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“At-Risk” Food Deserts in Lincoln, Nebraska

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“At-Risk” Food Deserts in Lincoln, Nebraska

An Undergraduate Thesis Project

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Thesis Advisor: Shannon Moncure   Signature:______________
Thesis Reader: Russanne Low    Signature: _________________

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“At-Risk” Food Deserts in Lincoln, Nebraska

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University of Nebraska-Lincoln, 2015

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Abstract

This investigational study conducted in Lincoln, Nebraska seeks to explore the link between geographic and economic barriers to food access. Food access is a problem in the United States. 29 percent of U.S. ZIP codes do not contain a grocery store or supermarket. Families also face barriers to food economically, as low income individuals are less able to afford food. Through the use of ArcGIS 10.2.2 for Desktop software this project seeks to visually represent the areas in which access to food is limited both geographically and financially. Creating one mile buffer zones around each grocery store in Lincoln, Nebraska and cross referencing that information with median household income data from the 2013 U.S. Census Bureau a map of “at-risk” food deserts was created. It was found that in Lincoln three food deserts exist, and coincide with the lowest income neighborhoods. An Environmental Justice issue was also uncovered, demonstrating patterns consistent with the United States that these “at-risk” food deserts show a higher population of minorities than non-food desert areas.
Introduction

Traditionally speaking, the idea of food scarcity has always been reserved for the past. It is blamed for the fall of societies, the ignition of wars, and general strife for the entire length of humanity’s history. Food scarcity, however, is not a thing of the past anywhere in the world. Lack of food access is food scarcity, because it is a limiting factor in the ability of individuals and families to obtain the resources they need to survive. In the United States, the United States Department of Agriculture (USDA) estimates that 29 percent of ZIP codes do not contain a grocery store or supermarket, and 74 percent do not have a chain supermarket (Whitacre et al., pp. 2-26). Foods that are nutritionally dense, or “healthy” foods can be even more difficult to come by when access to grocery stores and supermarkets is limited. As Dutko et al. describe in an article for the USDA Economic Research Service, this lack of access to healthy food results in more than 6,500 food deserts in the U.S. (Dutko et al., 2012).

Furthermore, in a 2007 study, Powell, Slater Mirtcheva, Bao, and Chaloupka found that minorities in general have less access to chain supermarkets. To expand, African-Americans have 50 percent less access to chain supermarkets than their Caucasian counterparts, and Hispanic-Americans have only 33 percent as much access. Powell notes that low income areas are particularly underserved by a supermarket. This is of high concern because supermarkets, in general, tend to offer healthy foods at lower prices than non-chain grocery stores and convenience stores (Powell et al, 2007). This leaves the low-income minority segment of the population at the highest risk of food scarcity and nutritional deficit in the United States.

One of the indicators of food scarcity in the United States is food deserts. A food desert has been traditionally defined as any discrete area in which access to affordable and healthy food
is low or non-existent. A more precise definition has been assembled by the USDA, which defines a food desert as “at least 500 people and/or 33 percent of the population residing more than one mile from a supermarket or large grocery in urban areas, and more than 10 miles in rural areas” (Dutko, Ploeg, and Farrigan, 2012). According to Adams (2010), food scarcity is a multifaceted issue, including economics, geographic, and epidemiological problems. Unfortunately, the economic aspect of food deserts has been understudied. To quote Bitler (2010), “despite numerous empirical studies of food deserts and the interest these studies have attracted from policy makers, [we] are not aware of a systematic economic analysis of food deserts” (p. 155).

The lack of holistic study of food access is problematic because it ignores the some of the most difficult barriers to overcome. Access to food can include the distance to the food outlet, as described above, but also many other things, including affordability, perception of expense and of the quality of the food in the outlet, the knowledge or lack thereof of how to prepare healthy foods, and so on. An intervention study conducted in Leeds, England by Wrigley, Warm, Margetts, and Lowe in 2004 was very telling about previously unknown barriers to access. In the study, researchers interviewed individuals before and after a supermarket was developed in an underserved community. Forty-five percent of respondents switched to the new supermarket, and the average distance traveled for food dropped from 2.25 km to .98 km. Walking as a mode of transportation also increased from 12.3 percent to 30.8 percent. While these results are exciting, the qualitative data is even more interesting. Respondents who did not switch did not do so for several reasons. The temptation to buy more junk food (as those are more available in supermarkets alongside fruits and vegetables), and the perceptions that the new store was more
expensive and/or had a low quality of food, were only some of the factors listed (Wrigley et al, 2004).

The link between economics and geographic distance can aid in understanding a particular kind of food desert here in the United States, “at-risk” food deserts. “At-risk” can be a problematic term, as described by Moore (2006). The article discusses issues with the term’s vague definition causing stigmatization and the wide variety of problems it can cover. “At-risk” spans the width of abuse, trauma, disability or illness, poverty, crime, and unemployment, each of which can be examined at the individual, familial, or community levels (Moore, 2006). For the purposes of this project the term “at-risk” will be used explicitly to describe economic problems, with the assumption that economic barriers are the second most difficult to surmount, following closely behind geographic barriers. Individuals with economic problems are “at-risk” of homelessness, joblessness, unsafe living arrangements and a variety of other issues associated with economic problems. Economic problems mostly include financial instability at the family level, but can also include unstable living arrangements, transportation, or health problems, all of which can make for financial insecurity.

