ACCESS AND AWARENESS OF HEALTHY FOOD OPTIONS IN THE UNITED STATES:
A SYSTEMATIC REVIEW OF FOOD DESERTS

By

Terrance Shawn McGill, MD

A Master's Paper submitted to the faculty of

the University of North Carolina at Chapel Hill

In partial fulfillment of the requirements for

the degree of Master of Public Health in

the Public Health Leadership Program.

Chapel Hill

2012

_____

Advisor: William A. Sollecito, DrPH

_____

Second Reader: David Steffen, DrPH

_____

Date

1

ABSTRACT

The United States Census Bureau and Measure of America's human development research provide data associating the geographic locations of people living in the United States and their health outcomes. Specifically, these data indicate that the zip code in which a person lives is correlated with their life expectancy. (Measure of America, 2012)(United States Census Bureau, 2012)One of the critical aspects of that determination has been linked directly to the amount of healthy food options in a given geographical area. Specifically, areas that are saturated with healthy food options are more likely to have healthy populations living there. However, those who do not have access or opportunity to obtain healthy food in their neighborhoods are said to live in what is now coined as food deserts; areas without supermarkets and access to healthy food is limited, including those without supermarkets.

Over time due to various pressures, such as socioeconomic, political, and environmental, these food deserts have become more prevalent resulting in healthy food options becoming scarcer for people living in those areas. In this paper, I have done a systematic review of studies that focused on different dimensions of the food desert dilemma. I analyze how people, view, purchase and consume food. The consumers' mindset of those living in these food deserts has switched from buying things that are healthy to now trying to buy things that are more affordable. However, that affordability has come at a high price to people's health while not serving as much of viable food option as it is a quicker food option. These food deserts have changed the landscape of the country, forcing the people living in those desolate areas to become nomads in search of quality food choices. To illustrate this concept I present a specific example of the impact of food deserts on my hometown of Greensboro, North Carolina. After reviewing the current thinking on this topic I provide a stratagem that incorporate leadership philosophies, health communication theories and policy designed to educate the people who live in food deserts towards the goal of eliminating food deserts which will improve the health of those living in these communities.

Finally, I present recommended policy changes and other ways to combat this health barrier that has crossed into many different arenas of life. I propose that these solutions will have to be multi-dimensional and intersecting various parts of everyday lives including but not limited to, health care, businesses, transportation, education and government.

BACKGROUND

The definition and extent of what is a food desert has been highly scrutinized but that does not diminish impacts that food deserts have had on numerous parts of the world and more specifically in the United States, where food deserts have posed very formidable barriers to healthy living. These barriers have led to poor health outcomes and increased the risks that meet the criteria of being a food desert for developing obesity, cardiovascular disease, hyperlipidemia and diabetes for people living in those areas. (Boone-Heinonen et al., 2011; Graham, Kaufman, Novoa, & Karpati, 2006; Lewis et al., 2005; Widener, Metcalf, & Bar-Yam, 2012)

The goals of this paper are to use this review to: 1) discuss the genesis of a food desert; 2) analyze and classify recent journal articles in terms of what makes up the anatomy of food deserts; 3) review the strengths and weaknesses of each article; 4) consider policy changes at the local, state and national level aimed at improving life in food deserts with the long term goal of ultimately eliminating food deserts; 5) make recommendations on further research that should be done to help eradicate food deserts that exist and prevent them from reappearing.

This is especially important at this time in the history of the United States because there are several factors that contribute to the exacerbation of this problem , including: high levels of immigration of poor people coupled with high levels of unemployment among established residents and overall higher levels of poverty than we have had in many years. For example, the topic of food deserts was discussed at length at this year's Democratic National Convention. These factors were mentioned in various speeches and in First Lady Michelle Obama's tour of Charlotte, North Carolina and greater Mecklenberg County as part of her *Let's Move Anti-Obesity Campaign*.(Cherkis & Fionn-Bowman, 2012)

INTRODUCTION

What is a food desert?

The phrase ''food desert'' was first used in the early 1990s in Scotland by a resident of a public housing

sector scheme to describe areas of relative exclusion where people experience physical and economic

barriers to accessing healthy food. (Reisig & Hobbiss, 2000)As greater evidence of this phenomenon has

appeared over the years since then, this definition has been further refined.

Food deserts have been characterized as places where poor access to healthy and affordable food

contributes to social disparities. (Beaulac, 2009) The definition has been classified as very broad to place

the concepts of food deserts under the umbrella of obtaining environmental justice(Hilmers, 2012)**,** to a

more concise definition that looks at it as the literal absence of retail food in a defined area. (Beaulac,

2009) This issue also falls under the heading of a public health challenge; the assurance function of

public health charges society and government with the responsibility to provide equal access to healthy

food options for all citizens and to improve health outcomes. (Hilmers, 2012; Institute of Medicine (US)

Committee for the Study of the Future of,Public Health, 1988)Health outcomes will be addressed in

more detail, later on in the paper.

While the consequences of unhealthy foods are quite apparent in terms of co-morbidities, such as

obesity and diabetes, the exact definition of a food desert and its association to poor health outcomes

has been a subject of recent research efforts. Currently there is no consensus on what exactly a food

desert is or how to quantify what criteria are needed to identify a food desert. As a result, the lack of

cohesiveness in the terminology has given ammunition to the opponents who wish to continue the

status quo in these neighborhoods. The opponents' rationale is if no one can define what a food desert

is, then people cannot truly prove their existence.

However, existing research provides clear evidence that food deserts exist in numerous low-income communities and communities of color across the country, and that they have significant negative impacts on health, social equity, and local economic development. The balance of the research strongly suggests that making affordable, healthy foods more available to underserved residents will lead to their making healthier choices about what to eat and, ultimately, better health, while contributing to economic and neighborhood revitalization (Treuhart & Karpyn, 2010).

