Geographic Information Systems II 242
Community Based Mapping
Humboldt Park/West Town

Project: Spatial Relationships between economic inequity and access to nutritious foods

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Autumn 2007 – DePaul University

Project Summary:

The Humboldt Park grocery store project is rooted in a very strong and established Puerto Rican community. The core organization that this project comes from is the Puerto Rican Cultural Center (PPCC) that has been established for several decades. The goal of this organization is to create a Puerto Rican community that fully embraces and is dedicated to enriching the lives of its people. This project has been brought together through CMAP(Chicago Metropolitan Agency for Planning) and is supported by the Full Circle project that is geared by the Consortium to Lower Obesity in Chicago Children(CLOCC). More specifically the PPCC has decided to create a project called the Community Organizing for Obesity Prevention(CO-OP) in the Humboldt Park area to bring awareness to the obesity levels in the Puerto Rican Community and ways that this large and growing problem can be solved. This project began on September 4th of the year 2004 with a survey to try to determine the obesity levels of the Puerto Rican community in Humboldt Park. According to the results 35% of the adults in Humboldt Park are obese, exceeding the national percentage of 25%. Therefore, the purpose of this large project is to help the residents of Humboldt Park create a healthier life style through exercise, activity, and healthy eating. Our part of this tremendous project will involve specifically mapping locations of grocery stores where particular nutritious foods are accessible for the community. Not only will we map these grocery locations, but also pinpoint those specific foods that are of nutritious value while at the same time mapping locations that simply lack any nutrition.

We would like to produce an educational brochure for community residents with a map that shows locations of nutritious fresh foods (e.g. CSA/organic produce). We also would also like to have a map locating parks, community gardens and other green spaces to show where areas for physical activities are possible.

There have been some changes in our needs assessment report. In CO-OP's collection of chronic illness data in the area, they failed to include locations of residents with high obesity rates, diabetes, etc. In our research to obtain data on chronic illness we were unable to find any on a local scale, therefore we will not able to add this layer into our maps to find a relationship between access to fresh produce and chronic illnesses. The second dilemma we came across, was that CMAP is able to create a food index for the location and quality of nutritious foods in the area, and therefore we will have to create our own food index.

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Introduction:

In Humboldt Park there has been an increase in obesity rates among community members. Previous research has been done on food deserts, and an inaccessibility by minority groups to nutritious food, more importantly fresh produce. We feel this is an important attribute of the increased obesity rate in Humboldt Park, and would like to measure the relationship between areas with access to fresh produce, and income level, which unfortunately in this city are interconnected. Our group will examine the accessibility of nutritious foods in the Humboldt Park/ West Town area based on data collected by the Anthropology class. With the data collected we will create a food index which we feel represents the amount and quality of produce in various locations throughout the area. We would like to see where there might be disparities in access to fresh produce and how they relate to disparities in income levels. We would also like to create an education piece for the residents of Humboldt Park to help the community make more knowledgeable choices about where they shop for groceries. More importantly, to show where businesses that provide produce are needed and would thrive due to the lack of stores without produce.

In the following sections will cover the steps that we have taken in developing our maps for depicting the locations and quality of grocery stores in Humboldt Park/West Town in relation to income levels in the area. In order to find these relationships our objectives were to find the geographic locations of stores and rank the quality of these stores by creating a food index. Our needs assessment established the location of the stores and the types of foods they carries through our need to know questions. The system requirements states the relationship between our entities through the matrices and models creates. The data acquisition portion shows how we gathered our data. The three sources we used were data surveys from the Anthropology students, Census Tracts, and other Tiger line data. In data analysis we examined the relationship between income levels and locations of stores as well as income level and nutritious levels of these stores by creating our analysis plan with process diagrams. The maps we created show our final results, while our summary, conclusions, and recommendations is a summation of our findings as well as future ideas for this project.

Needs Assessments:

Background

The Humboldt Park grocery store project is rooted in a very strong and established Puerto Rican community. The core organization that this project comes from is the Puerto Rican Cultural Center (PPCC) that has been established for several decades. The goal of this organization is to create a Puerto Rican community that fully embraces and is dedicated to enriching the lives of its people. This project has been brought together through CMAP(Chicago Metropolitan Agency for Planning) and is supported by the Full Circle project that is geared by the Consortium to Lower Obesity in Chicago Children(CLOCC). More specifically the PPCC has decided to create a project called the Community Organizing for Obesity Prevention(CO-OP) in the Humboldt Park area to bring awareness to the obesity levels in the Puerto Rican Community and ways that this large and growing problem can be solved. This project began on September 4th of the year 2004 with a survey to try to determine the obesity levels of the Puerto Rican community in Humboldt Park. According to the results 35% of the adults in Humboldt Park are obese, exceeding the national percentage of 25%. Therefore, the purpose of this large project is to help the residents of Humboldt Park create a healthier life style through exercise, activity, and healthy eating. Our part of this tremendous project will involve specifically mapping locations of grocery stores where particular nutritious foods are accessible for the community. Not only will we map these grocery locations, but also pinpoint those specific foods that are of nutritious value while at the same time mapping locations that simply lack any nutrition.

Review of Literature:

The Chicago Food Desert Report produced by C-MAP examines the impact of food deserts on public health in Chicago. It compares food access and food balance,(do grocery stores balance out fast food restaurants?) directly influence health outcomes. They found the Food Balance Effect, areas with an out of balance food environment, will have higher rates of residents dying prematurely from chronic health conditions. They also found that Chicago's food deserts are nearly exclusively in African American communities, traveling the furthest to grocery stores (.59 miles) while people who live in a majority white, latino, and diverse tracts travel the shortest distance (.39 miles).

