced, processed and distributed within food systems, and their ability to engage in processes that shape food system policies and governance" (xv). The concept of agency allows us to explore the relationship of power between food systems and individuals. It raises the question: to what extent can people determine their food choices? One of the key challenges to urban food deserts is the inherent lack of agency. Currently, urban food desert residents have very little agency and exercise very little control over their food choices. Throughout this chapter, it has been made clear that a lack of choice, availability and support is rampant in food deserts, completely stripping residents of their agency in their food choices. This leads residents to either travel long distances for affordable food or nourish themselves with the little food available in nearby fast food restaurants and corner stores. The current food system in play allows for little agency and thus remains extremely unsustainable in the long-term.

There are many challenges affecting the agency dimension of food security, all of which have been observed in urban food deserts. For example, urban food desert residents are statistically more likely to suffer from disparities in wealth and income, where many residents live below the poverty line (Dukto et al, 2012). It has been clear that low-income neighborhoods with higher poverty rates are generally more likely to be urban food deserts (Dukto et al, 2012). Urban food desert residents are disproportionately Black, Hispanic and immigrant communities, they also have lower income levels, lower private vehicle ownership and are medically underserved despite suffering higher levels of diet-related illnesses (Dukto et al, 2012; HRSA, 2020; USDA, 2009; Abel and Faust, 2018; Gottlieb, 1996).

According to the 2020 HLPE report, "societal inequalities often reflect differences in agency among different individuals, groups and government institutions, which in turn affect development opportunities and outcomes" (HLPE, 2020: 8). Urban food deserts residents often have to advocate for their right to healthy foods. Their inability to choose the foods they want to eat, let alone afford or have access to these foods deprives these communities from the same rights as their non-food desert counterparts. Historically disadvantaged communities who lack agency in their food environment are also the ones who disproportionately experience high levels of food insecurity (HLPE, 2020). Low-income and high poverty rates correlate with being unable to afford healthy foods, thus affecting the food choices and health of the individual. Not to mention, many studies have demonstrated that urban food desert residents pay more for food than their wealthier counterparts (Fan et al, 2018; Jetter and Cassady, 2006; USDA, 2009).

Furthermore, the uneven local power dynamics present in urban food desert communities highlight further challenges. As a result of redlining, land ownership is scarce in these communities. When residents advocate for their right to healthy food, they are often met with barriers involving landowner disputes and lack of government support (Hachmyer, 2017; Hynes and Howe, 2004). As will be discussed further in chapter 4, community gardens are proliferating across the U.S. in urban food desert communities. However, many are facing unexpected problems where landowners are prohibiting the creation of community gardens in their vacant lots (Hachmyer, 2017; Hynes and Howe, 2004). In some cases, local governments are not always cooperating with the community and instead supporting landowners (Hachmyer, 2017). As such, it is widely recognized that the government plays an important role in ensuring public policies are created that enable agency. This is done "by supporting democratic, inclusive and participatory processes and institutions." (HLPE, 2020: 8). The government has largely overlooked these processes and institutions and sometimes even acts as the barrier to agency (Hachmyer, 2017). Ensuring that both the individual and the community have a greater role in shaping their food systems is largely down to governmental institutions that oversee the rights of its citizens (HLPE, 2020: 8). To an extent, individuals do have the power to exercise their individual agency, but the government and local infrastructure should be more responsible for providing those options. Large corporations have long since stood in the way of an equitable food environment. Banks redlining in the 1930s helped create massive income and racial

divisions between neighborhoods, and later, supermarket redlining further divided communities by avoiding low-profit neighborhoods and following White affluent families to the suburbs (Morales, 2011). The push for the creation of big supermarkets over smaller supply chains, has shaped the dynamics of the food chain and removed access to food in urban environments, demonstrating how corporate power can influence the local food context (McMichael, 2009; Hauter, 2012; Gross, 2017; NYLSRJP, 2006). Low vehicle ownership, as discussed, is also a problem due to the limited available public transportation (Wilde et al, 2017; Treuhaft and Karpyn, 2012). All of these challenges have been discussed in detail throughout this chapter, and they all culminate to a lack in agency for urban food deserts who are continuously disadvantaged communities.

The final key challenge is the uneven distribution of knowledge in making informed decisions (FAO, 2020). Where it is argued that many individuals do not know any better than buying what is available to them, studies, and the proliferation of community started urban agriculture projects, have demonstrated that individuals and communities are more than aware of the risks of their lack of food choices (Hachmyer, 2017; phillypeaceproject.com, n.d; Meenar and Hoover; 2012; Kato and McKinney, 2017). For urban food deserts to achieve agency, it implies the right to accurate information on nutrition and food production, "including access and control over resources required for production, harvesting and preparation of food" (HLPE, 2020). Agency encourages equitable access in the entire food production system, whereby all citizens have the potential ability to play a role in their own food production and consumption.

As a concept in food security, agency is not a new idea and is, in fact, implicit in each aspect of food security discussed in this chapter. This addition of agency as a separate dimension, however, is especially relevant in the case of urban food deserts. While food is available through fast food restaurants and small corner stores, food "is not accessible to all unless individuals and groups have the ability to exercise the agency that enables them to acquire the foods they need and shape food systems to meet their preferences" (HLPE, 2020: 11). Including agency as its own dimension highlights the increasingly problematic state of the food insecurity in urban areas and highlights the fact that urban food desert residents have very little choice in their eating habits.

3.5 SUSTAINABILITY

The other concept introduced as a new key defining aspect of food security is sustainability. According to the HLPE (2020), "sustainability refers to the long-term ability of food systems to provide food security and nutrition in a way that does not compromise the economic, social and environmental bases that generate food security and nutrition for future generations" (HLPE, 2020: xv). This definition requires that all three pillars of sustainability (environmental, social and economic) are met, ensuring that the needs of the current generation can be met without compromising future generations. Like agency, sustainability is not a new topic in food security and nutrition, but it is implicit throughout the discourse. The HLPE (2020) points out that "if food is not produced using sustainable practices, its stability and utilization are put at risk, which in turn, threatens availability and access over the long term" (HLPE, 2020: 11). Introducing sustainability as its own separate dimensions further highlights the social, economic and environmentally unsustainable food system as a whole.

The environmental dimension of sustainability, with regards to food security, implies a food system with practices that respect and protect the environment in the long term. Social sustainability refers to the people's agency in the food system and reduced social inequalities that have resulted in food insecurity. Finally, economic sustainability in the food system implies that people's livelihoods provide them enough income to afford food, and that the producers of foods are also receiving a livable wage. According to the HLPE (2020) it is becoming increasingly vital to highlight sustainability as its own dimension in the concept of food security and nutrition because climate change, the degradation of natural resources, and social and economic inequality are continuously growing trends that undermine the capacity of the ecological, social and economic systems required to support healthy food production and livelihoods in the food system. (HLPE, 2020).

These concerns are already partially touched on in the stability dimension of food security, but the difference is that sustainability encourages long-term solutions. The long-term perspective "is not readily captured by the stability dimension of food security, which was originally added to take into account shorter term disruptions, such as conflict, natural disasters and market turmoil, which can rapidly undermine food security" (HLPE, 2020: 9). The

sustainability dimension acknowledges the link between natural resources and society. It also acknowledges the food systems' capacity to maintain the system in place that ensures current and future food security. There are major challenges affecting this dimension of food security. Agriculture itself is one of the biggest contributors to climate change and conversely also the sector most affected by climate change. An extremely pressing concern is the impact of climate change on future food production, and the systems' ability to feed the world population. Poor, minority communities, such as those in urban food deserts, are already disproportionately impacted by the price fluctuations and increasing intensity of natural disasters as a result of climate change (Neff, 2015; Blackwell 2016; Brown et al, 2015).

While it has been made clear that urban food desert residents lack access to healthy and affordable foods, it is also important to point out that this system also indicates a lack of environmentally, economically and socially sustainable options. Sustainability as a separate dimension not only looks at what food is consumed, but also "how it is produced, processed, transported and used" (HLPE, 2020). This broad view encompasses the food system as a whole, rather than the consumption aspect of it. In this sense, it is worth noting the type of foods available in urban food deserts, where are energy-dense foods lacking in nutrition. In addition to being detrimental to health, the production of these foods is environmentally unsustainable and has many economic consequences. Food production and agriculture as a whole is one of the leading contributors to GHG emissions, leads to loss in biodiversity and affects water supplies (FAO, 2017; Wilde, 2013). Furthermore, the monopolization of a select few companies over the production of foods has threatened the livelihoods of many small farmers who struggle to receive subsidies from the government (Hauter, 2012). In the case of urban food deserts, the perpetual cycle of poverty and food insecurity leaves little room for economic or social progress. However, as the next chapter suggests, introducing urban agriculture as a sustainable alternative to the current food system presents many economic and social opportunities that are not otherwise possible in urban food deserts.

3.6 CONCLUSION

The phenomenon of urban food deserts almost comes across as surprising in a developed country, but it exposes how historically segregated policies have had an impact on contemporary society. Private companies, industries and politics have shaped the food environment to be what it is today, disproportionately affecting minority and low-income populations. Understanding the issues under the lens of the six dimensions of food insecurity provides an in-depth analysis of the different unsustainable aspects of urban food deserts. The lack of access and availability of affordable healthy foods are the key factors of food insecurity. Nonetheless, nutrition from a lack of proper utilization of food stands out as an especially devastating aspect of food insecurity in the U.S., where urban food desert residents are more likely to be chronically ill and medically underserved. Furthermore, recent devastating events such as hurricanes and the ongoing COVID-19 pandemic have exposed the fragility of the current food system in place. Agency, one of the newest dimensions of food insecurity, helps understand the larger context of food insecurity as not just the lack of food and nutrition, but also the lack of choice. Sustainability, the other newest dimension, further broadens the issues of food insecurity to include the production and distribution aspect, thus drawing attention to how and what food is made available in urban food.

As a whole, the current U.S. food system is flawed, and unsustainable and urban food desert residents are disproportionately affected by these issues. The following chapter will discuss possible remedies to the food insecurity in urban food deserts, encouraging sustainable food consumption as playing a pivotal role in ameliorating food insecurity in urban food deserts.

CHAPTER 4: URBAN AGRICULTURE AS A SOLUTION TO THE LACK OF SUSTAINABLE FOOD CONSUMPTION IN FOOD DESERTS

As demonstrated throughout this thesis, food insecurity has proven to be a serious issue which impacts the lives of many Americans and has also been a huge barrier to achieving sustainable food consumption. Urban agriculture has recently become a popular alternative to consuming food in the U.S. and is a promising solution to address these issues. Throughout this chapter, I propose urban agricultural initiatives as a means of tackling both the issues of food insecurity while also encouraging sustainable food consumption in urban food deserts. Urban agriculture "is a movement that dismantles monopolistic control of food production, and returns land, water, and seeds to the marginalized" (Hoover, 2013: 112). It is not the only solution to ameliorating urban food desert conditions and encouraging sustainable food consumption, but it is a promising one with many successful initiatives underway already. This chapter analyzes the environmental, social and economic aspects of three common types of urban agriculture: community gardens, farmers' markets and CSAs. The goal of this section is to showcase efforts to provide sustainable options in food deserts and analyze the effectiveness of each project. Moving beyond urban agriculture, food cooperatives are briefly discussed in their role of improving local food environments. Finally, I will be recommending several top-down policy instruments to emphasize the role of governments in facilitating the creation of urban agricultural systems.

Sustainable urban agriculture can play an essential role in addressing a myriad of problems in urban food deserts in innovative ways. The potential contribution of urban agriculture to community food security is vital (Gillespie et al, 2008; Meenar and Hoover, 2012; Cohen et al, 2012). Encouraging greener cities empowers residents by giving them the ability to grow and eat their own healthy food in local gardens, thus increasing access and greater control over the local food environment (Meenar and Hoover, 2012; Draper and Freedman, 2010; Krishnan et al, 2016; Allen, 2007; Cohen et al, 2012). Urban agriculture can also benefit urban food deserts by improving overall health and promoting a sense of place and pride for

community residents (Meenar and Hoover, 2012; Draper and Freedman, 2010; Krishnan et al, 2016; Cohen et al, 2012). Introducing safe public spaces and improving existing ones can promote participation and interactions between community members. Furthermore, farmers' markets and CSAs provide several economic opportunities such as employment, business incubators and circulating money within the economy. These opportunities can lead to economic development and revitalize the community's economy (Meenar and Hoover, 2012; Draper and Freedman, 2010; Krishnan et al, 2016; Cohen et al, 2012). Nonetheless, urban agriculture does also face some challenges. Critiques of the movement point to several factors that could impede the involvement of low-income, minority communities, for example temporal constraints, lack of knowledge and money, social exclusion, and landownership disputes, among others (Kato and McKinney, 2015; Meenar and Hoover, 2012; Alkon and McCullen, 2010).

4.1 COMMUNITY GARDENS

The use and presence of community gardens is not a new concept in U.S. history; however, their rate of growth has been steadily increasing since the 1970s, especially in light of the consequences of the modern food system. Today, the industrialized food system encourages environmentally unsustainable monocultures, longer food miles, cheap and processed ingredients, and unsustainable diets (Hauter, 2012; Blackwell, 2016; CSS, 2019; FAO, 2018; Pollan, 2008; Stoll-Kleeman and O'Riordan, 2015). Community gardens offer a sustainable alternative, bringing the food system back into the hands of local communities. First let us define community gardens – community gardens are plots of land that are rented out or owned by individuals or groups and used to grow produce. Usually these are located on vacant lands within urban communities and can vary in size. According to Ferris et al (2001), "what distinguishes a community garden from a private garden is the fact that it is in some sense a public garden in terms of ownership and access" (Ferris et al, 2001: 560). Community gardens place a strong emphasis on the *community* aspect where multiple individuals are involved in the gardening process, whether to support the local community, school or any other social group. (Draper and Freedman, 2010; Cohen et al, 2012; Krishnan et al, 2016). Across the U.S., there are thousands of community gardens that are being used to provide additional food sources to those who

participate (Haynes, 2018; Draper and Freedman, 2010; Cohen et al, 2012; Krishnan et al, 2016). According to The Trust for Public Land, in 2018 there were more than 29,000 registered garden plots in just the top 100 largest cities in the U.S. (Haynes, 2018). Since the Trust first started counting garden plots in 2012, the number of plots has risen 44 percent by 2018, indicating a dramatic proliferation of gardens in cities (ibid).