SYSTEMATIC REVIEW OF THE LITERATURE

Rationale

The purpose for conducting this systematic review of the literature was to identify the constructs of food deserts; including analyzing strategies to lessen the effects of food deserts and allow for critical thinking of ways to eradicate food deserts. This process involves gathering information, cataloging and categorizing the different studies and assessing the practicality of solutions as it pertains to food deserts in general and determining whether those solutions can be tailored to a particular geographical location.

Methods

The articles used in this review were identified from 2000 to 2012 by two mechanisms: keywords searches in Google Scholar, PubMed, and CINAHL and by reviewing these articles identified from these databases. These articles are summarized in Table 1. Combinations of the keywords "food deserts", "food access" and "health policy" were used to identify relevant articles. Only articles that were written in English were used and all of the articles that were reviewed were based on research done in the United States.

There were no constraints on the years used. The abstracts from the articles were reviewed to assess which studies were going to be used in this paper. The literature review was based on several criteria: (1) the quality of the abstract; (2) relevance to the topics of food deserts; (3) and health policy

concerning food deserts. Fifty-two articles were identified in the initial review. After reading the articles, it was determined that only forty-four would be included in the review. The articles were classified into the following separate primary categories: Food access, racial and ethnic disparities, socioeconomic status in food deserts, health outcomes, environmental justice and policies. It should be noted, that while most studies were classified in one area, some studies crossed over into other categories. Those articles were reused to present a more complete and cohesive analysis of the literature.

Findings

The articles that were ultimately selected for this review represent the diversity of research done concerning food deserts. Forty-four articles were used. These can be seen on the summary of publications which is located at the end of this paper (Table 1).

The United States Census Bureau and Measure of America's human development research provide data associating the geographic locations of people living in the United States and their health outcomes. Specifically, these data indicate that the zip code in which a person lives is correlated with their life expectancy. (Measure of America, 2012)(United States Census Bureau, 2012)One of the critical aspects of that determination has been linked directly to the amount of healthy food options in a given geographical area. Specifically, areas that are saturated with healthy food options are more likely to have healthy populations living there. However, those who do not have access or opportunity to obtain healthy food in their neighborhoods are said to live in what is now coined as food deserts; areas without supermarkets and access to healthy food is limited, including those without supermarkets.

Availability versus access

These two words may look to be similar however there is a difference between the two as they pertain to food options. Availability most often refers to the physical location or proximity of food retail outlets. Sometimes the term is also used to describe the presence of healthier foods within stores. Access is a

broader, more general concept that includes availability as well as the cost and quality of foods. The purpose of our intervention proposal is to focus on both concepts increasing the access to healthy foods while increasing the availability of the food retail outlets (CDC, 2011).

What is available?
Fast Food Restaurants
A trend that developed in the latter part of the 20th century and continues today is that people have wanted ways that they could prepare food in shorter time frames. In cutting corners on how the food is being prepared as well as the type of ingredients used, consumers have turned to fast food restaurants for initially a quick fix but that has now has become a staple in many people's diets throughout the nation.

Poorer neighborhoods with a higher percentage of African American residents have fewer choices for nutritious fresh foods and more fast food restaurants. In addition, these restaurants heavily promote unhealthy food options to attract residents to eat in their restaurants and are significantly less likely to promote healthy items than restaurants in other communities.(Lewis et al., 2005)

With that finding in mind the question that must be asked is, what are taking the place of these healthier food options in lower income neighborhoods? Enter fast food restaurants. Having this plethora of fast food restaurants in these neighborhoods adds to the ever increasing environmental barriers to healthy eating as compared to options available to residents living in other, more well-to-do neighborhoods. (Zenk et al., 2011)

However, it is more than just having these unhealthy food options that is the cause. Also important is that more attention should be paid to educating residents in these neighborhoods, because as it stands the residents are so bombarded by prompts that encourage unhealthy options (e.g. such as dollar menus, coupons, combo specials, "supersizing" their orders, etc.) that they may be unaware that

healthier options exist (e.g. substituting for healthier food options, trying different locations, etc.).(Graham et al., 2006)

Convenience stores
There are an abundance of convenience stores in food deserts. (Raja, Ma, & Yadav, 2008) These convenience stores have been shown to provide less than healthful food options within walking distance of these areas. Instead of fresh fruits and vegetables, these stores are predominantly stocked with processed foods, cigarettes, alcohol and sodas. (Graham et al., 2006)

Food Access Problems
Poverty, or the lack of resources with which to acquire food, is the primary source of food insecurity in the United States. However, extensive documentation shows that the lack of access to food in low income urban neighborhoods, the simple inability to buy healthier food there, is an important additional factor. Compared to people living in higher-income areas, residents of low-income urban neighborhoods have very limited access to high quality food, enjoy fewer options in the variety of goods that are available to them, and pay higher prices for their groceries when they are available (Bolen & Hecht, 2003).

While individuals may be willing to walk to shop for daily food needs, such as milk and bread, it is cumbersome to carry heavy grocery bags even over short distances, particularly during inclement weather or for people with disabilities. To further understand the prevalence of this phenomenon it is useful to compare food access, between neighborhoods of color and white neighborhoods, within a five-minute drive of a neighborhood.(Raja et al., 2008)

Lack of Access to supermarkets
Over the past 5 decades, supermarkets have abandoned the inner city for suburban and exurban locations, which offered more land for parking, easier loading and unloading by trucks, convenient

access to highways and arterial roadways, which direct traffic between collector roads and highways, and a development context for much larger stores. Lacking conveniently located supermarkets, low-income urban residents typically pay more for groceries in nearby convenience stores, spend more time traveling to distant supermarkets, and possibly incur other costs related to forgone consumption or poor food habits developed as a result. (Pothukuchi, 2005)

The lack of supermarkets also costs communities in reduced job opportunities, fewer multiplier effects and entrepreneurship opportunities that grocery stores typically generate, and lower support for community engagement activities. (Pothukuchi, 2005). Without access to healthy foods, a nutritious diet and good health are out of reach. And without grocery stores and other fresh food retailers, communities are missing the commercial hubs that make neighborhoods livable, and help local economies thrive.

