Analyzing the Evolution of Urban Food Deserts in New York City from 2008-2014

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Motivation

As an HSSP major at Brandeis, I have become accustomed to learning about the social determinants of health. I have memorized the different layers, learned and relearned the effects of demographic characteristics on health and I have spent hours examining the benefits of disease prevention in health. For obvious reasons, my professors have stressed the strengths of preventing disease rather than treating it. In my courses, early medical intervention has often been touted as a way to reduce negative health outcomes while simultaneously decreasing healthcare expenditures.

Diet-related health problems come up often as example of how early medical intervention can improve the health of individuals. An exercise electrocardiogram, also known as a cardiac stress test, is a prime example of a medical test that can detect if an individual is at increased risk for a heart attack and can prevent adverse health outcomes. Typically, the proper medication, medical treatment and diet or exercise can be prescribed. Although this approach prevents the negative outcome of a heart attack, it is not as effective as preventing the increased risk for heart attack all together. What if you could prevent the need for an electrocardiogram in the first place, replace the need for medications and doctor’s appointments and simultaneously improve the health of many?

The year after high school and before college, I took a gap year to study in Jerusalem, Israel where I volunteered at Shaare Tzedek Hospital. I began to notice that the reasons individuals were coming to the hospital in Israel were not the same reasons that individuals were being hospitalized in America. Specifically, I notice there were many fewer patients with heart disease, diabetes and even fewer obese patients. Recognizing that I was merely making an inference based on my observations, I decided to do some research. I found that indeed Israel had
a lower mortality from heart disease than America. In 2007, mortality from ischemic heart
disease in Israel was 12.5 deaths per 100,000 people (Finegold, Asaria, & Francis, 2013). A year
later, the Centers for Disease Control and Prevention found that in America ischemic heart
disease caused 244.8 deaths per 100,000 people (Roger et al., 2012). I recognize that this was
crude research and did not take into account a host of confounding factors. However, this was
enough to spark my interest and led me to ask myself the question: why were more Americans
dying of heart disease than Israelis?

Around the same time, research on the benefits of the Mediterranean diet was being
published (Martínez-González, 2016). I hypothesized that possibly Israel had this lower
mortality rate from heart disease because, being a Mediterranean country, they were following
the higher-in-healthy-fats, low-in-processed-sugars and high-in-fresh-foods diet that was being
plugged as healthy. Again, I understand that this was crude and basic research but the
conclusions I formed from this unpolished research cemented my interest in the relation between
food and disease. It would be two years until I would see my subjective, personal observations
which piqued my curiosity quantified.

In the fall of my junior year, I read an article in the New York Times detailing the effects
of NAFTA on obesity in Mexico (Jacobs, 2017). To summarize, the increase of US imports of
processed foods and fast foods led to increased rates of obesity, heart disease and diabetes, or
nutritionally related diseases, in Mexico. I thought, what if this were reversed – if we decreased
the amount of unhealthy food in an area, could we decrease the prevalence of nutritionally-
related disease?

I was interested in how something as basic as food could impact a population’s health to
such a strong extent and I decided to pursue an internship in the field of food policy. During the
summer of 2018, I worked at the CUNY School of Public Health Urban Food Policy Institute (the Institute) which conducts academic research aimed at informing policy decisions around food, nutrition and nutritionally-related diseases throughout New York City. The Institute is constantly conducting research into a wide array of food and health-related topics and during the summer of 2018 I had the pleasure of working on an ongoing project aimed at mapping food deserts throughout the five boroughs of New York City. Using Google Maps imaging technology, and GIS geomapping, the Institute works to be able to visually map out the evolution of food deserts in New York City between 2007 and 2017. My work on this project over the summer presented me with a concrete way to quantitatively measure the change in fresh food access in specific neighborhoods.

After my work this summer at the CUNY Urban Food Policy, I knew I wanted to do my thesis on the topic of urban food deserts in New York City, but I wanted to expand my research beyond the topics that the CUNY Urban Food Policy Institute focused on. I chose to analyze food stores in New York City, specifically, since my work at the Institute consisted of extensive research relating to food policy in this region. I sought to study the reasons for the changes in fresh fruit and vegetable access in New York City. The interviews allowed me a deeper understanding of why changes are happening and enabled me to group together and analyze the reasons behind the shifts in fresh food offerings.

This study seeks to answer the question: How does the distance one must travel to buy fresh fruits and vegetables affect their diet and their health, and how could policy changes increase universal access to fresh produce? The study analyzes the effects of urban food deserts on health outcomes in New York City and seeks to understand if and why changes have occurred. To study the effects of distance from one’s home to a store selling fresh produce on
diet and health outcomes, this study utilizes survey data provided by the New York City Department of Health and Mental Hygiene. Interviews with store owners and managers are used to elucidate the reasons for choosing whether to sell fresh fruits and vegetables. This research aims to inform the reader about why access to healthy foods is important and how ensuring access can be achieved.
Contribution to HSSP

Health

Nutritionally-related diseases, such as cardiovascular disease, obesity and diabetes affect about half of all Americans (“Nutrition and Health Are Closely Related,” 2015). Poor diet has been shown to lead to higher rates of these diseases. Access to healthy foods, such as fresh fruits and vegetables is necessary to maintain health and reduce the risk of getting cardiovascular disease, diabetes or being obese. This thesis seeks to elucidate the connection between healthy and fresh food access and poor health outcomes in New York City.

Science

Eating fresh produce and fresh, nonpackaged foods has been shown to lower the risk of nutritionally related disease (Bennett, Hall, Hu, McCartney, & Roberto, 2015). This thesis builds on the medical and scientific foundation that links nutrition to disease, including obesity, cardiovascular disease and diabetes. In addition, it employs epidemiologic surveys to conduct primary data analysis that reveals connection between diet and health outcomes in New York City.

Society

Food access is a societal problem that causes vast disparities. Entire segments of our society do not have access to the right types of food to keep them healthy as access to fresh produce is divided along ethnic, racial, and socioeconomic lines. This thesis provides an insight into how as a society we can mitigate the development of nutritionally related diseases. As a society, we all pay the price when people get sick. There is a monetary price in the form of higher healthcare costs and lost wages as well as a social cost in terms of shorter life expectancy and lower quality of life. The impact of insufficient access to healthy foods affects the entire
American society and this thesis works to understand how as a society we can ensure the health of all.

Policy

The policy implications of this thesis are numerous. Policy has been used and will continue to be used to address food access both in New York City and nationwide. This thesis describes in depth the policies that already exist on the federal and local level. While previously-enacted policies have focused on individuals not having enough food, policy is moving in the direction of ensuring that individuals have enough of the right kinds of food. Research into food deserts expounds on the problem of healthy food access and elucidates the types of policies necessary to create a more just food system. The issue of policy is important and necessary when discussing urban food deserts and food access in general.
The term “food desert” originated in the United Kingdom in the 1990s but did not become widely used in public health literature until the early 2000s. It was used at first to describe an area in which healthy (unprocessed), fresh (unrefined) food was not readily available. It referred to an area, typically on the neighborhood level, in which there was a dearth of supermarkets or grocery stores, which are known to be the primary sellers of fresh fruits and vegetables.

The definition of a “food desert” has experienced a transformation from the time it was first evoked until the present day. In 2008, the Farm Bill, a bill passed by the US Department of Agriculture (USDA) to address problems of hunger, malnutrition and over-nutrition in America, defined a food desert as an “area in the United States with limited access to affordable and nutritious food, particularly such an area composed of predominantly lower income neighborhoods and communities” (Ploeg et al., 2009). It defined “limited access” as an area which was greater than the critical distance of 0.62 miles (1km) from a grocery store or supermarket. In 2008, members of the Community Food Security Coalition (CFSC), a nonprofit organization fighting food insecurity in America’s cities, said that in order for a neighborhood to be food secure, one must be able to affirmatively answer the following question: is the food quality in that neighborhood adequate and is the food available of a type that residents will actually eat? The CFSC stressed that it was not enough for food to merely be available, for it to accessible it needs to be culturally desirable (Raja, Ma, & Yadav, 2008). Later on, Gordon et al. (2011) described food deserts as having few supermarkets, many bodegas and a lot of fast food. The most recent definition of a food desert comes from the National Academy of Sciences which defines a food desert as “a rural or urban low-income neighborhood or community with limited
access to affordable and nutritious food” (Wolf-Powers, 2017). This definition encompasses many aspects of food deserts brought up by earlier definitions. It addresses the necessity of access to nutritious food and qualifies that this food has to be affordable for it to be accessible. This definition also speaks to the idea that food deserts can be in rural or urban areas but they mostly affect low-income communities. For this reason, this paper will use the National Academy of Sciences definition along with the USDA qualification that a neighborhood must be more than .62 miles from a supermarket to classify as a food desert.

**Food Deserts, Food Choice and Health**

The relationship between diet and health is well established (Morland, Wing, Diez Roux, & Poole, 2002). Epidemics of diabetes and obesity disproportionately affect minority communities (Moore & Diez Roux, 2006). In 2009, the USDA Food Desert Study (2009) observed that several studies linked proximities of unhealthy options (such as fast food restaurants) to greater body mass index (BMI) and obesity (Ploeg et al., 2009). Research has found that access to supermarkets is associated with greater fruit and vegetable consumption (Franco et al., 2009; Larson, Story, & Nelson, 2009) and reduced BMI (Larson et al., 2009; Lopez, 2007). Supermarket availability was associated with more balanced diets and lower rates of obesity in a study by Morland et al. (2002). Taken together, these studies indicate that access to supermarkets can be connected to better health in the form of lower rates of diabetes, obesity and cardiovascular disease.

In certain areas, there is a demand for nutritious food but not an adequate supply. In a study reviewing interviews of residents in a food desert in rural and urban South Carolina and urban Nashville, Tennessee, low-income respondents overwhelmingly reported that they did not see
their local food environment as having balanced access (Freedman, Blake, & Liese, 2013). This demand was greater when there was a higher concentration of smaller food stores, convenience stores and fast food stores in a food environment. Participants without balanced access stated they would like more farmers markets, meat markets, full-service grocery stores and discount superstores. This indicated that there was a self-reported demand for nutritious food but not a supply in certain areas. Importantly, respondents said they felt better when they ate healthier and would eat more nutritiously to be healthier, indicating that this is not only a problem from the outside, but one perceived from the inside, too (Freedman, Blake, & Liese, 2013).

The Origin of Food Deserts

In New York City, there is a correlation between income level and healthy food access. A study done in Manhattan compared food choices and diabetes prevalence in East Harlem, which predominately consists of individuals living on an income under 200% of the federal poverty line, to the Upper East Side, which predominately consists of individuals living on an income above 400% of the federal poverty line (Horowitz, Colson, Hebert, & Lancaster, 2004). The study found that East Harlem residents were more likely than Upper East Side residents (50% vs. 24%) to have stores on their block that did not stock foods recommended for diabetics. In a study by Inagami, Cohen, Brown, and Asch (2009) researchers found a direct correlation between increased distance from a grocery store and worse health outcomes such as higher rates of diabetes and cardiovascular disease. For instance, in Los Angeles, a distance from home to a grocery store of 1.76 miles or greater was found to be predictive of increased BMI (Inagami, Cohen, Finch, & Asch, 2006). Addressing the environmental disparities in the availability of diabetes – or cardiovascular – healthy foods could mitigate these effects. However, more
research must be done to test hypotheses about the impact of the food environment on health outcomes.

Although the term is relatively new, food deserts are not. No one knows exactly why food deserts became a phenomenon suddenly observed in the late 1990s and the early 2000s, but Walker, Keane, & Burke (2010) provide two theories as to how and why food deserts came to be in America. The first theory, also postulated by Pothukuci (2005), suggests that movement of supermarkets from urban to suburban locations have led to a proliferation of food deserts. In the mid 20th century, supermarkets began relocating from urban to suburban settings. A number of factors contributed to the beginning of this relocation, including more and cheaper land on which to build large supermarkets, easier highway access for truck loading and unloading, the increase of large suburban developments and more room to build spacious parking lots allowing more customers to access the stores (Pothukuchi, 2005). As these supermarkets began to grow, they consolidated, creating bigger stores with better hours, more parking and increased food variety (Walker et al., 2010).

The number of supermarkets in America have been on the decline as the food retail sector has been consolidating. Large supermarket chains buy out smaller stores in a move that is decreasing the number of unique grocery store chains in the United States. While the chains are becoming larger in size, individual stores are closing, especially in urban areas (Raja et al., 2008). More importantly, many supermarket giants find it more profitable to open new stores in suburban or rural areas while smaller, independent stores are more likely to operate in urban areas (Raja et al., 2008). This theory is the basis of the definition, use by some researchers, of a food desert as “an area where high competition from the multiples [large chain supermarkets] has created a void” (Furey, Strugnell, & McIlveen, 2001).
Walker, Keane, and Burke's (2010) second theory links the urban economic decline of medium and low-income and minority demographics beginning in the 1970s to the departure of larger supermarkets in the urban settings where they lived. As the median income of these neighborhoods declined, supermarkets began to leave in search of larger profit margins in suburban areas. More affluent individuals left these urban communities for suburban sprawl and created even more of an incentive for supermarkets to relocate. During this time period, between 1970 and 1990, almost 50% of supermarkets in America’s three biggest cities, New York, Los Angeles, and Chicago, closed (“1997 Population Profile of the United States,” 1997; Walker et al., 2010).

Supermarkets have been shown to be better and more reliable suppliers of fruits and vegetables than other types of stores such as bodegas and convenience stores. In a survey of supermarket, grocery stores and convenience stores in urban locations of an Ohio county, Raja, Ma, and Yadav, (2008) found that all supermarkets carried fresh foods but only 70% of grocery stores and 33% of convenience stores did. The study also found that the produce at grocery stores and convenience stores were less fresh and more likely to be past its expiration date than the produce at full-scale supermarkets.

Today, low-income urban neighborhoods tend to have fewer supermarkets than their suburban counterparts (Powell, Slater, Mirtcheva, Bao, & Chaloupka, 2007). A study of 2000 census tracts found that low-income neighborhoods only had about 75% of the number of supermarkets as middle-income neighborhoods. This trend was applicable to minority groups, too. Predominately black neighborhoods had 52% as many supermarkets as predominately white neighborhoods and this percent was even lower in urban areas. Predominately Hispanic neighborhoods had 32% as many supermarkets as predominately non-Hispanic neighborhoods.
Smaller grocers and non-chain supermarkets are more prevalent in low-income and minority neighborhoods (Powell et al., 2007). Additionally, a study outlined in the 2009 USDA report to Congress found that urban areas with limited food access relied more heavily on small grocery stores or convenience stores that did not carry as much fresh fruits and vegetables and, when they did, these foods were more expensive (Ploeg et al., 2009). For example, the study found that consumers pay 5% more than the grocery store price (.13 cents more per ounce) when they shop for staple food products at convenience stores and a 24-ounce bag of bread was 10% more (.62 cents more per ounce) at a convenience store than a grocery store (Ploeg et al., 2009).

**Urban Food Deserts in Public Health**

Starting in the early 2000s, urban food deserts became a topic of interest in public health (Wolf-Powers, 2017). Since then, urban food deserts have risen in prominence in public health discussions, but to a lesser extent than they could have. However, research into the causes and effects of urban food deserts in on the rise. One potential reason urban food deserts are relatively scarce in the public health literature is that not enough research has been done on the benefits of increasing access to food as there has not been enough time for benefits to emerge. Nutritionally related diseases, or diseases that arise from deficiencies in nutrients or excess in fats in one’s diet including diabetes, heart disease, cardiovascular disease and obesity, are often the primary focus of public health interventions designed to increase food access (“Nutrition disorders - Latest research and news” 2019). Since the idea of food deserts only came to the forefront of research in the 1990s and then took a few years until researchers began to study it, there has not been enough time for studies to measure health outcomes in terms of prevalence of nutritionally related diseases. In other words, reliable and convincing study designs which use cohort studies
to evaluate the effects of food access on health have not had enough time to show results as nutritionally related diseases often take decades to develop or decline in populations. Therefore, most studies addressing the impact of food deserts on health have been either cross-sectional studies or case reports in which a myriad of confounders can affect the reliability of study data.

The Economics of Food Deserts

The relationship between the laws of supply and demand and food deserts are important to understand. Demand is necessary for any retailer to know before they enter a new market. Food retailers considering moving into neighborhoods designated as food deserts must consider whether residents want to eat healthier and fresher foods. Habits can influence food purchasing decisions as shown in a study done in Pittsburgh, Pennsylvania that found that customers were hesitant to change their shopping habits, a phenomenon that will be discussed further below (Ghosh-Dastidar et al., 2017). However, a study of food deserts in rural and urban South Carolina and urban Nashville Tennessee found that store owners were able to increase the demand for their healthier products through store incentives such as coupons or sales (Freedman et al., 2013). This example shows that while demand may be initially low for a food retail establishment, demand can be boosted to improve sales of healthier foods in previously low-access neighborhoods.