4.1.1 Environmental Sustainability

The environmental benefits of community gardens have recently garnered much interest, considering the current unsustainable state of the modern food system. Community gardens are considered part of an alternative food movement that advocates for shifts towards ecologically sustainable agriculture compared to conventional large-scale farming, and helps combat the effects of climate change and environmental degradation (Krishnan et al, 2016; Draper and Freedman, 2010; Meenar and Hoover, 2012; Flachs, 2010).

Environmentally sustainable consumption habits are difficult to develop, let alone maintain, in urban food deserts. The lack of access and availability of healthy foods leads to a consumption of highly processed foods that have been produced using unsustainable processes and have a heavy carbon footprint as a result of longer food miles. Not to mention, reliance on a private vehicle and public transportation for food shopping increases the overall carbon footprint of the food, since urban food desert residents tend to travel further distances for their groceries (Dukto et al, 2012). Introducing a community garden in urban food deserts can help promote environmentally sustainable consumption habits. Local food sources reduce food transportation costs, plastic use, and has the potential to reduce the demand for unsustainable food products (Flachs, 2010). Some of the biggest concerns for activists are growing local produce, which will then be transported locally and sustainably, so that the ecological footprint of food is much lower than convenience store alternatives.

Sustainability is the main driving force behind community gardens; therefore, farming involves the production of organic foods and low to no use of fertilizers and pesticides (Krishnan et al, 2016; Flachs, 2010; Hoover, 2013; Cohen et al, 2012; Draper and Freedman, 2010). As a result, the food produced and distributed to participants in the community is healthy and, more

importantly, fulfills the sustainability dimension of food security. Many alternative food activists who encourage community gardens are "mainly concerned with the stamp of 'organic' or 'local' [and] pride themselves on their low carbon footprint and 'knowing' their farmers or animals" (Hoover, 2013: 111). Even in situations where monetary incentives are the driving force behind creating a community garden, gardeners continue to use organic and environmentally friendly agricultural practices to ensure that the food is safe to eat (Flachs, 2010, Dion and Laurent, 2015). Organic farming and participation in the community garden also offers opportunities for urban food deserts to have control over their own food system and encourage agency in the local food environment.

Community gardens play an essential role in the "greening" of cities, turning vacant lots and unused lands into public gardens (Knizhnik, 2012; Hoover, 2013; Krishnan et al, 2016; Brown and Jameton, 2000). The abandoned lots, "which [can be] the sites of former residential buildings that have been demolished [and] consist of debris, [often] attract dumping of trash and potentially toxic substances" (Knizhnik, 2012: 14). Converting these lots into community gardens can significantly benefit the surrounding environment by removing the debris, eliminating the harmful effects of pollution and generally promoting a greener landscape (Knizhnik, 2012; Krishnan et al, 2016; Hoover, 2013; Brown and Jameton, 2000). Urban communities that consist of few green spaces run the risk of polluted waterways, flooding and erosion from stormwater runoff due to the lack of soil. Introducing community gardens can already decrease these risks, relieve any further strains on waste infrastructure and improve the microclimate of the community (Knizhnik, 2012; Krishnan et al, 2016; Brown and Jameton, 2000). These impacts are extremely relevant, especially since climate change is likely to increase heavy precipitation, as noted in Chapter 3. Many urban food desert communities are disproportionately impacted by extreme weather events and steps like these can help mitigate future risks and protect communities.

Increasing green spaces can also help to reduce the surface temperature of urban environments. With climate change and rising temperatures, many urban cities can become unlivable during heatwaves. In fact, NOAA (2020) reported that 2010 - 2019 was the hottest decade on record and 2019 was the second hottest year on record. Urban heat islands (UHI) are a phenomenon where urban cities are significantly hotter (up to 6℃) than their rural counterparts

due to the ecological location of the city as well as its size and shape (Knizhnik, 2012). UHIs disproportionately affect disenfranchised communities where temperatures can vary between neighborhoods but "it is mostly lower-income households and communities of color who live in these [UHIs] which have historically had fewer green spaces […], and more concrete and pavements and thus are less equipped to cope with the mounting effects of global heating" (Lakhani, 2020). A study conducted by Hoffman et al (2020) suggests that historical redlining policies have an impact on urban heat distribution today. In fact, the authors' study found that "the consistency of greater temperature in formerly redlined areas across the vast majority (94%) of cities included in this study indicates that current maps of intra-urban heat echo the legacy of past planning policies" (Hoffman et al, 2020: 9). Essentially, the areas that were formerly redlined (urban food deserts) experienced far hotter temperatures than their non-redlined counterparts (White affluent neighborhoods) (ibid). Furthermore, the vacant lots used for community gardens transforms the areas from being used as dumping grounds into green open spaces, reaping other environmental benefits. For example, "gardens increase a city's biodiversity with plant variety and by attracting beneficial soil microorganisms, insects, birds, reptiles, and animals. Urban green spaces can also play a role in species preservation for birds and butterflies by providing food, resting spaces, and protection" (Brown and Jameton, 2000: 32). The development of more community gardens can result in more green spaces and significantly impacts the surrounding environment.

For urban food deserts, the environmental sustainability may not be main a focus, however, locally sourced healthy foods from a community garden address all six dimensions of food security[7]. Availability and access of affordable healthy foods are improved, while the increase in healthy produce encourages proper utilization. Having some food locally sourced helps mitigate and adapt to any potential stability issues like economic or environmental crisis that could otherwise inhibit access. Furthermore, as a community supported project, agency is a key aspect that allows residents to choose their foods for healthier diets. Community gardens offer a myriad of environmental benefits, nonetheless, they do also face challenges.

[7] The six dimensions of food security are access, availability, utilization, stability, agency and sustainability (HLPE, 2020).

4.1.1.1 Challenges and Approaches

While community gardens can transform vacant lots in urban environments, this transformation can also pose some risks to participants. Soil and contamination from nearby industries and highways pose a serious risk in community gardens. Urban soil is not inherently organic because "airborne lead, other heavy metals, and toxic organic industrial wastes can settle on garden soil, plant leaves and fruits" (Brown and Jameton, 2000: 31; Kim et al, 2014). If not washed correctly, the produce can expose consumers to such pollutants. In the past decades, federal policy required lead-free gasoline for vehicles, thus reducing lead contamination in soil; however, more regulations are required for industry pollution since urban environments continue to be heavily polluted (Brown and Jameton, 2000). Urban food deserts tend to be located closer to landfills and industries than those in affluent White neighborhoods. Consequently, "soil in gardens located on or downstream from former industrial sites and highways may still harbor a buildup of hazardous manufacturing residues and automobile exhaust" (Brown and Jameton, 2000: 31). The increased exposure to pollution can cause more harm to community garden participants and negate the effects of eating organic and healthful foods (Brown and Jameton, 2000; Kim et al, 2014). The environmental challenges of community gardens are mostly encompassed in the potential for the gardens' exposure to pollutants and contaminants, which then affect participants. Due to the rising number of community gardens across urban food desert communities, this issue requires both top-down policy solutions to address industrial pollution, as well as innovative grassroot solutions to help gardeners clean up polluted soil and water.

Fortunately, there are relatively straightforward remedies to help clean up polluted soils and plants that have incorporated contaminants. According to Brown and Jameton (2000), the process of "'phytoremediation' has successfully extracted lead, chromium, and other pollutants from soils and water" (Brown and Jameton, 2000: 31). Phytoremediation is a cost effective mechanism that refers to the use of plants to clean contaminated soil, air and water. Essentially, the plants "act as vacuum cleaners [and] remove harmful chemicals from the ground when their roots taken in water and nutrients in polluted soils" (Rodman, 2012; EPA, 2011). When properly done, "composting can further contribute to public health by enriching garden soils and thereby

reducing the need to chemical fertilizers" (Brown and Jameton, 2000). Composting can also serve as a form of remediation for urban soil contaminated by pollutants. The bacteria in composting can break down a variety of chemicals that can work alongside phytoremediation. Not to mention, adding other organic material to the soil can reduce the likelihood of plants absorbing contaminants (Brown and Jameton, 2000). Other alternatives to this process would be to remove the soil from the contaminated site and replace it with clean soil or using hydroponic farming. However, both of these projects are costly and would require funding (Brown and Jameton, 2000; Rodman, 2012; Lloyd, 2019).

Hydroponic farming involves completely indoor farming that is not exposed, nor reliant on the weather. Plants are typically grown in floor to ceiling shelves, "fed by nutrient enriched water and lit by LED lamps" (Lloyd, 2019). Hydroponic farming can be a good adaptive solution to pollution and the effects of climate change because the growing takes place indoors. It has also shown public health and educational benefits when introduced into schools, where students who participated in these programs were more likely to eat more fruits and vegetables than students who did not (Lloyd, 2019). Increased funding and policies directed at supporting community gardens could provide the aid that communities require to startup such projects. Even traditional community gardens require funding in both the initial stages and throughout, although studies have shown that selling produce from the garden can sometimes cover the costs of maintaining the garden (Draper and Freedman, 2010; Krishnan et al, 2016; Meenar and Hoover, 2012).

Another challenge in community gardens is the effort required to maintain the garden. Typically, food in community gardens is grown organically to avoid the use of pesticides and fertilizers, and the work becomes very tiresome. Community gardens take "a tremendous commitment of time to create and sustain [which] can be difficult for lower-income residents who have two or three jobs, often outside their neighborhoods, and rarely have time to cook food, let alone grow it" (Meenar and Hoover, 2016: 151-152). Organic agricultural practices require constant work and many urban food desert residents may not be willing, nor have the time, for converting a vacant lot into a successful, organic garden. Unfortunately, community gardening is not always reliable. Agricultural yields are highly volatile and vary according to the lands' condition and availability, weather, a reliable water source, the duration of the growing

season, the species of the seed, and, most importantly, the skill of the gardeners (Brown and Jameton, 2000). Gardening skills and knowledge are key requirements when commencing a community garden. First, there needs to be a proper understanding of what kinds of produce can grow in the respective environment. Then, how to build a garden, how to grow and how to maintain the garden. Even given these constraints, it has been observed that urban gardens can nonetheless produce a significant amount of yields (Brown and Jameton, 2000: 25). It is difficult, but not impossible to start a community garden with just community residents; however, many are commenced by non-profit organizations who have funding to support such projects. As a result, volunteering and paid positions are options provided to encourage higher rates of participation.

These solutions do not remove the hard work required for the garden, but they are incentives for urban food desert residents who are more likely to be low-income (Flachs, 2010). Gardening and general agricultural knowledge is another important qualification for starting a successful community garden, but it is also something that can be learned with the support of qualified individuals and books. Community gardens started by non-profit organizations can, and do, provide educational class that offer information about gardening, agriculture, nutrition and food. A successful community garden located in Washington DC is DC UrbanGreens who aims to "increase accessibility of affordable healthy foods to residents living in DC's food desert neighborhoods" (dcurbangreens.org, n.d). The organizers use sustainable farming methods to grow food in vacant lots and host workshops to expand knowledge on food production to the surrounding low-income communities. DC UrbanGreens acknowledges that one of their biggest barriers is the lack of available vacant land in urban environments. This has resulted in the experimentation of a moveable urban farm model consisting of self-contained grow-boxes that can be relocated without any major loss in infrastructure. This model is convenient for small production in urban environments where residents are struggling to acquire land and frequently need to relocate.

Schools can also benefit from gardening knowledge and skills, but many schools in urban food deserts are underfunded, understaffed and may not find the time nor the right educators to teach such classes. In the case where community residents start a garden, it would be beneficial for this knowledge to be made widely available in local libraries or community centers if there

are any. In these situations, top-down policies to invest in the infrastructure of urban food desert communities need to be introduced. Increased funding for schooling and public libraries or community can benefit the community by improving education and sharing the knowledge and skillset required to help the community develop agency in their local food environment.

4.1.2 Social Sustainability

In a systematic review of literature on U.S. community gardens, Draper and Freedman (2010) identified several themes that were prevalent among research on the social impact of community gardens. A key theme found across the articles reviewed was food security, a big concern for urban food desert communities. The presence of a community garden is primarily to support residents by providing access to affordable healthy food and promoting food security. In Draper and Freedman's analysis, "one-fourth of the studies reviewed mentioned food production as a benefit or motivating force for participation" (Draper and Freedman, 2010: 481). While community gardens are not usually the primary source of food for participants, it can be extremely helpful in improving access to and availability of additional healthy foods that may not otherwise be available in the community (Flachs, 2010; Draper and Freedman, 2010; Ostrom, 2008; Meenar and Hoover, 2012; Kim et al, 2014; Hynes and Howe; 2004).

Of the studied articles, Draper and Freedman also found that around 50 percent of them mentioned the health benefits of community gardens, which "are often used to promote individual health and also to serve as components of broader community-based health promotion strategies" (Draper and Freedman, 2010: 480-481). As the authors explained, health benefits are extremely important to consider in food deserts since many of these areas are medically underserved and have high rates of diet-related diseases (Krishnan et al, 2016; Hoover, 2013; Meenar and Hoover, 2012; Rundle et al, 2009; Jetter and Cassady, 2006; Sadler et al, 2019; HRSA, 2019). Krishnan et al (2016) further supports this and discusses how community gardens "improve access to fresh, nutritious food, helping combat childhood obesity, diabetes, and poor nutrition prevalent in many urban communities (Krishnan, 2016). Along with improving consumption of produce, community gardens can promote physical activity and improve mental health by making open spaces more available to residents. (Draper and Freedman, 2010; Brown

and Jameton, 2000; Krishnan, 2016). Brown and Jameton (2000) also highlight the stress-reducing benefits of gardening and green open spaces in general. This relationship was explored in Atlanta, Georgia, where psychologists studied the impact of the local green environment on the community and found that "the mere presence of vegetable gardens featured significantly as a positive community influence" (Brown and Jameton, 2000: 28). Community gardens can improve the mental health of urban food deserts residents.