The flight of supermarkets to the suburbs, inadequate public transportation, and a paucity of healthy foods at corner stores are all factors that contribute to lack of healthy food access in low-income neighborhoods. However, recent studies and experiences indicate that this same deficiency also may represent an opportunity for development of small-scale grocery stores, designed to match specific demographics and other criteria, to provide healthy foods to residents of low-income neighborhoods and to be financially self-sustaining (Bolen & Hecht, 2003).

Lack of transportation
Inner-city residents without cars must depend on public transit, taxis, or friends to travel to grocery stores if there are no stores in the immediate neighborhood. This limits the frequency of their trips and thus their opportunities to purchase fresh produce and other nutritious perishable foods. Even when available, public transits, taxis, and friends are inferior methods of travel for food shopping. Residents using bus transit can manage only limited quantities of groceries on their return trips, particularly when

they are accompanied by young children, when transfers between bus lines are required, or when the walk to their residence after disembarking the bus is long (Weinberg, 1995). Taxis are expensive and often difficult to procure in many low income neighborhoods. Friends are not always available or reliable. Moreover, whenever children are involved, the additional time required for car-less grocery shopping could be a serious barrier. For seniors and others who must walk to bus stops, safety concerns often make food shopping unattractive (Bolen & Hecht, 2003).

Racial/Ethnic disparities in food deserts
A growing body of evidence indicates that residential segregation by income, race, and ethnicity contributes to health disparities in the U.S. In addition these studies show disparities in health between urban and rural areas. (Raja et al., 2008)(Rigby et al., 2012) Poor dietary patterns and obesity, established risk factors for chronic disease, have been linked to neighborhood deprivation, neighborhood minority composition, and low area population density (as found in more rural areas). Neighborhood differences in access to foods may be an important influence on these relationships. Establishing the presence, nature, and implications of neighborhood differences in the physical availability of more and less healthy foods is necessary to properly inform the development of responsive public health policies and interventions that may help reduce inequalities in health.

Socioeconomic status in food deserts
People living in food deserts are already at a greater disadvantage, in terms of health and good nutrition, than people who live in areas where healthy food options are available and abundant. Studies have shown that people with poor nutritional status among adults, especially older adults, are of greater concern because they face a variety of economic, physical, and social changes that can compromise nutritional well being. In many studies, more than 80% of community-dwelling older adults report inadequate dietary intakes of vitamin D and calcium, and vitamin B-12 deficiency is known to be prevalent in this population as well, indicating that these nutrients are of particular concern. (Boone-

Heinonen et al., 2011; Kwate, Yau, Loh, & Williams, 2009; Morland & Evenson, 2009; Widener et al.,

2012)

Health Outcomes
Effects of Obesity Resulting from Food Deserts
Nutrition, physical inactivity and obesity greatly reduce both the length and quality of life. Obesity is

second only to cigarette smoking as the major preventable cause of mortality in the US. In 2007, 46% of

preventable causes of death in North Carolina were associated with the obesity-related behaviors of diet

and physical inactivity (North Carolina State Center for Health Statistics, 2006).

Obesity represents a significant risk factor for numerous health conditions. According to the Center for

Disease Control 33.8% of all adults in the United States are obese, (Flegal, Carroll, Ogden, & Curtin,

2010) a condition that substantially raises their risk of morbidity from hypertension, hyperlipidemia,

type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea and

respiratory problems, and endometrial, breast, prostate, and colon cancers. Higher body weights are

also associated with increases in all-cause mortality. (Boone-Heinonen et al., 2011; Graham et al., 2006;

Lewis et al., 2005; Widener et al., 2012)(Boone-Heinonen et al., 2011; Graham et al., 2006; Lewis et al.,

2005)(Boone-Heinonen et al., 2011; Graham et al., 2006; Lewis et al., 2005)(Boone-Heinonen et al.,

2011; Graham et al., 2006; Lewis et al., 2005)

Along with the physical consequences, there are psychological consequences, such as low self-esteem,

negative body image and depression, which in turn, can affect social functioning. Obese individuals may

also suffer from social stigmatization and discrimination (Barlow & Expert Committee, 2007). As a major

contributor to preventive death in the United States today, the condition of being overweight and

obesity pose a major public health challenge (NIH, NHLBI Obesity Education Initiative, 1998).

Research has shown that people with better access to supermarkets and limited access to convenience stores may have lower levels or reduced risk of obesity, as well as healthier diets, including higher intakes of fruits and vegetables. (Kwate et al., 2009)(Morland & Evenson, 2009)Also, supermarkets, as compared to other food stores, tend to offer the greatest variety of high-quality products at the lowest cost (Larson, 2009). In contrast, convenience stores sell mostly prepared, high-calorie foods and little fresh produce, at higher prices.

Birth outcomes due to poor nutrition
Poor nutrition due to living in food deserts can have lasting impact on not only adults but in children as well. Expectant mothers with poor nutrition can have negative ramifications on birth outcomes. For prenatal care, iron and folate supplements reduce anemia and should be included. Calcium supplementation should also be given to reduce the risk of hypertension, preeclampsia and hypertension. (Villar et al., 2003)

Poor nutrition has been linked to birth defects, poor weight gain and growth in children in the first years of their lives as well as impaired mental and cognitive function. In order to have healthy children with adequate growth, expectant mothers need a well balanced, healthy diet. (Abu-Saad & Fraser, 2010)

Lack of nutrition leads to poorer education outcomes
Not only has poor nutrition impeded growth at the start of life for children but also during their primary education. Poor nutrition has lead to impaired memory, low test scores and below average grades. Furthermore it has been shown that the overabundance of convenience stores and gas stations leads teens to engage in risky behavior of smoking, drinking alcohol and using other drugs. (Symons, Cinelli, James, & Groff, 2009)

Environmental Justice
All of the previous listed findings could all be placed under the broad heading of environmental justice. Environmental justice has been defined as "the fair treatment and meaningful involvement of all people

regardless of race, ethnicity, income, national origin or educational level in the development, implementation and enforcement of environmental laws, regulations and policies." (National Research Council, 1999)

Over time, the impact of neighborhood design on residents' health has become a focus of interest. The findings from those research studies have led to an expansion of activism beyond the confines unequal distribution of environmental hazards to now encompass issues of public health such as obesity. (Lee, 2002)

Due to the built environs, a plethora of fast food outlets and small convenience stores combined with a dearth of grocery stores, low income and racial/ethnic minority populations have substantial environmental challenges to overcome. These challenges have made it increasingly difficult to make healthy dietary choices and to maintain a healthy body weight. (Hilmers, 2012)

And these challenges above do not even address the additional harmful constructs such as lead exposure, waste dumping and landfills to these areas which further compound the issues of how to obtain environmental justice for the people in these areas.