While there may be a demand for healthy foods in a food desert, there may not be a demand for healthy foods at the prices at which they are offered. An article by Cassady, Jetter, and Culp (2007) on the effects of price as a barrier to healthy eating concluded that fruits and vegetables need to become more affordable to low income individuals to make it realistic for them to buy healthier foods. Eating healthier costs more and while there may be a demand in a neighborhood
for healthier foods, if there is not a supply at a price that can meet that demand a fresh-food retailer will not thrive in that neighborhood.

Additionally, culture can play a role in demand and, by extension, supply, in a given neighborhood (Freedman, Blake, & Liese, 2013). For example, in 2007 a multi-ethnic neighborhood in Philadelphia got a supermarket for the first time since 1999 (Eckholm, 2007) and the population it served came from many ethnicities. The managers of this supermarket found that they needed to stock many types of foods but not as much of each food, which proved to be more expensive for the store (Eckholm, 2007). From the supply side, it was hard for these retailers to give customers everything they wanted and this resulted in lower sales for this supermarket. The interplay of customer demand and food retailer supply affect food deserts in different ways than other parts of the food economy. The economics of food deserts may need to be further elucidated before effective policies or economic initiatives can be implemented.

One way to overcome the problems of changing shopping access and making healthier meals more affordable is for supermarkets to offer incentives for customers to buy healthier foods. In a study of responses from a food survey of consumers in South Carolina and Nashville, Tennessee Freedman et al. (2013) found that food knowledge and preference were important factors in individuals deciding to eat healthier food. Store incentives such as coupons, bargain bins, advertising sales in weekly flyers were important. Customer service is important, too. When surveyed, many individuals responded that if they did not like the employees at a supermarket they were less likely to shop there, even if it meant eating less fresh food (Freedman et al., 2013).

There are untold potential benefits of bringing healthier food to underserved areas. For instance, supermarkets generate economic activity in different neighborhoods and are an important determinant of residents’ physical health (Berg & Murdoch, 2008). Supermarkets are
also important because other retailers often decide to locate stores in a neighborhood only after a supermarket has done so (Berg & Murdoch, 2008).

When deciding to move into a new neighborhood, store owners must consider their potential profits. It may be beneficial for a food retailer to enter previously underserved neighborhoods because the new food retailer will have less competition, raising their profits (Berg & Murdoch, 2008). Underserved neighborhoods also have access to a greater labor supply because they are often also high-unemployment neighborhoods and where labor may be cheaper (Berg & Murdoch, 2008). While these types of benefits affect stores, the customer also benefits when supermarkets come to underserved areas. For example, the resultant cheaper prices offered at supermarkets are more suitable for those using SNAP (colloquially known as food stamps) or other government funded vouchers to purchase food (Pothukuchi, 2005).

**Challenges of Bringing Healthy Foods to Cities**

Bringing healthier, fresh food to urban areas comes with a host of problems. Often times, there is not enough land in urban areas to open up a full-scale supermarket or grocery store (Bitler & Haider, 2010) and, from the perspective of a developer, there is a perception that the market in low income or minority communities is not suitable for large-scale supermarkets (Pothukuchi, 2005). There is an idea that supermarkets cannot do well in low-income neighborhoods because there is not as much disposable income in those neighborhoods. However, it has been shown that low-income residents spend a higher fraction of their income on essentials like food (Berg & Murdoch, 2008). Food is an essential good to the extent that a set portion of one’s income will always have to go towards food. Therefore, low-income neighborhoods still produce a generous profit for supermarkets. Another reason supermarket
owners are hesitant to move to low-income or minority neighborhoods is that these places have a reputation for having higher crime rates (Berg & Murdoch, 2008). Whether this is true or not for any given neighborhood, this disincentivizes supermarkets from opening in these neighborhoods. The owners of these stores fear the losses they may experience from petty shoplifting but also do not want to incur the extra costs of increased security in these stores (Eckholm, 2007).

When discussing bringing fresh food to underserved neighborhoods, it is important to discuss that just because a supermarket is in a neighborhood, does not mean it is accessible to everyone. A barrier to accessibility could be traffic at specific times of day (Widener & Shannon, 2014). Store hours could pose another potential barrier (Widener & Shannon, 2014). For example, if a store is only open from 9am-9pm, someone with early or late work shifts or possibly caring for a child or family member might not be able to go to this store. It is important to recognize that even if a supermarket is physically close to an individual, there may be other barriers preventing individuals from utilizing this store.

**Transportation**

A discussion about food access must also include a conversation about transportation or the lack thereof. For example, if two individuals live 10 miles from a supermarket, the individual with a car has an easier time getting to the grocery store than the individual without. Vehicle ownership, public transportation access and impediments to walking such as crime or poor traffic safety are all important to look at when studying food deserts (Walker et al., 2010).

Physical distance does not necessarily correlate with travel burden. Less direct bus routes, avoidance of high crimes areas, or traffic patterns could all slow down a customer, making their trip to a supermarket longer than simply mapping the route would make it seem (Walker et al.,...
It is hypothesized that these sorts of variations could lead to the mixed results that are seen in urban food desert studies linking food deserts to health outcomes (Walker et al., 2010).

The boundaries of local food environments are defined as the areas for which residents use the terms "neighborhood" and "community". This means different things in different locations and to different people. For example, in a survey of residents in rural and urban South Carolina and urban Tennessee the authors of the study defined a food desert as being more than 1 mile from a supermarket, but respondents added that being more than 3 minutes from a supermarket without proper transportation made their store inaccessible (Bitler & Haider 2010). In this study, the availability of transportation played a large role in residents defining what was or was not in their local food environment.

While changing shopping habits is one barrier, another problem arises from the fact that even if people have physical access to healthy foods, there is a monetary cost and time cost to cook these foods (Bitler & Haider, 2010). This problem is mitigated when stores sell prepared healthy food and meals but these are often more expensive (Granville, 2009). There are, however, resources that help people cook healthy on a budget that also include ways to cook nutritious meals using SNAP benefits (Bittman, 2009).

Individuals need to consider the amount of money they spent to go grocery shopping, which includes bus tickets, subway tickets, gas money or having to pay someone for childcare while they shop (Bitler & Haider 2010). One proposed solution to the financial barriers for individuals taking public transportation is to give transportation vouchers to individuals who cannot afford to get to areas that have healthy and fresh food (Bitler & Haider 2010). This has not yet been implemented in a major city However, one must still consider the problem of the time and inconvenience of getting to a supermarket, even if the transportation cost is reduced.
Socioeconomic Status and Average Distance from a Fresh Food Retailer

No definitive answer can be given for the connection between socioeconomic status and where individuals buy food. Consumers tend to shop for convenience goods, or everyday goods, closer to home. Food is a convenience good and is therefore typically bought in the neighborhood where one lives (Wang et al., 2007). However, some disagree with this, positing that people are likely to travel to buy their food if they recognize that they can get better quality or healthier food somewhere else, perhaps close to where they work or spend free time (LeDoux & Vojnovic, 2013).

Accessibility can have many different definitions. For example, in a study done by Walker et al. (2010), a store in a neighborhood with the highest quintile of homicide rates was deemed inaccessible. The authors stated that it was not realistic to expect that individuals would often go into such a neighborhood voluntarily if they did not already live there. In this study, the number of accessible supermarkets in the poorest tracts dropped from 1.8 to .8 when they adjusted for crime (Walker et al., 2010). While a supermarket may be physically close to a neighborhood, it may still not be accessible if intervening factors prevent the ready use of that supermarket by residents.

The inaccessibility of supermarkets disproportionally affects residents of low-income neighborhoods. A total of 23.5 million Americans living in low-income census tracts (based on the 2000 census) live 1 mile or more from a supermarket or large grocery store (Ploeg et al., 2009). The national average time spent traveling to a grocery store is 15 minutes but people living in low income areas (in which at least 40% of individuals make less than 200% of the federal poverty line) spend 19.5 minutes on average getting to a grocery store (Ploeg et al., 2009).
Lower income neighborhoods are less likely to have supermarkets than their higher-income counterparts. A study done in New York and North Carolina elucidated the connection between the local food environment, or the food that an individual is likely to buy based on where they go in a day, and the socioeconomic status of a neighborhood (Moore & Diez Roux, 2006). The study found that low-income and minority race areas were more likely to have fewer fruit and vegetable markets, specialty stores, and natural food stores but were more likely to have liquor stores. Neighborhoods that were predominantly minority and racially mixed were more likely to have small grocery stores but less likely to have full-scale supermarkets than predominately white neighborhoods. A similar study of food environments in Mississippi, Minnesota, North Carolina and Maryland found there to be 4 times more supermarkets in predominately white neighborhoods than in predominantly black neighborhoods (Morland et al., 2002).

**Food deserts in New York City**

In New York City, there is a correlation between income level and healthy food access. A study done in Manhattan compared food choices and diabetes prevalence in East Harlem, predominately consisting of individuals living on an income under 200% of the federal poverty line to the Upper East Side, predominately consisting of individuals living on an income above 400% of the federal poverty line (Horowitz et al., 2004). The study found that East Harlem residents were more likely than Upper East Side residents (50% vs. 24%) to have stores on their block that did not stock recommended foods from a list of foods recommended for diabetics. In a study by Inagami, Cohen, Brown, & Asch (2009) researchers found a direct correlation between increased distance from a grocery store and worse health outcomes such as higher rates diabetes and cardiovascular disease. For instance, in Los Angeles, a distance from home to a grocery store of 1.76 miles or greater was found to be predictive of increased BMI (Inagami et al., 2006).
Addressing the environmental disparities in the availability of diabetes – or cardiovascular – healthy foods could mitigate these effects. However, more research must be done to prove the causation of food environment on health outcomes.

Food deserts in New York City remain racially polarized and economically segregated. A study done in New York City in 2010 assessed New York City neighborhoods for how food accessible they were (Walker et al., 2010). This study found that 96.3% of tracts did meet the set standards for accessibility because most tracts were accessible by walking, subway or bus. However, the researchers found that if they adjusted for the availability of transportation, the largest decrease in accessibility was in predominantly black neighborhoods and predominately low-income neighborhoods (Walker et al., 2010). Similarly, while farmers markets are 10% of accessible healthy food outlets in high-poverty neighborhoods (Bader, Purciel, Yousefzadeh, & Neckerman, 2010), they are not open all year in cold areas such as New York City and the traveling nature of farmers markets make them less accessible than permanent supermarkets (Walker et al., 2010).

While food deserts have been prevalent in New York City for decades, public policies around food deserts were not enacted until the past decade. New York City lawmakers have been involved in food policy and the health of their residents for a long time. In the past, they have implemented laws that have come down on trans fats, made stores list the calories in the foods they sell and have even attempted to tax extra-large sugary beverages. However, policies that attempt to bring healthy food to neighborhoods have been scarce (Cardwell, 2009).

In 2009 the Food Retail Expansion to Support Health (FRESH) Act was passed to promote the establishment and expansion of supermarkets in low-access areas throughout New York City. The stated purpose of the Act was that it “promotes the establishment and expansion
of grocery stores in underserved communities by lowering the costs of owning, developing, and renovating retail space.” (“Food Retail Expansion to Support Health (FRESH),” 2014). Under the act, New York City would be giving zoning and tax incentives to land developers aimed at promoting full-service grocery store development in areas that were deemed “low access”. To qualify for these incentives, a store has to dedicate a percentage of their space to fresh produce, meats, dairy and other perishables (Cardwell, 2009).

The purpose of this act was to decrease the barriers that often had kept food retail stores from coming to neighborhoods that already had low food access as well as to provide incentives for developers to open supermarkets in these neighborhoods. This was premised on the idea that there were financial barriers to fresh food retail in low food access neighborhood (Cardwell, 2009). For example, the FRESH act stated that "Smaller stores in certain commercial and manufacturing districts would be exempt from a requirement that they provide customer parking. And in manufacturing districts, developers could build stores of up to 30,000 square feet — the current limit is 10,000 — without going through the city’s laborious and expensive land-use review process” (Cardwell, 2009). Additionally, the Act encouraged developers to use these lots as mixed-use developments. The lots still had to house a food retailer meeting all the above requirements, but it could also be used for office space, or apartments which would be an extra, and typically more lucrative, form of revenue for developers. As a result, developers were more likely to invest in these types of lots and consequently build fresh-food retailers in these locations (Cardwell, 2009). While this program was well research and implemented, the success of this program has not been well studied.

Since the 1990s, the term food desert has evolved within the public policy and public health fields. The use of the term food desert to describe New York City neighborhoods is
important in creating a system in which everyone has access to a diet that supports their health. New York City’s diversity provides a unique perspective on the effects of race, socioeconomic status and a myriad of other factors on healthy food access as well as health outcomes. Research into the causes and health implications of healthy food access is constantly improving and this thesis aims to add to this body of research.
Policy and Legislation

This section will outline the legislation and policy proposed by the Federal and New York City governments affecting food deserts in New York City. Legislation, or laws, are the legal standards that society must follow. They can be passed by the Congress in the Federal Government, by state governments or by city legislatures such as the City Council of New York City. Policy is a set of guidelines that will direct how a government will achieve a certain set of goals. Policy lays out the course of action but is not legally binding in the same way legislation is (Laws, Policies and Regulations: Key Terms & Concepts, 2015). Both legislation and policy impact food deserts and therefore both will be the focus of discussion in this section. This section divides policy and legislation into those aimed at developers, those aimed at retailers and those aimed at consumers. These policies and legislation will be further split into those introduced to Congress and those introduced to the New York City legislature.

SNAP and WIC

Before delving into the past and current legislation and policy affecting food deserts, it is important to note two longstanding federal legislative programs designed to increase access to healthy and fresh foods. The Supplemental Nutrition Assistance Program (SNAP), formerly known as “food stamps”, is administered by the federal government. It is funded by the US Department of Agriculture (USDA) but can be supplemented by individual states. The SNAP program provides financial assistance in the form of an electronic benefits transfer (EBT) that is comparable to a debit card for SNAP benefits. The recipients are provided with a certain amount of money, depending on income, household size and location, that can be spent at SNAP approved retailers on certain items. A SNAP approved retailer is often a grocery store,
supermarket or warehouse store (“Supplemental Nutrition Assistance Program (SNAP),” 2018). There is an incentive for a store to become a SNAP retailer because this brings to a store a larger customer base. However, to become a SNAP retailer a store must adhere to certain regulations such as the types of food it sells, the amount of space it devotes to fresh food in the store and the total number of sales in these categories. SNAP consumers can only buy certain items using their SNAP benefits. Examples include breads and cereals, fruits and vegetables, meats, fish and poultry, and dairy products. SNAP benefits may not be used for food that is deemed not nutritious, household supplies, hot foods or vitamins and medicines (“Supplemental Nutrition Assistance Program (SNAP),” 2018).

The Women, Infants and Children (WIC) food and nutrition program is also federally administered and funded by the USDA. This program provides grants to states for a variety of health-related programs for mothers and children, including initiatives to bring healthy food to this population. WIC provides short-term assistance and, although it is federally funded, it is administered by individual states. For this reason, the eligibility for WIC is determined by each individual state and, unlike SNAP which eligibility which is the same everywhere in the country, it varies state-by-state. Benefits distribution varies by state but are often either in the form of a check or vouchers that can only be used to buy nutritious food as WIC certified (often the same as SNAP certified) locations (“Women, Infants, and Children (WIC),” 2018). WIC is looking to roll out an electronic benefits transfer (EBT) similar to that of SNAP in 2020. WIC is similar to SNAP as it provides healthy foods to families with a certain income but differs in who is eligible and how the benefits are administered.
Going to Market Food Policy Report in New York City

The NYC Department of City Planning, the NYC Department of Health and the NYC Economic Development Corporation completed an analysis of the healthy food access in New York City in 2008 titled *Going to Market* in order to better comprehend the need for healthy and fresh food access ("NYC Going to Market", 2008) in 2008. The results presented problems that future New York City food policies should address. The analysis determined that approximately three million New York City residents lived in high need neighborhoods, meaning that they lived in a location that met the USDA definition of a food desert. In response, citywide food access goals were set. While the goals were not requirements, they laid out a framework by which the city council could enact future policy regarding food deserts. The first goal was to increase the current citywide average ratio of supermarket size (in square feet) per 10,000 people from 15,000 square feet per 10,000 people to the City Planning Standard Ratio of 30,000 square feet per 10,000 people. At the time of the analysis, only 2 Community Districts citywide met the City Planning Standard Ratio (both in Manhattan).