Wrigley (et al. 2002) discusses their results on the first ever before/after UK study of food consumption patterns in deprived, previously poor food retail access area of Seacroft Leeds. Based on the assumption that poor food retail access in deprived areas of British cities is linked to compromised diets and under nutrition to poor health and widening health inequalities. They were looking to find what the impact of a sudden and significant improvement in food retail access in food deserts be on residents. They suggest that the study has the potential to provide some of the missing links between poor retail access, compromised diets, poor health, and compound social exclusion.

Whalen (et al. 2002) discusses the results of the above study, looking at individual food shopping behavior, consumption patterns and attitudes towards a health diet. In doing so they were able to find information on how different demographic groups adapt to living

within a food desert. There is a focus on economic and physical constraints of residents in the area, such as health and family responsibilities. They found that women and children may also have less access to places because they feel safer going into certain areas or streets only when they are with someone.

Whalen, Amanda (et al.) "Life in a 'Food Desert'". Urban Studies, vol. 39, no 11. 2002: 2083-2100.
Neil Wrigley (et al.) "Assessing the Impact of Improved Retail Access on Diet in a 'Food Desert': A Preliminary Report". Urban Studies. Vol 39, no 11. 2002: 2061-2082.
http://www.marigallagher.com/site_media/dynamic/project_files/Chicago_Food_Desert_Report.pdf

Goal:

Our group will examine the accessibility of nutritious foods in the Humboldt Park/ West Town area based on data collected by the Anthropology class. We would like to see where there might be disparities in this community or links between chronic diseases (e.g. diabetes, cancer) and lack of nutritious foods. We would also like to create an education piece for these residents to help them make more knowledgeable choices about where they are purchasing foods from.

Objectives/ what we want to find out:

- ✓ CO-OP would like to display the geographic locations of disparities and rank or Code stores based on the nutritious levels from the Anthropology surveys.

- ✓ CO-OP would like to produce a map comparing income levels with locations of fresh produce.

- ✓ CO-OP would like to map geographic data of chronic diseases in comparison to locations of the fresh produce through the Inverse distance weighted method.

Information Products:

- ✓ we would like to produce an educational brochure for community residents with a map that shows locations of nutritious fresh foods (e.g. CSA/organic produce) we would also like to have local parks, community gardens and other green space located on this map.

- ✓ we would like to produce a set of maps based off of our above objectives

  For Example:
  - Proportional map depicting the levels of nutritious foods at the various stores in the area

- Map showing a link between chronic disease and lack of nutritious foods by locale (if data is available)
    - ✓ To represent this relationship between chronic disease and the nutritious levels of the stores a scatter plot can show this relationship clearly.
- Comparing income levels with locations of fresh produce so that our clients can visually see this data.

System Requirements:

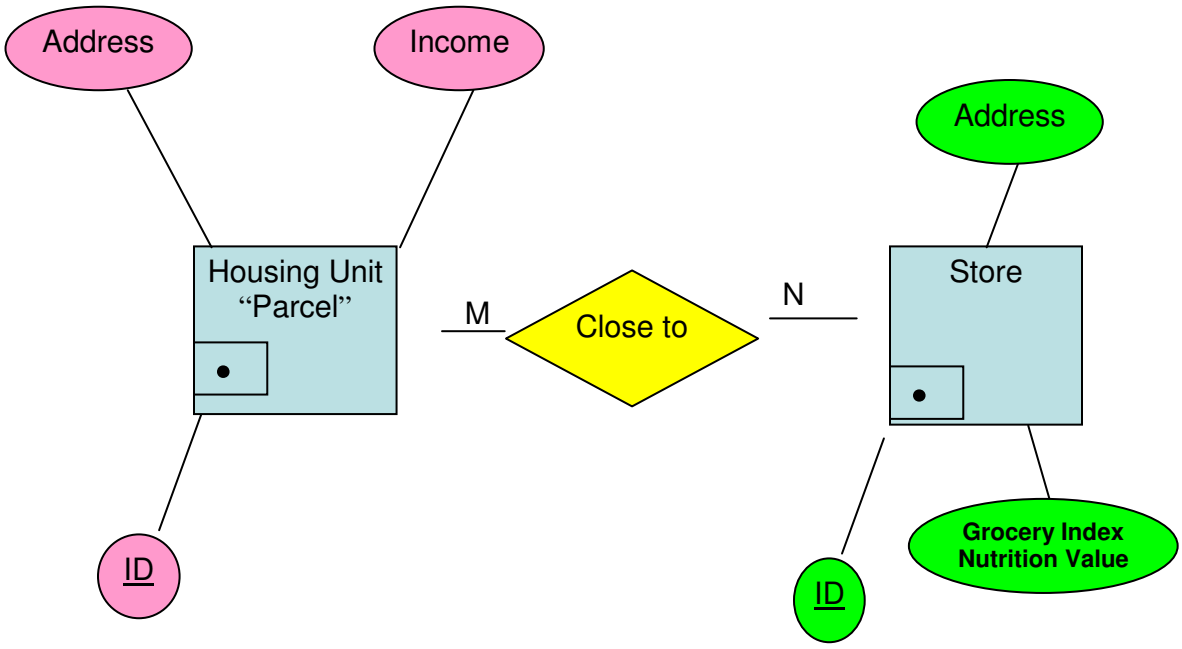
In the following section you will find diagrams showing how our database will be created for each information product. This includes the se are our matrices for each need to know question along with our entity relationship models. Our main entities are Housing Unit, Store, Green Space and Location of fresh produce. We have chosen these

entities because we feel that these will best represent the relationships of our attribute data to answer all of our need to know questions.