DISCUSSION
Increase access to healthy foods
The systematic review of the literature presented here has defined and described food deserts, in particular the health consequences of food deserts and most important their link to health disparities. It has been shown that there are gaps between what food options people have, what food options they want and what shop owners and offer people who live in food deserts. (Walker, Keane, & Burke, 2010) There are several solutions that can be considered to address these issues: farmer's markets, food co-ops, increased supermarkets and increased transportation.

Farmer's Market
Farmer's markets can accomplish two goals. One, it can provide fresh fruits and vegetables to the people living in these areas. Two, it can help spur local economy by recycling local monies and keep it in the community. However farmer's market would only be useful if they are situated in the area of the food desert so that the people living in those areas can take full advantage of them. Another benefit would be to also have people living in food deserts cultivate and grow their own fruits and vegetables for sale and consumption. (Larsen & Gilliland, 2009; New York City Dept of Health and Mental Hygiene, 2012) This can be accomplished by cleaning up abandoned lot, and converting them into areas where planting can be done or by creating rooftop gardens which would take advantage of altitude in locations that are limited in their geographical expansion.

Food Co-ops
As stated in the previous paragraph, people living in these food areas should try and cultivate their own fresh fruits and vegetables. One way to do that is through community gardens which have been seen in urban areas. This would solve a number of immediate issues providing healthy food options and also groom people living in these areas to be better judges of fruits and vegetables as it pertains to freshness and ripeness, encourage people to make their own meals now that they have fresh ingredients, spur more people into the culinary arts to help them earn a living. These community gardens have successfully created in larger urban areas such as Baltimore, Maryland and New York City however with some modifications these community gardens could be incorporated into smaller towns and locations.(Armstrong, 2000; Corrigan, 2011)

Increased Supermarkets
As stated in previous sections, increasing supermarkets in the area of food deserts would have a major impact on diminishing food deserts. The definition of being in a food desert is contingent on not having any supermarkets in those geographical areas. The key here would be to encourage city planners to earmark locations in those areas, and have contractors and businesses to relocate into those

areas.(Sparks, Bania, & Leete, 2011) This would create economic benefits such as jobs as well as health benefits.

Transportation

The previous three solution suggestions all take time to plan, set up and develop. However one of the more immediate solutions is to provide additional transportation routes through food desert areas to supermarkets and farmer's markets in other areas. Transportation can also be used to bring food into those food deserts as well. (Zenk et al., 2011) This also represents another entrepreneurial opportunity for the community in the form of providing transportation for others.

Increased Food Options to Children

Food options can be given back to children by reinstituting food trucks that provided free food to children in lower income neighborhoods throughout the year. Also government can earmark monies to expand the food assistance programs, such as school lunches, food stamps, Women Infant and Children programs.(Rigby et al., 2012)

Policy Recommendations

My first recommendation to address the issues presented here is to gauge just how bad the situations are in these communities. One way to accomplish this is to include environmental scans into the assessments that county health department do annually. These community assessments are vital in understanding truly the complex web of health disparities.

Localizing the Problem: An Example from Greensboro, NC

To illustrate the food desert concept more clearly in terms of its severity and to show how to make policy changes that will have a positive impact on this problem I am going to use Greensboro, North Carolina as an example. I chose this area based on my personal knowledge of the area; this is the city I grew up in. Moreover, this city provides a good illustration of the food desert concepts because the area

has been hard hit by environmental and social pressures which have resulted in the expansion of food

deserts in various parts of Greensboro, more specifically, in the eastern part of the city.

Food Deserts in Greensboro
According to the Guilford County Health Department website, http://www.guilfordhealth.org/(Guilford

County, 2012), the health department looks at several metrics including healthy birth outcomes, HIV &

STD data, healthy lifestyles such as obesity, physical activity and nutrition as well as healthy homes and

built environments. The assessment can be expanded to encompass healthy lifestyle aspects by

including a neighborhood environmental scan for healthy places to eat and supermarkets that sell

healthier foods than the ones seen in fast food restaurants, convenience stores and gas station that

have oversaturated these areas.

Based on my knowledge and experience in the Greensboro community there is clear evidence to the

existence of food deserts in Greensboro. To document this and in order to best assess the needs of the

community, I propose conducting environmental scans of some of the local corner stores in eastern

Greensboro, NC, where there exist several communities that could be considered food deserts from any

one of the definitions given in the introductory section of this paper. Through those scans, we can assess

not only the current living environments, places to find healthy food options but it will also give an

assessment into how city and regional planning which has been seen as a neglected issue within the

social and health policy for decades. (Robinson, Caraher, & Lang, 2000) Social and health policy needs to

be included and there is strong evidence that has been neglected for decades and needs to be included

in the future.(Hilmers, 2012; Robinson et al., 2000)(Hilmers, 2012)

Once the local health departments has the environmental scans along with the data concerning healthy

lifestyles they can best take their recommendations to the local government to get government officials

to buy into the notion that food deserts need to be eliminated. Currently there is a perception is that

the cities do not feel that this is a big enough problem. However when the data of the lifestyles and health outcomes are presented I believe that the food desert argument will be considered compelling enough to take action against them.