The second goal was for the creation of a Supermarket Need Index (SNI) to determine the areas in New York City with the highest levels of diet-related diseases and largest populations with limited opportunities to purchase fresh foods. The index was based on the following measures: high population density, low access to a car at the household level, low household incomes, high rates of diabetes, high rates of obesity, low consumption of fresh fruits and vegetables, low share of fresh food retail and capacity for new stores ("NYC Going to Market", 2008). The index highlighted the needs of lower-income communities and allowed for further investment in these neighborhoods. Since its creation over a decade ago, the index has not been central to subsequent discussions of food access and has been largely ignored (cite?).
The resulting “Going to Market” report laid out recommendations for what future policy should address (New York City Department of City Planning, NYC Department of Health and Mental Hygiene, NYC Economic Development Corporation, 2008). These include modifying existing land regulations affecting supermarkets, where appropriate, and ensuring future rezoning considers the need for supermarkets or neighborhood grocery stores. Additionally, the report proposed that potential of city-owned property could be used by new supermarkets and that the appropriateness of supermarkets should be assessed in projects containing a retail component on city-controlled sites. Lastly, the report suggested that the city should limit restrictive policies such as policies requiring supermarkets to have a certain amount of parking or other restrictive policies to encourage supermarkets to open in new locations. This report was the first attempt by the city to address the problem of inadequate access to healthy foods. Each of these policies have been incorporated into city legislation in some way, although not all to the extent described above. However, there has been little systematic research that evaluates the effectiveness of these policies.

I. Overview of Legislation and Policies Pertaining to Land Developers

The role of developers is to take a plot of land and transform it into something useful for public or private use (i.e., a building, set of buildings, park, etc.). Developers make a profit by understanding how land can best be used to create revenue and they are the connection between the construction ability and the investors’ needs. Legislation or policy that affect developers often include monetary incentives such as tax breaks, tax refunds or grants, but can also include suspending certain existing regulations to entice developers to build in a certain area (Urban
Enticing developers to build supermarkets in previously underdeveloped or underserved neighborhoods is difficult due to the perception that there is not a market for large-scale supermarkets in low-income or minority communities. This is often because price can be a barrier to customers buying healthier food (Cassady et al., 2007). Additionally, urban areas sometimes do not have enough land to develop a full-scale supermarket or grocery store (Bitler & Haider, 2010). Policy must address these issues to assist developers in creating the foundation for supermarkets or other types of healthy food retail in underserved neighborhoods.

a. Federal Legislation and Policies Pertaining to Land Developers

The Federal Government can have an immense impact on food policy that affects city developers. As far back as 1992, a report by Congress called on legislators to help the supermarket industry by giving them access to vacant land or buildings owned by the city (Urban grocery gap, 1992). The report insisted that legislation should help connect real estate developers with supermarkets since typically a developer who owns a piece of land must locate and contact a supermarket chain to entice that supermarket to move onto their plot of land. Removing the barrier between developers and supermarket chains or potential supermarket owners is thought to increase the number of supermarkets brought into undeveloped or underdeveloped areas. While these specific suggestions were not introduced as legislation before Congress in the 1990s, the idea of government matching developers and retailers has been brought up in future initiatives to increase healthy food access.

The Healthy Food Financing Initiative (HFFI) was first passed in 2010 and aims to bring supermarkets, grocery stores and other healthy food retailers to underserved urban and rural
communities across America ("Healthy Food Financing Initiative," 2017) by providing financial and technical help to developers and retailers. This initiative supports public and private investments in the form of loans, grants, promotions, and other programs designed to create healthy food options in food deserts across the country. The program is funded by the USDA, which authorized $125 million in the 2014 farm bill for the HFFI, and the US treasury which, through the Community Development Financial Institutions Fund (CDFI Fund) provides financial incentives as well as training to financial institutions that invest in companies, such as supermarkets, that provide healthy foods. This includes developers and investors in developers that will help bring healthy food to underserved areas of the United States.

Another US treasury funded program, the New Markets Tax Credit Program ("New Markets Tax Credit Program," 2018) provides a tax credit against a corporate investor's private income tax if they build in underdeveloped areas. Similarly, the Community Development Financial Institutions Fund offers grants to help Certified Community Development Financial Institutions (CDFIs) to build their financial capacity. This ensures that these lenders can make the necessary loans to developers and retailers in areas that have been shown to have low access to a supermarket or grocery store through a methodology that has been adopted for use by other governmental or philanthropic healthy food initiatives.

b. New York City Legislation and Policies Pertaining to Land Developers

In New York City, the problem of not enough fresh and healthy foods in concentrated urban areas centers around the fact that government initiatives often focus on building housing in these areas instead of other types of infrastructure. Therefore, there are more people but less room to build supermarkets (Urban grocery gap, 1992). This is detrimental to ensuring access to affordable, healthy and fresh food. Food policy should address this problem.
The history of food policy and legislation passed by the New York City government that affects developers is recent. In 2001, a resolution was passed by the New York City council that allowed supermarkets in Brooklyn council district 36 to be larger than 10,000 square feet (“The New York City Council - File #: LU 1175-2001,” 2001). This resolution was important as often times supermarkets are hesitant to move into areas that do not allow them the necessary space to sell high quantities of food.

It was not until 2009 that legislation affecting developers was brought back to the floor of the New York City Council. The Fresh Program, started in 2009 (“Food Retail Expansion to Support Health (FRESH),” 2009), aims to encourage grocery stores to locate to low-access neighborhoods of New York City by lowering barriers for developers and retailers to locate there. The program offers financial incentives such as reductions on real estate and sales tax. Zoning incentives are also offered by the program including development rights outside those allowed by local ordinance, reductions in required parking availability and allowance of stores with larger square footage than written into the development code of the city. The relation of this program to food retailers will be discussed in detail later.

II. Overview of Legislation and Policies Pertaining to Retailers

Retailers are often wary of moving into low-income or minority neighborhoods, which, as shown earlier, are typically the low access neighborhoods. Low-income or minority neighborhoods have a reputation for having higher crime rates, and, whether true or not for a given neighborhood, creates perceived disincentives for supermarkets and grocery stores to open stores in these neighborhoods. Additionally, there is a perception among potential investors and store owners that the market in low income or minority communities is not suitable for large-
scale supermarkets (Pothukuchi, 2005) because price is often a barrier to customers buying healthier food (Cassady et al., 2007). Legislation affecting retailers aims to entice food retailers to enter underserved neighborhoods.

**a. Federal Legislation and Policy Pertaining to Retailers**

The second focus on policy is that aimed at retailers. Congressional legislation works to enhance the relationship between food access and food retail. A congressional report in 1992 (Urban Grocery Gap, 1992) recommended that Congress create a food access standard and help every community obtain that standard. To reach these goals, the report suggested that Congress work with the supermarket industry to set strategies to bring supermarkets to underserved areas, ensure that supermarkets have good service which entices customers to go to those stores and encourage locals to work at supermarkets that move into their neighborhood, which improves unemployment rates at the same time. Additionally, the report proposed creating food-related policies that were friendlier to independent grocery operators. Many laws create a system in which only the big supermarket chains can move into a neighborhood, and, if these chains choose not to move into these neighborhoods, this decreases the capacity to increase access in that area. These proposals were not directly incorporated into resulting legislation but did build a foundation upon which future research could shape the legislation that has been enacted since.

To reduce financial and technical barriers to small grocery stores carrying fresh produce, the Healthy Food Financing Initiative (HFFI) (“Healthy Food Financing Initiative,” 2017) offers various assistance to eligible fresh, healthy food retailers. The program, funded as part of the 2014 Farm Bill, provides grants to individual healthy food retailers as well as community partners for market planning, promotions, infrastructure and operational improvements with the stated goal to increase demand for healthy foods among low-income customers and to increase
availability of locally grown foods in such stores. Both the developer initiatives reviewed earlier, and the retailer initiatives funded under the HFFI enable underserved areas to increase their healthy food retail.

An amendment to the Agriculture Act of 2014 (Aussenberg, 2016), passed in 2016, redefined specifically what the Federal Government would fund as part of healthy foods programs. The most important provision of this amendment was that which redefined "staple food" under SNAP as anything that is not an accessory food which is a food not deemed necessary for a balanced diet. Unlike the previous definition in which a box of macaroni and cheese could be classified as a “grain” and paid for with SNAP funds, now staple foods do not include those which are highly processed. Additionally, this amendment added a provision to increase the minimum amount of refrigerated produce and staple food variety a store is required to have in its inventory for it to be considered for special federal funding. This amendment was designed to encourage stores that have many SNAP customers, to sell more fresh or healthy foods because those with SNAP benefits will be more likely to purchase these foods.

When this bill was under consideration, there were concerns that it could potentially have negative effects on small retailers as it has created more rigorous requirements to qualify as a SNAP retailer. Not every retailer can meet these requirements and those that cannot may consequently lose out on a customer base. While no data on this has been collected, this worry shows the balance that legislation must straddle to be advantageous to all retailers and not detrimental to some.

The Supermarket Tax Credit for Underserved Areas Act was introduced in the House in 2017 but was not passed. This bill would have decreased the tax rate for renovations on supermarket buildings in underserved areas. It would also have ensured that low paid
supermarket employees in underserved areas get a tax credit for working in such areas and would increase the maximum yearly salary to be eligible for this tax credit by $1000. Lastly, it would allow for a 15% tax credit for retail stores that sell locally grown fresh produce in underserved areas (Cohen, 2015). The goal of this legislation was to encourage supermarkets to move to and stay in underserved neighborhoods.

b. New York City Legislation and Policies Pertaining to Retailers

The New York City Council released a report in 2010 detailing suggestions to improve overall food access in New York City, including healthy food access in food deserts (Baum, Forum, Berg, Cohen, & Conard, 2010). The proposals were broken down into those that would help improve bodega infrastructure and those that would expand the existing Green Cart program.

Years earlier, to improve healthy food access at bodegas, the Department of Health and Mental Hygiene (DOHMH) had created a program to help bodegas source, store and sell fresh fruits and vegetables. This program helped find bodegas an affordable and reliable fruit and vegetable distributer and assisted them in obtaining infrastructure such as shelving, refrigeration and air conditioning to extend the shelf life of fresh produce. The DOHMH also helped bodegas obtain the proper permits to have fresh fruit and vegetable stands outside their stores. The 2010 report suggested that the DOHMH expand on this program and find new ways to help bodegas become fresh produce retailers but did not go into further detail on how to accomplish this (Baum et al., 2010).

The Green Cart program, passed in 2007, aims to increase the number of mobile fresh produce sellers on the streets of New York City. The 2010 New York City Council Report suggested that City Council increase the number of Green Carts on the street by allowing more
Green Carts in areas that have been shown to have low food access. Additionally, the report suggested that the City Council pass legislation that would enable electronic benefits transfers (EBT) service to be used at Green Carts by consumers. If Green Carts were allowed to accept this form of payment, they could increase fresh produce access in neighborhoods that do not have supermarkets. While this report only contains suggestions and not actual policy (a Green Cart bill was not passed), it exhibits the City Council’s ambition to address food deserts in New York City and outlines what they perceive to be feasible and effective goals.

The Healthy Food Financing Initiative was passed in 2005 but was expanded into Shop Healthy NYC in 2012. The program aimed to help bodegas to carry healthier foods by lowering the barriers to small shops getting fresh produce. Shop Healthy NYC does this through connecting distributors and bodegas as well as through teaching owners how to profit from the sale of fresh produce. The program was proven to work as many bodegas began carrying more fresh produce in the subsequent years as a result of this program. However, no data has been collected on the sales of the produce currently being sold at these bodegas. It is notable, though, that the bodegas have continued to sell fresh produce to the present day, so it is likely that the fresh produce being carried at these bodegas is being sold (Bloomberg, Farley, & White, 2010).

One of the biggest and most expansive food desert-related policies passed by the New York City Council is the Food Retail to Support Health (FRESH) Act (“Food Retail Expansion to Support Health (FRESH),” 2018). Passed in 2009, the FRESH Act provided financial incentives to retailers for selling fresh produce and other healthy foods. These incentives include financial incentives such as building and land tax reductions, mortgage recording tax reductions and a waiver of city and state sales tax on materials used to renovate or equip such supermarkets to sell fresh produce. To be eligible for these financial benefits, FRESH food retailers must meet
the following requirement: located in a previously low-access neighborhood; have a minimum of 5,000 square feet of retail space for grocery products intended for home preparation and consumption; at least 50% of their retail space for food products intended for home preparation and consumption; and at least 30% of their retail space for perishable goods including dairy, fresh produce, fresh meats, poultry, fish, and frozen foods. The benefits and successes of the FRESH program in relation to the consumers will be discussed later but it must be noted that since 2009 over 20 FRESH approved supermarkets have opened or are being built (“Food Retail Expansion to Support Health (FRESH),” 2018). This accomplishment shows how financial incentives can be used to increase healthy food access.

Figure 1. Eligibility of New York City zones for the FRESH Program. Eligibility is determined by insufficient current fresh produce access (“Food Retail Expansion to Support Health (FRESH),” 2018).
Another program in New York City aimed at increasing access to healthy food in neighborhoods with high rates of obesity is Shop Healthy NYC which was launched in 2012 (NYC Department of Food Policy, 2017). A 2014 report finding this program to be successful stated that, as a result of Shop Healthy NYC, more retailers carried healthier foods, resulting in either keeping their revenue flat or increasing it and that retailers began offering healthier snacks and less processed and canned foods (NYC Department of Food Policy, 2017).

There have been additional bills in New York City, some of which have passed and some of which have not, that provide insight into the City Council’s food-policy landscape. For instance, the New York City Council - File #: Int 1116-2018 was introduced at the end of 2018 and is still in the Committee on Consumer Affairs and Business Licensing. If passed, this bill would increase the number of street food vendors allowed on the streets of New York, thereby allowing for Green Carts or fresh produce sellers in the area. While this is positive as Green Carts can increase fresh produce access in neighborhoods without supermarkets, this bill would also raise fees and create more stringent rules, something that has gained the bill many opponents (Chin, Menchaha, Lander, Rose, & Miller, 2018).
Figure 2. Green Cart locations (Figure A) and randomly chosen potential Green Cart locations (Figure B) within the same tracts in 2014. Figure depicts the percent of stores within each location carrying fruits and vegetables. Access is used to categorize locations as food deserts (0 healthy stores), food swamps (≤1 in 5 healthy stores), or healthy areas (>1 in 5 healthy stores) (Li, Cromley, Fox, & Horowitz, 2014).

Another bill, the New York City Council - File #: Int 1472-2017 was referred to the Committee on Finance but never came to a vote. It attempted to keep grocery stores affordable if their rents became too high by exempting these stores from the commercial rent tax if they attained certain affordability requirements. In order to be eligible for the tax exemption, the bill required that stores have a minimum of 500 square feet of floor space used only for the sale of fresh produce (C. Johnson, Chin, Levin, Dromm, & Salamanca, 2017, p. 1). If this bill had passed, it would have had a positive impact on keeping supermarkets and, by extension, healthy food access in areas at risk of losing them.

In 2001 the New York City Council, in File #: Res 0901-2011, called upon the New York State Legislature to pass legislation that would give bodega owners a tax exemption for carrying fruits and vegetables. The resolution was referred to the Committee on Finance but was not
passed (Cabrera et al., 2011). Financial incentives such as tax exemptions can be helpful for spurring interest in carrying healthy foods. While these policies may seem dissimilar, they all reflect the recent stances that the New York City Council has taken on food desert policy and can inform future policy decisions. These bills highlight that the New York City Council takes a supportive stance on policies addressing the problem of food deserts.

III. Overview of Legislation and Policies Pertaining to Consumers

While the previous section focused on policies aimed at retailers, there has been substantial attention also focused on consumers. The ultimate goal of food desert legislation and policy is for consumers to access fresh and healthy foods. Therefore, legislation and policy directly benefitting consumers is a straightforward and often-used way of addressing the problem of food deserts. Consumer-based policy and legislation often creates or assists programs that bring the healthy food directly to consumers, such as Green Carts, urban gardening or farmer’s markets. Additionally, policy and legislation focus on ways to market healthy foods to consumers in an effort to increase consumers’ consumption of these foods.

a. Federal Legislation and Policies Pertaining to Consumers

The Federal Government funds a bevy of initiatives to increase healthy food access in ways that directly affect the consumer. Some are parts of existing food policy such as the ability of WIC and SNAP benefits to be used at farmer’s markets (R. Johnson & Cowan, 2016). Others, such as the Community Food Projects (CFP) Competitive Grants Program (“Community Food Projects (CFP) Competitive Grants Program,” 2017) from the National Institute of Food and Agriculture are stand-alone plans. CFP, first approved in 2008 and then re-approved in 2014 and 2018 provides grants to nonprofits or government entities for projects or programs that supply
food to low-access individuals, including programs focusing on getting adequate nutrition to people who otherwise would not have it.