In some situations, urban food desert residents can be new immigrants who are finding it difficult to adapt to U.S. culture. The creation of community gardens can help with cultural preservation and expression by taking into account the vital role of culture in agriculture (Krishnan et al, 2016; Hoover, 2013; Meenar and Hoover, 2012; Brown and Jameton, 2000; Flachs, 2010). Additionally, the transition to U.S. culture can be made easier, where "access to rare foods that support cultural heritages of immigrant communities and provides social benefits through improving international relationships and decreasing crime" (Krishnan et al, 2016: 326). Improving access to food is an extremely important aspect and supporting diverse diets for international families is indispensable (Flachs, 2010). These motivating factors can also encourage participants to invest more time in the community garden to ensure that they are successful, thus benefiting the community in more ways than one. In Latino community gardens in New York City, it was "found that the structures, design and plants within the 20 Latino-operated gardens that they studied reflected the participants country of origin [while] events held in the garden provided opportunities for cultural expression through dance, musical performances, and food focused activities" (Draper and Freedman, 2010: 843 - 844). Other programs in Oklahoma have also invested in preserving Native American culture by providing after school education in community gardens (Draper and Freedman, 2010). In a program where 75 percent of students were Native American, the preservation and expression of their culture through sustainable agriculture is socially significant (Robinson-O'Brian et al, 2009). As a means of connecting with their culture, "the traditional 'three sisters' garden was planted with corn, beans, and squash" (Draper and Freedman, 2010: 484). Additionally, the Mvskoke Food Sovereignty Initiative in Oklahoma is attempting to use community gardens as a means to "reintroduce farming and food preparation methods that are more culturally and ecologically appropriate and contribute to building a sense of community and a healthier lifestyle" (Morales,

2011: 162). These examples demonstrate how community gardens can help preserve minority cultures by providing a safe, open spaces for residents to gather (Shostak et al, 2017; Flachs, 2010; Morales, 2011). In many underserved neighborhoods such as food deserts, public parks do not exist. Community gardens in these neighborhoods are especially important "for those who would not otherwise have easy access to such areas. For example, the Latino community gardens in New York City were identified as the only open spaces available within the neighborhood" (Draper and Freedman, 2010: 843). These open spaces allow local residents to gather, thus building a sense of community and enhancing social interaction (ibid; Flachs, 2010; Morales, 2011; Krishnan et al, 2016; Hoover, 2013; Meenar and Hoover, 2012; Brown and Jameton, 2000).

Community gardens also have the potential to promote community organizing, empowerment and mobilization, three key aspects of any food sovereignty movement (Hachmyer, 2017; Brown and Jameton, 2000). Further studies have shown how participants in community gardens have mobilized with others in order to better address community needs or even fight against any threats of losing land (Draper and Freedman, 2010; Hachmyer, 2017). Brown and Jameton (2000) note that "the political efforts to develop and sustain urban gardens requires complicated knowledge and skills to navigate government offices, access public resources, persuade funders, and deal with complex social relationships" (Brown and Jameton, 2000: 29). These collective efforts encourage the mobilization of communities, which is an effective force in enacting further change in local governments and leading the way in the sustainable development of urban food desert communities (Draper and Freedman, 2010; Hachmyer, 2017; Meenar and Hoover, 2012; Brown and Jameton, 2000).

4.1.2.1 Challenges and Approaches

While some studies praise the diversity and social inclusion of community gardens, many others point to a contradictory problem. Social exclusion refers to the inability of some people to participate due to financial, racial, age, access limitations and perceived socio-economic status (Meenar and Hoover, 2012). The social exclusion of non-White participants in community

gardens in predominantly non-White neighborhoods is highlighted by authors like Meenar and Hoover (2016) as a serious problem.

Social Exclusion

Currently, community gardens, while growing in popularity, largely remains an activity dominated by middle-class and upper class White populations. There is no doubt that community gardens can benefit any neighborhood. However, it is often the case that participants are predominantly White, even in communities in which they are a minority. In Hoover's (2013) analysis on community garden participation reveals that urban agriculture participants in Denver were 78 percent White, 12 percent Hispanic, and 8 percent African American, despite working in predominantly Hispanic and African American communities (Hoover, 2013). The same trends were found in Philadelphia, where 47 percent of participants were White and 36 percent African American even though the African American population is larger than the White population in Philadelphia (ibid). Hoover (2013) explains that "urban agriculture is a white-dominated practice primarily occurring in neighborhoods with high concentrations of African American and Latino communities, with little participation from within those communities [...] unintentionally creating an exclusive environment where people of color are excluded" (ibid: 110). Although many non-profit organizations run these urban agricultural projects to support food desert communities, they find that sometimes they are not entirely successful.

One community garden in Philadelphia was located in a neighborhood with an 85 percent Black population, but a low level of community involvement was reported (Meenar and Hoover, 2012). The coordinator of this garden had "heard comments related to race and slavery, and thought that a generational gap in farming could be another reason for low community participation" (ibid: 152). In general, younger generations do not seem to be interested in farming, but this is more so the case in Black populations where "teenagers have said to me [community garden coordinator] 'oh look, we're out working in the fields again' ... you just don't find many African Americans who can be farmers in the city. Most people have forgotten how to garden'" (Meenar and Hoover, 2012: 152). Philadelphia, along with many other cities in the U.S., has faced much systemic and historical racism, and consequently "non-Whites will be

suspicious if apparently privileged White people come in and state a garden that is fenced off, even if they do not make overt references to slavery" (Meenar and Hoover, 2012: 152). The history of slavery and racial segregation in the U.S. plagues disenfranchised communities who continue to face many hardships. The symbolic association of farming with slavery presents a challenge to increasing voluntary participation of Black and Hispanic residence in community gardens. In fact, some urban agriculture project organizers perceived Black populations as voluntarily excluding themselves from community gardens due to its symbolic ties to slavery (Meenar and Hoover, 2012).

This history may explain why many Black populations may not want to participate in a community garden, but the truth behind their exclusion is more complicated. Interestingly, Carolyn Finney (2006) identified differing perspectives on the lack of Black and Hispanic participation in nature and outdoor activities that are applicable to urban agriculture participation. She found that while "whites attribute minimal participation among African Americans to a lack of interest and different values [...] African American respondents identified exclusionary practices, environmental groups' lack of commitment or investment in the black population, and white privilege" (Hoover, 2013:113). These findings demonstrate that despite the presence of urban agriculture and farmers markets in many urban food desert communities, they can remain largely inaccessible because of this sense of social exclusion. The issue of social exclusion is a pressing matter since the majority of urban food desert residents are low-income minority populations. There is a paradox where those who would benefit the most from community gardens are also those who are the least likely to participate. Guthman (2011) notes that "African Americans that do participate in alternative food have tended to become involved because they have been sickened (literally and figuratively) by industrial food provisioning practices" (Guthman, 2011: 277). For example, the Detroit Black Community Food Security Network was established for this very reason, as discussed below. An underlying concern for Guthman (2011) is that because urban agriculture continues to attract young White populations, this very limited crowd will define the spaces, projects and rhetoric of urban agriculture and continue to exclude others.

Nonetheless, while the problem of social exclusion persists in many communities, it is not the case for all community gardens. A Detroit community garden was started and maintained

by local Black populations facing food insecurity and who felt excluded from local White urban agricultural movements. The Detroit Black Community Food Security Network (DBCFSN) was established in 2006 after “we [the organizers] observed that many of the key players in the local urban agriculture movement were young whites" (dbcfsn.org, n.d). This initiative grew in response to social exclusion precisely because they felt that “the most effective movements grow organically from the people who they are designed to serve” (dbcfsn.org, n.d). In the first two years of its operation, the DBCFSN faced land security issues, having to move locations three times before settling in a long-term location after negotiations with Detroit City Council and the City’s Planning Department (dbcfsn.org, n.d). DBCFSN hosts educational programs on environmentally sustainable farming practices. Their success, however, has led the organization to open a community-owned grocery store “to provide improved access to healthy food and food education” (Detroit People’s Food Co-op, 2020). This community garden grew from a small local plot of land run by food desert residents to a successful grocery store demonstrating how a small initiative has the potential to revitalize food desert communities.

Overcoming social exclusion is crucial in encouraging community gardens in urban food deserts. The agency dimension of food security suggests that individuals and communities should have the ability to choose their local food environments. In the case where a community garden exists but its practices are exclusionary, the garden is not providing community food security. Addressing these issues requires greater inclusion of non-White participation. For example, offering jobs and volunteering opportunities at all levels for local residents at the community garden increases diversity and offers a familiar face to other community members who may have been hesitant to participate. Not to mention, such strategies can improve employment opportunities, spread the word of the community garden and increase the number of participants. The issue of social exclusion is a delicate matter that cannot be ignored. In Canada, the City of Vancouver highlights several steps for increasing inclusivity in community gardens. The first and foremost strategy is community engagement, including face-to-face engagement with residents. In international communities, speaking multiple languages is encouraged for organizers to demonstrate diversity and solidarity with the population (Lowcock, 2014). Communication and engagement in the community is key prior to the establishment of a community garden in order to ensure that cultural perspectives are aligned (Lowcock, 2014).

Furthermore, a "successful community space must exist beyond [its] primary use" (Lowcock, 2014, p 10). In other words, the garden must serve more than just as a place to produce food. It should have other elements such as various activities, open spaces for socialization and opportunities to engage with others. As such, the community garden should be able to provide a sufficient amount of land, resources and nutritious food (Lowcock, 2014). Furthermore, community gardens should be designed with accessibility in mind so that vulnerable members of the community can participate. Finally, to be inclusive, a community garden should encompass all of the policies discussed, encourage and facilitate community building, and respect diversity (Lowcock, 2014). These strategies are a step in the right direction to reducing social exclusion and empowering food desert communities with community gardens.

4.1.3 Economic Sustainability

Furthermore, the establishment of community gardens in neighborhoods has shown to promote economic development in the community. In some gardens, enough fresh fruits and vegetables are produced that "equate to significant monetary value and savings" (Draper and Freedman, 2010: 481). Urban community gardens create a direct access to food for urban food desert residents, while simultaneously helping the local economy (Krishnan et al, 2016; Meenar and Hoover, 2012). Growing food in a community garden also allows individuals to "produce their own food at a fraction of the cost of produce in a supermarket" (Flachs, 2010: 3). There are several ways that participants profit from the gardens: financial savings from saved transportation and food costs, and from selling extra produce to local farmers' markets or restaurants (Krishnan et al, 2016; Meenar and Hoover, 2012; Brown and Jameton, 2000). Additionally, other studies have demonstrated evidence that green spaces in urban neighborhoods have a significant and positive impact on the surrounding property values (Meenar and Hoover, 2012; Flachs, 2010; Treuhaft and Karpyn, 2010).

Youth education, development and employment are also key benefits that often directly provide opportunities for at-risk or low-income families (Draper and Freedman, 2010; Krishnan et al, 2016; Brown and Jameton, 2000; Robinson-O'Brian et al, 2009). Many community garden programs offer monetary compensation along with other benefits such as developing job and

interpersonal skills. In fact, Draper and Freedman found that "behavioral improvements related to respectfulness, commitment, and positive teamwork were noted" (Draper and Freedman, 2010: 842). In other studies, the impact of youth education and employment as well as the provision of open spaces were noted in the reduced levels of crime in the neighborhoods (Krishnan, 2015; Draper and Freedman, 2010; Brown and Jameton, 2000). While no quantitative studies were conducted on this link, many interviews reported that community residents observed a noticeable reduction in crime rates once a community garden was established and maintained (Draper and Freedman, 2010; Gorham et al, 2005; Kuo and Sullivan, 2001; Brown and Jameton, 2000).

The key economic challenge at the moment is the question of land ownership, or lack thereof. A 2015 study on community gardens in urban cities in the U.S. found that "community gardens are often located on borrowed, leased, or squatted land" (Drake and Lawson, 2014a: 250). The examples of Boston and Philadelphia highlight these issues where the community or program had little security, and little say in their land use. Accordingly, "[m]any disinvested urban communities recognize that controlling the resources inherent in vacant land may be key to thwarting hegemonic structures that historically fail to serve the most marginalized populations" (Hachmyer, 2017: 109). Hachmyer (2017) studied two particular situations in Boston and Philadelphia where land struggles are preventing the development of community gardens in food desert communities. "In cities across the country, the adoption of food movement projects and goals into policy frameworks is often accompanied by land-based disputes" (Hachmyer, 2017: 110). Boston, Massachusetts is in Suffolk county where, in 2010, the USDA recorded 27.25 percent of the population living in a food desert 0.5 miles away from a grocery store. Roxbury and Dorchester are two neighborhoods in this county that are disproportionately low-income but are also "home to some of Boston's most thriving social movements and grassroots organizing, including around food systems change" (ibid: 111). However, in 2008 groups of residents and communities from Dorchester were interested in urban agricultural projects in the local vacant lots. The lots, which were owned by the Boston Redevelopment Authority, were not made available for public use (ibid). Eventually, in 2010, the growing interest and conversations amongst residents and grassroot organizations about the vacant lot led to a meeting with the Mayor who supported the concept of incorporating an urban farm into the community.

Nonetheless, negotiations between landowners were complex and did not appropriately consult community concerns and interests. In addition to facing challenges with regards to lack of land ownership, the residents of Dorchester were not included in the discussion regarding the allotment of land for the use of the project, despite being the ones to develop the idea and request permission over several years. Eventually, resistance was to such an extent that a reevaluation of the project was prompted and the "community was given further opportunity for comment" (ibid: 113). Engaging with the community residents led to more positive involvement and support for the community gardens which led to their successful establishment. Today, The Trustees of Reservations, Massachusetts's largest preservation and conservation non-profit, protects 56 community gardens in 8 Boston neighborhoods, including Dorchester and Roxbury (The Trustees, 2020).