Local Government Actions
There are several actions and policy changes that local government officials can pursue that could be implemented and would be likely to be embraced by their constituents. These policies include: having subsidies to encourage healthy supermarket growth. This is supported by studies that have shown that people who live in food deserts are willing to spend the money. According to the new market report done by the U.S. Department of Housing and Urban Development report, inner-city neighborhoods had an estimated untapped demand of $8.7 billion for the 48 cities in which a retail gap existed. While that study was compiled back in 1999, it still shows that there is definitely a viable economic market just waiting there to be tapped into. The data reflects that people opening stores in those neighborhoods could and should be able to turn a profit. (Cuomo, 1999)

Green Carts
Community leaders and experts along with local government officials can engage local farmers to bring their produce to those areas as sort of "Green Cart" endeavors, where local farmers can sell their fresh fruits and vegetables in various parts of the city. This program has gained much attention in New York City, where they have numerous brochures that detail locations of where to find these Green Carts in each borough. In addition to giving the locations of the Green Carts, there is also information about how to best store fresh fruits and vegetables, the benefits of eating those foods, and ways that those fruits and vegetables can be incorporated into various meals throughout the day. (New York City Dept of Health and Mental Hygiene, 2012)

Local government officials can do more than just encouraging businesses to set up shop in those areas where food deserts exist but they can also assist in helping to solve the health disparities on people

living in these areas by giving the people living in these food deserts the means to live more active and engaging lives. For example, a preliminary environmental scan of the area of food deserts in Eastern Greensboro revealed there were only one recreation center, Windsor Recreation Center and one YMCA. Ironically, those two locations are within two miles of each other. Furthermore these facilities have very limited equipment and other resources. At Windsor there should have more workout apparatuses (e.g. weight machines, treadmills, etc.) whereas there are currently empty rooms and a few basketball goals. The YMCA has some of the amenities that I suggested adding to Windsor center, however, there is a measure of cost and affordability that needs to be addressed. There is currently no sliding scale of membership fees at the YMCA which makes it difficult for most citizens in Eastern Greensboro to take advantage of the facilities.

Also there are a number of areas in the Eastern Greensboro and other parts of Greensboro that have places for basketball goals but the city has taken the goals down in these areas. The city should put those basketball goals up to encourage more exercise from the citizens.

Funding Options
The simplest way to see these ideas come to fruition is to increase funding through grants, earmarks in the budget and other resources. To explore this further I have found several grants that are awarded to city, county and state governments as well as to school districts and housing authorities. The information on these grants and others were found on the government website, www.grants.gov.(U.S Department of Health and Human Services, 2012) I put in a search engine the words, "food deserts", obesity, or exercise which provided 91 results of potential grants that could be used to fund these and other suggested endeavors.

Long Term Goals - Regional and City Planning
Environmental justice for the citizens that live in these areas must be championed not only by elected officials but also by those who determine where businesses can be set up, what businesses can be placed in those areas, when they can be set up and most importantly who are setting up those businesses. In the long term, regional and city planning must be addressed in order to completely eradicate food deserts.

Low-income neighborhoods have offered greater access to food sources that promote unhealthy eating. (Hilmers, 2012) If officials took more care in the planning of these areas, it would stunt the growth of these unhealthy areas and could help stem the spawning of new food deserts in the future.

Calling greater attention to health
There needs to be more encouragement by various news and media outlets to include more news about health. Because of the complexity of this topic, one needs to conceptualize the barriers of communicating the ideas of eating healthier and making the public more aware of food deserts and ways to best combat the outcomes of living in food deserts. I have hypothesized that there are four levels of barriers that need to be overcome to effectively reach a given population:

- Awareness
- Attitude
- Fear
- Fatalism (AAFF)

The population needs to be more aware about their own health and potential health pitfalls. If the population does not know about their own health, then there will not be any urgency to thwart problems or change behaviors. Once awareness is met people will still have to adjust their attitudes towards their own health issues. People can have all the information on the issue but the population has to embrace change. In order to embrace that change they need to get over the fear of not wanting to know the condition of their health. Finally the condition of fatalism must be overcome. Fatalism is the attitude of resignation in the face of future events in which they feel a particular outcome, is inevitable. People need to acknowledge that there are options available to them to reach their intended goal,

which is in this case is finding healthy food options that are closer or make the healthy food options more readily available.

Also, the community can do more activism towards inspiring the people to care and take ownership of their own health. Some ways include to increase awareness is through health fairs, church briefings and more physical activities that are for the community and for specialized groups within the community such as for example families, children, single men and women. These events can be cross groupings to allow for multiple messages being sent such as a health fair at church, or a community pot luck supper that encourages families, neighbors and friends to come out and learn more about their food choices they make.

Mental support is also needed in addition to the physical activities through support groups among the different segments of the population. For example, for children, and teens struggling with obesity, they are more likely prone to being bullied. The effects of bullying can be so taxing on their mental state and can cause these children to find comfort in food which will only exacerbate the issue, by creating a toxic cycle of repetition of unhealthy circumstances. This can be improved by engaging other members of the community, such as social groups, churches and schools, to work in coalitions to encourage good mental health and hopefully physical health as well.

In order to accomplish these policy changes, several public health methodologies can be used to increase the effectiveness of the new policy. To increase public awareness, health education and health communication is needed to bridge the education gap for people who are unaware of their health situation, how they eat and what they can do differently. This is where social marketing has had an increased presence in influencing health behaviors.

Social Marketing

Health communications is one tool to increase social awareness. However health communications alone may not be sufficient to change health behaviors. Social change has long been a challenge for public health practitioners, mainly because it is hard to make a message that will not only be heard by the public but also will be embraced as well. However, in recent years social and health marketing techniques have been demonstrated to help provide opportunities for the public health practitioner to reach people and effect change.