Another program that offers grants for initiatives for increasing healthy food access is the Farmers’ Market Promotion Program (Department Of Agriculture, 2011). Passed and funded by the Department of Agriculture in 2011 this program provides $10 million in grant funds to increase consumption of fresh produce. These grants are awarded for direct producer-to-consumer marketing such as new farmer’s markets, roadside stands, community supported agriculture (CSA) programs, agritourism activities, and other direct producer-to-consumer infrastructure. Lastly, the Food Insecurity Nutrition Incentive Program provides grants for initiatives, big or small, to incentivize SNAP recipients to buy fresh produce.

b. New York City Legislation and Policies Pertaining to Consumers

A report by the New York City Council in 2010 (Baum, Forum, Berg, Cohen, & Conard, 2010) suggested that to improve overall food access in New York City, including healthy food access in food deserts, the city must support efforts to improve food co-operatives. In a food co-operative (co-op), individuals band together to buy food, often fresh fruits and vegetables, in bulk from the seller in an effort to keep the food easily accessible and affordable. This has worked in select neighborhoods already, and the prices consumers pay for fresh fruits and vegetables are 20 to 40 percent lower than at the surrounding supermarkets. Additionally, many communities in New York City have asked for assistance in starting their own co-ops, indicating there is interest in this approach (Baum, Forum, Berg, Cohen, & Conard, 2010).

A resolution calling upon the New York State Legislature to amend New York State Property Tax Law to allow a tax reduction for owners of green roofs, or rooftop gardens (“The
New York City Council - File #: Res 0507-2010,” 2010) was passed in 2010. Green roofs and
the overall idea of agriculture in a city is aimed at combatting the lack of access to fresh fruits
and vegetables in certain parts of cities. While this initiative was not taken up in the New York
State Senate, it highlights the importance of individuals growing their own fresh produce in New
York City.

Shop Healthy NYC, mentioned earlier in reference to how it helps bodegas, also works
with local residents and local retailers to increase the number of retailers that sell fresh produce
as well as the number of consumers who will buy it. This program was implemented in 2012,
and a 2017 report found the program to be successful as more retailers carried healthier foods. In
addition, not only were more residents buying fresh produce at the Shop Healthy stores, but 49% of
consumers interviewed reported buying healthy foods because it was advertised in a Shop
Healthy store near them (NYC Department of Food Policy, 2017).

Examples from Other Communities

New York City is not the first city to encounter and act upon the problem of urban food
deserts. Many cities across the United States and across the world have enacted policies and
legislation intended to change their city’s food landscape. Looking at what these other cities have
done can be helpful in understanding what can be done in New York City.

A study done in Cleveland, Ohio (Freedman et al., 2018) evaluated the use of farmer’s
markets as a means of getting fruits and vegetables to underserved areas. The study examined
farmer’s market shopping among SNAP participants and found that farmer’s market use was
especially low among SNAP participants, and that many consumers did not know that SNAP
benefits could be used at farmer’s markets. There was a direct correlation between consumers
knowing about the benefits and consumers using them and, conversely, not knowing about the benefits and not using them. Therefore, the study concluded that one way to make fruits and vegetables more accessible is to ensure that SNAP participants are aware that they can use these benefits at certain farmer’s markets. Food policy is only useful when consumers are aware of its benefits and this study exhibits that cities must publicize such benefits to reap the full results.

Kings County, Washington, commonly known for the city of Seattle, released a document detailing food access problems in the county in 2011 (Ringstrom & Born, 2011). Although the report discussed a large number of policies related to people not having enough food, it indicated that there are not enough policies around having the right foods. Further, to address government and institutional development, the report suggested that the county create a food system council, include food access goals on county health assessments and conduct a food system assessment. To address healthy food-retail the report suggested the county ensure that small scale healthy food retail has the appropriate infrastructure to sell healthy food (i.e., refrigerators, wholesalers, air conditioning). Additionally, the report recommended that the county use grocery retail as an economic development opportunity and encourage retailers to accept SNAP or WIC benefits. This was suggested with the idea that, in order to become SNAP or WIC authorized, a retailer has to adhere to certain regulations of selling healthy and fresh foods. Therefore, if retailers accepted these benefits, they would be selling healthier foods. The report proposed that the county also offer tax or other monetary incentives for new grocery retailers in underserved areas, such as density bonuses, which are incentives for private developers to invest in high density areas with little fresh food access. Lastly, the report advised that the county identify or assemble sites for healthy food retail (Ringstrom & Born, 2011).
Not all food policy is helpful, though, and learning from unsuccessful policy in other cities can strengthen new policy being drafted. For instance, a fast food ban in South Los Angeles aimed at preventing the rise of food deserts in that area proved to be ineffective. The policy banned only one type of unhealthy food (fast food) and a policy review report on the effects of the policy found that residents of these neighborhoods were merely getting their unhealthy food elsewhere. The authors of the report criticized the policy for not expanding access to healthy or fresh food in ways such as increasing the number of grocery stores or making fruits and vegetables more affordable (Brown & Brewster, 2015). This policy review exhibits the necessity of providing healthy food instead of just banning unhealthy food and should help inform future food-related legislation in New York City.

Policy on the federal and city levels have a myriad of impacts on healthy food access in New York City. From large, federally-funded, programs such as SNAP, to smaller initiatives such as the Green Cart Program, the government can enact top-down change that provides consumers with easy access to fresh produce. Legislators differ in how much control they wish the government to have in addressing food deserts. Some believe that a laissez faire approach would allow industry and capitalism to solve the problem of insufficient access to healthy foods. However, those legislators who believe that legislation and policy are the ways to solve the problem of food deserts understand that market incentives leave out entire swathes of society. Legislation and policy must address the necessity of access to healthy foods to safeguard health and longevity. Current policies affecting food deserts in New York City do a respectable job of addressing these problems, but future policies should fill in the gaps that these policies have missed. For this reason, this thesis includes interviews with store owners who have changed their
selection of healthy foods to better understand their decisions and to inform future policy that would seek to help other store owners provide fresh and healthy foods to consumers.
### Federal Policy

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
<th>Year</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Markets Tax Credit Program 7</td>
<td>US Treasury</td>
<td>2000</td>
<td>Passed</td>
<td>Provides a tax credit against a corporate investor's private income tax if they build in underdeveloped areas. This includes building supermarkets in underdeveloped areas.</td>
</tr>
<tr>
<td>Supplemental Nutrition Assistance Program (SNAP) 1</td>
<td>USDA</td>
<td>2008</td>
<td>Passed</td>
<td>Federal aid program to provide food to low-income Americans. Includes provisions to increase access to healthy and fresh foods.</td>
</tr>
<tr>
<td>Call to Action to Prevent and Decrease Overweight and Obesity 2</td>
<td>US Surgeon General</td>
<td>2008</td>
<td>Report</td>
<td>Recommends that government entities create policies that promote environments in which healthy dietary options are easily accessible.</td>
</tr>
<tr>
<td>Farmers’ Market Promotion Program (FMPP) 4</td>
<td>Department of Agriculture: Agricultural Marketing Service</td>
<td>2011</td>
<td>Passed</td>
<td>$10 million in grant funds for direct producer-to-consumer marketing for fresh produce such as new farmers markets, roadside stands, community supported agriculture (CSA) programs etc. in an effort to cut out the middle man of supermarkets.</td>
</tr>
<tr>
<td>Healthy Food Financing Initiative (HFFI) 6</td>
<td>U.S. Departments of Agriculture (USDA), Treasury and Health and Human Services (HHS)</td>
<td>2011</td>
<td>Passed</td>
<td>Provides financial and technical help to developers and retailers to increase fresh food accessibility in underserved areas</td>
</tr>
<tr>
<td>Community Development Financial Institutions Fund 5</td>
<td>Department Of The Treasury</td>
<td>2017</td>
<td>Passed</td>
<td>Grants to help Certified Community Development Financial Institutions (CDFIs) to build their financial capacity to make loans to developers and retailers in areas that have been shown to have low access to a supermarket or grocery store.</td>
</tr>
<tr>
<td>Updated Standards for SNAP-Authorized Retailers 8</td>
<td>USDA</td>
<td>2018</td>
<td>Passed</td>
<td>Made changes to requirements for stores to be a SNAP retailer aimed to increase SNAP recipients’ access to health and fresh foods.</td>
</tr>
<tr>
<td>Community Food Projects (CFP) Competitive Grants Program 3</td>
<td>National Institute of Food and Agriculture</td>
<td>Passed in 2008, reapproved in 2014 and 2018</td>
<td>Passed</td>
<td>Provides grants to nonprofits or government entities for projects or programs that are supplying food to low-access individuals. This includes programs that focus on getting adequate nutrition to people who do not otherwise have.</td>
</tr>
</tbody>
</table>

Table 1. This table outlines bills and reports affecting healthy food access passed by the Federal legislature

1 (“Supplemental Nutrition Assistance Program (SNAP) | Food and Nutrition Service,” 2018)
3 (“Community Food Projects (CFP) Competitive Grants Program,” 2017)
4 (Department Of Agriculture, 2011)
5 (Community Development Financial Institutions Fund, 2017)
6 (“Healthy Food Financing Initiative,” 2017)
7 (“New Markets Tax Credit Program,” 2018)
8 (Aussenberg, 2016)
### New York City Policy

<table>
<thead>
<tr>
<th>Name</th>
<th>Sector</th>
<th>Year</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ULURP, Zoning Special Permit, Brooklyn CD#36</td>
<td>Development; Food Retail</td>
<td>2001</td>
<td>Passed</td>
<td>A resolution to allow supermarkets in Brooklyn council district 36 to be larger than 10,000 square feet</td>
</tr>
<tr>
<td>Healthy Bodegas Initiative</td>
<td>Food Retail</td>
<td>2005</td>
<td>Passed</td>
<td>An initiative to encourage bodegas to carry healthier foods</td>
</tr>
<tr>
<td>Health Bucks</td>
<td>Consumer</td>
<td>2005</td>
<td>Passed</td>
<td>Provides New Yorkers who already receive SNAP with additional benefits to spend on fresh fruits and vegetables at farmer's markets</td>
</tr>
<tr>
<td>Mayor to Declare an Emergency Health Disaster in the Bronx</td>
<td>Public Health</td>
<td>2006</td>
<td>Filed</td>
<td>Resolution for the Mayor of NYC to declare obesity and diabetes, among other diseases, an emergency health disaster</td>
</tr>
<tr>
<td>Green Carts</td>
<td>Food Retail</td>
<td>2007</td>
<td>Passed</td>
<td>Limits the number of greencarts, which sell fresh fruits and vegetables, allowed on the streets of NYC to a maximum of one thousand</td>
</tr>
<tr>
<td>FRESH</td>
<td>Development; Food Retail</td>
<td>2009</td>
<td>Passed</td>
<td>Offers financial and real estate development incentives to promote the expansion of food retail into New York City's underdeveloped neighborhoods</td>
</tr>
<tr>
<td>Green Roof Tax Exemption - Res 0507-2010</td>
<td>Consumer</td>
<td>2010</td>
<td>Passed</td>
<td>Called upon the New York State Legislature to pass legislation that would give green roof owners a tax exemption</td>
</tr>
</tbody>
</table>

**Table 2A.** This table outlines bills and reports originating in the New York City legislature affecting healthy food access and the sector they target. Continued in Table 2B.

9 (Eisland, 2001)  
1 (Bloomberg et al., 2010)  
3 (“Health Bucks,” n.d.)  
10 (Foster, Mark-Viverito, Mendez, & Sanders Jr., 2006)  
7 (Comrie Jr., 2008)  
5 (“Food Retail Expansion to Support Health (FRESH),” 2018)  
12 (Koppell et al., 2010)
### New York City Policy

<table>
<thead>
<tr>
<th>Name</th>
<th>Sector</th>
<th>Year</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bodega Fresh Produce Tax Exemption - Res 0901-2011</td>
<td>Food Retail</td>
<td>2011</td>
<td>In Committee on Finance</td>
<td>Called upon the New York State Legislature to pass legislation that would give bodega owners a tax exemption for carrying fruits and vegetables</td>
</tr>
<tr>
<td>Requiring Caloric Posting for Certain Mobile Food Vendors</td>
<td>Food Retail</td>
<td>2011</td>
<td>Filed</td>
<td>A motion to require calorie posting for certain mobile food vendors</td>
</tr>
<tr>
<td>Adding Drinks to SNAP Prohibitions - Res 0768-2011</td>
<td>Consumer</td>
<td>2011</td>
<td>Filed</td>
<td>A resolution to call upon the USDA to add certain drinks to the list of foods one is prohibited to buy with SNAP benefits</td>
</tr>
<tr>
<td>Shop Healthy NYC 4</td>
<td>Consumer; Development; Food Retail</td>
<td>2012</td>
<td>Passed</td>
<td>Aims to increase healthy food access in neighborhoods with high obesity rates</td>
</tr>
<tr>
<td>Allowing the Sale of Sugary Beverages - Res 1431-2012</td>
<td>Consumer</td>
<td>2012</td>
<td>Filed</td>
<td>A resolution to encourage stopping a bill that would limit the sale of large sugary beverages at food service establishments in NYC</td>
</tr>
<tr>
<td>Food Policy Council - Int 1223-2013 6</td>
<td>Food Retail</td>
<td>2013</td>
<td>Filed</td>
<td>An initiative to create a food policy council in NYC to increase healthy food availability for NYC residents</td>
</tr>
<tr>
<td>OneNYC 2</td>
<td>Consumer; Development; Food Retail</td>
<td>2015</td>
<td>Report</td>
<td>Sets goals for healthy food access in NYC, including increasing healthy food access for all neighborhoods</td>
</tr>
<tr>
<td>Exempting certain grocery stores from the commercial rent tax 14</td>
<td>Food Retail</td>
<td>2017</td>
<td>In Committee on Finance</td>
<td>An initiative to exempt grocery stores who meet certain size, affordability and fresh produce requirements from the commercial rent tax</td>
</tr>
<tr>
<td>Expanding the Availability of Food Vendor Permits 8</td>
<td>Food Retail</td>
<td>2018</td>
<td>In Committee on Consumer Affairs and Business Licensing</td>
<td>An initiative to increase the number of street food vendors allowed on the streets of New York City, thereby allowing for more green carts or fresh produce sellers in the area</td>
</tr>
</tbody>
</table>

**Table 2B.** This table outlines bills and reports originating in the New York City legislature affecting healthy food access and the sector they target.

11 (Cabrera et al., 2011)  
13 (Ferreras-Copeland et al., 2011)  
15 (Koo & Vallone Jr., 2011)  
4 (“Shop Healthy NYC,” n.d.)  
16 (Cabrera et al., 2012)  
6 (Lander et al., 2013)  
2 (“#OneNYC,” n.d.)  
14 (C. Johnson et al., 2017)  
8 (Chin et al., 2018)
Methods

Types of Data

The research included two types of data collection and analysis aimed at understanding the change in healthy food access in New York City between 2007 and 2017. The first analyzes a quantitative dataset, titled the *Community Health Survey*. This public use dataset is available from the New York Department of Health and Mental Hygiene and includes responses on the health status of New York City residents for every year between 2002 and 2017 and was used in this study to determine a correlation between healthy food access and health outcomes in New York City residents. The data was analyzed using logistic regression models in Stata. The second type of data collection aimed to qualitatively understand the role of food retailers in changes to healthy food access between 2007 and 2017. This data was collected through interviews, conducted by the researcher, of food retail store owners in New York City whose fresh food selection had changed between 2007 and 2017.

Using both types of data, this study seeks to establish a correlation between healthy food access and health outcomes, to determine whether this correlation has changed between the given years and to understand the role of food retailers in this change.

*Community Health Survey Data*

The *Community Health Survey* conducted by the New York City Department of Health and Mental Hygiene each year collects extensive data on New York City residents through a voluntary phone survey. The target population of this study is New York City residents over the age of 18 and not living in group-home settings who have either a cell phone or landline phone. The survey asks about 125 questions on topics such as: general health status and mental health,
health care access, cardiovascular health, diabetes, asthma, immunizations, nutrition and physical activity, smoking, HIV, sexual behavior, alcohol consumption, cancer screening and other health topics. The survey is conducted by computer-assisted telephone interviewing (CATI) and the phone numbers are provided by commercial vendors. Surveys are done in English, Spanish, Russian and Chinese with an option of live translation services for other languages available some years. Sample size ranges from 7,000 participants to 10,000 participants depending on the year. This analysis used years 2008 and 2014 with sample sizes n=7554 and n=8562, respectively.

The years 2008 and 2014 were chosen for use in this research because they both contained the independent variable, “If you were to walk from your home to purchase fresh fruits and vegetables, how long would it take you to get there?” Respondents could select the following answers: “less than 5 minutes” 5 to 10 minutes” or “more than 10 minutes”. This was used as a measure of food access, with those living further from fresh fruits and vegetables having less access as established in previous research (Sharkey & Horel, 2008).

Through regression analysis between the distance of a given tract to the nearest supermarket or fresh food retail location and the dependent variable, such as health status (i.e. BMI, diabetes prevalence etc.), the method can isolate the impact of food access while incorporating control variables such as smoking, insurance coverage or average amount of exercise. For example, prior research used a regression analysis between BMI and fast food restaurant locations in L.A. neighborhoods with distance based on the 2000 census tracts (Inagami et al., 2009). The resulting data was deemed reliable and statistically significant and for this reason, as well as the relative simplicity of this method, it will be used in this paper.
The dependent variables in this study were the prevalence of nutritionally-related disease, other adverse health outcomes related to diet and the respondents’ reported diet. Several dependent variables were examined: body-mass index, diabetes, total servings of fruits/vegetables consumed per day, the number of sugar sweetened sodas consumed per day, high blood pressure and the respondents’ self-reported general health (Table 3). These variables were chosen because they are measures of nutrition and the diseases caused by poor nutrition. Additionally, they were measured in both the 2008 and 2014 Community Health Survey and could therefore be compared across years.