Philadelphia presents an equally interesting situation where a non-profit organization called Central Club for Boys and Girls was involved in land disputes. In 1920, Central Club was established in Gray's Ferry neighborhood and has been a prominent "program working with youth to help them develop life skills, from gardening to leadership development" (Hachmyer, 2017: 116). Despite working on the same plot of land for many decades, the non-profit organization never acquired ownership of the land they worked on and thus faced challenges when portions of the land they used went for sale. It was not until 2012, after many years of legal disputes did the organization acquire ownership of the land that it worked on. This success was largely thanks to food movement leader and attorney Amy Cahn who fought for the organization over those years (ibid).

Another example is the North Philly Peace Park. Home to a successful community garden, it is one of the only place for residents of the local urban food desert in Sharswood to access affordable healthy foods. First established in 2012 on several vacant lots across the street from housing projects, the original founding members were a group of individuals who "sought to collectively solve man of the neighborhoods critical issues [by] design[ing] a campus that included a fence-free organic farm, a pavilion [for events] and after school and community programs" (phillypeacepark.org, n.d). Like many other community gardens, the North Philly Peace Park faced many landownership disputes. In 2015 the park was displaced and found itself fighting for land security for two years before being relocated and eventually gaining land

security (phillypeacepark.org, n.d). Today, the park has five visions which include "1) organic and sustainable farming, 2) educational programs, 3) community programs and partnerships, 4) Green Wall Street[8] and 5) benefit corporation[9]" (phillypeacepark.org, n.d). The organizers of the park keep it free and open to all those who respect the rules in an effort to open up the community to knowledge on nutritional and mental wellbeing and the skills required for food production.

These cases are not unique. Throughout history, there has been a strained relationship between community gardens and cities (ibid). Authors Drake and Lawson (2014b) highlight some critical discussions of how community gardens have been perceived as temporary or "useless" by government officials, as opposed to long-term solutions. Community gardens were once supported by local governments during the Great Depression as a means to alleviate high unemployment rates and improve food insecurity (ibid). Today, however, community gardens are viewed as non-capitalist commodities and several local governments have worked actively in preventing their creation (ibid). As such, community garden organizers are finding it difficult to "compete with market-based land uses, such as housing and retail, if they are evaluated solely by their tax generating and other economic potential" (Hynes and Howe, 2004: 175; ibid). This is especially a problem in urban environments where competition for property is extremely high. Drake and Lawson (2014b) discuss tensions between gardeners, real estate developers and local governments where "application of the law favored the status quo of development over the user-managed open space of the garden site" (ibid: 3). Both local laws and landowners would rather sell land or develop a profitable use for it than to rent it out for a community garden (Drake and Lawson, 2014a). 1990s New York City, for example, found grassroot organizations using community gardens to "challenge the Giuliani administration's control of social space and orientation toward market-friendly policies" (ibid: 3). The administration viewed community gardens as old relics of communism and aimed to demolish gardens across the city (ibid). Both

[8] "A local entrepreneur incubator, green workforce development program, makerspace and marketplace" (phillypeacepark.org, n.d).

[9] "A burgeoning community design and equitable development corporation which aims to repeat the parks success in other neighborhoods facing high lot vacancy rates, gentrification, poverty, food insecurity, displacement, and violence" (phillypeacepark.org, n.d).

of these situations highlight the importance of market-friendly policy in the U.S., which prioritize profits over the concerns of local communities (ibid; Hynes and Howe, 2004). Furthermore. Drake and Lawson (2014b) suggest that "community gardens challenge assumptions about the essential characteristics of urban space" (ibid: 3). That is to say, urban spaces are not designed for individual profits or benefits, but rather for recreational purposes for the whole community to enjoy. This sentiment has been prevalent in since the 20th century in city planning and urban theorists who have been averse to gardening in public spaces (ibid). According to Lawson (2004) community gardens have not been considered as "public goods, […] […] and this perspective framed gardening as a good temporary use of derelict land… but not necessarily a permanent land use" (166). The association of community gardens as a "communist relic" and unprofitable has tarnished their reputation and thus, many projects are facing challenges due to lack of landownership, especially in communities of color. The lack of land ownership among communities of color can be traced back to the New Deal lending patterns "that excluded black homeownership [and] refused to provide mortgages based on race and neighborhood. Over time, these trends fostered limited urban land ownership among communities of color, thus effectively institutionalizing the dispossession of these communities" (Hachmyer, 2017: 108). These trends have prevented disadvantaged communities of color from being able to develop land in their favor and excluded them from participating in the decision making of their own communities.

As was briefly discussed, it is important for an organization or a group to be ready to face all the hurdles of finding information on available land before being able to even start a garden, which in itself requires a lot of knowledge. In food desert communities many residents are low-income who may not have the time nor the energy to find all the necessary information. A potential solution could be a government sponsored program that addresses all the legal concerns for local communities. This way, local communities can have information on all the local and available vacant lots, along with the information and tools to set-up a community garden. At the moment, "there is growing concern that land rights are significant for shifting and establishing structures of power, rendering them necessary for transforming the food system" (Hachmyer, 2017: 109). Taking back land rights and using them to establish community gardens promotes food security and sustainable consumption in urban food deserts that otherwise lack access to

healthy and nutritious foods. There are several recommended methods for establishing community gardens in urban locations. The Public Health Law Center recommends

> working with local community-based organization, community land trust, or a community land bank; checking if the municipality has open space, parkland, undeveloped or blighted properties; identifying privately owned underutilized or vacant land; and contacting public housing agencies to explore the possibility of starting a community garden at a public housing site. (Public Health Law Center, 2017)

There are options out there to start community gardens, but they are not as accessible as they could be. In 2013 California enacted a legislation that allows cities or counties to establish an Urban Agriculture Incentive Zone (UAIZ) to support local food production. This legislation allows cities to "enter into contracts with landowners who agree to restrict the use of their land for a minimum of five years for small-scale agricultural production" (NCSL, 2019). Similar legislation has been enacted in other places too. For example, in the District of Columbia, the mayor is authorized to create the Food Production and Urban Gardens program to compile a list of all the vacant lots for community gardens. New York has also created "an office of community gardens to assist in the development of community gardens on vacant public lands" (NCSL, 2019). These governmental initiatives are all a step in the right direction and demonstrate the increasing awareness of the crucial role that community gardens play in urban food security.

Community gardens have the potential to significantly impact the social, economic and environmental aspects that can benefit and improve communities. Traditional community gardens are already being successfully implemented across urban food deserts where local residents are fed up with the lack of access to affordable healthy foods. Throughout this text are presented only some of the successful community gardens popping up across the U.S. in an attempt to provide increased food security and access to healthy foods in urban food deserts. Grassroot movements have the potential to play a large role in shaping the future of sustainable food production and consumption but, as highlighted in the examples above, continue to face many challenges. Land disputes, social exclusion and participation are big barriers to successful community gardens. Federal support for such movements can give them the recognition and

funding required to maintain these initiatives and improve food security across urban food desert communities.

4.2 FARMERS' MARKETS

The following section will look more closely at the impact of farmers' markets and their potential as an urban agriculture initiative to alleviate many of the unsustainability issues suffered by urban food deserts. Farmers' markets are community institutions that are key to building and strengthening local food systems (Gillespie et al, 2008: 66). In general, farmers markets are marketplaces where farmers can sell their produce directly to consumers. These can be indoors or outdoors and typically only occur once or twice a week in their respective locations. Farmers' markets are described as "allow[ing] consumers to have access to locally grown, farm fresh produce, enable[ing] farmers the opportunity to develop a personal relationship with their customers, and cultivate[ing] consumer loyalty with the farmers who grow the produce" (Gunderson et al, 2009). Since the USDA first created a directory of farmers' markets in 1994, the number of markets had increased from 1,755 to 8,476 in 2015 (USDA, 2019). As of August 2, 2020, there were 8,764 farmers markets listed in the USDA's National Farmers Market Directory. Farmers' markets have proliferated across the U.S. in response to increased concerns about the globalizing trends in foods, organic production, environmental and animal welfare concerns (Gillespie et al, 2008; Hauter, 2012).

While similar to community gardens in that fresh food is made available to communities, farmers' markets offer a slightly different approach. Whereas community gardens tend to be run by either local residents or non-profit organizations, farmers' markets are established by nearby small family farms. Foods sold at the farmers' markets can range from local produce to goods such as dairy, meat, breads, dried goods, and regional products. The main purpose of farmers' markets is for small family farms to earn a living and secondary benefits can include helping alleviate community food insecurity. In recent decades, farmers' markets have become a popular alternative or supplement to regular food shopping. The following section will discuss the potential impact of farmers' markets as a solution to the pressing issues of food security as well as the wider issues of sustainable food consumption in urban food deserts.

4.2.1 Environmental Sustainability

Farmers' markets have become an increasingly popular sustainable food alternative, going so far as to be praised for having the "potential to build and rebuild local and regional food systems" (Gillespie et al, 2008: 69). The focus on short supply chains, organic and sustainable production processes, and the ability for farmers to meet customers can prompt support for small farms over large corporations. Not to mention, the benefits of farmers' markets towards environmental concerns are abundant; they support local, organic supply chains, there are less GHG emissions from transportation, products are seasonal, and more often than not, there is less packaging involved (ibid). In food deserts, farmers' markets have the added benefit of also improving the quality of life by offering affordable healthy foods and also providing employment and supporting small local businesses (ibid; Treuhaft and Karpyn, 2010).

Much like community gardens, farmers' markets have many of the same benefits of targeting economic, social and environmental needs of urban food deserts. Exposure to, and education about local produce and agriculture can encourage sustainable food consumption and the physical location of farmers' markets also offer opportunities for social interaction and creating a sense of community (Gillespie et al, 2008: 66). Knowledge about the food production process is a keystone to helping empower community residents to demand a better local food environment. Farmers' markets can provide a space for communities to develop the skills and knowledge to grow and produce their own foods, develop entrepreneurial experiences and develop sustainably. These skills help address the sustainability dimension of food security.

4.2.2 Social Sustainability

Under the social pillar of sustainability, many of the benefits of farmers' markets are much the same as those offered by community gardens. The key issue of unsustainability in urban food deserts continues to be food insecurity and farmers' markets can potentially contribute to improved food security. According to Gillespie et al (2008) "some farmers' markets play a central role in providing local residents with safe […] and nutritious food at the same time

that they stimulate new and stronger local food and farming enterprises" (Gillespie et al, 2008: 80). Community food security is only achieved when all these needs are met. Farmers' markets inherently have a bigger budget than community gardens, which allows them further opportunities to offer affordable healthy foods while stimulating the local economy. Boos (2012) surveyed Richmond Certified Farmers' Market in Richmond, California, a farmers' market located directly in an urban food desert. His results found that the market "is successful in providing access to healthy foods to a local population who would have limited or no access to healthy foods" (11). The location of the market was a crucial factor in improving accessibility to the urban food desert residents where those who lived close to the market did 25 to 50 percent of their grocery shopping there (ibid). Another study conducted in Washington state found that "one quarter of urban food deserts were found to have the effects of their low-access to food reduced" (Sage et al, 2013: 1278). By improving community food security and availability of foods, farmers' markets have also demonstrated a capacity to improve fruit and vegetable consumption, thus targeting the access and utilization dimensions of food security.

The rise in diet-related diseases in urban food deserts have highlighted the unsustainability of current diets. To combat these trends, farmers' markets are being proffered as a means of increasing fruit and vegetable intake to ameliorate public health conditions across urban food deserts. Several studies have demonstrated increases in produce consumption after the introduction of a farmers' market in an urban food desert (Sage et al, 2013; Gary-Webb et al, 2018; Gillespie et al, 2008; Shostak et al, 2017; Zepeda et al, 2013; Rodier et al, 2017). For example, the main goal of the Sommerville Mobile Farmers' Market in Middlesex County, Massachusetts, is to improve food access (Shostak et al, 2017). Consequently, the market targets communities that are particularly low-income and low-access with high SNAP users. Shostak et al (2017) found that 81 percent of customers who participated in the Sommerville Mobile Farmers' Market "reported that the market helps them – or their children – eat more fruits and vegetables" (ibid: 67). Furthermore, in Allegheny County, Pennsylvania Gary-Webb et al (2018) observed a 13 percent increase in vegetable intake in *Green Grocer* participants (ibid). The *Green Grocer* mobile farmers' market was first piloted in 2015 and is still successful today, continuing to cater to urban food desert residents in the county. In collaboration with the Greater Pittsburgh Community Food Bank, the "'farm stand on wheels' is a delivery truck of

refrigerated, ready-to-sell fresh fruits and vegetables, and other healthy food options" (ibid: 376). Both of these farmers' markets were created with the intention of ameliorating food access and public health conditions in urban food deserts and have proven to be a successful endeavor.

Not unlike community gardens, farmers' markets similarly provide an open public space for the residents to gather, increase social interaction and thus build a sense of community. The Williamsburg Farmers' Market in Brooklyn, New York takes place in a low-income area and "has become a hub for building relationships among people in the neighborhood's diverse ethnic enclaves as well as better connecting urban people. The market is at the core of a constellation of programs supporting food production and enterprise development, including a community garden, a shared-use kitchen, and a CSA enterprise" (Gillespie et al, 2008: 79). This example of the Williamsburg Farmers' Market operates in many of the same ways as the community gardens by not only offering access to healthy and affordable foods, but also providing economic opportunities and educational programs. This combination is crucial in the revitalization of food desert communities and can help encourage sustainable food consumption and further address the six dimensions of food security. Providing a safe public space for social interaction and nutritional education can also empower residents to address community needs and potentially mobilize in an effort to improve their local food environment. Doing so can further encourage sustainable food consumption across urban food deserts.

4.2.2.1 Challenges and Approaches

Recent trends have pointed to a huge proliferation of farmers' markets across the U.S. It is increasingly becoming one of the more popular forms of encouraging sustainable food consumption. Nonetheless, farmers' markets do face a number of social challenges that impact participation rates such as the prominent issue of social exclusion, and also lack of visibility.