Why social change is needed

Public health must dedicate its efforts to modifying individual lifestyle and behavior, improving social and economic conditions, and reforming social policy to establish an environment that fosters optimal health. The continuing presence of food deserts have in turn created an environment that cultivates chronic diseases, due to encouraging unhealthy lifestyles and behaviors, deteriorating social and economic conditions and presenting a crisis in access to quality health care.(Siegel & Lynne, 2008) In order to reverse this trend public health must focus on creating social change.

How to Market Social Change

There are several challenges to marketing social change: The unfavorable state of individual and societal demand for social change, the hostile environment in which social change must be marketed and the limited training of public health practitioners in the skills necessary to market social change. First the unfavorable state, change for some people tends to be unwanted, considered unnecessary and for some directly opposed to what people were doing in the first place (Siegel & Lynne, 2008). Quite simply, people resist change. This resistance has created a hostile environment not only in the minds of the public health consumer but also in the major industries and lobbying groups that the population has come to rely on for their business. These include food industries that benefit from the distribution and advertising of unhealthy food options.

In order to push back against this resistance, more training is needed for public health practitioners in order to become stronger advocates of healthy nutrition and the direct link between better nutrition and positive health outcomes. This is also then includes educating health practitioners in communicating with the population. Social marketing has been demonstrated to be a technique for eduation and motivation to encourage better health behaviors and choices. An example of this has been seen in the social marketing that has been used to curtail cigarette smoking.

Opportunity to Market Public Health
With apathy, lack of awareness, fear and fatalism preventing most people from seeking the help and care they need to live healthier lives; social marketing a proven methodology to influence change. The basic approach of social marketing is for public health professionals to find out what the consumer wants and then redefine, repackage, reposition and reframe the product in a way that satisfies an existing demand among the target audiences.(Siegel & Lynne, 2008) Through redefinition this provides public health professionals an opportunity to be very creative and elaborate to find new and innovative ways to improve the health of communities and hopefully find new ways and new discoveries that would help in other public health issues.

Future areas of research in the US
While the concepts of food deserts have been around for decades there still is much work to be done on this field considering that there is not a consensus rubric for what a food desert is nor are there metrics by which to measure, and identify what and where food deserts are. To assess the locations of these food deserts, environmental scans, store surveys and data collection are needed. That would include mapping out various locations of stores and detailing what is being sold within these stores, such as whether there were any healthy options, and if they were available, where were these options located within the store. Furthermore, once we have a proper consensus on what food deserts are and where they are located then we can go forward with planning out policy that will help reduce and ultimately

eradicate food deserts; this then identifies a major area of research that is needed to create an evidence base of strategies that prove to be successful in making inroads to the eradication of food deserts. This research should include a multidisciplinary approach including public health nutrition, health education, and social marketing. It should also include business/economic research in the areas of retail food sales to better understand and to encourage broader retail options in underserved geographic locations.

More resources and studies are also needed to address the limitations of current studies, and identify effective policy actions to achieve environmental justice, and evaluate intervention strategies to promote lifelong healthy eating habits, optimum health, and growing communities. (Hilmers, 2012)

CONCLUSION

Presentation and treatment of chronic diseases that are the direct outcome of poor nutrition has long been a challenge to both public health and medical care practitioners. What this paper has shown is that part of the presentation strategy that has gained recent attention is the need to take a broader view including health education and new methodologies, such as social marketing targeted at pockets of resistance. In particular, these efforts must be targeted on food deserts, which clearly exist and are more prevalent in underserved communities, leading to an exacerbation of the serious health disparities that exist in communities through the United States.

Medical intervention can help to fix the number of people having poor health outcomes. Monthly neighborhood improvement clinics have shown promise in making people more aware of their health and increased their relationship with their primary care providers.

However, it will take a concerted, community effort to improve the conditions in the food desert. Long term plans will need to also be put in motion to ensure sustainability of policies and educational and social marketing efforts in the areas affected by the food deserts. That effort will require leadership from not only the community but also government officials.

Finally ongoing and future research will be needed to evaluate the changes proposed in this literature review and to make further policy changes as needed.

Table 1. Literature Review Evaluations

Primary Author	Publication Year	Article	Primary Category
Beaulac,J.	2009	Peer Reviewed: A Systematic Review of Food Deserts, 1966-2007	Environmental Justice
Hilmers,Angela A.	2012	Neighborhood Disparities in Access to Healthy Foods and Their Effects on Environmental Justice	Environmental Justice
Larson,N.I.	2009	Neighborhood Environments:: Disparities in Access to Healthy Foods in the US	Environmental Justice
Lee,C.	2002	Environmental justice: building a unified vision of health and the environment.	Environmental Justice
National Research Council	1999	Towards Enviromental Jusice: Research, Education, and Health Policy Needs.	Environmental Justice
Bolen, E.	2003	Neighborhood Groceries: New Access to Healthy Food in Low-Income Communities	Food Access
CDC	2011	Healthier Food Retail: Beginning the Assessment Process in Your State or Community	Food Access
Cuomo, A.	1999	New markets: The untapped retail buying power in America's inner cities	Food Access
Graham, R.	2006	Eating in, eating out, eating well: Access to healthy food in North and Central Brooklyn	Food Access
Lewis,L.B.	2005	African Americans' access to healthy food options in South Los Angeles restaurants	Food Access
New York City Dept of Health and Mental Hygiene	2012	Eat Street Smart	Food Access
Sealy,Y.M.	2010	Parents' food choices: obesity among minority parents and children	Food Access
Sparks, A.L.	2011	Comparative Approaches to Measuring Food Access in Urban Areas The Case of Portland, Oregon	Food Access
Sparks,A.	2009	Finding Food Deserts: Methodology and Measurement of Food Access in Portland, Oregon	Food Access
Treuhart,S.	2010	The Grocery Gap: Who Has Healthy Food and Why It Matters	Food Access