Several control variables were included in this study to isolate the effect of food access and examine the effect of confounding factors that could influence diet and health outcomes in a significant way. These controls were chosen because they have been proven to each have effects on health outcomes and on diet (Raja et al., 2008). Control variables include: race, insurance status, level of activity, smoking status, sex, age and income (Table 4).

Regressions were run using Stata for each dependent variable and independent variable with controls. A logistic regression was run for dichotomous dependent variables and an ordinary least square regression was run for ordinal dependent variables. The reference variable was kept the same in each regression. The odds ratio and standard deviation for each variable were recorded and significance was labeled.
### Table 3. Independent variable (walk to produce) and dependent variables. Questions, variable name and variable categories are provided to provide context for reference categories.

<table>
<thead>
<tr>
<th>Walk to Produce</th>
<th>BMI</th>
<th>Diabetes</th>
<th>Fruit and Vegetable Consumption</th>
<th>General Health</th>
<th>Blood Pressure</th>
<th>Sugary Drink Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2008 variable name</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>weightall</td>
<td></td>
<td>diabetes08</td>
<td>fruitveg</td>
<td>generalhealth</td>
<td>toldhighbp08</td>
<td>avgsgoodaperday08</td>
</tr>
<tr>
<td><strong>2014 variable name</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>weightall</td>
<td></td>
<td>diabetes14</td>
<td>fruitveg</td>
<td>generalhealth</td>
<td>toldhighbp14</td>
<td>avgsgoodaperday14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable categories as used in this study</th>
<th>1=</th>
<th>2=</th>
<th>3=</th>
</tr>
</thead>
<tbody>
<tr>
<td>1= No</td>
<td>2=</td>
<td>3=</td>
<td></td>
</tr>
<tr>
<td>2= Yes</td>
<td>1=</td>
<td>2=</td>
<td></td>
</tr>
<tr>
<td>3= &gt;5 servings</td>
<td>1=</td>
<td>2=</td>
<td></td>
</tr>
<tr>
<td>3= &gt;5 servings</td>
<td>1=</td>
<td>2=</td>
<td></td>
</tr>
<tr>
<td>3= &gt;5 servings</td>
<td>1=</td>
<td>2=</td>
<td></td>
</tr>
<tr>
<td>3= &gt;5 servings</td>
<td>1=</td>
<td>2=</td>
<td></td>
</tr>
</tbody>
</table>

### Table 4. Control variables. Questions, variable name and variable categories are provided to provide context for reference categories.

<table>
<thead>
<tr>
<th>Race</th>
<th>Income</th>
<th>Sex</th>
<th>Insurance</th>
<th>Exercise</th>
<th>Smoking Status</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
<td>Which one or more of the following would you say is your race?</td>
<td>Is your household's annual income from all sources: &lt;100-1999, etc.</td>
<td>Because it is sometimes difficult to determine over the phone, I am asked to confirm with everyone. Are you male or female?</td>
<td>Any type of health insurance?</td>
<td>During the past 30 days, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?</td>
<td>Have you smoked at least 100 cigarettes in your entire life? Do you now smoke cigarettes: everyday, some days, or not at all?</td>
</tr>
<tr>
<td>2008 variable name</td>
<td>newrace</td>
<td>newspovgrips</td>
<td>sex</td>
<td>insured</td>
<td>exercise</td>
<td>nonsmoker</td>
</tr>
<tr>
<td>2014 variable name</td>
<td>newrace</td>
<td>imputedpovertygroup</td>
<td>sex</td>
<td>insured</td>
<td>exercise14</td>
<td>nonsmoker</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable categories as used in this study</th>
<th>1=</th>
<th>2=</th>
<th>3=</th>
<th>4=</th>
<th>5=</th>
</tr>
</thead>
<tbody>
<tr>
<td>1= White Non-Hispanic</td>
<td>2=</td>
<td>3=</td>
<td>4=</td>
<td>5=</td>
<td></td>
</tr>
<tr>
<td>2= Black Non-Hispanic</td>
<td>3=</td>
<td>4=</td>
<td>5=</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3= Hispanic</td>
<td>4=</td>
<td>5=</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4= Asian/PI</td>
<td>5=</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5= Other Non-Hispanic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Interview Data

The interviews conducted with food retail store owners in New York City sought to elucidate the reasons that stores would change their selection of fresh fruits and vegetables or other healthy items and to understand the impacts of these changes. Change is defined as a store carrying more or less fresh fruits and vegetables or other healthy items over the period between 2007 and 2017. Interview questions aimed to show whether these changes occurred as a result of policy, customer preference, personal or business decisions or for other reasons.

Sample Selection

The target population was store owners whose selection of fresh produce had either increased or decreased between 2007 and 2017. The researcher identified these storefronts using the Google Maps Streetview program to visualize food retailers in 2007 and 2017. Using the New York State Open Data website, the name, location and other identifying information of every food retailer in New York City for 2007 was found. These retailers were randomly chosen to be entered into Google Maps and their street view found. In Google Maps Streetview, a specific address’ street view image can be viewed for every year its image has been collected by Google. The first year of collection was 2007 and most locations have been imaged every other year until 2017.

To determine if there was change in fresh produce selection and in which direction this change was, a storefronts’ image was analyzed for signs of external change such as store name or advertising. For example, if the storefront’s named changed from “Bodega” to “Supermarket” the store owner was hypothesized to have increased their selection of fresh produce as literature has shown that bodegas carry more processed and packaged food and less fresh produce than
supermarkets. Conversely, if the advertising outside a storefront changed from “fresh produce sold here” to “deli inside”, the store is hypothesized to have decreased their selection of healthy foods. This hypothesis was tested by contacting the store owner and asking if they perceive their selection to have changed and, if they responded it had, the interview would proceed. The sample size for this data was small due to the difficulty of randomly selecting stores and finding that those are stores whose selection has changed and because of the time necessary to properly vet and interview store owners limited the sample size.

**Interview Process**

IRB exempt status was obtained and IRB protocol was followed for these interviews (Appendix A). The interview participants each had a food retail store in New York City and had changed their selection of healthy food offered between the years 2007 and 2017. Participants were excluded if they reported that their store did not change their offering of fresh or healthy foods between 2007 and 2017 n=2, they did not wish to participate in the interview (n=18), or if they did not speak English (n=7).

Owners or managers of the selected stores were contacted by phone, as found online, and were asked to participate in and consent to a 10 to 15-minute survey over the phone at a future time of their convenience. If the owner or manager agreed to an interview, they were emailed a one page summary with contact information and to request a specific time for the interview (Appendix B). The summary specified a third party to contact if they had questions, including Professor Darren Zinner and the Brandeis IRB. Consent was established if they confirmed an interview date and time and voluntary agreed to speak. Data on the number of stores that consented or declined was maintained.
During the phone interview, verbal consent for the name of the subject’s store to be used in the final presentation of the data and for their interview to be audio recorded was obtained. If the subject did not consent to audio recording, the surveyor took handwritten notes. The store owner or manager were informed that if at any time during the interview they wished to not answer a question or terminate the interview, they could do so.

Interviews were conducted using the interview guide (Appendix C). The interview began by asking for background details about the store, such as how long it had been in the neighborhood and how long the interviewee has been in their role at that store. The interviewee was then asked if they believe that the fresh fruit and vegetable selection at their store has changed in the last 10 years. The subsequent questions addressed what had prompted the change, and specifically probed for answers relating to changes in *customer preference, results of public policy* and *changes due to business decisions* because literature has shown that these are the primary reasons food retailers to change their selection of fresh or healthy foods. The next set of questions were related to the food environment in which the store resided. Questions included if the store owner had ever been asked to carry healthier foods or if other stores in the neighborhood carried fresh produce or healthy foods. Lastly, the interviewee was asked about whether they wished to carry healthier foods and what changes they would like to see occur for this to happen.

**Interview Analysis**

The interviewer wrote down the answers while conducting the interview. While the interviews were not transcribed, the interviewer made sure to write any notable quotes that could be of assistance in the final analysis. As interviews were completed, the answers were put into an
excel document with the questions on the left-hand side and answers to each question across the document. Each column contained the answers given by one respondent. The store name and any identifying information was not attached to the answers. The answers were then compared across each question in order to identify trends and trends were noted in a separate document.
Results

Community Health Survey Data

The Community Health Survey was analyzed to examine the association of fresh food access and health outcomes and to identify meaningful trends over time. The demographics of respondents in 2008 and 2014 are presented in Table 5. Respondents were more likely to be white, female and between the ages of 45 and 64 in both 2008 and 2014. Respondents were almost equally split among the income groups in 2008 but were more likely make under 100% of the Federal Poverty Level in 2014. In 2008, 43% of respondents said they lived within a 5 minute walk of fresh produce and in 2014, 46% of respondents said they lived within a 5 minute walk of fresh produce.

<table>
<thead>
<tr>
<th>Demographics of Respondents in 2008 and 2014</th>
<th>2008</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Race</td>
<td>7554</td>
<td>8562</td>
</tr>
<tr>
<td>White Non-Hispanic</td>
<td>3,376 (44.69%)</td>
<td>2,983 (34.84%)</td>
</tr>
<tr>
<td>Black Non-Hispanic</td>
<td>1,780 (23.56)</td>
<td>1,861 (21.74)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1,691 (22.39)</td>
<td>2,535 (29.61)</td>
</tr>
<tr>
<td>Asian/PI</td>
<td>556 (7.36)</td>
<td>1,008 (11.77)</td>
</tr>
<tr>
<td>Other Non-Hispanic</td>
<td>151 (2.00)</td>
<td>175 (2.04)</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;100% FPL</td>
<td>1,365 (21.18)</td>
<td>2,331 (27.22)</td>
</tr>
<tr>
<td>100 - &lt;200% FPL</td>
<td>1,220 (18.93)</td>
<td>1,773 (20.71)</td>
</tr>
<tr>
<td>200 - &lt;400% FPL</td>
<td>1,072 (16.64)</td>
<td>1,538 (17.96)</td>
</tr>
<tr>
<td>400 - &lt;600% FPL</td>
<td>1,178 (18.28)</td>
<td>1,422 (16.61)</td>
</tr>
<tr>
<td>&gt;600% FPL</td>
<td>1,609 (24.97)</td>
<td>1,498 (17.50)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2,861 (37.87)</td>
<td>3,689 (43.09)</td>
</tr>
<tr>
<td>Female</td>
<td>4,693 (62.13)</td>
<td>4,873 (56.91)</td>
</tr>
<tr>
<td>Insurance Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insured</td>
<td>6,605 (88.35)</td>
<td>7,462 (88.57)</td>
</tr>
<tr>
<td>Not Insured</td>
<td>871 (11.65)</td>
<td>963 (11.43)</td>
</tr>
<tr>
<td>Exercise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>2,121 (28.10)</td>
<td>2,118 (24.78)</td>
</tr>
<tr>
<td>Yes</td>
<td>5,426 (71.90)</td>
<td>6,430 (75.22)</td>
</tr>
<tr>
<td>Smoking Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never Smoked</td>
<td>3,085 (41.05)</td>
<td>3,041 (35.67)</td>
</tr>
<tr>
<td>Current or Former Smoker</td>
<td>4,430 (58.95)</td>
<td>5,484 (64.33)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24 yrs</td>
<td>310 (4.11)</td>
<td>664 (7.77)</td>
</tr>
<tr>
<td>25-44 yrs</td>
<td>2,294 (30.44)</td>
<td>2,774 (32.46)</td>
</tr>
<tr>
<td>45-64 yrs</td>
<td>3,069 (40.72)</td>
<td>3,161 (36.99)</td>
</tr>
<tr>
<td>65+ yrs</td>
<td>1,863 (24.72)</td>
<td>1,946 (22.77)</td>
</tr>
</tbody>
</table>

Table 5. A breakdown of the demographics of the respondents. Each demographic includes the percentage of the population in parentheses.
Food Access and Health

Odds ratios for the 2008 and 2014 data are available in Table 6 and Table 7. The odds ratios for both years were similar and will be discussed below. The following description is of the 2014 results.

Controlling for demographic variables, regressions indicate that access to fresh food did not have substantial correlation to diet. Compared to New York City residents who live within a 5 minute walk fresh fruits and vegetables, those who live a 5-10 minute distance had similar rates of fruit and vegetable consumption (OR = 1.105, p = .184) and sugary drink consumption (OR = 1.119, p = .081). Those that lived even further (greater than 10 minute walk), had worse diet outcomes, including lower rates of fruit and vegetable consumption (OR = .977, p = 0.720). However, this group also had lower rates of sugary drink consumption (OR = .960, p = .437).

Conversely, there is a correlation between food deserts and chronic health outcomes, especially among those with the least access. Compared to New York City residents who live within a 5 minute walk of fresh fruits and vegetables, those who live a 5-10 minute distance had higher rates of obesity (OR = 1.136, p = .029), diabetes (OR = 1.055, p = .614) and high blood pressure (OR = 1.031, p = .681), but these values are not statistically significant. However, those who lived even further (greater than 10 minute walk), had significantly worse health outcomes, including higher rates of obesity (OR = 1.441, p = 0.00), diabetes (OR = 1.303, p = .001) and high blood pressure (OR = 1.235, p = .001).
### Table 6: Odds Ratios for 2008 Data

Table of odds ratio for the 2008 Community Health Survey data. Detail on questions, variable name and variable categories are provided in Table 3 and Table 4. Odds ratios are calculated against the noted reference.

<table>
<thead>
<tr>
<th>Controls</th>
<th>Model 1 BMI</th>
<th>Model 2 Diabetes</th>
<th>Model 3 Fruitveg</th>
<th>Model 4 General Health</th>
<th>Model 5 Blood Pressure</th>
<th>Model 6 Avgsoda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk to Produce</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 5 min</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
</tr>
<tr>
<td>5 - 10 min</td>
<td>1.082</td>
<td>(0.0705)</td>
<td>0.921</td>
<td>(0.120)</td>
<td>0.967</td>
<td>(0.0808)</td>
</tr>
<tr>
<td>&gt; 10 min</td>
<td>1.325***</td>
<td>(0.0738)</td>
<td>1.545***</td>
<td>(0.152)</td>
<td>0.905</td>
<td>(0.0651)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Non-Hispanic</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
</tr>
<tr>
<td>Black Non-Hispanic</td>
<td>1.981***</td>
<td>(0.127)</td>
<td>2.461***</td>
<td>(0.277)</td>
<td>0.479***</td>
<td>(0.0413)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1.674***</td>
<td>(0.115)</td>
<td>1.896***</td>
<td>(0.233)</td>
<td>0.373***</td>
<td>(0.0345)</td>
</tr>
<tr>
<td>Asian/PI</td>
<td>0.399***</td>
<td>(0.0422)</td>
<td>1.635***</td>
<td>(0.298)</td>
<td>1.233</td>
<td>(0.157)</td>
</tr>
<tr>
<td>Other Non-Hispanic</td>
<td>1.130</td>
<td>(0.199)</td>
<td>1.744*</td>
<td>(0.537)</td>
<td>0.915</td>
<td>(0.207)</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;100% FPL</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
</tr>
<tr>
<td>100 - &lt;200% FPL</td>
<td>0.801***</td>
<td>(0.0620)</td>
<td>0.676***</td>
<td>(0.0804)</td>
<td>1.018</td>
<td>(0.0998)</td>
</tr>
<tr>
<td>200 - &lt;400% FPL</td>
<td>0.804***</td>
<td>(0.0651)</td>
<td>0.510***</td>
<td>(0.0686)</td>
<td>1.312***</td>
<td>(0.138)</td>
</tr>
<tr>
<td>400 - &lt;600% FPL</td>
<td>0.734***</td>
<td>(0.0591)</td>
<td>0.502***</td>
<td>(0.0679)</td>
<td>1.708***</td>
<td>(0.180)</td>
</tr>
<tr>
<td>&gt;600% FPL</td>
<td>0.629***</td>
<td>(0.0503)</td>
<td>0.272***</td>
<td>(0.0423)</td>
<td>2.034**</td>
<td>(0.213)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
</tr>
<tr>
<td>Female</td>
<td>0.659***</td>
<td>(0.0332)</td>
<td>0.651***</td>
<td>(0.0591)</td>
<td>1.391***</td>
<td>(0.0909)</td>
</tr>
<tr>
<td>Insured</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
</tr>
<tr>
<td>Not Insured</td>
<td>0.831**</td>
<td>(0.0668)</td>
<td>0.684***</td>
<td>(0.107)</td>
<td>1.023</td>
<td>(0.104)</td>
</tr>
<tr>
<td>Exercise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
</tr>
<tr>
<td>No</td>
<td>0.680***</td>
<td>(0.0375)</td>
<td>0.737***</td>
<td>(0.0677)</td>
<td>2.110***</td>
<td>(0.152)</td>
</tr>
<tr>
<td>Smoker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never Smoked</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
</tr>
<tr>
<td>Current or Former Smoked</td>
<td>0.931</td>
<td>(0.0467)</td>
<td>0.854*</td>
<td>(0.0760)</td>
<td>1.234***</td>
<td>(0.0798)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24 yrs</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
<td>[ref]</td>
</tr>
<tr>
<td>25-44 yrs</td>
<td>2.044***</td>
<td>(0.294)</td>
<td>1.671</td>
<td>(0.882)</td>
<td>1.416**</td>
<td>(0.241)</td>
</tr>
<tr>
<td>45-64 yrs</td>
<td>3.044***</td>
<td>(0.435)</td>
<td>11.43***</td>
<td>(5.842)</td>
<td>1.612**</td>
<td>(0.273)</td>
</tr>
<tr>
<td>65+ yrs</td>
<td>2.132***</td>
<td>(0.315)</td>
<td>14.69***</td>
<td>(7.547)</td>
<td>1.939**</td>
<td>(0.344)</td>
</tr>
<tr>
<td></td>
<td>6,178</td>
<td>6,241</td>
<td>6,161</td>
<td>6,215</td>
<td>6,232</td>
<td>6,195</td>
</tr>
</tbody>
</table>
Table 7. Table of odds ratio for the 2014 Community Health Survey data. Detail on questions, variable name and variable categories are provided in Table 3 and Table 4. Odds ratios are calculated against the noted reference. *** p<0.01, ** p<0.05, * p<0.1.