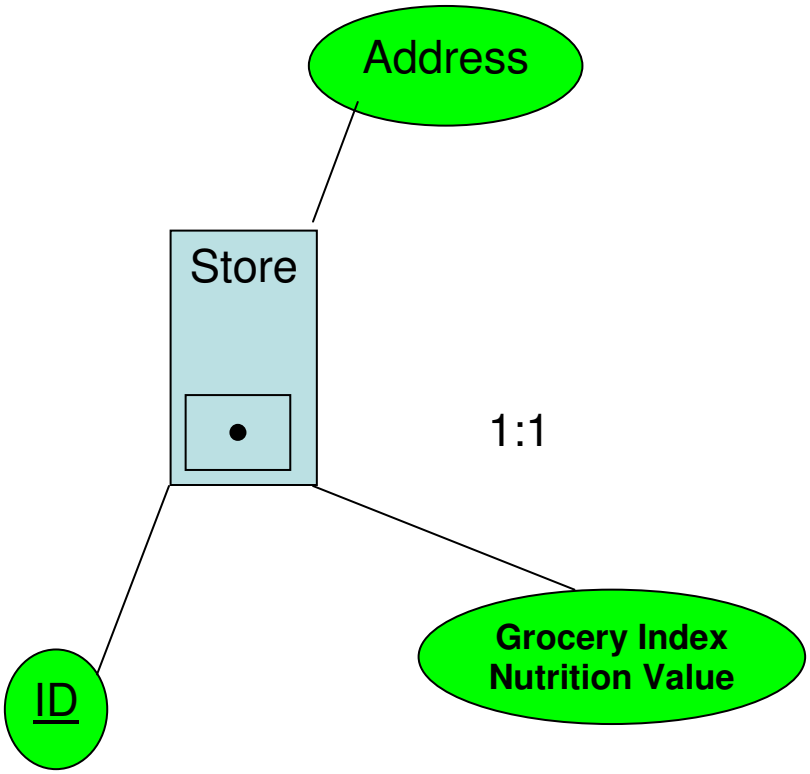
We have also created two matrices to show which components will be used in each map. The first matrix shows attribute data relationships and the second matrix shows software functions for each map.