Primary Author	Publication Year	Article	Primary Category
Weinberg, Z.	1995	No Place to Shop: The Lack of Supermarkets in Low-Income Neighborhoods	Food Access
Abu-Saad, K.	2010	Maternal nutrition and birth outcomes	Health Outcomes
Barlow,S.E.	2007	Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report	Health Outcomes
Boone-Heinonen, J.	2011	Fast food restaurants and food stores: longitudinal associations with diet in young to middle-aged adults: the CARDIA study	Health Outcomes
Flegal,K.M.	2010	Prevalence and trends in obesity among US adults, 1999-2008	Health Outcomes
Honore,P. P.A.	2011	Creating A Framework For Getting Quality Into The Public Health System	Health Outcomes
Institute of Medicine (US) Committee for the Study of the Future of,Public Health	1988	The future of public health	Health Outcomes
Kerr,Jacqueline J.	2008	Exercise Aids, Neighborhood Safety, and Physical Activity in Adolescents and Parents	Health Outcomes
Measure of America	2012	2012 Opportunity Index	Health Outcomes
Morland, K.B.	2009	Obesity prevalence and the local food environment	Health Outcomes
NIH, NHLBI Obesity Education Initiative	1998	Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: executive summary. Expert Panel on the Identification, Evaluation, and Treatment of Overweight in Adults	Health Outcomes
North Carolina State Center for Health Statistics	2006	North Carolina Preventable Causes of Death	Health Outcomes
Siegel, M.	2008	Marketing Public Health: Strategies to Promote Social Change: Strategies to Promote Social Change	Health Outcomes
Swinburn,B.	2005	Obesity prevention: a proposed framework for translating evidence into action	Health Outcomes
Symons, C.W.	2009	Bridging student health risks and academic achievement through comprehensive school health programs	Health Outcomes

Primary Author	Publication Year	Article	Primary Category
Villar, J.	2003	Nutritional interventions during pregnancy for the prevention or treatment of maternal morbidity and preterm delivery: an overview of randomized controlled trials	Health Outcomes
Armstrong, D.	2000	A survey of community gardens in upstate New York: implications for health promotion and community development	Policy
Corrigan, M.P.	2011	Growing what you eat: Developing community gardens in Baltimore, Maryland	Policy
Larsen, K.	2009	A farmers' market in a food desert: Evaluating impacts on the price and availability of healthy food	Policy
Pothukuchi,K. K.	2005	Attracting Supermarkets to Inner-City Neighborhoods: Economic Development Outside the Box	Policy
Widener, M.J.	2012	Developing a mobile produce distribution system for low-income urban residents in food deserts	Policy
Zenk, S.N.	2011	"You Have to Hunt for the Fruits, the Vegetables": Environmental Barriers and Adaptive Strategies to Acquire Food in a Low-Income African American Neighborhood	Policy
Raja, S.	2008	Beyond food deserts measuring and mapping racial disparities in neighborhood food environments	Racial & Ethnic Disparities
Rigby, S.	2012	Food Deserts in Leon County, FL: Disparate Distribution of Supplemental Nutrition Assistance Program–Accepting Stores by Neighborhood Characteristics	Racial & Ethnic Disparities
Robinson, Nicola	2000	Access to shops: the views of low-income shoppers	Racial & Ethnic Disparities
Cherkis, J.	2012	Democratic National Convention Host Charlotte: Anti-Union Rules, Packed Shelters, Food Deserts	Socioeconomic Status in Food Deserts
Kwate, N.O.A.	2009	Inequality in obesigenic environments: fast food density in New York City	Socioeconomic Status in Food Deserts
Walker,Renee E.	2010	Disparities and access to healthy food in the United States: A review of food deserts literature	Socioeconomic Status in Food Deserts
Reisig, VMT	2000	Food deserts and how to tackle them: a study of one city's approach	Food access

REFERENCES

Abu-Saad, K., & Fraser, D. (2010). Maternal nutrition and birth outcomes. *Epidemiologic Reviews, 32*(1), 5-25.

Armstrong, D. (2000). A survey of community gardens in upstate New York: Implications for health promotion and community development. *Health & Place, 6*(4), 319-327.

Barlow, S. E., & Expert Committee. (2007). Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: Summary report. *Pediatrics, 120 Suppl 4*, S164-92. doi: 10.1542/peds.2007-2329C

Beaulac, J. (2009). Peer reviewed: A systematic review of food deserts, 1966-2007. *Preventing Chronic Disease, 6*(3)

Bolen, E., & Hecht, K. (2003). *Neighborhood groceries: New access to healthy food in low-income communities*. California: California Food Policy Advocates.

Boone-Heinonen, J., Gordon-Larsen, P., Kiefe, C. I., Shikany, J. M., Lewis, C. E., & Popkin, B. M. (2011). Fast food restaurants and food stores: Longitudinal associations with diet in young to middle-aged adults: The CARDIA study. *Archives of Internal Medicine, 171*(13), 1162.

CDC. (2011). *Healthier food retail: Beginning the assessment process in your state or community*. Washington DC:

Cherkis, J., & Fionn-Bowman, R. (2012). Democratic national convention host charlotte: Anti-union rules, packed shelters, food deserts. Retrieved October 30, 2012, from http://www.huffingtonpost.com/2012/04/12/democratic-national-convention-charlotte_n_1419444.html

Corrigan, M. P. (2011). Growing what you eat: Developing community gardens in baltimore, maryland. *Applied Geography, 31*(4), 1232-1241.

Cuomo, A. (1999). New markets: The untapped retail buying power in America's inner cities. *Washington, DC, Government Printing Office, 495*

Flegal, K. M., Carroll, M. D., Ogden, C. L., & Curtin, L. R. (2010). Prevalence and trends in obesity among US adults, 1999-2008. *JAMA : The Journal of the American Medical Association, 303*(3), 235-241. doi: 10.1001/jama.2009.2014

Graham, R., Kaufman, L., Novoa, Z., & Karpati, A. (2006). Eating in, eating out, eating well: Access to healthy food in north and central brooklyn. *Brooklyn District Public Health Office.New York City Department of Health and Mental Hygiene,*

Guilford County, N. C. (2012). Department of public health. Retrieved 11/12, 2012, from http://www.guilfordhealth.org/

Hilmers, A. A. (2012). Neighborhood disparities in access to healthy foods and their effects on environmental justice. *American Journal of Public Health (1971), 102*(9), 1644-1654.