<table>
<thead>
<tr>
<th>Walk to Produce</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>ref</td>
<td>ref</td>
<td>ref</td>
<td>ref</td>
<td>ref</td>
<td>ref</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.136** (0.0663)</td>
<td>1.055 (0.111)</td>
<td>1.105 (0.0628)</td>
<td>1.170*** (0.0653)</td>
<td>1.031 (0.0765)</td>
<td>1.119* (0.0721)</td>
</tr>
<tr>
<td>Fruitveg</td>
<td>1.441*** (0.0706)</td>
<td>1.304*** (0.108)</td>
<td>0.977 (0.0622)</td>
<td>1.615*** (0.0763)</td>
<td>1.235*** (0.0751)</td>
<td>0.960 (0.0537)</td>
</tr>
</tbody>
</table>

| Controls        |         |         |         |         |         |         |
| Race            |         |         |         |         |         |         |
| White Non-Hispanic | ref     | ref     | ref     | ref     | ref     | ref     |
| Black Non-Hispanic | 1.736*** (0.106) | 1.969*** (0.207) | 0.526*** (0.043) | 1.217*** (0.0718) | 2.153*** (0.116) | 2.139*** (0.149) |
| Hispanic        | 1.677*** (0.0981) | 2.073*** (0.214) | 0.464*** (0.0376) | 2.013*** (0.119) | 1.783*** (0.137) | 1.825*** (0.127) |
| Asian/PI        | 0.351*** (0.0284) | 1.456*** (0.201) | 1.165 (0.115) | 1.851*** (0.136) | 0.866 (0.0894) | 1.053 (0.0926) |
| Other Non-Hispanic | 0.968 (0.148) | 2.133*** (0.553) | 0.838 (0.165) | 1.286* (0.187) | 1.255 (0.252) | 1.489** (0.246) |

| Income          |         |         |         |         |         |         |
|                |         |         |         |         |         |         |
| <100% FPL      | ref     | ref     | ref     | ref     | ref     | ref     |
| 100 - <200% FPL | 0.947 (0.0589) | 0.766*** (0.0740) | 1.082 (0.0870) | 0.654*** (0.0393) | 0.969 (0.0749) | 1.050 (0.0716) |
| 200 - <600% FPL | 0.939 (0.0617) | 0.569*** (0.0624) | 1.348*** (0.116) | 0.445*** (0.0285) | 0.747*** (0.0619) | 1.088 (0.0785) |
| 400 - <800% FPL | 0.851* (0.0595) | 0.503*** (0.0606) | 1.635*** (0.151) | 0.257*** (0.0203) | 0.705*** (0.0619) | 0.913 (0.0726) |
| >600% FPL      | 0.673*** (0.0494) | 0.375*** (0.0522) | 2.266*** (0.217) | 0.209*** (0.0151) | 0.677*** (0.0629) | 0.820** (0.0698) |

| Sex             |         |         |         |         |         |         |
| Male            | ref     | ref     | ref     | ref     | ref     | ref     |
| Female          | 0.783*** (0.0339) | 0.784*** (0.0585) | 1.599*** (0.0902) | 1.045 (0.0435) | 0.938 (0.0514) | 0.615*** (0.0301) |

| Insured         |         |         |         |         |         |         |
| Insured         | ref     | ref     | ref     | ref     | ref     | ref     |
| Not Insured     | 0.936 (0.0649) | 0.521*** (0.0796) | 1.110 (0.0991) | 1.069 (0.0696) | 0.595*** (0.0586) | 1.169** (0.0834) |

| Exercise        |         |         |         |         |         |         |
| yes             | ref     | ref     | ref     | ref     | ref     | ref     |
| no              | 0.750*** (0.0379) | 0.803*** (0.0634) | 1.895*** (0.125) | 0.544*** (0.0265) | 0.759*** (0.0465) | 0.801*** (0.0449) |

| Smoker          |         |         |         |         |         |         |
|                |         |         |         |         |         |         |
| Never Smoked    | ref     | ref     | ref     | ref     | ref     | ref     |
| Current or Former Smoker | 0.945 (0.0424) | 0.877** (0.0659) | 1.212*** (0.0707) | 0.734*** (0.0319) | 0.845*** (0.0472) | 0.780*** (0.0402) |

| Age             |         |         |         |         |         |         |
| 18-24 yrs       | ref     | ref     | ref     | ref     | ref     | ref     |
| 25-44 yrs       | 1.787*** (0.164) | 3.479*** (1.481) | 1.386*** (0.153) | 1.219** (0.0994) | 1.868*** (0.318) | 0.664*** (0.0557) |
| 45-64 yrs       | 2.591*** (0.238) | 18.33*** (7.610) | 1.462*** (0.162) | 2.364*** (0.195) | 8.136*** (1.329) | 0.903*** (0.0267) |
| 65+ yrs         | 1.895*** (0.186) | 35.82*** (14.94) | 1.539*** (0.185) | 3.588*** (0.323) | 22.10*** (3.731) | 0.196*** (0.0199) |

8,170 8,279 8,086 8,241 8,271 8,242
Sociodemographic Factors

The percent change of each independent variable from the reference for the 2014 dataset was visualized in graphical form for each dependent variable (Figure 3). The noteworthy difference observed in this study was the affect that each control played on the outcomes. For every model both black and Hispanic cohorts had a significantly higher likelihood of poor outcomes. For example, black respondents had a 73.6% higher likelihood and Hispanic respondents had a 62.7% higher likelihood of being overweight or obese than white respondents. Black respondents were 47.4% less likely to have consumed a serving of fruits or vegetables in the past day and 113.9% more likely to drink more than one sugar-sweetened soda per day than their white counterparts. Hispanic respondents were 53.6% less likely to have consumed a serving of fruits or vegetables in the past day and 82.5% more likely to drink more than one sugar-sweetened soda per day than their white counterparts. Of these measures, Asian respondents were less likely to be overweight or obese, more likely to consume fruits and vegetables and less likely to drink sugar-sweetened sodas. The “other” category for race typically followed the trend of the black and Hispanic categories (in having a positive or negative percent change from the white category) but to a much lesser and must less severe extent.

Interestingly, there was a direct correlation between increasing income and decreasing the rate of disease and increasing the rate of healthy eating. When compared to an income of 100% of the federal poverty line (FPL), an income of 100 - <200% FPL predicted a lower likelihood of being overweight or obese, having diabetes, and reporting that one had poor general health. An income of 200 - <400% FPL predicted an even lower likelihood of those health problems than 100 - <200% FPL, a 400 - <600% FPL predicted an even lower likelihood of those health problems than 200 - <400% FPL and so on. Similarly, with diet, a higher income predicted a
higher rate of eating a serving of fruits and vegetable each day and a lower rate of consuming sugar-sweetened beverages. This result is especially interesting because it follows the theory that poor diet and poor health outcomes result from insufficient income to buy healthy foods and to afford quality healthcare. However, this finding does not prove that theory, it merely aligns with it.

**Figure 3.** Each graph shows the percent change from 1 of the odds ratio for the dependent variable from each reference (labeled). Percent change was calculated using the formula [(OR-1)*100]. Each graph contains the independent variable “walk to produce” and the controls. Significances found in Table 7. * = p<.05  ** = p<.01  *** = p<.001.
Each graph shows the percent change from 1 of the odds ratio for the dependent variable from each reference (labeled). Percent change was calculated using the formula \(((\text{OR}-1)\times100\)). Each graph contains the independent variable “walk to produce” and the controls. Significances found in Table 7. *  =  p<.05  **  =  p<.01  ***  =  p<.001.
Sub Analyses of Sociodemographic Variables

Several sociodemographic variables in the main regression show a strong correlation to diet, disease and health behaviors. To explore the relationship of whether food access exacerbates these findings, several sub analyses were conducted among vulnerable subpopulations.

Among blacks and Hispanics (n= 4,244), food access was not significantly associated with fresh produce consumption (5-10 minute walk: OR = 1.099, p = .635; greater than 10 minute walk: OR = 1.107, p = .546) compared to residents with a 5 minute walk, but these relationships are not substantially different than the population as a whole. Like the main analysis, healthy food access was also not significantly associated with worse health outcomes for those with a 5-10 minute walk to fresh fruits and vegetables but was significantly associated with worse health outcomes for those living further away. Compared to black and Hispanic residents who live within a 5 minute walk fresh fruits and vegetables, those who live a 5-10 minute distance had higher rates of obesity (OR = 1.113, p = .529) and diabetes (OR = 1.074, p = .634). Those that lived even further (greater than 10 minute walk), had even worse health outcomes, including higher rates of obesity (OR = 1.311, p = 0.00) and diabetes (OR = 1.228, p = .045).

Among those making less than 200% of the Federal Poverty Line (n=4,104), food access was associated with higher fruit and vegetable consumption (5-10 minute walk: OR = 1.254, p = .025; greater than 10 minute walk: OR = 1.253, p = .176) compared to residents with a 5 minute walk. This was substantially different than the general population, but it is not clear why this trend occurs. This population did have worse health outcomes that were greater than for the general population. Compared to residents making less than 200% FPL who live within a 5
minute walk from fresh fruits and vegetables, those who live a 5-10 minute walk away had similar rates of obesity (OR = 1.079, p = .820) and diabetes (OR = .994, p = .564). Those that lived even further (greater than 10 minute walk), had even worse health outcomes, including higher rates of obesity (OR = 1.397, p = 0.004) and diabetes (OR = .394, p = .005).

Lastly, for the population over age 65 (n=1,946), a greater walk to fresh produce was significantly associated with diet and this differed from the general population. Fruit and vegetable consumption of those with a 5-10 minute walk was lower, but not statistically different, than those with a less than 5 minute walk (OR = .817, p = .538). Fruit and vegetable consumption of those with a greater than 10 minute walk was lower than those with a 5-10 minute walk, compared to those with a less than 5 minute walk (OR = .673, p = 0.000).

Compared to residents over the age of 65 and within a 5 minute walk fresh fruits and vegetables, those who live a 5-10 minute distance had similar rates of obesity (OR = .969, p = .589) and diabetes (OR = .962, p = .554). However, those that lived even further (greater than 10 minute walk), had worse health outcomes, including higher rates of obesity (OR = 1.455, p = 0.001) and diabetes (OR = 1,246, p = .006). This result was not significantly different than the general population.

**Changes Over Time**

Multivariant regression analyses were conducted to examine the effect of food access on health outcomes and healthy behavior while controlling for the sociodemographic variables listed in Table 4. The odds ratios created from the *Community Health Survey* data showed little change between 2008 and 2014 (Figure 4). For the independent variable, “If you were to walk from your home to purchase fresh fruits and vegetables, how long would it take you to get
there?” the answer “5-10 minutes” provided slightly higher odds ratios in every category for 2014 than for 2008. While the answer “greater than 10 minutes” showed slightly higher odds ratios for the dependent variables of BMI, fruit and vegetable consumption and general health, it showed slightly lower odds ratios for the dependent variables of diabetes, blood pressure and sugary drink consumption. The difference in odds ratio never exceeded .2 for each variable, suggesting that the difference seen is minute. Further studies would have to be conducted, perhaps a longitudinal study or the same study on other years, to prove that this difference is consequential and not merely an outcome caused by the random nature of the samples for each year.

**Figure 4.** Odds ratios of health outcomes and behaviors (references found in Table 3) for 2008 and 2014. Figure 4A represents odds ratios for the group with a 5-10 minute walk from their home to a location to purchase fresh fruits and vegetables compared to individuals who have a less than 5 minute walk. Figure 1B represents odds ratios for the group with a greater than 10 minute walk from their home to a location to purchase fresh fruits and vegetables compared to individuals who have a less than 5 minute walk.

**Interview Results**

The interview produced a small sample (n=5). Respondents were all male and were all managers of their respective stores. Of the five respondents, the average length of the time the store had been in the neighborhood was 7.2 years but, excluding the outlier of 20 years, the
average was 4 years. The average amount of time that a respondent had been the manager was 2.6 years and most of the respondents (4 of 5) were not residents on the neighborhood in which the store was located.

Customer demand was a driving force behind the decision to carry fresh produce in a store. Whether or not a store carried fresh produce, the manager mentioned customer demand as the reason behind the decision. All those who responded that they carried fresh fruits or vegetables said that they did so because their customers requested it. Respondents indicated that they decided what to carry based on what their customers asked them to carry. For example, one respondent who carried many types of fresh produce and said that their store was constantly changing their selection stated: “We have vegetables because that is what our customers want. Our customers like to be healthy and we look for good food to be better than the other stores. Customers always give feedback and we listen to what customers want and answer to customers. You do what you do to make more money”. As shown, this respondent caters to their bottom line and, if the customer will buy fresh produce, they will be there to sell it.

The amount of fresh produce a store carried was also dependent on customer demand. One respondent stated that although they already carried a small amount fresh produce because it had been found to be popular with customers, they would carry more if customers asked them to. However, without customer requests they did not find a reason to increase their fresh produce selection. Additionally, stores that did not carry any fresh produce explained that their decision stemmed from a lack of customer demand. One respondent noted that he did not carry fresh produce but expounded that if customers asked him to, he would think about it: “I do not carry fruits or vegetables. Not for a reason but I would have to see more interest to stock them”. If
customers did desire fresh produce and communicated their interest, many stores would respond by carrying more and a wider variety of fresh produce.

Another significant finding was that those who did not carry fresh produce mentioned that expense was a factor in their decision. One respondent said that “it was too expensive” and that he “would not pay money for something customers do not want”. However, the respondent did not expand on what part of the expense they found the be limiting. Perhaps, future research could probe the price question and future policy could address ways to make carrying fresh produce more affordable to small business owners.

Selling fresh produce was looked at as a business decision rather than a moral or policy-driven decision. The managers who sold fresh fruits and vegetables did not mention any difficulty when beginning to sell this fresh produce. Rather, all managers who sold fresh produce stated that they considered the high up-front costs a business cost. This is significant as it shows that business is a driving force when deciding to sell fresh produce. Competition was important in making decisions to sell fresh produce.

Only managers of stores which carried fresh produce knew of other places in their neighborhoods that also carried fresh produce, indicating that this is a business decision made by stores to stay ahead of competitors. As one respondent put it, “some other stores sell fruits and vegetables and we always have to stay ahead”, referencing the need to attract more customers than their competitors. The choice to sell fresh produce has been casted as a business decision by every respondent, regardless of whether they carry fresh produce or not. For example, one respondent who did not carry any fresh produce said, “no one else has it [fresh produce], so why should I?”.
Remarkably, no respondent mentioned policy in their responses, even when probed about it. When asked about specific policies, no respondent knew about the specific policies that could benefit them. This has a twofold significance. First, no matter how many policies or laws exist, if the beneficiaries are not aware of their benefits, they are not valuable. Second, this study found that stores were carrying fresh produce despite not knowing about the policies. This shows that policy was not a deciding factor in deciding to carry fresh produce and were not necessary in these cases. When asked if he knew about Shop Healthy NYC, an initiative passed by the New York City Council to assist small shops in getting fresh produce, one respondent replied, “I don’t know about this, but I make my decisions for more money and for my customer.” While many policies are in place to assist in bringing fresh produce to stores, this study found that they were not used in actual circumstances of stores increasing their supply of fresh produce.