Social Exclusion

The issue of social exclusion spans throughout all urban agricultural movements. Discussed in the section on community gardens, social exclusion refers to the inability of

individuals to participate due to several constraints such as financial, racial, age, access limitations and perceived socio-economic status (Meenar and Hoover, 2010). This same trend has been observed in farmers' markets where many studies point to clear disparities in the race and income levels of farmers' market participants. (Sage et al, 2013; Alkon and McCullen, 2010; Hoover, 2013; Lambert-Pennington and Hicks, 2016; Zepeda et al, 2013; Brace et al, 2020). These authors argue that the movement is dominated by affluent White activists. However, the reasons for social exclusion in farmers' markets are slightly different compared to community gardens. Where the latter discusses symbolic ties to slavery and a generational gap in farming skills, farmers' markets low participation rates are generally attributed to lack of trust and White discourse.

Alkon and McCullen (2010) argue that "farmers' markets, and the alternative agri-food movement more generally, contain whitened discourses and practices" (938). What they are referring to is not only the fact that the consumer base seems to be mostly made up of White populations, but that the farmers' markets themselves "are shaped by a set of white cultural practices" (ibid: 938). This observation demonstrates two main problems. First of all, it is generally agreed on that farmers' markets typically attract affluent, or middle-class White families partly because of the higher priced foods in some locations, and also because they are predominantly run by White people (Brace et al, 2020; Hoover, 2013; Zepeda et al, 2013). Consequently, the "clustering of pale bodies in farmers markets [...] can inhibit the participation of people of color" (Alkon and McCullen, 2010: 938). A sense of social exclusion is created here where Black and Hispanic populations may feel unwelcome at farmers' markets and find them untrustworthy (Zepeda et al, 2013). This issue is discussed in Zepeda et al's (2013) study where many of the participants disclosed that "[they] did not feel welcome [and perceived farmers' markets] as uninviting and targeting tourists or people with money" (ibid: 61). As Zepeda et al (2013) point out, urban food desert residents are, for the most part, poor and hence vulnerable. For vulnerable communities, trust is very fragile because they do not experience the same advantages as others. Consequently, trust tends to be built by experience and relationships, which can be achieved in farmers' markets since the same farmers and vendors are there every couple of days (ibid). Not surprisingly, in a comparison of the impact of different mobile farmers' markets across the country, Zepeda et al (2013) found that certain markets fared better than

others among urban food desert residents as a result of the trust built up between participants and vendors. In Washington, D.C., shoppers perceived mobile market staff "as a family, although they were not" (ibid: 65). Similarly, in Chicago, Illinois, "shoppers, who were mostly African-American, perceived the young African-American staff very positively and assumed they were from their community" (ibid: 65). On the other hand, shoppers in Madison, Wisconsin "perceived the White staff as not from their community and as not being particularly friendly" (ibid: 65). The same could be said in Stevenson, Washington, where shoppers perceived the farmers' market staff "as not being from the community" (ibid: 65). These remarks heavily imply that in vulnerable communities such as urban food deserts, trust is found in those who are from the same community and understand the social and economic situations of other residents. These shared experiences between staff and participants enables the building of a trusting relationship. However, despite the good intentions of many non-profits who come from affluent White backgrounds, the very fact that they are White, and outsiders prevents their success. These issues can be easily avoided by hiring local staff to help run the farmers' markets. Such strategies can alleviate unemployment rates, help boost the local economy and, most importantly, encourage more participation of community residents.

Second, Sage et al (2013) have argued that a local food alternative must be accepted by the local community to become successful. This ties in with issues of perceived lack of trust. Non-profit organizations are typically led by young, White affluent individuals and thus the organizations they establish tend to reflect their own desires and aesthetics rather than addressing the needs and desires of food desert residents. In fact, in the example of the DBCFSN, the very reason for starting the garden was because there were no organizations led by Black people, despite being the majority of the population in Detroit (dbcfsn.org, n.d). Guthman (2015) argues that "what missionaries often don't recognize is that their messages speak mainly to the almost or already converted [...] in other words, it's not so much that the discourse of good food convinces its subjects; rather, subjects who are ready to believe it choose the discourse" (84-85). The audience for the local, organic and slow food can be urban food desert residents. However, if approached incorrectly, the well-intended message will be lost and unsuccessful. Like the DBCFSN, local initiatives created by those who are actually familiar with the needs and desires of their community are those set to be the most effective because they aim to not only change

consumption habits, but to also revitalize the community socially and economically. In this scenario, employing practices of inclusivity that were discussed in community gardens such as face-to-face communication and engagement with residents, demonstrating diversity and accessibility, and aligning cultural values is key to promoting a successful farmers' market in an urban food desert.

Visibility and accessibility

Furthermore, another challenge faced by farmers' markets is the lack of visibility, which can inhibit participation, simply because residents are unaware that the market even exists. In a study conducted in New Orleans, Louisiana, Kato and McKinney (2014) found that in the Hollygrove neighborhood farmers' market, the lack of participation was due to a lack of awareness of the market, rather than avoidance. Visibility and accessibility are key to the success of farmers markets, since this is how they receive and maintain consumers. These findings indicate that efforts to spread awareness of markets have been falling short and there needs to be more focus on this aspect. Farmers' markets have a limited budget to begin with so money budgeted towards marketing is very little or unavailable (Kato and McKinney, 2014).

Kato and McKinney (2014) found that "study participants knew very little about the market's products and services, including the resident discount service that was specifically aimed to benefit them" (ibid: 216). A survey from a different study of the same neighborhood found that 63 percent of participants had never been to a farmers' market, 80 percent were not aware that the market accepted SNAP, and 76 percent were not aware that they were eligible for a discount at the market (Skizim et al, 2017). This demonstrates how the market had unsuccessfully marketed itself and its benefits, failing to spread awareness to the community, indicating that low participation was not due to avoidance, but rather lack of awareness. Not to mention, because there is little information, it may not always be clear whether a farmers' market accepts any sort of food assistance program. If not, many residents will not choose to shop there, especially if it is also out of the way. In response to this challenge, Skizim et al (2017) found that "communication via the internet and social media could be viable among low-income individuals" (166). Throughout their study, also conducted in Hollygrove, New Orleans, 52

percent of low-income residents reported access to the internet, and 41 percent of those were on Facebook (ibid). Advertising the market on social media platforms could play an increasingly important role as a cost effective means of spreading awareness of the farmers' market, which tackles issues of lack of funding for advertising. Nonetheless, this solution does not account for the 48 percent of the low-income population who do not have access to the internet.

One solution could be relocating a farmers' market nearby a popular grocer. This not only increases visibility, but also allows residents to complete their full grocery shop in one day, as opposed to dividing it between various locations and days (Sage et al, 2013). Furthermore, small efforts like colorfully displaying produce and having big signs are ways of making farmers' markets more visible to community residents. Creating visibility is a "fundamental process by which farmers' markets become keystone institutions in rebuilding local food systems" (Gillespie et al, 2008: 70). Farmers' markets are grounded in public life and open to anyone by occupying open public spaces. This makes farmers' markets act as a temporary community hub where people can gather, learn about nutritious and locally sourced foods, meet local food producers and interact with other community residents. In this way, farmers' markets are another excellent means of encouraging sustainable food consumption by stimulating general awareness of food production processes. Making this public space accessible is especially crucial for urban food desert residents who otherwise may not participate.

4.2.3 Economic Sustainability

One of the key benefits of farmers' markets, compared to community gardens is the lack of landownership disputes. Farmers' markets typically set up for a couple hours in a public space once or twice a week. This makes it easier to establish a temporary market, compared to the permanency required for a garden. In this sense, farmers' markets are more flexible if the property suddenly becomes unavailable, making it easier to establish one compared to a community garden.

Additionally, farmers' markets are a great means of stimulating the local economy. Food sold from either local community gardens or small nearby family farms can provide extra income for the farmers and food producers. Not to mention, hiring local youth to help run the farmers'

market can improve employment rates and future employment opportunities for many. Encouraging farmers to diversify their products and service can also help rebuild local food systems. Gillespie et al (2008) explains that "diversification is a keystone process because it enhances the economic viability of small agricultural and food businesses while also developing consumer demand for local food products and services" (Gillespie et al, 2008: 72). Diversifying crops can allow food producers to extend the market season, attract more and/or different customers, better utilize resources, and finally, minimize the risk and losses of production failures and market price fluctuations (ibid). In 1991 New York, the Middletown Chamber of Commerce introduced a farmers' market in an attempt to revitalize a local urban food desert. In one instance, a farmer who had previously only grown one type of crop (onion) decided to diversify their production and sell it at the market since they could not compete with other onion farmers. This diversification succeeded, the garden business grew, and "led to a more economically viable farm" (ibid: 73). Furthermore, by diversifying crops and extending the market season, farmers' markets can operate for longer periods of time and aim to produce food throughout the year rather than seasonally. As a result, consumers have improved community food security. These benefits can stimulate the local economy, while also improving social aspects of the community. Creating consumer demands and responding to them has the potential to attract a wider variety of consumers, thus encouraging more participation in the market. Not to mention, diversifying crops can allow farmers to produce exotic foods that are traditional and familiar to immigrant populations. For example, the Sommerville Mobile Farmers' Market (SMFM) in Middlesex County, Massachusetts, there is a large ethnic population that is not always familiar with foods produced and eaten in the U.S. During an evaluation of the SMFM, Shostak et al (2017) observed that during a week where callaloo was available, a green that is popular in South Asia and the Caribbean, "customers bought as much as they could carry, pulled out their phones to call their friends to tell them it was available, and expressed profound disappointment when it sold out" (68). This observation demonstrates the importance of diversifying foods to local communities, especially in urban food desert communities where there are often ethnic populations who would appreciate familiar foods as opposed to the 'Western diet' (ibid). Responding to consumer demands is also key in addressing the agency dimension of food security by giving customers the opportunity to choose their local food

environment. Entwining both economic and social benefits are crucial to the success of farmers' markets in general, but especially so in urban food deserts. Supporting small local farms at farmers' markets will help stimulate the economy of the community, shorten supply chains and empower communities to have a say in their local food environment.

Another way that farmers' markets can be economically sustainable is through incubating other small local businesses that can potentially expand beyond just the farmers' market (Gillespie et al, 2008). By being in an open public space with a lot of foot traffic, farmers' markets offer the perfect space for businesses to set up a small stand and learn and grow from other successful businesses.

4.2.3.1 Challenges and Approaches

While farmers' markets offer many of the same opportunities and benefits as community gardens, the challenges they face are very different. The following section discusses some of the disadvantages to farmers' markets.

Lack of Farmers' Markets

Despite numerous studies demonstrating the benefits of farmers' markets as addressing community food security, there seems to be a considerable lack of farmers' markets in urban food desert communities. Sage et al (2013) found that in Washington state, urban food deserts are an average of 2.4 km from the nearest farmers' market and out of the 70,000 urban food desert residents, only 23 percent lived less than 1 km from a market (ibid). Brace et al (2020) found that in Hawaii, only 16 percent of all 101 farmers' markets in the state were registered in an urban food desert tract. For residents who do not own a vehicle, traveling more for a farmers' market where they might not even be able to find food they know and like, let alone afford it is highly unlikely. This lack of availability in food deserts can be attributed to several reasons. First of all, to set up in low-income neighborhoods, prices need to be lower and farmers' may not make a profit. However, if a farmers' market is established in an affluent White neighborhood, the farmer is almost guaranteed to make a profit (Sage et al, 2013). From a profit perspective, the

risks of setting up in an urban food desert outweigh the benefits of setting up in an affluent neighborhood. In this situation, a long-term solution would be government-provided subsidies to small family farms can open up more opportunities for farmers' markets in low-income areas.

In the short-term, non-profit organizations are given tax benefits which can help them budget for catering to urban food desert communities (Wilde, 2013: 7). However, the introduction of mobile farmers' market has proven considerable success in addressing lack of access and availability of farmers' markets in urban food deserts. Introducing the concept of a mobile farmers' market allows for farmers to reach various access points in neighborhoods and communities and thus targeting a wider audience. As a relatively recent phenomenon, studies on mobile markets are rather scarce, nonetheless, "several studies have shown an increase in fruit and vegetable consumption among targeted populations" (Gary-Webb et al, 2018: 376; Zepeda et al, 2013). Despite reports showing positive outcomes regarding healthy food intake, several obstacles remain, preventing mobile farmers' markets from succeeding. For example, "affordability, reaching intended customers, timing, lack of variety, and lack of advertising" (Gary-Webb et al, 2018: 376; Zepeda et al, 2013). Lack of advertising can be best addressed through flyers, community engagement and social media (Zepeda et al, 2013; Skizim et al, 2017; Lowcock, 2014). Consequently, including the date, time and cost of food in the information handed out can help reach more customers. One interviewee in Zepeda et al's (2013) study highlighted the importance of including the cost in the information saying "people don't want to go on the bus, get on there and pick up two or three items, and they cost an arm and a leg, you know. So they want to know what it's going to cost before they even get there to see if they can even afford it" (Zepeda et al, 2013: 63) Additionally, participants in Zepeda et al's (2013) study supported the idea of using a loudspeaker or a jingle to announce the arrival of the bus in the neighborhood (ibid). Further recommendations to increasing mobile farmers market use, especially in urban food deserts, could include improving the convenience of locations, various payment options (including SNAP), providing a variety of familiar options, and hosting events (cooking demonstrations, community organized dinners, social get togethers, etc.) (Gary-Webb et al, 2018; Zepeda et al, 2013).

Furthermore, a potentially effective means of spreading awareness of a farmers' market is by setting one up next to a popular supermarket. In this way, customers have the opportunity to

shop at the farmers' market along with their regular shopping trip to a supermarket. Improved advertising such as handing out flyers outside of grocery stores and setting up posters displaying benefits can attract more consumers. Sage et al (2012) found that farmers' markets in Washington state found that "in urban areas, we found farmers' markets are often located close to grocery stores" (25). This is helpful in terms of spreading awareness and information about the farmers' market and also boosting customer rates where "farmers' markets find positive value in locating near other retail activity" (ibid: 25). However, in the case of urban food deserts the problem of access remains. Farmers' markets should ideally alternate locations between being near popular supermarkets and also near urban food deserts. Flyers at the supermarket locations should indicate where and when markets take place so that residents can fully take advantage of their benefits.

