The overwhelming prevalence and associated morbidity of obesity, not to mention the financial burden that it places upon our health care system, demand immediate intervention (CDC 2010). Interventions at the individual level have proven ineffective and insufficient. It is time for approaches to obesity intervention to focus on the built environment of communities and for the topic to be approached from an ecological standpoint to examine the effects of lack of access to and affordability of nutritious food on individuals’ dietary choices (Cummins & Macintyre 2006). The term “food deserts” has arisen to describe such “neighborhoods and communities that have limited access to affordable and nutritious food” (Milner & Lytle 2008). This project evaluates the presence of food deserts in two suburban, low-income, predominantly minority neighborhoods, Nicholson and Sterling. The results of this spatial analysis indicate a deficiency of access to affordable and nutritious food that is dependent on the availability of personal vehicles for households in these two communities. Further community-level data collection is needed in order to better contextualize community and personal data, comparing across communities characterized by different income brackets, races or ethnicities, transportation access, etc.

I. Introduction

Obesity is an epidemic of ever-increasing proportions in the United States, with 33.8% of adults 20 years old or older being obese (BMI ≥ 30 kg/m2) and 68.0% being overweight or obese (BMI ≥ 25 kg/m2) (Flegal et al. 2010). The myriad of negative health outcomes associated with obesity include hypertension, cardiovascular disease, stroke, type 2 diabetes, and many types of cancer (including breast, ovarian, gallbladder, prostate, colon, and cervical). The estimated obesity-associated health care costs of 2008 alone reached $147 billion (CDC 2010). Lytle and Sallis have looked beyond explanations at the individual level and have claimed that obesity is a “normal physiology within a pathogenic environment” (1997). The term “food deserts” has arisen to describe a category of such pathogenic environments: “neighborhoods and communities that have limited access to affordable and nutritious foods” (KAP/NEC 2009).

II. Literature Review

Geographic Information System (GIS) technology has proven a useful tool for evaluating the presence and distribution of food deserts, a critical precursory step to intervention. The awareness afforded by such an evaluation can serve to inform future public policy and community-level initiatives. Howard and Goldstone’s use of GIS technology to map food deserts in Lansing, Michigan revealed the urbanization trend of supermarkets. Their research also examined the proximity of residents to food stores as well as transportation capacities and found that accessing fresh produce is much harder for those with cars than for pedestrians without a car (Mapping 2012). In another study, Kristen Larson and Jason Gilliland found that distinct urban food deserts exist in the mid-sized city of London, Ontario. The researchers used GIS to examine the accessibility of supermarkets, walking and public transit, distance to the closest supermarket, number of supermarkets within 1,000 meters, and neighborhood socioeconomic status, to assess the spatial distribution of food deserts. Their purpose was to explore the evolution of food deserts over time in order to inform public health policies regarding not only economic, but spatial, inequities related to access to and affordability of nutritious foods (Larsen and Gilliland 2006). In Adrianne Samuels Gibb’s article, “Watering the food desert,” the researcher looks at lack of access to healthy, affordable foods and the impact of such deficiencies in inner cities, as well as various means of combating or improving, or “watering,” those food deserts (2010). In an effort to improve living conditions in and mitigate the risks associated with food deserts, Wardens in areas deemed food deserts have been redesignated with expanded healthy food shopping guidelines (WAG’s 2010). Resurrection House Baptish Church in Southside Chicago added a farmer’s market to their ministry offerings to better meet the needs of residents.

III. Methodology

- • Mitchell Environment Measurements Survey in Stores and Restaurants (NEMS-S and NEMS-R) data collected from Nicholson and Sterling (two low-income, predominantly African-American neighborhoods in Greenville County, SC) by Reece Lytle, Alcia Powers, Sharron Mant, Mark Tanksley, and volunteers as part of a LiveWell Greenville initiative (Table 1, Figures 2-4)
- • Nicholson and Sterling boundary and buffer shapelifts from Reece Lytle and LiveWell Greenville (Figures 1-4)
- • American Census Bureau demographic block group level 2000 (5%) income, vehicle availability and 2010 (5%) race data from http://factfinder2.census.gov (Figures 2-4)
- • Block group boundaries from http://www.census.gov/www/tiger/ (Figures 2-4)
- • Greenville county boundary shapelfile from the Geographic Information Systems (GIS) Division of Greenville County, SC (Figures 1-4)
- • SC boundary shapelfile from Environmental Systems Research Institute (ESRI) Data & Maps Online (Figure 1), (2012) (Figure 3)
- • Base layer for streets from Bing Maps in ArcGIS (Figure 1)