Institute of Medicine (US) Committee for the Study of the Future of,Public Health. (1988). *The future of public health*. Washington, D.C.: National Academy Press. Retrieved from http://search.lib.unc.edu?R=UNCb2266030; Full text available from National Academies Press (http://www.nap.edu/books/0309038308/html/)

Kwate, N. O. A., Yau, C. Y., Loh, J. M., & Williams, D. (2009). Inequality in obesigenic environments: Fast food density in new york city. *Health & Place, 15*(1), 364-373.

Larsen, K., & Gilliland, J. (2009). A farmers' market in a food desert: Evaluating impacts on the price and availability of healthy food. *Health & Place, 15*(4), 1158-1162.

Larson, N. I. (2009). Neighborhood environments:: Disparities in access to healthy foods in the US. *American Journal of Preventive Medicine, 36*(1), 74.

Lee, C. (2002). Environmental justice: Building a unified vision of health and the environment. *Environmental Health Perspectives, 110*(suppl 2), 141.

Lewis, L. B., Sloane, D. C., Nascimento, L. M., Diamant, A. L., Guinyard, J. J., Yancey, A. K., . . . REACH Coalition of the African Americans Building a Legacy of Health Project. (2005). African americans' access to healthy food options in south los angeles restaurants. *American Journal of Public Health, 95*(4), 668-673. doi: 10.2105/AJPH.2004.050260

Measure of America. (2012). **2012 opportunity index**. Retrieved 9/2012, 2012, from http://www.measureofamerica.org/opportunityindex/

Morland, K. B., & Evenson, K. R. (2009). Obesity prevalence and the local food environment. *Health and Place, 15*(2), 491-495.

National Research Council. (1999). *Towards enviromental jusice: Research, education, and health policy needs.* (Washington DC ed.)

New York City Dept of Health and Mental Hygiene. (2012). Eat street smart. Retrieved June/14, 2012, from http://www.nyc.gov/html/doh/downloads/pdf/cdp/greencarts-brochure-online.pdf

NIH, NHLBI Obesity Education Initiative. (1998). Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: Executive summary. expert panel on the identification, evaluation, and treatment of overweight in adults. *The American Journal of Clinical Nutrition, 68*(4), 899-917.

North Carolina State Center for Health Statistics. (2006). *North carolina preventable causes of death*. Raleigh, North Carolina:

Pothukuchi, K. K. (2005). Attracting supermarkets to inner-city neighborhoods: Economic development outside the box. *Economic Development Quarterly, 19*(3), 232-244.

Raja, S., Ma, C., & Yadav, P. (2008). Beyond food deserts measuring and mapping racial disparities in neighborhood food environments. *Journal of Planning Education and Research, 27*(4), 469-482.

Reisig, V., & Hobbiss, A. (2000). Food deserts and how to tackle them: A study of one city's approach. *Health Education Journal, 59*(2), 137-149.

Rigby, S., Leone, A. F., Kim, H., Betterley, C., Johnson, M. A., Kurtz, H., & Lee, J. S. (2012). Food deserts in leon county, FL: Disparate distribution of supplemental nutrition assistance Program–Accepting stores by neighborhood characteristics. *Journal of Nutrition Education and Behavior,*

Robinson, N., Caraher, M., & Lang, T. (2000). Access to shops: The views of low-income shoppers. *Health Education Journal, 59*, 121-136. doi: 10.1177/001789690005900202

Siegel, M., & Lynne, D. (2008). *Marketing public health: Strategies to promote social change: Strategies to promote social change* Jones & Bartlett Learning.

Sparks, A. L., Bania, N., & Leete, L. (2011). Comparative approaches to measuring food access in urban areas the case of portland, oregon. *Urban Studies, 48*(8), 1715-1737.

Symons, C. W., Cinelli, B., James, T. C., & Groff, P. (2009). Bridging student health risks and academic achievement through comprehensive school health programs. *Journal of School Health, 67*(6), 220-227.

Treuhart, S., & Karpyn, A. (2010). *The grocery gap: Who has healthy food and why it matters*. Oakland CA: PolicyLink and the Food Trust.

U.S Department of Health and Human Services. (2012). Grants.gov - home. Retrieved 11/12, 2012, from http://www.grants.gov/

United States Census Bureau. (2012). Life expectancy - the 2012 statistical abstract - U.S. census bureau. Retrieved 11/12, 2012, from http://www.census.gov/compendia/statab/cats/births_deaths_marriages_divorces/life_expectancy.html

Villar, J., Merialdi, M., Gülmezoglu, A. M., Abalos, E., Carroli, G., Kulier, R., & de Onis, M. (2003). Nutritional interventions during pregnancy for the prevention or treatment of maternal morbidity and preterm delivery: An overview of randomized controlled trials. *The Journal of Nutrition, 133*(5), 1606S-1625S.

Walker, R. E., Keane, C. R., & Burke, J. G. (2010). Disparities and access to healthy food in the united states: A review of food deserts literature. *Health & Place, 16*(5), 876-884. doi: 10.1016/j.healthplace.2010.04.013

Weinberg, Z. (1995). *No place to shop: The lack of supermarkets in low-income neighborhoods* Public Voice for Food and Health Policy.

Widener, M. J., Metcalf, S. S., & Bar-Yam, Y. (2012). Developing a mobile produce distribution system for low-income urban residents in food deserts. *Journal of Urban Health,* , 1-13.

Zenk, S. N., Odoms-Young, A. M., Dallas, C., Hardy, E., Watkins, A., Hoskins-Wroten, J., & Holland, L. (2011). "You have to hunt for the fruits, the vegetables": Environmental barriers and adaptive strategies to acquire food in a low-income african american neighborhood. *Health Education & Behavior, 38*(3), 282-292.