Participation in SNAP

Participation in food assistance programs is a key challenge. As of the 8th of October, there are 2,728 or 44.5 percent of farmers' markets that participate in food stamp programs (USDA, 2020a). This percentage is relatively low because of the requirements for accepting food assistance vouchers. Since SNAP moved to EBT credits, farmers' markets need access to electricity to work with the credit system, and when a farmers' market sets up temporarily in a parking lot or other vacant lot, electricity is not always easy to come by. Also, while the USDA funds EBT technology in grocery stores, they do not do the same for farmers' markets (Brace et al, 2016). In addition to the costs for EBT machines, Brace et al (2016) highlights other administrative challenges hindering farmers' markets from becoming SNAP retailers. For example, "developing the process needed to successfully accept food assistance benefits at farmers' markets; training market managers and farmers; hiring staff to work the EBT booths; promoting the food assistance programs; and financial reporting responsibilities" (ibid: 252). As such, the implementation of SNAP acceptance and its success in farmers' markets varies by states. In Hawaii, for example, only 28 percent of the total number of farmers' markets accepted more than one type of food assistance program, 40 percent accepted SNAP and 58 percent did not accept any type of food assistance (Brace et al, 2020). Additionally, in Durham, North Carolina, where about 16.2 percent of the population lives in a food desert, only two farmers'

markets accept EBT cards for food assistance programs and neither of those two markets are located in an urban food desert (Brace et al, 2016). Other studies in Washington state have demonstrated "remarkably low, less than 25 percent, participation rates in farmers' markets by those receiving food stamps" (Sage et al, 2013: 1274). Pointing to a lack of participation of SNAP users in farmers' markets in Washington. Furthermore, Georgia has a low concentration of farmers' markets in urban food deserts, and consequently "may lack the availability of state and local funding […] as well as the skills necessary to implement proper marketing and distribution strategies, resulting in a continued prevalence of food insecurity" (Brace et al, 2016: 252). On the other hand, bigger states like New York and California have the ability to apply for the funds required to implement EBT technology and the associated costs (Brace et al, 2016).

Participating in SNAP is extremely important in helping to alleviate food desert struggles, where the Sage et al (2012) study found that "several markets would likely be negatively affected should these forms of payment [SNAP/ EBT] no longer be available to their lower-income customers" (Sage et al, 2012: 24). To successfully implement a farmers' market in an urban food desert, acceptance of SNAP will open the market up to a wider audience and help more households.

The SMFM makes another great example in this situation. Shostak et al's (2017) study found that the SMFM received 60 percent of all SNAP sales between three farmers' markets in the area. The difference being that, unlike SMFM, the other two markets do not cater to urban food desert residents and are located in less accessible areas that also have less SNAP users (Shostak et al, 2017). This percentage demonstrates the importance of accepting SNAP and EBT credits since "it is clearly meeting a need among the City's [Sommerville's] low-income residents" (Shostak et al, 2017: 66). High poverty rates and participation in food assistance programs heavily implies that urban food desert residents are inclined to make savings on their groceries. Consequently, Gary-Webb et al (2018) found that "low-income women were increasingly willing to shop at farmers' markets when the price savings increased and the market was incrementally closer to their residence" (Gary-Webb et al, 2018: 376). In the long-term, increased subsidies to farmers' markets and small family farms can lower the price of foods since farmers would be earning better wages.

In the meantime, however, Sage et al (2013) highlight three key strategies to improving SNAP receiver participation in farmers' markets, which are "education, access to markets, and market equality" (Sage et al, 2013: 1274). The *Green Grocer* mobile farmers' market encompasses these three strategies. As one of the only mobile farmers markets in the country that is owned by a food bank, the *Green Grocer* is able to provide competitive prices and accept food assistance vouchers (Gary-Webb et al, 2018). Not to mention, because *Green Grocer* "stops in areas where grocery stores are less accessible, they are not competing with local retailers" (ibid: 376). This allows the mobile market to supply communities without negatively impacting the local economy. Another one of the benefits of farmers' markets is the capacity to sell more than just fruits and vegetables, but also dry goods, meat and dairy. *Green Grocery* also provides "frozen meats and dry goods, so that customers can create complete meals" (ibid: 377). This allows customers to complete their grocery shopping at the market rather than splitting up their shopping between a farmers' market or community garden and a supermarket that is far away. As a plus, the market also offers recipe cards and other information regarding nutrition education to help its customers create nutritious and sustainable meals (ibid). As a matter of fact, Gary-Webb et al's study on the impact of *Green Grocer* during its pilot phase, observed "declines in produce procurement from supercenters, with subsequent increases in produce purchases from *Green Grocer* mobile market, farmers' markets, gardens and other sources" (Gary-Webb et al, 2018: 382). This type of set up is extremely promising as a means of encouraging sustainable food consumption in urban food deserts.

These observations demonstrate the potential of urban agriculture in encouraging sustainable food consumption in the long-term. The funding received from the foodbank opens up much more opportunities for the mobile farmers' market compared to other markets and non-profit organizations. Consequently, they can properly cater to the needs and desires of urban food desert residents in an environmentally, socially and economically sustainable way.

Farmers' markets have a strong potential in alleviating food insecurity in urban food deserts. The ability of farmers' markets to provide access to affordable healthy foods also plays an important role in encouraging more sustainable food consumption. Not to mention, farmers' markets address all six dimensions of food security. Access and availability of healthy affordable foods is improved when farmers' markets are located in urban food desert communities.

Converting into mobile markets only further improves the accessibility of affordable healthy foods. Consequently, fruit and vegetable intake are increased from access, thus improving the utilization of food. Furthermore, having a farmers' market that offers a diversity of crops ameliorates community food security year-round and provides stability and agency, as participants are given more opportunities to make demands. Finally, rebuilding local food supply through farmers' markets offers an economically, environmentally and socially sustainable development for urban food desert communities. Nevertheless, it must be remembered that "the farmers' markets that contribute the most to local food system development are those organized and conducted with more deliberate community development intent" (Gillespie et al, 2008: 81). A farmers' market must be perceived as trustworthy and acceptable for it to be successful in urban food desert communities. Employing practices of inclusivity, increasing visibility and improving SNAP acceptance rates are crucial in ensuring the success of farmers' markets in urban food deserts.

4.3 COMMUNITY SUPPORTED AGRICULTURE

The following section aims to discuss the role of community supported agriculture (CSA) in encouraging sustainable food consumption while also ameliorating unsustainable conditions in urban food deserts by providing access to healthy and affordable foods. Community Supported Agriculture was first introduced to the United States in the mid-1980s by Jan Vandertuin from Switzerland (Krishnan et al, 2016). The concept rapidly gained momentum across the Northeast before spreading to farms across the rest of the U.S. They are very similar to farmers markets in that farms are selling directly to consumers. However, the difference is that instead of choosing the vegetables, participants receive a box of available in season produce. Krishnan et al (2016) explains that "the farmer offers a certain number of 'shares' to the public which may consist of a box of vegetables. Interested consumers purchase a share through a membership or subscription and in return receive a box of seasonal produce each week throughout the farming season" (ibid: 15). This box can either be delivered straight to the door for a fee or collected at an agreed upon location.

In CSAs consumers are usually provided with produce that is in season, but some do offer a selection, although limited, from which members can choose. Ostrom (2008) argues that even if CSA farmers will never become major food producers in the U.S., they should nonetheless be praised for encouraging members to "increase their understanding of food, the challenges faced by farmers, the needs of the environment, and the potential role informed citizens can play in reshaping food and economic systems" (Ostrom, 2008: 117). Much like community gardens and farmers' markets, CSAs the overall goal of a CSA is to rebuild local food systems and help ameliorate community food insecurity.

4.3.1 Environmental Sustainability

CSA's promote environmental sustainability by using environmentally friendly agricultural practices, cutting down on packaging and thus waste, creating shorter supply chains and offering in season produce. The agreement between participants and farmers acknowledges that CSAs will only offer a box of seasonally grown produce, with the exception of a few that can also offer dry goods, dairy and meat products. As such, consumers tend to be made aware of the environmental limitations of growing food. Furthermore, as a "community-supported" project, CSAs often ask for community participation in the farm or a monthly fee in return for a box. This community involvement and restricted selection can foster a better understanding of where food comes from, how it is grown, and the many of the challenges faced by farmers. According to Ostom (2008), "CSAs have been proposed as a strategy for revitalizing local agricultural economies, preserving farmland, enhancing community food security, and educating consumers about farming and the environment" (Ostrom, 2008: 99). These same goals are echoed throughout other urban agricultural means as discussed above.

4.3.2 Social Sustainability

Several CSA farmers in Minneapolis, Minnesota and Madison, Wisconsin expressed in a survey that they were "committed to addressing food security issues and had taken steps to provide food to low-income households" (Ostrom, 2008: 105 -106). This indicates that farmers

in the movement are aware of the barriers experienced by low-income populations in accessing affordable healthy foods and are acting to ameliorate these living situations.

A much discussed challenge in urban food deserts is the lack of public transportation and low vehicle ownership (Abel and Faust, 2018; USDA, 2009). As a solution to this problem of accessibility, CSAs offer delivery services or pickup locations, making it easy for participants to receive their food. In an effort to help revitalize the local economy, pickup locations could be established in nearby convenience stores. This arrangement improves access and availability to affordable healthy foods without compromising convenience stores. First of all, since convenience stores are located throughout urban food deserts, participants will not have a hard time accessing their orders. Secondly, this arrangement could potentially bring more foot traffic to the convenience store and increase its sales.

4.3.2.1 Challenges and Approaches

Unfortunately, delivery and pickup options do not always exist. Gillespie (2008) argues that not all farms offer this option and that "CSA farms are rarely in well-trafficked public locations that by virtue of their openness might serendipitously attract new people into the experience" (Gillespie et al, 2008: 71). This is a big challenge to encouraging CSAs in urban food deserts since many already live far away from a grocery store. Many residents will most likely not be making the commitment to a seasonal fresh food box if it means they have to go out of their way to pick it up. This is especially the case if the foods that they are offered are not what they are used to eating and they cannot choose the food. Not to mention, not all foods types are offered in these boxes and people would have to be making several trips to pick up the rest of their groceries elsewhere. Without a private vehicle, it is even less likely that urban food desert residents would be interested in this type of arrangement. Nonetheless, this situation can be easily addressed by offering a delivery service or pickup location.

The issue of not being able to choose the food is a major setback for CSAs. This is reflected in the agency dimension of food security, where individuals should have a right to choose their food environment. While all the foods are healthy, nutritious and in season, there is often a learning curve when it comes to eating farm food. At least at farmers' markets and

community gardens, participants and customers can pick and choose the foods they want to buy or grow. Ostrom (2008) noted that in Minnesota and Wisconsin, “although [enthusiastic members] liked ‘having to do something with they got’, at times their lives were too busy, and they ended up wasting vegetables” (Ostrom, 2008: 113). It is difficult for CSAs to compete with supermarket abundance, where customers are used to having a variety of choices for low prices. This concern is addressed in a small study conducted in Hollygrove, New Orleans by Kato and McKinney (2017). Participants in Hollygrove received biweekly boxes of produce from the local farm. “As expected, the items that respondents struggled with preparing were mostly less-familiar items, such as tatsoi and bok choy, yet the qualitative comments in bi-weekly surveys indicated that many took this opportunity to experiment with preparing those items and most had positive reactions (Kato and McKinney, 2017: 224). This implies that while some may see the lack of choice as a burden, others use it as an opportunity to expand their knowledge on food and nutrition. While this study is not representative of all urban food desert residents, it is significant enough to continue considering CSAs as a part of a solution to ameliorate community food security.

4.3.3 Economic Sustainability

Unlike community gardens, where the farmers are voluntary residents, or farmers’ markets, where farmers are at risk of not making a profit, CSAs can directly benefit farmers. As outlined by Krishnan et al (2016), CSAs “provide farmers the opportunity to market their produce early in the season; [receive] early payments for sales and increase in cash flow; provides opportunities to meet people and know who eats the food they grow" (Krishnan et al, 2016: 331). Allen et al (2006) argue that CSAs are often “economic lifelines" for small-scale farmers with limited production, especially those using sustainable practices since it allows them to avoid middlemen and selling at market prices (Allen et al, 2006: 1). On the flip side, the benefits for consumers are much community gardens and farmers’ markets where consumers are provided with “fresh, on-farm produce with all the nutritional benefits; opportunities to visit the farm and know how the food is grown; [and can] help develop a relationship with the grower” (Krishnan et al, 2016: 331). In this case, CSAs seem to offer a win-win situation where both

farmers and consumers benefit. Furthermore, several CSAs, but not many, offer a contract-less arrangement where participants can choose the weeks that they want to participate. However, these tend to only work for bigger and successful farms who can afford to take more risks. Smaller farms depend on the monthly fee to keep their farm running.

4.3.3.1 Challenges and Approaches

As it stands, CSAs are still a relatively new form of urban agriculture and have encountered many challenges when trying to attract more low-income populations. For the most part there is "limited socioeconomic diversity among [CSA] members, with most being middle-class, urban, white, and highly-educated" (Ostrom, 2008: 109). Kato and McKinney (2014) point out that CSA programs tend to require financial commitments made in advance, which may prevent the participation of households who have limited savings and inflexible budgets (Kato and McKinney, 2014). Not to mention, most CSA farms are finding it difficult to also compete with cheap food provided in supermarkets and cannot sustain low prices (Ostrom, 2008). In Allen et al's (2006) study on the impact of CSA farms in alleviating food security issues in California, several managers of CSA farms in California expressed support for the role of urban agriculture initiatives in improving food insecurity, but equally expressed concern for farmer income (ibid). To earn a living wage, farmers must price their foods higher than at supermarkets, which, understandably, deters participation among low-income families. Consequently, most CSA farms have tended to cater to high-income families and have been frequently criticized for their inability to offer affordable and accessible fresh produce to all consumers (Ostrom, 2008; Allen et al, 2006). CSAs were described as a 'win-win' situation in the previous section, but, Allen et al (2006) rightfully argues that "when consumers are affluent, CSAs may truly be 'win-win'. [...] However, it is not clear that [CSAs] can provide an easy 'win-win' solution for lower income consumers. [...] Given existing economic constraints they are not currently positioned to meet the goal of food security" (7). Allen et al (2006) and found that "CSA managers who indicated that they believe improving access [to low-income families] is important reported an average gross income of $113,706, while those who do not consider it important reported an average gross income of $ 24, 321" (ibid: 5). These findings suggest that larger CSA programs

may place a higher priority on serving low-income customers because they have the financial security to do so, compared to smaller CSA programs. Despite much support for helping low-income populations eat healthy, farmers are naturally concerned with their own incomes. The current state of the food production industry makes it so that large mass production farms receive the most subsidies while small scale farms are struggling to survive (Hauter, 2012). Currently, most CSAs do not have a cushion to fall back on if they take the risk of implementing new programs for low-income populations and it fails.