Figure 1: Location of Communities of Interest in Greenville County, SC (Nicholson and Sterling neighborhoods and 0.5 mile buffers situated in larger geographical context)

Figure 2-4: Block group census data shown in terms of standard deviation from the mean value %

Figure 5-6: Location and NEMS-S/R results amount of the total possible points of the food stores and restaurants surveyed in Sterling and Nicholson

Table 1: NEMS-S & NEMS-R Results

IV. Results and Discussion

- • Sterling and Nicholson are communities characterized by a predominantly minority (specifically Black or African-American) population, low household incomes, and high proportions of no vehicle access.
- • Food stores and restaurants are few and far between; for the most part, those that do exist in the area received low NEMS-S/R ratings (based on availability, quality, quantity, and affordability of nutritious food).

Limitations:

- • Difficulty to collect NEMS-S data from two of the four food stores in Sterling due to safety issues and store owner’s refusal to participate
- • Limited sample size and resulting limitations on feasibility statistical analyses
- • Realistically current restaurants included in the NEMS-S data still outside the realm of affordability and accessibility for the community residents, catering to the more affluent downtown population, even though they are within the 0.5 mile community buffer range
- • Lack of specifically geo-referenced demographic data at the community level and misalignment of block group boundaries with NEMS-S/R boundaries
- • Lack of equivalent data

V. Conclusion

There exists a need for more extensive empirical data rather than an imputant reliance on factoids when it comes to food desert policy making (Cummins and Macintyre 2002). It is paramount that policy makers critically consult empirical data to avoid mainfested policies (Cummins and Macintyre 2002). Several gaps in the literature still exist:

- • Much of the data is not specific enough to support thorough analysis. (Existing measures of bikability and walkability are mostly limited to presence or absence of sidewalks and bike lanes, with no data on traffic flows, safety, condition, etc. Similarly, the simple evaluation of food deserts according to proximity of food stores and restaurants with no information on affordability, quality, and accessibility of the food offered is inadequate when one realizes that not all supermarkets, convenience stores, restaurants, fast food chains are equal (Powers, Lytle & Mant).)
- • There are few studies of the nutrition environment on a micro-scale (Glaze et al. 2007).
- • More comprehensive, detailed studies of access to healthy foods, especially in minority, low-income, suburban communities, are needed.
- • The comparison of food deserts in African American versus Hispanic communities could provide some interesting insight. (Data collected in this study is limited to the Greenville metropolitan area). Hispanic and Latino communities are not included in future analyses, potentially affording an interesting inter-minority comparison with the predominantly African American communities of Nicholson and Sterling.)
- • No comparable data collected at this level from other high income communities in the area or elsewhere exists to serve as a comparison; it would also be helpful to have widespread, georeferenced demographic data available at the same community/neighborhood level.

VI. Future Research

- • The lack of accessible, affordable nutritious foods makes these two communities appear to be food deserts. However, in order to be able to more conclusively support this claim and determine the severity of these food deserts, parallel data from other communities for comparison is critical.
- • Interventions for this food desert problem could include community-based and community-driven initiatives, possibly including traveling farmers’ markets, produce stands, Community Supported Agriculture programs, community gardens, kitchen gardens, refurbishing of already existing food stores, etc. These initiatives could include healthy options for affordable prices, menus alterations at already existing restaurants, etc.
- • Improvements in the transportation situation of residents could also help alleviate some of the resultant associated problems of walkability, bikability, safety, and public transit systems in and around these communities could help connect residents with healthy food sources.
- • Education is a key factor in the larger obesity context. Families not only need access to affordable nutritious food, but also a knowledge base with regards to what constitutes a healthy diet and how to prepare nutritious foods/meals.

VII. References