Entity Relationship Models

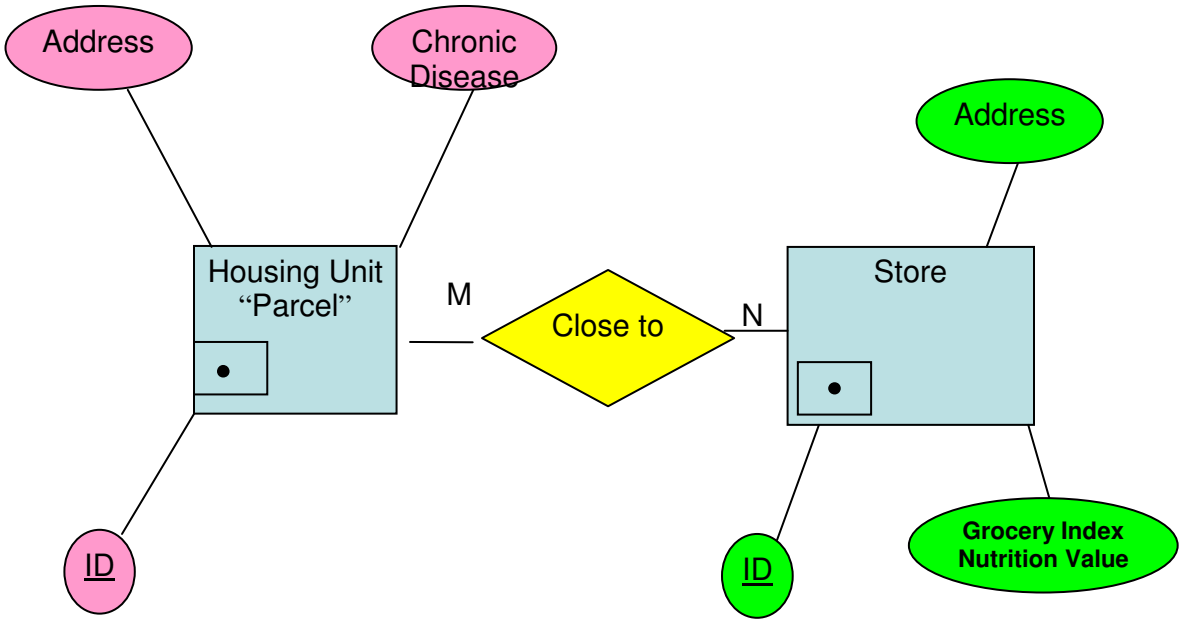
2.3 Entity Relationship Diagrams



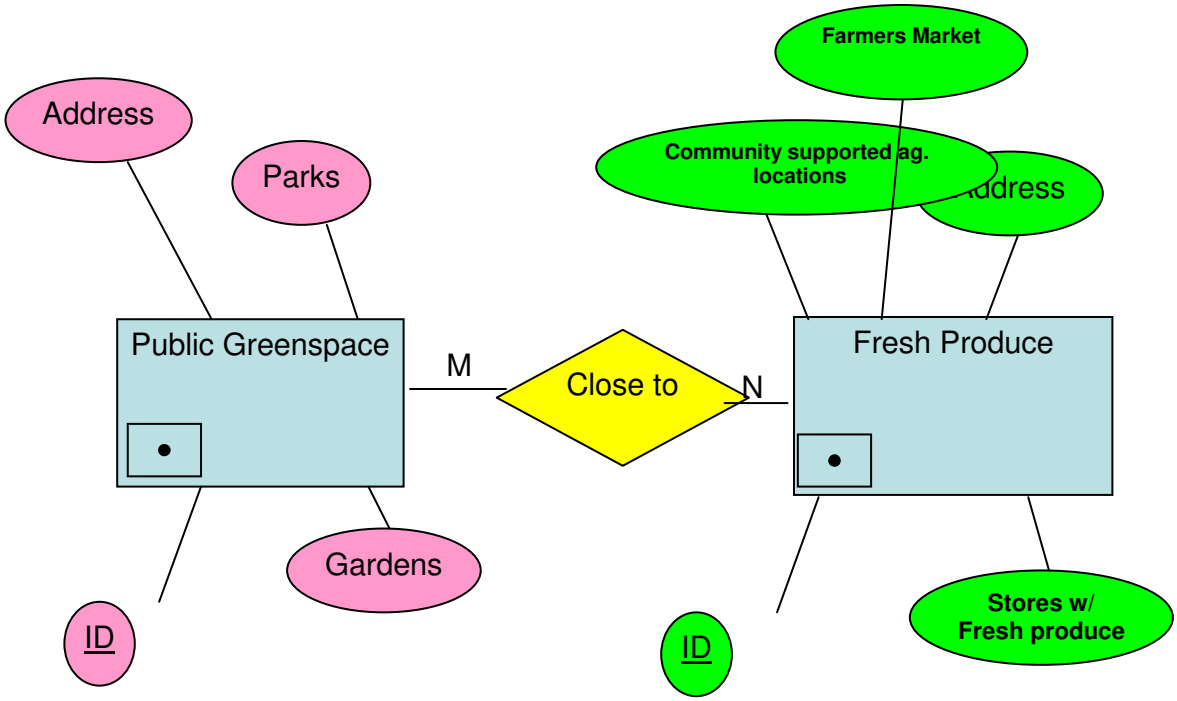
Income vs. Store Location



Map of Nutrition Index by store



Chronic Disease vs. Location of fresh produce



Greenspace vs. Location of produce

Questions	A	B	C	D
Software Functions				
Thematic Mapping	x	x	x	
Address Matching	x	x	x	x
Point in polygon		x	x	
Inverse Distance Weighted	x	x	x	x
C = Income vs. Store Location				
B = Chronic Disease vs. Location of fresh produce				
A = Nutrition index by store				
D = Greenspace vs. Location of produce				

Questions	A	B	C	D
Entity Class				
Housing Unit "Parcel"		x	x	
Stores with Fresh Produce	x	x	x	x
Greenspace				x
A=Nutrition index by store				
B= Chronic Disease vs. Location of fresh produce				
C=Income vs. Store Location				
D=Greenspace vs. Location of produce				

Data Acquisition

Introduction:
Our database specification, which includes income level by census tract, quality food market by food index and amount and the location of green space requires us to collect data from The U.S. Census Bureau, from anthropology students surveying west town food markets, and Chicago Park Districts.

File Name: SurveyData
Source of Data: Anthropology Students
Description: Data Survey of Anthropology class fieldwork with type of Products available in each store.
Spatial Type: Point

File Name: CensusTracts
Source of Data: U.S. Census Bureau
Description: Census data will be obtained from U.S. Census Bureau digital database for Cook County including information of FIPS State and County codes, Census 2000 Tract code. The census blocks will also have demographic information.
Spatial Type: Polygon/Attribute Tables

FileName: BasemapBlocks
Source: TIGER Data U.S. Census Bureau
Description: Block Information for areas in Humboldt Park and Westown
Spatial Type: Polygon

FileName: Street Data
Source: TIGER Data From the U.S. Census Bureau
Description: we will need streets information to geocode each of our points.
Spatial Type: Line

Data Sources Steps:

Information has been collected by an Anthropology class at DePaul University for the autumn 2007 quarter. This **Survey Data** is being collected for CO-OP Humboldt Park Group and CMAP. The data contains information about types of products that are available in food markets throughout Humboldt Park and Westown. The Students Surveyed Markets in the target area with permission from store owners. They notated what types of food was available at the present time of the survey. The survey question was provided by CMAP. They then tabulated the data into an excel sheet. CMAP will organize this data for a GIS Database which will be made available to us and the public. For **Census block** and **Census Tract** data, we will use data from the US census bureau website. We will use American fact finder or Tiger Data to download datasets on census blocks and census tracts.

Fitness For Use:

The Data that we are using will be a good fit for the types of maps that we are making. The Census data is highly accurate because it is frequently updated and the federal government gets data multiple sources ensuring accuracy. The survey data however, may contain some human error – either on the survey questions or on survey collection methods. Overall, The spatial type of this data is not completely accurate because we are using data that was only collected on one occasion, which may not fully represent the amount of products offered at each location.

Constraints of Data:

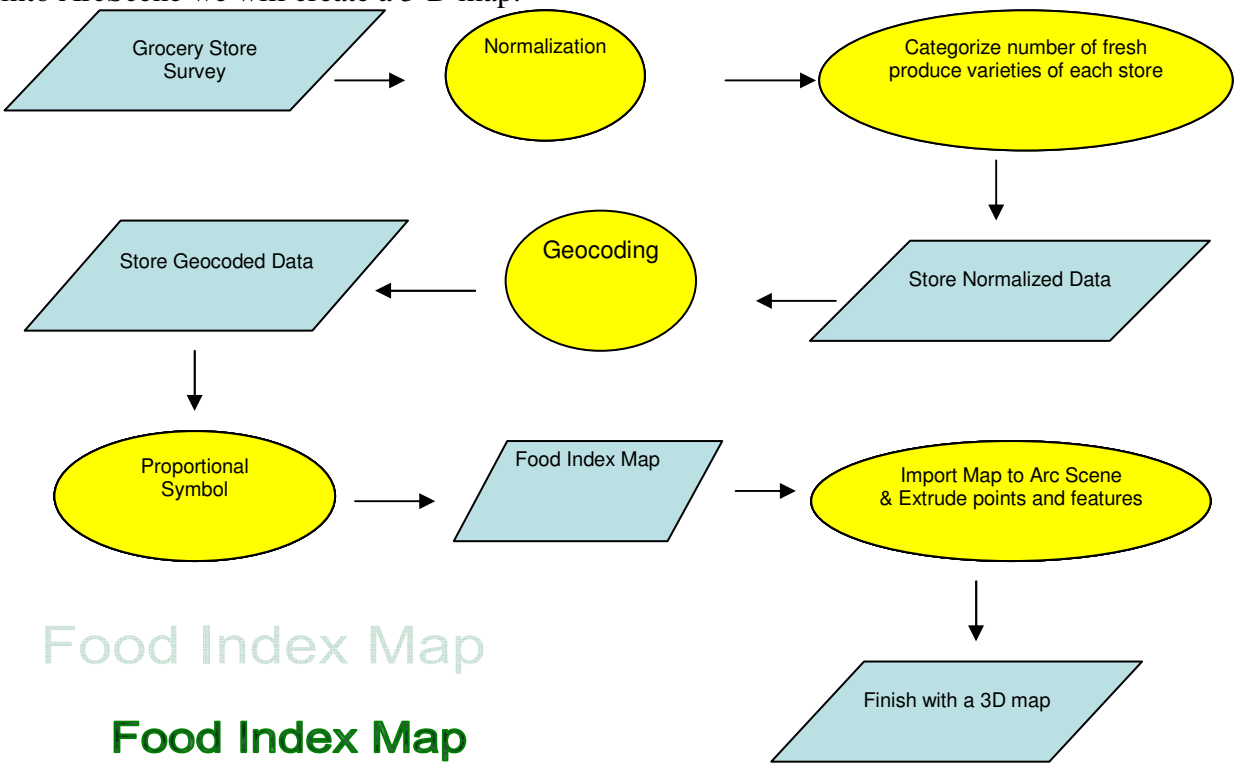
We have several data constraints for our project.