Accepting SNAP vouchers has demonstrated increased participation in farmers' markets in urban food deserts, making this a logical next step for CSA farms in promoting their program to low-income communities. However, the USDA's Food and Nutrition Service have decided to not allow certain CSAs to process food stamps, explaining that "CSAs that require an entire season's payment in advance and do not guarantee a certain amount of produce in return are considered too speculative for food stamp purchases" (Allen et al, 2006: 6; Center for Agriculture and Food Systems, n.d; Zenger Farm, 2013). Consequently, the low participation rates of low-income families in CSAs can be attributed to the lack of federal entitlements such as SNAP. (Allen et al, 2006). As a result of the decision to prohibit some CSAs from accepting SNAP, other CSAs who are actually eligible are not aware of it. A survey of CSA farmers in California found that very few CSAs were eligible for authorization of food stamps and "one manager of a very well-known CSA told us that the only people who have asked if they take food stamps are other researchers" (ibid: 6). This response indicates two main problems with CSAs as a solution to healthy food access in urban food deserts. Those who are participating in the CSA do not require food assistance programs and are thus presumably at mid/ high-income levels and not serving low-income urban food deserts. Secondly, there is a lack of information for both CSA farmers and consumers about where food assistance programs are accepted.

It was noted that one of the most effective means of attracting low-income customers was through the establishing the CSA as a non-profit organization (ibid).[10] Allen et al (2006) found that "91 percent of CSA managers said they would or might consider employing additional

[10] But as a non-profit ""they are subject to the vagaries of philanthropic priority changes, the volatility of the stock market that determines foundation resources, and the presence or absence of effective leaders" (Allen et al, 2006, p 8).

tactics to serve low-income people. [...] Suggest[ing] a strong commitment to improving food security" (2). Not to mention, 83 percent of CSA respondents had already attempted at least one strategy to encourage participation of low-income populations (ibid). Access to funding has made many CSAs possible and allowed them to take more risks. Previously, lack of money was a major barrier preventing many CSA managers from implementing initiatives to support low-income families.

At the moment, there are several CSA programs across the U.S. that put in the effort to support low-income families. One farm, Vines, in Binghampton, New York is open to families of all income levels and offers a 25, 50 or 75 percent discount to those who receive any type of food assistance, or fall within their income eligibility guidelines (vinesgardens.org, 2020). This CSA program also works directly with areas in neighborhoods that lack access to fresh and healthy food. Hanson et al's (2017) study on the Northeast Organic Farming Association of Vermont found that subsidizing 25% of the share to participants in a CSA resulted in increased fruit and vegetable intake (ibid). It was so effective that "participants and children reported total fruit and vegetable intake greater than the U.S. average, and more often met recommendations for vegetable consumption than the U.S. population" (ibid: 735).

Farmer Dave's, north of Boston, Massachusetts also supports low-income families through donations from other members and organizations, as well as accepting food assistance programs, and even setting up a SNAP pilot program that works with the scheduled benefit payments (farmerdaves.net, n. d). The farm does acknowledge, however, that lowering prices and organizing payments to accept SNAP cannot be done without outside partners to help coordinate and fund these initiatives. A USDA report on Farmer Dave's highlights four key factors that make this innovative CSA successful: "1) Cultivating key agency partners that have a shared mission to help urban consumers gain access to local, fresh food as affordably as possible, in a way that also makes it economically compelling for the CSA supplier farms; 2) Developing and facilitating payment mechanisms that work with cash-flow limits of low-income buyers; 3) Exploring CSA access health benefits with local health care partners; and 4) Providing program evaluation that can frame the justification for public support" (Woods et al, 2017: 40). The market has demonstrated several successes through improved access to nutritious foods in urban

food deserts, providing inspiration to duplicate the program in other communities, and increased number of shares across food desert neighborhoods (ibid: 41).

As a much smaller and less economically-viable option, CSAs alone are not enough to alleviate community food security issues nor encourage sustainable food consumption. Nonetheless, the impact and success of CSAs in addressing lack of access and availability of affordable healthy foods in various urban food desert communities should not be forgotten. Farmer Dave's and Vines exemplify the advantages of CSAs when they accept SNAP. Some of the key setbacks of CSAs are the lack of flexibility in paying as well as the inability to choose the produce. These issues can be addressed with increased subsidies to small farms who can then afford to take risks in the short term to ensure success in the long run. The following two sections of this chapter will look at the role of food cooperatives as institutions and the role of top-down policy instruments in not only encouraging sustainable food consumption, but also supporting the three urban agricultural movements.

4.4 FOOD COOPERATIVES

Food Cooperatives, also known as Food Co-ops, are publicly owned, community driven supermarkets and they have the ability to work closely with the above urban agricultural initiatives. The fundamental mission of a food co-op should be to provide a grocery store in a low-income, urban food desert. This goal establishes the ownership of the co-op in the low-income community, allowing the community to prioritize their needs and desires. There are several advantages to a food co-op. First of all, all types of food, rather than just fresh produce can be made available, like pantry staples, along with other household items. With urban agriculture, these options are limited as usually only fresh fruits and vegetables and sometimes meat (in the case of farmers' markets) can be made available. Secondly, as mentioned, food co-ops can work with local urban agriculture initiatives, providing monetary support and security for community gardens and CSAs, while also securing fresh and seasonal fruits and vegetables for the store itself. Thirdly, not unlike other urban agriculture initiatives, food co-ops can offer employment and volunteering opportunities. Importantly, these opportunities tend to be more secure compared to seasonal farmers' markets and CSAs. Food co-ops are a big undertaking but

demonstrate a strong potential to address the underlying issues in urban food deserts by restoring power into the hands of local communities; they are an excellent next step after a successful urban agricultural initiative

The Food Trust in Philadelphia was among the first non-profit organizations to help reestablish grocery stores in low-income neighborhoods. Their efforts supported by the Pennsylvania statewide program, the Fresh Food Financing Initiative, helped finance 88 supermarkets in urban food deserts across Pennsylvania (Treuhaft and Karpyn, 2010). According to Treuhaft and Karpyn, some of the economic benefits of introducing food retailers includes "job opportunities, local tax revenues, revitalizing neighborhood housing market, workforce training and development, new businesses surrounding the market, additional spending in the local economy" (19). Following national success, other states began to implement their own financing initiatives to encourage supermarket openings while several supermarket chains like Walmart and Walgreens pledged to open or expand stores in urban food deserts (Brinkley, 2019). An analysis of the impact of these initiatives found that from 2000 to 2019, only 71 supermarkets that opened across the country opened in an urban food desert (Brinkley, 2019). Of these 71 supermarkets "21 were driven by government, 18 by community leaders, 12 by non-profits and eight by commercial interests" (ibid). Interestingly enough, 22 of the supermarkets opened by non-profit organizations and community continue to be successful, two closed, and six are still in progress. On the other hand, "nearly half the commercial stores and a third of the government developments have closed or didn't make it past planning" (ibid). These findings reiterate that in order for a project to be successful in an urban food desert, it needs to be implemented with the deliberate intention of developing the community, as opposed to making a profit (Gillespie et al, 2008). Brinkley (2019) argues that the food co-ops were the most successful because of the community engagement in opening and sustaining the market. Some vital practices employed by these food co-ops were "adopt[ing] local hiring practices, pay[ing] living wages and help[ing] residents counteract inequities in the food system" (ibid). The democratic and community ownership of food co-ops ensured that the concerns and values of the local community were met. Additionally, food co-ops can further encourage sustainable consumption by offering zero or low waste products, reducing the carbon footprint of residents who no longer have to travel longer distances for groceries, and also reducing the transportation of produce by working with local

urban agriculture. Finally, introducing a permanent grocery store relieves the burden of residents without a private vehicle who would otherwise have to take public transportation or use car sharing to do groceries. The following is an example of a successful food co-ops in Detroit.

The DBCFSN, which began as a project to improve food security in a Detroit urban food desert became so successful that they received enough funding to open their own food co-op. Their store, The Detroit People's Food Co-op, "is an African American led, community-owned grocery cooperative [...] meeting the needs of the community through democratic control of the co-op by its members / owners" (detroitpeoplesfoodcoop.com, n.d.). As a matter of fact, this store is described as being a unique model, since most food co-ops in the U.S. usually tend to serve college towns or affluent neighborhoods (ibid.). Instead, The Detroit People's Food Co-op was built purely with the intention of "serving an urban, predominantly African American, low- and moderate-income community" (ibid.). Similarly to the discussed urban agricultural movements, the Co-op has four main goals which cover all three pillars of sustainable development. The first goal, which has been the primary goal of every movement, is "improving community access to fresh and healthy food" (ibid). The second goal is to "educate the community about nutrition and sustainability" (ibid.). This will be achieved by offering class on nutrition, sustainability, and community development, among others (ibid.). The third goal is to support local businesses by buying from local food suppliers and service providers when possible (ibid). This goal can also help support local urban agricultural movements such as community gardens, farmers' markets and CSAs. Finally, the fourth goal is "assuring member access to the goods, services and facilities of the Co-op" (ibid.). Ensuring equal access to all services is a crucial practice of inclusivity and promoting diversity, which is keystone in the success of an organization in an urban food desert (Lowcock, 2014; Zepeda et al, 2013).

4.5 POLICY INSTRUMENTS

Grassroot organizations and efforts are an extremely effective means of enacting change at societal level. Long-term solutions, however, require the support of government agencies since policy decisions effect every aspect of urban agricultural projects (Cohen et al, 2012). There are

various policy instruments that are suggested in addressing community food security as well as encouraging sustainable food consumption.

To improve food security in urban food deserts, several policy instruments highlighted by The Food Trust and The USDA include incentives to attract more supermarkets to urban food deserts. Some of the tools policymakers can utilize include zoning, economic development, land use planning, and "strengthening the purchasing power of consumers by enhancing and expanding nutrition assistance" (Bell et al, 2013: 20). The impact of expanding nutrition assistance has been discussed in detail and remains one of the more promising steps to improving access to affordable healthy food (Brace et al, 2016). Economic development can improve the overall infrastructure of an urban food desert and introduce developments such as public transportation, safe access to drinking water, and fewer unsafe vacant lots (ibid; USDA, 2009). Finally, zoning and land use planning can facilitate the establishment of both a supermarket and an urban agricultural initiative like community gardens or farmers' markets and reduce the proliferation of fast food restaurants. All of these policy instruments are crucial steps worth considering in the effort to improve food security. However, they do not address the question of sustainable food consumption. These instruments focus only on the dimensions of access and availability in food security, but ignore the other four dimensions of utilization, stability, agency, and sustainability. The importance of encouraging urban agriculture in urban food deserts is because of their role in addressing all six dimensions of food insecurity while embodying the three pillars of sustainability – environmental, social and economic. Policy instruments should address not just access to food, but also how to sustainably develop the community to further encourage sustainable food consumption. In a report on the future of urban agriculture in New York, Cohen et al (2012) discuss several areas lacking policy instruments and how to address them for the successful establishment of urban agricultural systems in urban food deserts.

In general, Cohen et al (2012) found that there was a disconnect between policy-making and the needs of communities where interviewees felt that "government officials make decisions based on citywide criteria, and in doing so they were neglecting critical block – and neighborhood – level concerns" (ibid: 80). The very existence of urban food deserts demonstrates that the government does not consider neighborhood concerns when making decisions. Otherwise, fewer individuals would experience food insecurity, there would be better

access to affordable healthy foods, and there would be more of an emphasis on sustainable food consumption. The Food Trust non-profit organization in Philadelphia highlights the importance of designing strategies to "improve access for low-income people and communities of color [which] can result in benefits for the broader community" (Bell et al, 2013: 20). The Healthy Food Financing Initiative, for example, which supported the opening of several food co-ops specifically in urban food deserts was fairly successful until its funds were depleted (ibid; Treuhaft and Karpyn, 2010; Brinkley, 2019). Fortunately, as of May 6th, 2020, the USDA "announced the availability of around $3 million for grants through its new Office of Urban Agriculture and Innovative Production" (USDA, 2020b). This grant will go towards supporting urban agriculture and innovative projects that have the potential to address issues like food access and "to increase local food production in urban environments" (USDA, 2020b).

In a project on the future of urban agriculture in New York City, Cohen et al (2012) found that government agency rules were often unclear or even hindered the progress of urban agricultural movements. Among interviewees, there was a "general desire for [government] agencies to do more to support and help expand urban agricultural activities" (ibid: 78). Most setbacks were experienced when budget and funding was cut in social services such as the Department of Youth and the Community Development's Summer Youth Employment Program (ibid.). Furthermore, "farmers and gardeners expressed frustrations with delays on the part of the agencies, confusing procedures, and [...] onerous regulations" (ibid: 79). Among these frustrations, interviewees explained their problems with being granted permits, not receiving food stamps for seniors, lack of responses for issues with maintenance, safety, sanitation, etc. These issues further highlight bureaucratic hurdles that often delay or prevent projects from succeeding. Efforts need to be made at the government level to make these processes more accessible to the public. Funding from the government is crucial in the development and support of urban agricultural initiatives aiming to ameliorate food insecurity in urban food deserts.