The purpose of this research is to explore links between geographic and economic barriers to food access. The objective of this research to create a visual representation of geographic access issues and combine it with a visual representation of the income levels in Lincoln using the U.S. Census Bureau data from 2013. The resulting merger of geographic accessibility and economic levels will be a more accurate representation of the accessibility of food in Lincoln, Nebraska. This information about food accessibility in Lincoln should be used to inform policy makers, civic planners, and others concerned with planning the growth of a city about the ideal locations to encourage the development of supermarkets and non-chain grocery
stores to better serve all of the city’s residents. The use of this data to inform zoning laws and other related fields can help bolster the economy and health of the city by creating jobs, supplying an outlet for healthy foods, and reducing travel costs for food in underserved areas. Additionally, public health money could potentially be saved if better access to healthy food is given to those who don’t currently have it.

**Materials and Methods**

According to the 2010 United States Census Bureau, Lincoln is a city of about 268,738 individuals. Its population can be divided into demographics of 86 percent Caucasian, 6.3 percent Hispanic or Latino, 3.8 percent African-American, and 3.8 percent Asian. The median annual income of households in Lincoln is $65,979. Lincoln has an unemployment rate of 3.9 percent, well below the national average of 5.8 percent. (Lincoln, 2010) These statistics are important descriptors of the economic state of Lincoln, Nebraska, and are informative of the monetary challenges the average Lincolnite would face. This city is ideal for study because it is medium sized, and comparable to the United States as a whole in that its racial demographics reflect that of the United States, although Lincoln is less diverse, and it is only economically slightly better off than the national average. Nationally, the United States is 77.7 percent Caucasian, 17.1 percent Hispanic or Latino, 13.2 percent African-American, and 5.3 percent Asian. Lincoln’s household income is higher than the national average, $65,979 in the city compared to $53,046 nationally.

The geographic barriers were assessed using the USDA definition of food deserts. Using ArcGIS 10.2.2 for Desktop, buffer zones were created around each supermarket and grocery store in the city of Lincoln. These buffer zones collectively make up zones where food is within
walking distance. As this project additionally seeks to examine the economic aspect of modern food scarcity, a full map of the buffer zones was layered with U.S. Census Bureau Household Income Level data on the block level. The income levels are displayed in $20,000 increments on a red to green color scale. Using this visual display, the lowest income levels are displayed in reds, gradually increasing toward green areas of relative wealth. The revealed map clearly displays red shaded areas without a buffer zone covering them. These areas which are both untouched by buffer zones and are lowest income can be considered “at-risk” food deserts based on the given definitions. Analysis of the distribution of food scarcity is further disaggregated for racial and socio-economic level of accessibility using additional U.S. Census Bureau data combined with ArcGIS Online. As the racial and socio-economic level information is generalized to entire ZIP codes, it is not believed that linking this information to the block-by-block analysis violates any confidentiality or private information.

**Results**

The map created using the described methods exposes three food deserts. These areas are located near Downtown Lincoln, Northeast Lincoln, and South Lincoln. All three areas are dominated by residential buildings. These areas also line up nearly identically with the three lowest income areas [See Fig. 1-4]. Census data shows that these areas range in household income level from approximately five thousand dollars annually to thirty-five thousand dollars annually. The income level range represented in these areas is on average below the poverty line of $23,492. For two of the three food deserts, the Downtown and Northeast deserts, half of the population has an income between five thousand dollars and twenty thousand dollars. The highest income level in the “at-risk” food deserts is 68.12 percent of the city’s median household income.
The racial demographic information for the “at-risk” food deserts is an average of 8.1 percent African American, 8.2 percent Hispanic, and 1.5 percent Asian. The total minority population is roughly 1.28 times higher than the general population of Lincoln [See Fig. 1]. The furthest that an individual in the “at-risk” food deserts would have to travel to reach a grocery store or supermarket is 2.36 miles, which can also be interpreted as 2.36 times further than the outside range of the food desert criteria of one mile. The average highest education level for the “at-risk” food deserts is a high school diploma. To summarize, the average person in the “at-risk” food desert makes 68.12 percent of the median household income of the city as a whole, is more likely to be a minority, and may have to travel as much as 2.36 times further than the maximum distance an individual living within the one mile buffer zone of a grocery store would have to travel to purchase food.

**Discussion**

Due to the lack of systematic study on the economic analysis of food deserts (Bitler, 2010) a comparison to other cities’ food deserts is not possible, analysis of this case is important to gaining a holistic view of food access issues. In Lincoln, it is evident from the findings that there is a strong link between geographic and economic barriers to food access. For Lincoln, 100 percent of the food deserts also coincide with the lowest income areas. There is only one neighborhood that is low income and does not fall into the food desert category, and it is largely commercial, rather than residential.

