Income Inequalities and Food Security:
Obesity Risk for Neighborhoods in Manhattan, New York

Introduction

Obesity is one of the leading concerns of health officials in developing countries. Obesity related condition include heart disease, strokes, type 2 diabetes, and certain types of cancer; all of which can be prevented. In the United States, the percentage of obesity cases have increased every year since 1985. Nearly one-third of American adults and 17 percent of children ages 2-19 years old, mostly affecting Black and Latino communities.

There are several risk factors related to a community's health infrastructure. The Center of Disease Control (CDC)[4] and the Food Research and Action Center (FRAC)[5] have released studies of the relationship of socioeconomic status (SES) of communities and obesity cases. Communities of lower SES levels have a greater chance of obesity than those of higher economic statuses because of limited resources and lack of access to healthy[1], affordable foods. In lower income neighborhoods obesity is more prevalent due to the lack of grocery stores nearby and a greater availability of fast food options, also because healthier foods are commonly more expensive[2]. The CDC states communities like these as food deserts.

I chose the borough of Manhattan, New York because of its large income gap between its neighborhoods in a small urbanized area. I wanted to see if there was a relationship between obesity, fast food restaurants, supermarkets, and income levels even in a highly populated city. The relationship found can serve as a model for developing countries to reconsider urban planning to lower obesity rates. I expect low income neighborhoods to have more fast food restaurants, less supermarkets and higher obesity rates in comparison to their higher income counterparts.

Methodology

First I needed to identify the borough of Manhattan in New York City and the neighborhoods inside of it. Using google maps I found the addresses of all the major fast food restaurants and supermarket chains in the borough, they were geocoded using an address locator made from the lion polygons. I made a summarized inside join of the fast food restaurants and supermarkets to find the sum of each type in every neighborhood. With this spatial join I used it to plot the density of the restaurants and supermarkets. Income levels were plotted using (Figure 5 and 6) displaying median income levels. I did this by joining the table to the New York neighborhoods.The obesity densities were plotted using the table from the New York CIty's Community Health Survey of 2007, which shows the number of obesity cases in the United Hospital Fund neighborhoods..

Figure 1: Neighborhoods in Manhattan

Analysis

For my analysis, I wanted to look at the densities of the different risk factors I am observing spatially: fast food restaurant density, supermarket density, and median income. I then compared them to the number of obesity cases in each neighborhood. With the spatial analysis from the maps, I created tables that allowed me to better analyze the correlation between socioeconomic status and obesity.

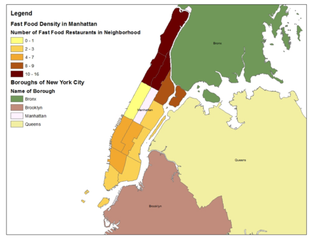

Figure 2: Density of fast food restaurants in every United Hospital Fund Neighborhoods

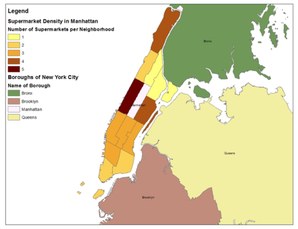

Figure 3: Density of supermarkets per United Hospital Fund Neighborhoods

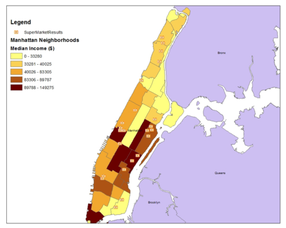

Figure 6: Number of supermarkets in every neighborhood in comparison to median income.

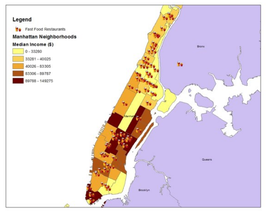

Figure 5: Number of fast food restaurants in every neighborhood in comparison to median income.

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CEE 187: Final Project

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Data References:

Community Health Survey 2007

Lion Shapefile from Bytes Big Apple

Open Data NYC

Coordinate System:

NAD_1983_StatePlane_New_York_Long_Island_FIPS_3104_Feet

Findings

Through my analysis I found that lower income neighborhoods are more likely to have more fast food restaurants and less supermarkets in comparison to neighborhoods with higher income levels. The same lower income neighborhoods were also more likely to have greater obesity percentages as seen in Table 1. As seen in Figure 8, communities with lower incomes tend to have higher percentages of obesity cases in their population. This is most likely due to the lack of supermarkets nearby and the great number of fast food restaurants, which are cheaper in price. I recommend that developing countries have programs to stimulate the number of supermarkets in low income neighborhoods and lower the amount of fast food restaurants.

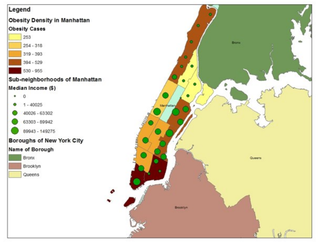

Figure 7: Number of obesity cases in comparison to median incomes of every neighborhood

Table 1: Manhattan neighborhoods median income and obesity percentage

Neighborhood	Median Income	Obesity Percentage
Marble Hill (Inwood)	$40,025	2.79%
Central Harlem North-Polo Grounds	$30,763	2.94%
Hamilton Heights	$34,490	2.79%
Washington Heights	$25,624	2.93%
Morningside Heights	$46,111	2.53%
Central Harlem South	$36,945	5.31%
Upper West Side	$51,395	0.40%
Hudson Yards-Chelsea-Flat Iron-Union Sq	$52,439	1.06%
Lincoln Square	$108,439	1.00%
Clinton	$63,302	1.24%
Midtown-Midtown South	$69,942	2.09%
Turtle Bay-East Midtown	$109,032	1.10%
Murray Hill-Kips Bay	$53,549	1.18%
Gramercy	$87,655	0.51%
East Village	$54,170	2.40%
West Village	$89,797	1.42%
SoHo-TriBeCa-Civic Center-Little Italy	$83,252	2.88%
Battery Park City-Lower Manhattan	$117,128	5.76%
Chinatown	$33,260	5.00%
Lower East Side	$31,024	5.24%
Lenox Hill-Roosevelt Island	$64,188	0.97%
Yorkville	$95,668	0.10%
East Harlem South	$36,493	2.30%
East Harlem North	$29,633	2.44%
Washington Heights North	$38,721	1.99%
Washington Heights South	$33,958	1.72%
Upper East Side-Carnegie Hill	$149,275	1.81%
Stuyvesant Town-Cooper Village	$51,860	2.99%
Central Park	$0	0.00%

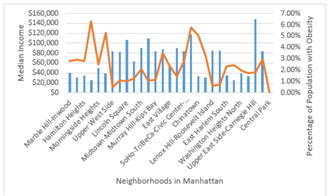

Figure 8: Median Income of Each Neighborhood in Manhattan

References

[1]Drewnowski, A., & Popkin, B. M. (2009). The Nutrition Transition: New Trends in the Global Diet. Nutrition Reviews. doi:10.1111/j.1753-4887.1997.tb01593.x

[2]Morland, K., Roux, A. V., & Wing, S. (2006). Supermarkets, Other Food Stores, and Obesity. American Journal of Preventive Medicine. doi:10.1016/j.amepre.2005.11.003

[3]Cummins, S. (2005). Food environments and obesity--neighbourhood or nation?International Journal of Epidemiology. doi:10.1093/ije/dyi27

[4]Food Desert| Gateway to Health Communication | CDC. (n.d.). Retrieved from http://www.cdc.gov/healthcommunication/ToolsTemplates/EntertainmentEd/Tips/FoodDesert.html

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