Fortunately, grassroots have a history of successfully advocating for support, funding or to address the needs and concerns of communities. The example of the landownership struggles over community gardens in the neighborhoods of Dorchester and Roxbury in Boston, Massachusetts demonstrates how community mobilization can lead to policy changes. Several states have also begun to recognize the importance of rebuilding local food environments and, as

mentioned previously, have begun to enact various legislations at state level. California's Urban Agriculture Incentive Zone and Washington, DC's Food Production and Urban Gardens program has helped facilitate the creation, maintenance and success of urban agricultural movements in urban food deserts (NCSL, 2014). In New York City, "several policy documents have asserted the importance of urban agriculture to community development, food access and open space, recommending dozens of initiatives to support the city's farmers and gardeners" (Cohen et al, 2012: 110). These are all steps in the right direction; however, a lack of local legislations and Mayoral directives limits the authority and resources needed to address urban agriculture (ibid.). Cohen et al (2012) offers six policy recommendations that can make planning and maintaining an urban agricultural system more efficient and transparent:

- Develop an urban agriculture plan that establishes goals, objectives, a citywide land use scheme for garden and farm development, and adequate agency budgets to support existing and future urban agriculture activity.
- Integrate urban agriculture into existing plans, programs, and policy-making processes in city government, including the Department of Environmental Protection's Green Infrastructure Program and the Department of Sanitation's plans for compost production, and identify opportunities for existing initiatives to achieve multiple goals while supporting farmers and gardeners.[11]
- Foster innovative opportunities to build urban agriculture into the cityscape from new housing complexes and existing rooftops, to sidewalks and stalled development sites.

[11] The Department of Environmental Protection's Green Infrastructure Program launched in 1996. The program began as "the Greenstreets program" which was a "partnership between the NYC Parks and the New York City Department of Transportation (DOT). The program was created to change unused road areas into green spaces that beautify neighborhoods, improve air quality, reduce air temperatures, and calm traffic" (NYC Parks, n.d). Recently, The New York City Department of Environmental Protection (DEP) partnered with the newly named Green Infrastructure Program to build cost-effective stormwater capture and help reach goals to improve the water quality in the city (NYC Parks, n.d).

The Department of Sanitation's plan for compost production "was created by the NYC Department of Sanitation (DSNY) in 1993 [and] works to rebuild NYC's soils by providing New Yorkers with the knowledge, skills, and opportunities they need to produce and use compost locally" (DSNY, 2020).

- Address disparities in access to funding, information, and other resources by creating more transparent and participatory processes—such as a citywide Urban Agriculture Task Force—to enable gardeners and farmers to influence policy and decision-making.[12]
- Address race- and class-based inequities by supporting capacity building among underserved groups and within city agencies.
- Make existing administrative processes more responsive to urban agriculture constituents, making it easier for enterprising farmers and gardeners to thrive. (Cohen et al, 2012: 111)

Using these recommendations can address policy issues at all levels, from citywide plans, government agency regulations to individuals and sites (ibid.). They also address the infrastructure and services required in urban agriculture, such as finding available land and funding, which have been major setbacks in the urban agricultural movements. Along with proposing changes in certain laws and regulations, these recommendations also "determine how agency priorities are established and decisions are made" (ibid: 112). In this way, more priority can be attributed to urban agricultural movements that seek to establish community food security, an area that is currently lacking focus and funding. These efforts demonstrate that there is increased recognition at the government level that urban agricultural movements are increasingly being recognized as successful means of addressing unsustainability and food insecurity in urban food deserts.

4.6 DISCUSSION

This chapter aimed to analyze three urban agriculture movements, food cooperatives, and policy instruments as solutions to addressing food security issues by encouraging sustainable food consumption in urban food deserts. Urban agriculture is a key component in rebuilding

[12] The Urban Agricultural Task Force should be a citywide group "made up of farmers and gardeners, intermediaries, and city officials [who] would review the programs, policies, and budgets that affect urban agriculture and advise policy makers on strategies to strengthen and expand urban agriculture" (Cohen et al, 2012; 149).

local food systems across the U.S. because it has the potential to revitalize struggling communities who lack affordable and accessible healthy food options. The examples of community gardens, farmers' markets and CSAs throughout the chapter all highlight extremely important initiatives that have played a large role in alleviating food insecurity in their respective neighborhoods.

Connecting local producers with consumers has the potential to bring aspects of environmental and even economic decision making back to communities, thus restoring a degree of control over everyday life (Ostrom, 2008). Nonetheless, alternative food movements continue to face many challenges. Critics of urban agriculture initiatives have "faulted the movement's social and cultural exclusivity as discouraging minorities and the impoverished from engaging with the movement" (Kato and McKinney, 2014: 216). While this may be true in some cases, many non-profit organizations are striving for diversity and inclusivity in order to successfully alleviate food insecurity in urban communities that actually need it. Another great challenge of urban agriculture is the limited capacity to acquire and secure ownership of land for those movements that want to develop and expand, which is a problem especially for community gardens. The conditions for obtaining land in cities need to be regulated, preferably from top-down efforts to help better coordinate initiatives and offer support and funding (Krishnan et al, 2016: 339). The policy recommendations by Cohen et al (2012) help address such areas, ensuring efficient and transparent mechanisms through which urban agricultural systems can be established.

CHAPTER 5: CONCLUSION AND SUGGESTIONS FOR FURTHER RESEARCH

The overall objective of this thesis was to answer the primary research question: how can sustainable food consumption be encouraged in urban food deserts? In the effort to answer this question, two secondary questions emerged:

1. What are the food insecurity issues in urban food deserts?
2. How do various alternative food movements fulfil the requirements of the three pillars of sustainability?

These questions helped to develop an understanding of two of the key underlying issues preventing sustainable food consumption and how to move forward. First of all, food insecurity in the U.S. is largely concentrated in urban food deserts. As a result of institutional segregation and disinvestment, urban food deserts are largely populated by minority, low-income populations who lack access to affordable healthy foods. Secondly, encouraging sustainable food consumption in urban food deserts requires much more work than in affluent neighborhoods. In urban food deserts, residents are not provided with the same opportunities and often cannot afford to consume sustainably. As such, the presented solutions must consider these challenges and do more than just offer sustainable food.

5.1 FOOD INSECURITY

Food insecurity is a concerning issue which affects every part of the world. The U.S. presents a unique situation where food insecure households in urban food deserts do actually have access to foods, but these are energy-dense, nutritionless foods. Local food environments play a large role in shaping an individual's food consumption patterns, and people are limited by what they can afford. A prevalence of convenience stores and fast food restaurants in urban neighborhoods, coupled with lack of transportation options and far away grocery stores, negatively impacts the consumption habits of urban food desert residents who are forced to choose between traveling further distances for affordable healthy food or staying close to home but spending more money on unhealthy foods. The FAO's six dimensions of food security

(access, availability, utilization, stability, agency and sustainability) highlight the issue as one of unsustainability. Most importantly, the six dimensions each represent food insecurity as more than just a lack of food. Availability and accessibility do remain the first key issues in urban food deserts in that affordable healthy food is not available nor accessible because of the lack of outlets that have the capacity to sell these foods. The utilization dimension points to the public health concerns arising from lack of affordable healthy foods. Urban food desert communities, who suffer from high rates of diet-related diseases, are also located in medically underserved areas. Susceptibility to crises also illustrates how the local food system is unstable and are not reliable in the event of a crisis such as an extreme natural disaster or a pandemic. The most recent addition of agency explores the capacity for people to choose their local food environment, which is not necessarily the case in urban food deserts. Finally, the environmental, social and economic sustainability of the local food system is a crucial discussion in addressing current and future food security in urban food deserts. Despite being recently included, sustainability has been implicit throughout the discourse where food insecurity is not just being able to currently access food, but to have physical, social and economic access to affordable healthy foods at all times (HLPE, 2020). Future research on food insecurity in urban food deserts should pay close attention to the dimensions of agency and sustainability.

Several authors have highlighted the importance of giving consumers the power to choose their foods, which has yielded successful results and improved participation in urban agriculture. More research on this link will highlight the importance of respecting cultures and preferences in encouraging urban agriculture. Further research in the sustainability dimension could do more to look at the U.S. food system as a whole and address how and where urban food deserts residents are receiving their groceries. This approach highlights the long-term changes needed in the infrastructure of urban food deserts that could have implications for the entire U.S. food system.

5.2 URBAN AGRICULTURE

Throughout the thesis, three urban agricultural movements are put forth as solutions in ameliorating food insecurity conditions in urban food deserts while simultaneously encouraging

sustainable food consumption. While all three movements presented promising strategies, no single solution can address the extent of the problems existing in urban food deserts. Community gardens, farmers' markets and CSAs all face many challenges in their attempt to address food insecurity and sustainable food consumption in urban food deserts. For an urban agricultural movement to be successful in its endeavors, it should embody the three pillars of sustainability: environmental, social and economic. Community gardens offer a great source of improving the environmental and social pillars of sustainability in urban food deserts. Converting vacant lots into urban gardens that improve the public health and social wellbeing of its residents is an extremely efficient way of tackling many of the issues of food insecurity and unsustainability in these communities. Nonetheless, social exclusionary practices have hindered the attempts of many non-profit organizations to help communities. It is absolutely crucial that practices of inclusivity are employed to ensure the success of these initiatives. Furthermore, landownership disputes have brought to light the economic and political hurdles urban food desert residents must navigate before enacting change. Unfortunately, this latter issue is really one that can only be solved by top-down policy instruments. In the meantime, grassroot organizations can continue to advocate for the transformation of vacant lots into community gardens to increase the visibility and urgency of the problem.

Farmers' markets were presented as beneficial for all three pillars of sustainability, particularly the economical aspect. As a fresh food market that takes place in a public space, farmers' markets provide the opportunity for local economic stimulation by encouraging local entrepreneurial initiatives, offering employment for residents and circulating money within the local economy. Furthermore, the benefit of being able to make a farmers' market mobile ensures that accessibility is not a barrier to affordable healthy foods. A challenge faced by farmers' markets, much like community gardens, is exclusivity. There is a sense of whitened discourse and practices which permeates urban agricultural initiatives. This discourse promotes an increase in the consumption of healthy foods and rebuilding local food systems as opposed to supporting globalized food systems. While this message is not a bad one, it does not adequately align with the needs of urban food deserts, where community food security is of utmost concern.

Finally, CSAs represent a third potential solution to ameliorating urban food desert conditions. CSAs are mostly environmentally and economically beneficial to farmers. Like

community gardens and farmers' markets, CSAs also focus on environmentally friendly agricultural practices and encourage local food systems over a globalized one. CSAs are also extremely beneficial to farmers themselves who request advance payments for a harvest box, thus receiving monetary support for the farm. On the other hand, this arrangement can be unattainable to low-income urban food desert residents. In this case, similarly to landownership disputes, top-down policy instruments are needed to intervene in the success of CSAs in ameliorating conditions in urban food deserts.

Moving forward from urban agriculture, a final example of a food co-op in Detroit was discussed as a demonstration of how a successful community garden can evolve in an urban food desert with enough community involvement. Food co-ops are much like the outlined urban agricultural initiatives in that they are environmentally, socially and economically sustainable. As a community run organization, a food co-op specifically targets the needs of the community and therefore sets affordable prices, supports local gardens and farmers' by buying their products, ensures accessibility and helps to revitalize the local economy. From the viewpoint of a grassroot organization, urban agriculture like community gardens, farmers' markets and CSAs are more attainable in the short-term and can generate quicker results. A recommendation for further research should look at the long-term solutions of food co-ops. Food co-ops show especially great potential in ameliorating conditions in urban food deserts because of their capacity to address specific community needs. Although briefly discussed in this project, more research is required to establish a better understanding of the impact of food co-ops in urban food deserts.

As individual solutions, the proposed urban agricultural movements are not enough to address all the unsustainability concerns present in urban food deserts.

It is well known that issues in urban food deserts are unique and specific to each location and that there is no one solution that can equally address all the problems. This particular project aimed to demonstrate that this country-wide problem is the result of systemic disenfranchisement. Recognizing this aspect highlights the importance of moving beyond grassroot solutions to government levels. Further research could focus more on the role of policy instruments in establishing urban agricultural systems across the U.S. Top-down policy measures are inevitable for the long-term successful implementation of urban agricultural systems. Despite

their limitations, these initiatives are valuable, and they deserve more support from the government.

The continued rise in popularity of community gardens, farmers' markets and CSAs represents shifting perspectives on agriculture in contemporary U.S. society, where the recognition of the multiple benefits of sustainable food systems are moving beyond grassroot organizations to a broader audience. These initiatives benefit individuals by giving them agency, the capacity to feed their families, personal and professional development, and social connections in an often fragmented society. It is without a doubt that the urban agricultural initiatives that contribute the most to local communities are those that are organized deliberately with the intention of community development. Urban agricultural movements and initiatives are key in rebuilding local food systems in the U.S. Their potential to improve community food security and encourage sustainable consumption makes them an excellent asset to urban food deserts.

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APPENDIX LIST

APPENDIX 1: DIFFERENCES BETWEEN THE THRIFTY FOOD PLAN (TFP) BASKET AND THE HEALTHIER MARKET BASKET IN SACRAMENTO AND LOS ANGELES, CALIFORNIA

Table 1. Changes to the composition of Thrifty Food Plan market basket

Food item	Market basket	
	Thrifty Food Plan	**Healthier**
Breads	Enriched	Whole wheat
Canned peaches	In heavy and light syrup	In lite syrup
Canned pears	In heavy syrup	In lite syrup
Cheese	Whole fat	Low-fat
Chicken	With skin	Skinless
Cold Cereal	Corn flakes	Bran Flakes
Cooking oil	Vegetable	Canola
Egg noodles	Whole egg	Yokeless
Evaporated milk	Whole	Low-fat
Flour	White	Whole wheat
French fries	Frozen french fries	Potatoes
Frozen fish	Filets and breaded	Filets
Ground meat	Lean	Lowest fat
Milk	1%, whole	Non-fat, 1%
Rice	White	Brown
Salad dressing	Regular	Low-fat
Spaghetti	Enriched	Whole wheat
Spreads	Margarine	Lower-fat "healthy" spread
Tuna fish	Light	Albacore

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