Coop Humboldt park did an obesity study in 2006 however because they did not collect any address information from survey respondents we can only infer what lack of nutritious foods might have on our target area. This is our biggest constraint. Other constraints. Also, CMAP has yet to provide us with a complete data set of information collected by the anthropology students. This may mean that we will have to create our own nutritional index to meet the needs of the client. Because of this the clients expectations might not be met because we may not have the same idea about what constitutes healthy food as CMAP has done in a previous done in a previous study. Finally, we have no way of knowing if the anthropology students collected data from all food markets that were available in the target area, or they selected certain stores. The information given to us by anthropology students thus far has been incomplete and this may alter our final products.

Data Analysis

Process Diagram 1 (food index)

Using the survey data provided, we will rate each fresh produce location based on the amount of fresh produce available at each location. Our first step was to look at the amount of produce on the survey and summed up what locations had what amount of fresh produce. Using this, we are creating a scale of all stores which carry fresh produce, and rating or categorizing each store based on high, medium and low levels of nutritious value (produce). Using this index we will create a proportional symbol map to show which stores have a higher level, or lower level of nutritious foods. Importing the map into ArcScene we will create a 3-D map.



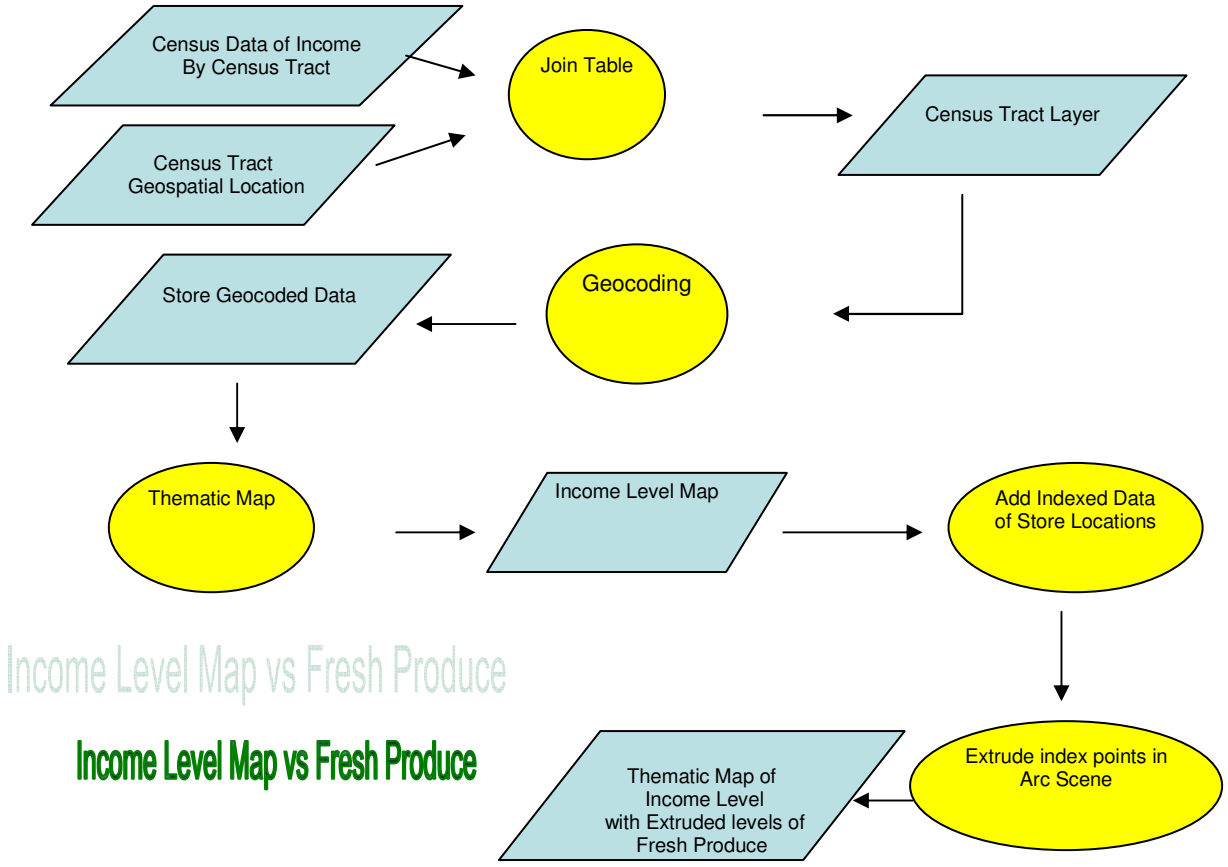
Food Index Map

Food Index Map

Process Diagram 2 (Income Level vs. Food Index)

The goal of our second map will be to show the relationship between locations of stores, and their nutritious level based off of the index, and the income level in the close proximity. Using the data we will make two maps to portray the relationship between these two variables.