While a generalization of the United States, or even the state of Nebraska cannot be made with these findings, it can be concluded that even in Lincoln, a town with lower-than-average unemployment and higher-than-average median household income for the United States, the
most underserved areas geographically are also the least able to obtain food financially. This paints a grim picture for the well-being of such low-income families, given the well-established connection between nutrition and success, particularly in school-aged children, a group least able to procure their own food. Additionally, Ver Ploeg, Mancino, Todd, Clay, and Scharadin finds in a 2015 study of low-income residents that those with lower incomes are also less likely to have personal transportation to grocery stores or supermarkets (Ver Ploeg et al., 2015). The combination of these factors alone would be troubling. In order for a person in one of these “at-risk” food deserts to get food, they would have to travel up to twice the distance of individuals living within the grocery store and supermarket buffer zones.

Although the express purpose of this project did not include investigating ethical issues, they were naturally revealed in the researching process. Although a moderate increase, there is a difference in the proportion of African American, Hispanic, and Asian populations to Caucasian populations. This, in combination with economic discrepancies creates a clear picture of injustice for the impoverished and minority populations in Lincoln. These findings are also consistent with results found by Powell et al.’s 2007 study, which showed that minorities in general have less access to chain grocery stores and supermarkets than Caucasians. Across the United States we can see a similar pattern of less access to grocery stores and supermarkets for minority populations and lower income individuals, from both Powell’s research and this project.

This is not the fault of grocery store owners or of supermarkets themselves. We can reasonably assume that grocery stores and supermarkets have reasons for failing to locate in these areas. The reasons include zoning laws, but more importantly speak to the idea that food retailers do not see an opportunity for financial success in these areas. The Wrigley et al. (2004)
study explored government subsidies used to encourage food retailers to develop in underserved areas. Such subsidies improved the food accessibility of individuals in these areas by reducing the distance they had to travel and by offering a food retailer that stocked a greater amount of fresh and healthy food than was previously available (Wrigley et al., 2004). This type of incentive should be considered by civic planners and community developers.

This research should be considered a resource to inform and impact the ways that cities can plan development to encourage economic growth in the areas that need it the most, and to develop resources for individuals that need them the most. Food is a fundamental need of all humans, and as our economic system requires money in exchange for food, the development of grocery stores and supermarkets in underserved areas can improve them in two ways. First, they can provide healthier food options than non-grocery store food retailers and fast food restaurants, while also being more affordable. Secondly, the development of these food retailers can increase job opportunity in these areas, increasing the flow of money in and out of these areas. This increase in money not only improves the economy in the “at-risk” food deserts themselves, but also for the city as a whole. It is conceivable that food deserts, at least in Lincoln, can be eliminated almost entirely with the development of only three grocery stores or supermarkets, a feasible feat with moderate government economic incentive. It is conceivable that local low cost supermarkets could be persuaded to develop in these areas, as the company has a stake in the local economy by virtue of being based in the area.

**Conclusion**

Further study on this issue should incorporate information about alternative food retailers and food quality. For example, Gallagher’s (2006) study incorporating healthy food ideas in
Chicago used a food access ratio that incorporates the difference in food quality between non-grocery stores food retailers and grocery stores and supermarkets. In this study, Gallagher used the distance to the nearest non-food retailer (called fringe food stores) over the distance to the nearest grocery store or supermarket for each block in a neighborhood in Chicago to measure the access to healthy and affordable food. A method like this, including a look at the relative price of food at each type of retailer could address three of the issues related to food accessibility, geography, distance, and quality. (Gallagher, 2006).

Further study should also focus on zoning laws and methods by which policy makers can encourage the development of food retailers in underserved areas. If the barriers to development of grocery stores and supermarkets in these areas are zoning issues, it should be a primary priority of involved parties to get those laws changed, as it would benefit the residents in those areas. Other methods that could encourage the economic growth in these areas include providing financial incentives to the grocery stores to offset fiscal loss they might incur by developing in low income areas. Economic growth can only serve to improve the city as a whole, as well as the communities in these “at-risk” food deserts.

Implications of this research reveal a serious ethical issue, as the at-risk food deserts show a higher percentage of minority individuals than the city as a whole [See Fig. 5]. The exposure of this injustice can easily be addressed using the above methods. Improving the economic base of these areas improve the lives of all of the residents in them. A city is only as strong as its weakest neighborhood. The addition of affordable retailers in these areas increases the ability of the residents to improve their own access to food, as well as increasing local jobs. Strengthening these communities, and the city, is only a matter of supplying them with the resources they need to help themselves.
Figures and Tables

Figure 1: Full Scale Map of Lincoln with "At-Risk" Food Deserts indicated
Figure 2: Close up of Downtown Lincoln "At-Risk" Food Desert

Figure 3: Close up of Northeast Lincoln "At-Risk" Food Desert
Figure 4: Close up of South Lincoln "At-Risk" Food Desert

Figure 5: Percent of Total Population for Lincoln, Nebraska and "At-Risk" Food Deserts
## Proposed Budget

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**Signature of Director:**
References