Overall, the interview portion of this study found that businesses did not rely on policy when deciding to carry fresh fruits and vegetables. Overwhelmingly, store managers expressed that their customers’ preferences drove these decisions and that competition and their bottom line were their top priority when choosing to carry healthy foods. Respondents stated that they were highly responsive to customer requests and that they look to customers and competition rather than policy when deciding what foods to stock in their stores.
Limitations

Limitations exist in every study. Likewise, this research is not without its limitations. Limitations exist in both the data analysis portion of the study and the interview portion of the study.

For the data analysis, the most obvious limitation is that the data obtained from the Community Health Survey from the NYC Department of Health and Mental Hygiene (DOHMH) only spans the years 2008 and 2014. These years were chosen because the variable “walk to produce” was present in both of these years. However, without this data on other years, the conclusions are limited to this timespan.

Another limitation exists in the types of bias that may exist in the Community Health Survey Data. The Community Health Survey was conducted over the phone using an automated system. There may be selection bias as the individuals who chose to answer the phone and complete the study are the only ones whose information is available. Additionally, to be a part of the survey an individual had to own a phone and that phone number had to have been provided to the NYC DOHMH through private company phone number logs. In 2008 the survey was only conducted through a landline phone, adding more limitations to this data. The survey also did not include those who lived in group living facilities (i.e. dormitories or nursing facilities). This data may be influenced by the types of individuals who were able to complete the survey. The survey was created in English and translated into three languages (Spanish, Chinese and Russian). Therefore, respondents only represent the population in New York City that speaks one of those four languages.

Lastly, self-report bias as well as recall bias both affect the types of answers given in the Community Health Survey. For example, in the case of self-report bias, one may be less likely to declare themselves overweight or to report that they drink large quantities of soda. In the case of
recall bias, one may not accurately remember how many servings of fruits or vegetables they had eaten in the previous day or how many sugar-sweetened beverages they consume on average. These types of biases create limitations in the collection of accurate and complete data.

The interview component of this study presents its own set of limitations. The first, and perhaps most restrictive, limitation is the small sample size of interview respondents. While almost 30 stores were called, only five store managers agreed to participate in the interview. The reasons for turning down interviews included a lack of time, a lack of knowledge of the English language, and, most commonly, the manager not being at the store at predictable hours.

While the study originally aimed to compare stores that increased their selection of fresh produce to those that decreased their selection, the process through which these stores were identified did not prove to be effective. Interviews were conducted to elucidate why stores chose to carry the amount and types of healthy foods that they did. Interview respondents discussed changes in fresh produce selection that did not match the change that had been hypothesized for their store.

The method through which stores were selected to request an interview had limitations. Stores were deemed to have changed their selection of fresh fruits and vegetables based on an image of their storefront taken in 2007 and an image taken in 2017. This method, while widely used, created room for error in classifying stores as having changed their selection. This creates a limitation in that stores may have been misclassified as not having changed their selection when they actually did and were therefore not contacted for an interview.

The interviews also contained selection bias as the respondent sample consists of only those who opted in to completing the interview. The interview was requested in a way that encouraged managers to speak about their healthy food options. More than once, managers who
stated that they did not carry healthy food turned down an interview. Perhaps in future experiments the interviewer would present the interview in such a way as to avoid respondents knowing about the topic before the interview occurs.

As with any interview or survey structured experiment, self-report bias and recall bias present limitations to the research. The language barrier between the interviewer and the respondent is another limitation. Many respondents stated that Spanish was their native language and, while they understood English, some of what the interviewer asked may have been misinterpreted or not understood in the way the interviewer intended. The interviewer did attempt to control for this type of bias by creating a Spanish version of the questions to send to the respondents, but respondents all chose to do the interview in English rather than over email in Spanish.

Finally, the interviews were only conducted on store owners and managers in the Bronx because the databased used to determine fresh produce changes was only completed for stores in the Bronx. This poses a limitation as it could be a reason that respondents had similar demographic attributes. However, the same laws and policies apply to everyone in New York City equally and therefore results from the Bronx can be expanded to other boroughs in New York City.
Future Research

Future research should expand on the knowledge that this study has added to the field of food desert research. The quantitative findings on the effect of how far one lives from a supermarket on their health as well as the qualitative results from the interviews suggest many future directions for this research.

One noted limitation of this research was the small sample size obtained in the interview portion of the study. This resulted from the inability to reach managers or owners at times that were convenient for them and from the hesitance by respondents to conduct an interview over the phone with someone they had not met. Therefore, future studies could utilize the method of conducting in-person interviews to ensure a larger sample size. This would consist of going door-to-door and, although it would be more labor intensive, it would produce stronger results.

The question of what costs were prohibitive for store owners looking to begin offering fresh produce was not addressed in this study. However, respondents in the interview portion of the study occasionally mentioned cost as a prohibitive measure for beginning to stock fresh produce. Since this was outside the scope of this study, respondents were not probed on this question, but future research should tackle this problem. If store owners decide that they would like to carry fresh produce, prohibitive costs should not stop them from doing so. While current legislation and policy do address the high costs of carrying fresh produce, they address what legislators speculate would be prohibitive costs but the research on what would store owners deem to be the most beneficial is limited. Delving into this question would inform future policy in a substantial way.

The original intent of this study was to compare healthy food access and health outcomes across the five boroughs of New York City. This could not be done as the Community Health
Survey data was not available on the borough or zip code level. New York has wide disparities in socioeconomic status, healthy food access and health status between neighborhoods (Baum et al., 2010). Pending more specific data, future studies should break down the healthy food and fresh produce access in New York City to the district, zip code or borough level. This could elucidate the areas of New York City that should be focused on when addressing inequality in food access and health outcomes and could also show researchers the effects of such disparities on healthy food access in a way that the city-wide study could not.

A natural continuation of the changes in healthy food offerings at specific stores over time would be to map out these changes using GIS mapping. Future studies could seek to utilize mapping programs to help visualize the changes that are happening in healthy food access in New York City. Additionally, health outcomes could be mapped in a similar way, connecting changes in healthy foods and changes in health outcomes over time. This would exhibit trends that this study could not capture.

Lastly, this study could be expanded to different cities. While the results of this study were significant for the City of New York, they cannot definitively be applied to cities with different laws, policies and actors. Conducting this study in other cities would be beneficial for obtaining similar findings for those cities and would provide data on how differences in cities lead to distinctive outcomes.
Policy Implications

The conclusions drawn from this study point to a myriad of potential policies that would alleviate the problem of urban food deserts in New York City. Many of the suggested policy implications will address the need to switch the focus from developers and retailers to consumers. Right now, policy is focused on those supplying the fresh produce, but not enough policy focuses on creating interest in those who would be buying the foods. Additionally, this study found that managers of food stores were unaware of the policies that applied to them or that could assist them in stocking health foods. Future policy should include provisions on how to ensure that beneficiaries know about the policy.

Increasing Consumer Demand

Urban food desert policy often focuses on addressing the needs of those providing healthy foods, such as developers and retailers. By doing so, these policies aim to create a system in which those who wish to provide healthy foods to their customers, can. Additionally, some policies incentivize even those who have not previously considered adding healthy foods, especially fresh fruits and vegetables, to their inventory. The results of this study call attention to the need for policy to focus on consumers, especially minorities. This study found that consumers, as the drivers of demand, play a sizeable role in creating the environment in which healthy foods are sold and consumed. The policy implications of this finding are limitless.

In the interview portion of the study, respondents who did not carry fruits and vegetables mentioned that they did not because customers had not asked for it. On the flip side, respondents who did carry fresh produce stated that they did so because it was popular with customers or because customers had requested it. Although a store may be open to selling fresh produce, they
will only do so if there is sufficient demand. Future policy should look to create such a demand. For example, policies focused on educating consumers as to why fresh fruits and vegetables are beneficial could lead to increased demand for such foods. Policy could also create local initiatives aimed at helping local store owners see the community’s demand for fresh produce. Future policy should attempt to increase consumer demand as a way of creating a system in which healthier foods are being supplied and consumed.

**Focus on Minorities**

The food access and health data analysis portion of this study found that individuals of minority races were more likely to consume more sodas and less fresh produce and more likely to have worse health outcomes. While the association of these factors with walking distance to fresh fruits and vegetables did not vary significantly from the general population, the black and Hispanic groups did show significantly higher rates of nutritionally related disease. The disparity in outcome could stem from a myriad of factors but future policy should focus on ways to specifically target these groups. The disparities in consumption of healthy foods, with black and Hispanic groups being more likely to consume unhealthy foods and less likely to consume healthy foods, can also be addressed through policy. For this reason, future policy should focus on these minorities, perhaps specifically targeting minority communities.

**Focus on Low-Income Consumers**

The *Community Health Survey* analysis found a direct correlation between income, diet and health. In fact, as income increased, the likelihood of consuming fresh produce increased, and the likelihood of consuming sugar-sweetened beverages decreased along with the likelihood
of having a nutritionally related disease. Often times, policy is built to address everyone equally, but future policy should focus specifically on bringing healthy foods to low-income communities. Programs such as the FRESH program in New York City or the Green Cart program can be expanded to ensure that a low income is not a barrier to eating healthy.

Additionally, the qualitative portion of this study found that some respondents worried about the costs their store would incur by carrying fresh fruits and vegetables. While these specific locations did not carry fresh produce, if they did, the costs would surely be passed on to the customer thereby creating an incentive to not buy these healthy foods. Future policy should address the high costs of eating fresh fruits and vegetables and should look for ways to ensure that cost is not a barrier to the consumer who wishes to eat a healthy diet.

**Publicizing Policies**

When asked if they knew about any policies that could assist small stores in bringing healthy foods to their shelf, every respondent replied “no”. The interview responses showed that the lack of knowledge about policy and programs were hurting customers. Customers who could be going to bodegas which stocked subsidized fruits and vegetables or supermarkets receiving tax breaks for carrying fresh produce were going to local convenience stores that only sold processed foods. It is a shame the programs that have the potential to help many are not being used to their fullest extent.

Every policy should be created along with a plan to publicize that policy. For example, the Healthy Bodegas Initiative, a sound policy aimed at assisting bodegas in carrying fresh fruits and vegetables, did not include a provision for how potential recipients of the program would find out about it. Future policy should address the problem of disseminating knowledge about the
policy and should work to ensure that every potential recipient is not only aware of but adequately understands how each policy could be beneficial for them.

The individuals interviewed in this study overwhelmingly did not speak English as their first language and a majority were immigrants. Currently, the systems to disseminate potential policies does not include provisions to ensure that those who may not interact with society as the typical American-born, English-speaker does still have ready access to potential policies (Brownson, Eyler, Harris, Moore, & Tabak, 2018). Future policy must include ways to disseminate knowledge about programs to everyone because no policy is useful if the recipients are unaware of their existence.
Conclusion

This study analyzed the effects of increasing food access on health in New York City between 2008 and 2014. The results of this study prove that there is a correlation between access to fresh fruits and vegetables and diet quality and health outcomes. Notably, the study found that individuals have worse health outcomes when they have to walk further to buy fresh fruits and vegetables and that this finding was especially pronounced for those living more than 10 minutes from fresh produce. Increased access to fresh produce was associated with lower rates of heart disease, diabetes and obesity as well as a lower likelihood of consuming sugar-sweetened beverages. Consequently, lack of fresh fruit and vegetable access is a public health issue.

In addition to determining the effects of insufficient access to fresh produce, this study revealed ways to increase access. Interviews with store managers indicated that decisions to sell fresh fruits and vegetables are made based on customer preferences with little attention paid to beneficial policies. This suggests that future policy addressing food deserts in New York City should look to interest consumers in buying fresh produce. Furthermore, this study showed that any type of law or public policy pertaining to food access and food deserts needs to be publicized in a way that all those who could utilize them know about them. These results exhibit the need for policy to directly address those who would benefit from it most.

This thesis has shown that, although food deserts have been identified and health outcomes have been quantified, policy has not sufficiently resolved the problem of healthy food access in New York City. This research will inform change by outlining and articulating the efforts to address this issue. Only with increased fresh fruit and vegetable access and policies encouraging consumers to buy and, consequently, store owners to sell fresh produce will we begin to see improved health outcomes. Development and communication of policy is critical in
order to increase the likelihood of successful health outcomes in underserved areas. This will help ensure that the health needs of individuals and communities are met for years to come.
References


Appendix: A

IRB Exempt Application

Exempt Research Protocol

Use this form if you believe your research to be exempt from IRB review. The PI may not make final determination of exempt status.

Instructions
1. This form is a dynamic pdf - the box fields will adjust in size after you have filled them out (once you have completed typing, click outside the box, and it will expand to make all your text visible).
2. Feel free to cut and paste from a word processor; however, we ask that you use the font Arial 10 to maximize readability.
3. To format text, use keyboard command Command/Ctrl E to open a font toolbar. (When making revisions required by the IRB or IRB offices use a bold red font to identify the changed text.)

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<tr>
<td>Project Title:</td>
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<tr>
<td>Zinner Hall</td>
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<tr>
<td>First Name: Darren</td>
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<tr>
<td>Last Name: Hall</td>
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<tr>
<td>Dept: HSSP</td>
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<tr>
<td>PI Phone: 781-796-3971</td>
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<td>E-mail: <a href="mailto:dzinner@brandeis.edu">dzinner@brandeis.edu</a></td>
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<tr>
<td>Student Researcher Last Name: Alyafit</td>
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<td>Status: Undergraduate</td>
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<td>Phone: (412) 526-5732</td>
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<tr>
<td>E-mail: <a href="mailto:alyafit@brandeis.edu">alyafit@brandeis.edu</a></td>
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Grant Title

1. Exemption

Check all categories of exemption for which you are applying: [ ] Category 1 [ ] Category 2 [ ] Category 3 [ ] Category 4 [ ] Category 5 [ ] Category 6

2. Purpose of the Research

[ ] Class Assignment [ ] Thesis/Dissertation [ ] Presentation [ ] Evaluation/Assessment [ ] Publication [ ] Other:

Describe the overarching goal of what you seek to discover from the research, as well as its expected benefits.

I plan to explore food deserts in the New York Metropolitan area. My research will seek to elucidate how and why fresh food access has changed in the Bronx between 2007 and 2017. My research on what specific factors, including policies or shifts resulting from public policy, have led to a change in fresh food locations will be conducted through interviews with store owners of locations which have changed their quantity of fresh food offered from 2007 to 2017. To determine the correlation to health outcomes, I will use datasets provided by the CDC, FDA and local governments around the US to determine the prevalence of the three above-mentioned nutritionally related diseases in neighborhoods with similar racial and socioeconomic demographics to those of the zip codes I am studying. These methods will inform research on the health impacts of low food access to the Bronx community and how they can be mitigated through policy change.

3. Personnel

List all research personnel who will take part in the research, role in the project, and CITI training in human subjects research. For student-initiated research, describe the PIs professional qualifications to oversee the student project.

I am a senior at Brandeis majoring in Biology and Health Science, Society and Policy. As a research assistant at the CUNY School of Public Health Urban Food Policy Institute this past summer, I gained experience conducting and transcribing interviews with business owners in New York City. I’ve also completed the CITI training in human subjects research.

Darren Zinner, Ph.D. is a professor in the Health Science, Society and Policy (HSSP) Program at Brandeis.

4. Collaborations

415 South Street, MS 110 • Barnstein-Marcus, Room 121 • Waltham, MA 02454 • T. 781.736.8933 • F. 781.736.2123 • irb@brandeis.edu
Variables within the database from which subjects will be selected was created in conjunction with the CUNY School of Public Health Urban Food Policy Institute.

5. Conflicts of Interest

List any actual, potential, or apparent conflicts of interest - financial or otherwise - any research personnel or collaborator may have regarding this research. (This includes any actual, potential, or apparent financial conflicts of interest that do not rise to the level of significant financial interest.)

☐ No Conflicts of Interest Exist

6. Study Location

Outline where the proposed research will be conducted.

☐ Home Institution (e.g., Brandeis campus)

Brock, NY and Brandeis University

7. Existing Data and Protected Information

*For detailed information regarding the use of PHI see the HRPP webpage HIPAA and PHI

☐ Yes ☐ No Does the proposed research involve the use of existing data, documents, records, or pathological or diagnostic specimens?

☐ The data, records, or specimens are publicly available.

☐ Authorization to access the data (if not publicly available) is required. (Attach authorization documents.)

☐ The original data, records, or specimens were collected for non-research purposes.

☐ Yes ☐ No Does the proposed research involve the use of de-identified HIPAA-Protected Health Information (PHI)?

☐ Yes ☐ No Does the proposed research involve the use of non-de-identified HIPAA-Protected Health Information (PHI)?

☐ Yes ☐ No Does the proposed research involve the use of FERPA-protected educational records?

8. Subject Details

*For detailed information regarding the use of vulnerable populations see the HRPP webpage Vulnerable Subjects

☐ Adults (≥18) ☐ Minors (<18) ☐ Cognitively Impaired ☐ Minorities ☐ Students

☐ Economically Disadvantaged ☐ Educationally Disadvantaged ☐ Elderly/Aged

☐ Other:

Approximately how many subjects do you plan to enroll? If enrolling multiple groups, (e.g., those to be surveyed vs those to be interviewed, controls, etc.) specify how many subjects you plan to enroll in each group.