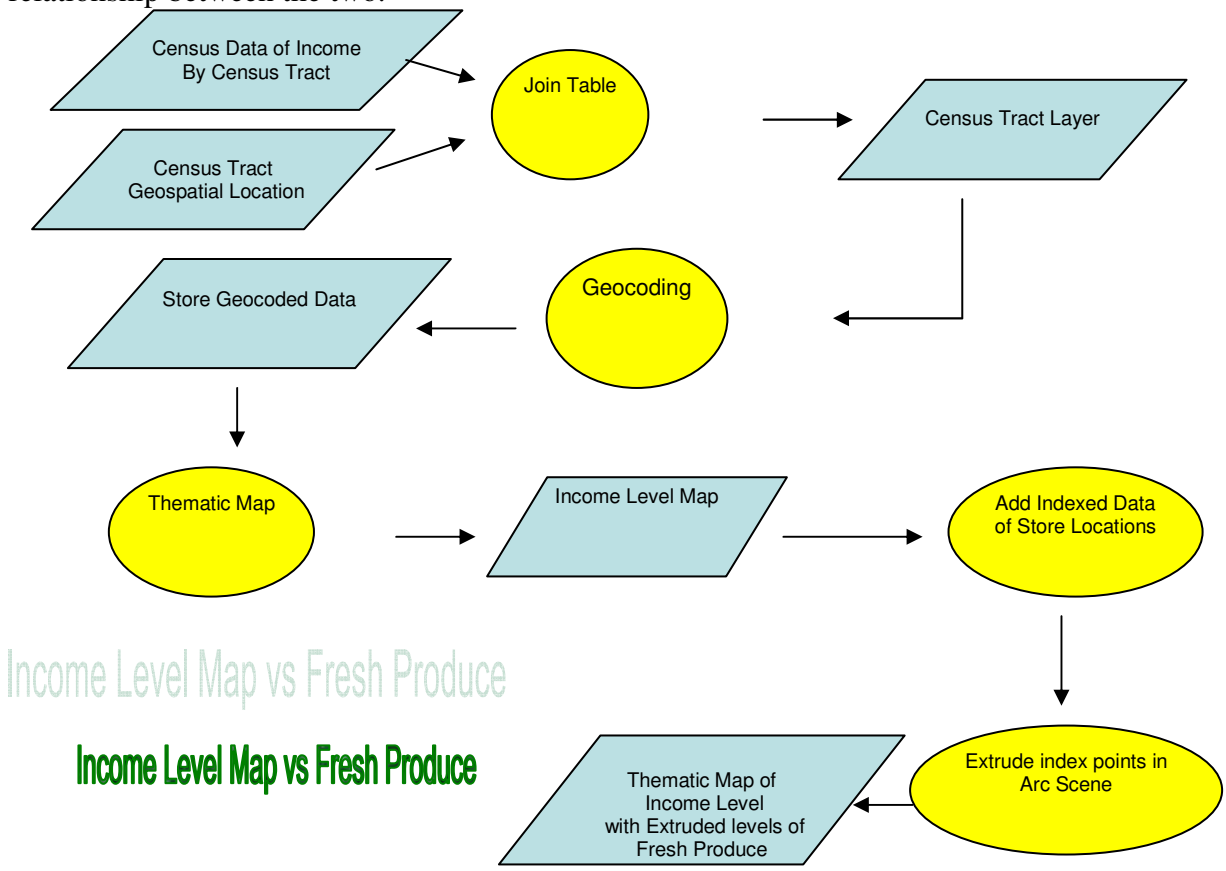
Our first map will contain a base thematic layer of income level by census tract, the second layer will include vertically extruded bars showing each stores location and nutrition index level.



Income Level Map vs Fresh Produce

Income Level Map vs Fresh Produce

In the second map we will create mean income by area (which is still undecided) and mean index level of nutrition. Visually these points can be bars to represent proportion/ relationship between the two.



Income Level Map vs Fresh Produce

Income Level Map vs Fresh Produce

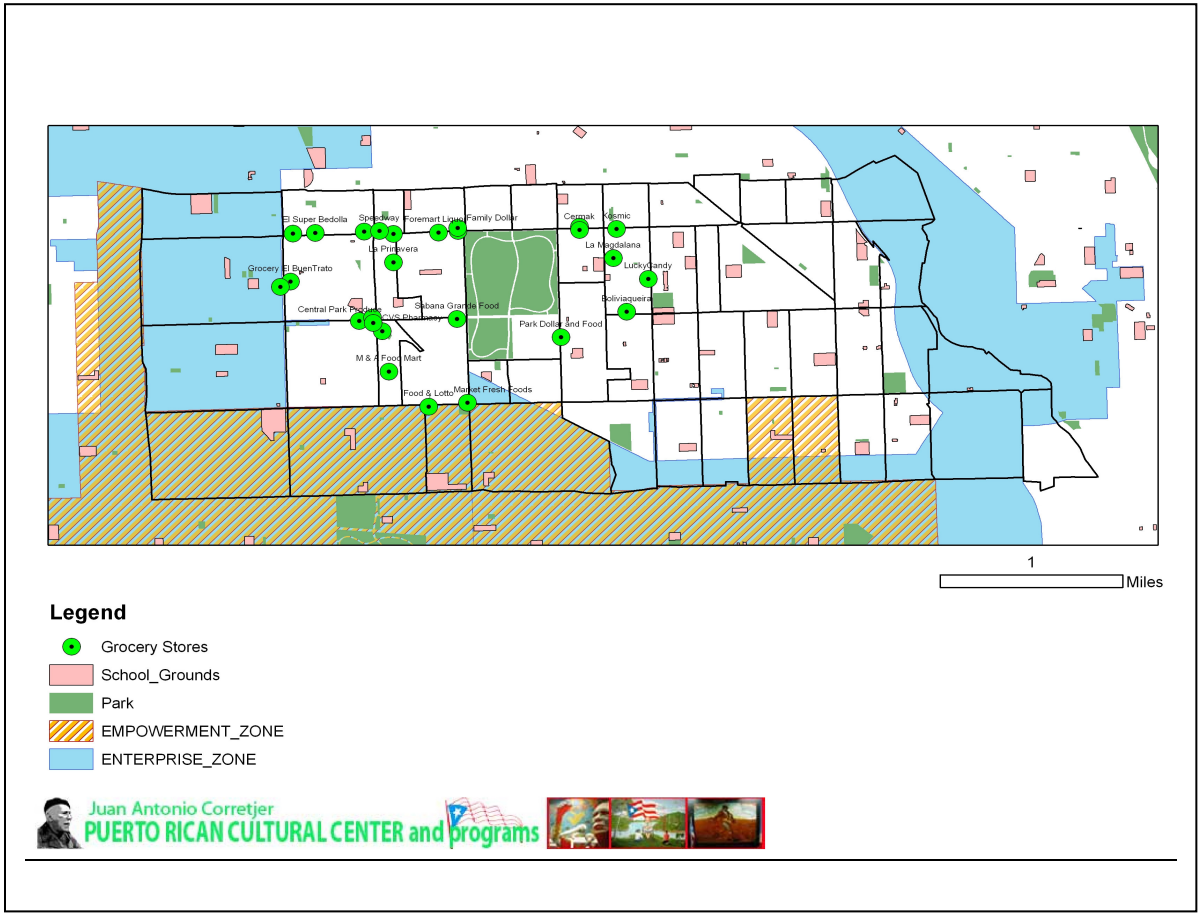
Results:

These are the results the anthropology students gathered in their survey, the chart below shows the amount of produce each store location has of fresh fruit and vegetables. With this we created a Food Index to portray the quality of each store, which allowed us to rank stores by the amount and variety of produce available in each store. Stores with 1 or 2 different types of produce were given a value of 1. Stores with 2 to 4 different types of produce were given a value of 2. Stores with 4 to 6 varieties of produce were given a value of 3. Stores with 6 to 14 varieties of produce were given a value of 4 and stores with 14 to 21 varieties of produce were given a value of 5.

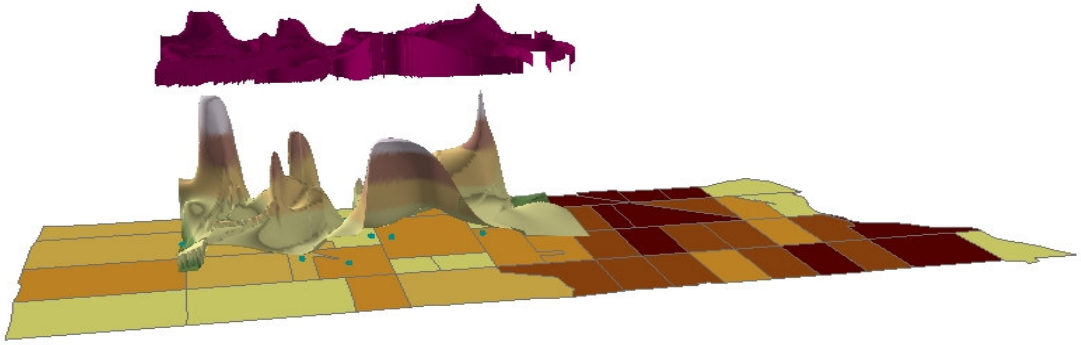
The data we used for income levels was Census Tract data gathered from the Census Bureau from 2000. We used to compare location and quality of grocery stores to level of income in the stores area.

We found that income level did not have a strong relationship with the location and quality of stores. We found that all locations of stores were in low levels of income. However, this might be due to the fact that all of the data collection has not yet been completed, and this may have skewed the results of our maps. Also, CMAP did not provide a food index which we were told they would do. Therefore our food index may not be as reliable or complete due to the fact that we only looked at fresh produce, not at whole grains or sources of protein.

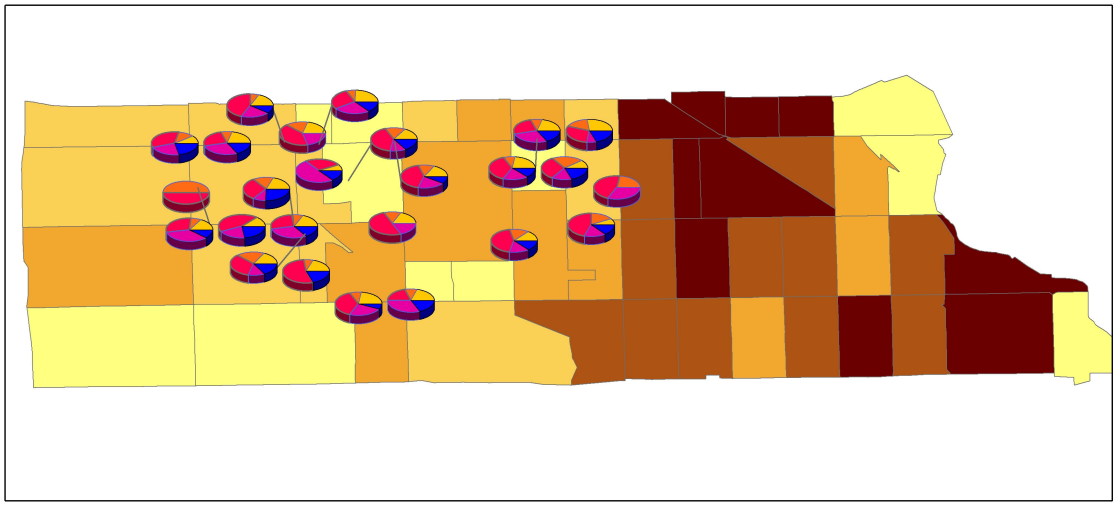
Location of grocery stores, school grounds, parks, and empowerment and enterprise zones