11-15

Describe your subjects – explain any inclusion and exclusion criteria you plan to employ.

The subjects will be included in the study if they currently own or manage a food store in the Bronx which has changed its selection of fresh foods between 2007 and 2017. Subjects will be asked to participate in and must opt into the study.

Justify the use of any special/vulnerable populations for this research.

☐ Not Applicable

9. Identifiers to be Collected:

*For detailed information regarding the collection of subject identifiers see the HRPP webpage De-Identifying non-PHI Data
10. Recruitment Methods

Describe the recruitment methods you plan to employ. (Attach recruitment materials and site-specific permissions to recruit, if applicable.)

I will recruit subjects using a database of food stores in the Bronx developed by the CUNY Urban Food Policy Institute. Subjects will own or manage a store that has changed its selection of fresh fruits and vegetables (either more or less) between 2007 and 2017. The subjects will be contacted by phone to ask if they would like to participate in the survey and the project will be outlined in detail at the time.

11. Procedures

What data recording methods will you employ?

- Handwritten Notes
- Computer
- Video Recording
- Audio Recording
- Photograph

Other:

What Data Collection Tools/Study Instruments will you use? (Attach all study instruments.)

- Online Survey
- Paper Survey
- Interview Guide
- Standardized Test
- Behavioral Measure(s)

Other:

How will you interact with your subjects/conduct your research?

- In person (1 on 1)
- In person (group)
- Email
- Telephone/Skype
- Online
- Standard Mail

Other:

Describe all procedures, steps, and actions you will be performing in chronological order – be as detailed as possible.

- Include a discussion of the specific data you will be collecting and what you plan to do with it.
- Describe in detail your plans for protecting the subjects’ privacy and data confidentiality/anonymity, if applicable.
- Notes: If helpful, you may use bullet points and/or attach flow charts, graphs, timelines, etc.

Phase

1. Food stores are designated as having changed their selections of fruits and vegetables if they have changed their store type at the same storefront between 2007 and 2017 as determined by images on Google maps. Store names and locations are from an nys.gov database with the names and identifying information of all food stores created and released each year.

2. Stores that have changed their selection of fruits and vegetables between 2007 and 2017 as indicated using the data collected in phase 1, are selected. A change in selection of fruits and vegetables will be determined by a store being ranked high in fruit and vegetable...
3. Owners or managers of these stores are contacted by phone, as found online, and are asked to participate in and consent to a 10-15 minute survey over the phone at a future time of their convenience.
   a. Student interviewers are proficient in Spanish, the second most spoken language (aside from English) in the Bronx, NY. If the research subject wishes to speak in their native language, they will be accommodated using either questions translated by someone fluent in both English and their native language.
4. Owner or manager is emailed a one-page summary with contact information and to request a specific time for the interview. The summary will specify a third party to contact if they have questions. Consent is confirmed if they confirm an interview date and time and voluntary agree to speak.
   a. Data on the number of stores that consent or decline will be maintained.
5. Phone interview: Verbal consent will be obtained for the name of the subject’s store to be used in the final presentation of the data and for their interview to be audio recorded. If the owner or manager does not consent to the name of their store being used the surveyor will use a pseudonym for their store in the presentation of the data. If the subject does not consent to audio recording, the surveyor will take handwritten notes.
6. The interview is conducted over the phone with 10-15 subjects. The survey is audio recorded, if consent is given, and notes are taken on the interview.
7. The data obtained from the interview on reasons why store owners or managers changed their selection of fresh fruits and vegetables between 2007 and 2017.
8. The surveyor will write up responses within 48 hours in a common document allowing comparison of responses across questions.
   a. The spreadsheet will not reference the names of the subjects or the store name if the subject so requested. Just the pseudonym
      will be used to identify stores if the subject did not consent to the store name being used in the final presentation.
9. A separate document will contain a cross-reference list of store names and pseudonyms that will be maintained only by the surveyor.
   a. This separate spreadsheet will be kept in Box linking the names of the store owner or manager (the subject), the name of the
      store and the pseudonym. This spreadsheet will be destroyed right after the final thesis presentation in May 2019.
10. Answers to the survey questions (attached) will be categorized by policy, consumer choice etc. on an excel spreadsheet and
    qualitative findings from interviews will be used to suggest how or why these changes occurred.

12. Risks and Benefits

*For detailed information regarding minimizing risks and balancing risks and benefits see the HRPP webpage Criteria for Review

What risks do you foresee for subjects in this research? Remember, all research involves some risk, even if only minimal.

☐ Social       ☑ Psychological/Emotional       ☐ Physical       ☐ Legal       ☐ Economic       ☐ Loss of privacy/confidentiality
☐ Other:

Describe in more detail the risks to subjects checked above.

Subjects could experience psychological guilt as a result of my asking owners to discuss why they do or do not have certain foods. Additionally, they will experience a loss of privacy by telling me the information which I will be collecting in the survey.

Describe your provisions for managing the risks discussed above.

The subject will be able to terminate the interview at any point before or during the interview. They will not have to give a reason and can request for the information already disclosed to not be used. The privacy of subjects will be protected through the use of password protected folders on Box.com. The names of subjects will not be disclosed to anyone and if the subject requests that their store have a pseudonym the document connecting store names, subjects and pseudonyms will be kept in a locked folder on Box.com to which no one will have access besides me.

Describe the anticipated benefits to subjects, society, and/or other specific groups from this research. (Note: Compensation is not a benefit.)

This research will seek to connect food deserts, health outcomes and public policy in New York City. This research has the potential to help policy makers better understand how food deserts arise and what solutions can be implemented to bring healthier food to neighborhoods that lack it. The research also has the potential to inform store owners about the impacts on the neighborhood of having healthier food in their stores.
13. Costs and Compensation

Describe any costs to subjects for their involvement in this research (time, transportation, economic – loss of work, need for child care – etc.).

☐ Not Applicable

Costs are the time to participate in the interview. There will be no compensation for this cost.

Describe any form of compensation subjects will receive (cash, gift card, course credit, medical care) as well as the terms and conditions of receiving the compensation (e.g., partial compensation for partial participation, etc.).

☐ Not Applicable

14. Informed Consent

*For detailed information regarding informed consent — including how to construct an informed consent form — see the HRPP webpage Informed Consent.

Select all that apply:

☐ The proposed research will follow standard procedures for obtaining documented informed consent.

☐ Approval for a waiver of documented informed consent is being requested.

☐ Approval for an alteration to or waiver of informed consent is being requested.

☐ The proposed research involves children.

☐ Information regarding the true objectives of the research will be withheld during the informed consent process (incomplete disclosure).

Describe the circumstances surrounding your informed consent procedures – remember that obtaining informed consent is a continuous process:

- Describe the setting in which you will be obtaining informed consent, along with any special considerations you will make for vulnerable or non-English speaking subjects (e.g. witnesses or translators).
- If your subjects include children (<18), describe both the parental consent and child assent processes.
- Attach all consent documents and scripts.

☐ Not Applicable: A waiver of informed consent is being requested.

- If requesting a waiver of standard documented informed consent procedures, detail the reasons why and the conditions that necessitate the request.
- If requesting an alteration to or waiver of informed consent, detail the reasons why and the conditions that necessitate the request.

☐ Not Applicable: Standard procedures for obtaining documented informed consent will be followed.

A waiver of informed consent is being requested. The risk to the subject in this study is minimal. The only potential risk is that subjects could experience psychological guilt as a result of any asking owners to discuss why they do or do not have certain foods and that they will experience a loss of privacy by telling me the information which I will be collecting in the survey. These risks will be minimized as described above. Furthermore, informed consent would not minimize the effects of the potential risks for the subject.

After being reminded they may start participation at any time, consent will be assumed if the subject agrees to an interview during an initial phone meeting and a follow-up email and through voluntary completion of the interview. At the beginning of the interview, verbal consent will be requested for audio recording. The informed consent script is included in the interview guide attached. If the subject does not consent the interview will not be recorded and typed notes will be taken. Written consent for an interview would not be required outside of the research context.

15. Data Security

*For detailed information regarding data security see the HRPP Guide to Data Management and Protection.

Describe how you will keep the research data you collect (including consent forms, surveys, notes, recordings, etc.) secure throughout their lifespan (collection → transportation → storage → data analysis → publication → destruction/indefinite storage):

Describe how you will keep the research data secure during collection (e.g., audiotape directly to Box.com).

☐ Not Applicable

All interviews will audiotaped directly to Box.com. Interviews that are not audiotaped will be transcribed directly onto a document on Box.com. No handwritten or hard copies of the notes will exist. Notes on the audio recordings will be written directly onto a
If collecting sensitive information (level IV or V), describe how you will keep the research data secure during transportation (e.g., in a locked briefcase).

☐ Not Applicable

Describe how you will keep the research data secure during storage (e.g., in a locked file cabinet).

The data collected in the study will be kept in password protected folders on Box.com. Every folder will have a different password. One folder will contain a document linking the subjects, any of their identifying information (contact information), their store and the pseudonym of the stores. The audio files of the interviews will be kept in a separate folder. All files except those connecting the subject, store and pseudonym, will only be accessible by me and Professor Darren Zinner. The file connecting the subject, store and pseudonym will only be accessible by me.

Describe how you will keep the research data secure during data analysis (e.g., on Box.com).

A third folder will have the interview notes as well as any interview data analysis. These notes and analysis will only reference locations by their pseudonym. All files except for those connecting the subject, store and pseudonym, will only be accessible by me and Professor Darren Zinner. The file connecting the subject, store and pseudonym will only be accessible by me.

Describe how and at what point the research data will be de-identified.

☐ Not Applicable

The research data will be de-identified within 48 hours of conducting each interview. The name of each subject, their store and their store’s pseudonym if they do not wish for their store name to be used, will be stored in a document on a password protected file on Box.com. This folder will have a different password than other folders used for this research and will only be accessible by me.

Describe how you will protect confidentiality when the research data is presented/published.

I will use the name of the stores but not of the names of or other identifying information about the owners of these stores in the presentation of the data.

Describe when and how the research data will be destroyed. If the research data will be stored indefinitely, describe how you will continue to keep it secure.

All data, identifying information and audio files will be destroyed in May after defending my thesis.

Describe who will have access to the research data throughout its life. (must always include PI).

All files except for those connecting the subject, store and pseudonym, will only be accessible by me and Professor Darren Zinner. The file connecting the subject, store and pseudonym will only be accessible by me.

Discuss any additional data security plans you may have.

☐ Not Applicable

16. Additional Committee Approvals

☐ Yes ☐ No: This research involves human blood, fluids, tissues, or cell lines; infectious agents; select agents; or rDNA.

☐ Yes ☐ No: This research involves animals.

17. Additional Comments

18. Supporting Documents

Please attach to this application:

☐ Assurances: PI or Faculty/Student

☐ Consent Documents: Final versions (as they will appear to your subjects - e.g., with graphics, on letterhead, etc.) of informed consent/assent forms, information sheets, computer consent screens, consent/assent scripts, etc.
Zinn
Bahary

Recruitment Materials: Final versions (as they will appear to your subjects - e.g., with graphics, on letterhead, etc.) of
flyers, letters, texts of e-mails, scripts for phone calls, etc., as well as site-specific permissions to
recruit if working with an outside organization (i.e., letters of permission from each organization
that details their understanding of your project, their support and involvement in your project,
and the duration of their involvement in your project).

Study Instruments: Surveys, questionnaires, interview guides, tests, photographs, equipment diagrams or photographs,
etc.

☐ Translation Certification(s), if applicable
☐ Permission Letter(s); Data Use Agreements (DUs), Memorandums of Understanding (MOUs), etc.
☐ International Research Addendum, if applicable
☐ Other:

Revised 11/7/2018
Appendix: B

Recruitment Email

Dear ,

Thank you for agreeing to participate in a 15 minute phone interview.

To recap what we went over in our phone call, here is a brief description of my thesis. I am conducting research for my senior thesis on urban food deserts in New York City. As part of my research, I am conducting a survey of food stores in New York City which have been designated as having changed their fresh fruit and vegetable selection between the years 2007 and 2017. The purpose of the survey is to identify what prompted these changes to better understand how food deserts have evolved in New York City.

I also want to remind you that, do you choose to participate in this survey, your answers are confidential and neither your name nor any of your contact information will be shared with anyone outside of myself and my advisor, Darren Zinner. Your participation is voluntary, you can choose to not answer any question if you do not wish to do so. If at any time during the interview you do not wish to continue, you may terminate the interview. The name of your business will be used in the final presentation of the data, but if you wish for the name of your business to not be used, it will not.

If you have questions about the survey, you can contact Dr. Zinner, my thesis advisor, or the Institutional Review Board at Brandeis University.

Darren Zinner
Email: dzinner@brandeis.edu
Phone: (781)-736-3971

Institutional Review Board
Email: irb@brandeis.edu
Phone:(781) 736-8133

I am also going to attach the questions I will be asking during the interview. If you would like the questions to be translated to another language, please let me know and I will send you a copy of the questions in your preferred language.

Questions:
1. How long has this store been in the neighborhood?
2. How long have you been the manager of this store?
3. Do you live in this neighborhood?
4. Have you changed your selection of fresh fruits and vegetables in the past 10 years (or since you began managing this store)?
5. If so, what prompted that change?
6. Where else can residents in your neighborhood get fresh food?
7. Have you ever been asked to carry fruits and vegetables?
8. Did you change your fruit and vegetable selection as a result of this? If not, why not?
9. Do you wish to carry more fresh foods and, if so, why don’t you?

If you would be able to participate in this survey, please send me a few times and dates that work for you. The survey will be conducted over the phone, so please also make sure to include the phone number I should call at.

Thank you,

Ayelet Bahary

signature
Appendix: C

Interview Guide

The initial phone call to request an interview:

Good morning/afternoon. My name is Ayelet Bahary and I am a student at Brandeis University located outside Boston, Massachusetts. I am contacting you to ask if you would be willing to take 10-15 minutes to answer a few questions about your business. I am conducting research for my senior thesis on urban food deserts in New York City. As part of my research, I am conducting a survey of food stores in New York City which have been designated as having changed their fresh fruit and vegetable selection between the years 2007 and 2017. The purpose of the survey is to identify what prompted these changes to better understand how food deserts have evolved in New York City.

Your answers are confidential and neither your name nor any of your contact information will be shared with anyone outside of myself and my advisor, Darren Zinner. Your participation is voluntary, you can choose to not answer any question if you do not wish to do so. If at any time during the interview you do not wish to continue, you may terminate the interview. The name of your business will be used in the final presentation of the data, but if you wish for the name of your business to not be used, it will not.

I would be happy to email you a one page summary/outline of research project along with the primary set of questions we are interested in asking and also provide other contact info for questions. Would you be willing to take the survey and can we set up a time to talk for 15 min?

If you have questions about the survey, you can contact Professor Zinner, my thesis advisor, or the Institutional Review Board at Brandeis University

Darren Zinner
Email: dzinner@brandeis.edu
Phone: (781)-736-3971

Institutional Review Board
Email: irb@brandeis.edu
Phone: (781) 736-8133

At actual interview:

As we discussed earlier, I am conducting research for my senior thesis on urban food deserts in New York City. As part of my research, I am conducting a survey of food stores in New York
City which have been designated as having changed their fresh fruit and vegetable selection between the years 2007 and 2017. The purpose of the survey is to identify what prompted these changes to better understand how food deserts have evolved in New York City.

Your answers are confidential and neither your name nor any of your contact information will be shared with anyone outside of myself and my advisor, Darren Zinner. Your participation is voluntary, you can choose to not answer any question if you do not wish to do so. If at any time during the interview you do not wish to continue, you may terminate the interview. The name of your business will be used in the final presentation of the data, but if you wish for the name of your business to not be used, it will not. Now ask: Would it be okay for the name of your business to be used in the presentation of this research? Is it okay that I audio record this interview for my notes, it will not be shared with anyone else? If not, I will take typed notes.

Questions:

1. How long has this store been in the neighborhood?
2. How long have you been the manager of this store?
3. Do you live in this neighborhood?
4. Have you changed your selection of fresh fruits and vegetables in the past 10 years (or since you began managing this store)?
5. If so, what prompted that change?
   - If subject is struggling to find an answer, prompt with:
     i. change in customers
     ii. policy
     iii. economic/ business decisions
     iv. competition
6. Where else can residents in your neighborhood get fresh food?
7. Have you ever been asked to carry fruits and vegetables?
   - Could be by a customer or by the city
8. Did you change your fruit and vegetable selection as a result of this? If not, why not?
9. Do you wish to carry more fresh foods and, if so, why don’t you?

Thank you for your participation in this survey. The results of this survey and the entire study will be presented as part of my senior thesis at Brandeis University. If you would like, I would be happy to share the final publication with you as well as a condensed version of the results.

Have a good day and thank you again for your participation.