IDW and Contour Line -Nutrition Index VS. Income Level



Food Availability by Percent



Legend

MEAT_TOTAL
DAIRY_TOTA
TOTAL_GRAI
TOTAL_VEGE
TOTAL_FRUI

Legend

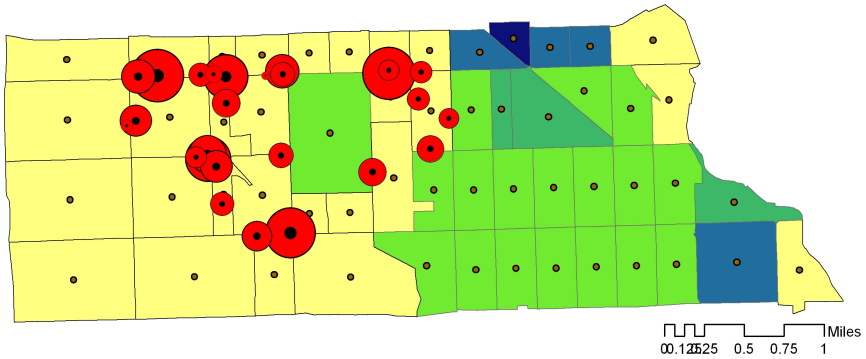
HBP_CT_Income

PCIncome

0 - 9454
9455 - 11374
11375 - 18103
18104 - 25604
25605 - 66819

1
Miles

Humboldt Park - Total Nutrition vs. Income



Legend - Equal Interval

HBP_CT_Income

PCIncome

- 0 - 13364
- 13365 - 26728
- 26729 - 40091
- 40092 - 53455
- 53456 - 66819

Legend - Proportional Symbol

HBPDATATOTALS

TOTAL_NUTR

- 1
- 5
- 10
- 50
- 100

Juan Antonio Corretjer

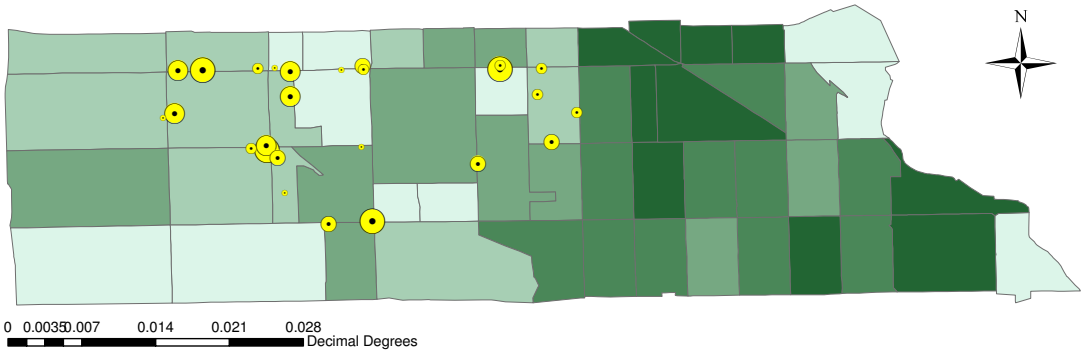
PUERTO RICAN CULTURAL CENTER and programs

Parks & Marjor Grocery Stores in Humboldt Park

Legend

- majorstores
- majorrds
- Park_Clip

Food Index VS. Income



Legend

Census Tract Income

- 0 - 9454
- 9455 - 11374
- 11375 - 18103
- 18104 - 25604
- 25605 - 66819

Food Index

- 1.000000 - 2.000000
- 2.000001 - 4.000000
- 4.000001 - 6.000000
- 6.000001 - 14.000000
- 14.000001 - 21.000000

Name	Type of Store	Name	Total Fruit	Total Veg.	Food Index
Kosmic	Corner Store	Kosmic	2	1	3
TipTop Food and Liquor	Liquor store with food	TipTop Food and Liquor	1	2	3
Cermak	National/Reginal chain supermarket) Dominick's Jewel	Cermak	7	14	21
Park Dollar and Food	Corner Store	Park Dollar and Food	2	3	5
Boliviaqueira	Missing (ask Meagan Sutton)	Boliviaqueira	2	3	5
La Magdalana	Corner Store	La Magdalana	2	2	4
Carlos Food & Liquor	Corner Store	Carlos Food & Liquor	0	0	0
Grocery El BuenTrato	MISSING (ask Matt Galloway)	Grocery El BuenTrato	2	8	10
El Barrio Food Mart	Corner Store	El Barrio Food Mart	5	6	11
Kickel Liquor Mini-Mart	Liquor store with food	Kickel Liquor Mini-Mart	2	2	4
Citgo / Dunkin Donuts	Gas station food mart	Citgo / Dunkin Donuts	0	0	0
CVS Pharmacy	Chain drug store (walgreens, CVS, etc)	CVS Pharmacy	3	3	6
Central Park Fruit Market	Chain drug store (walgreens, CVS, etc)	Central Park Fruit Market	7	3	10
Eddies Party Store		Eddies Party Store	1	3	4
El Super Bedolla	Independent Supermarket	El Super Bedolla	7	14	21
Family Dollar	Chain drug store (walgreens, CVS, etc)	Family Dollar	1	3	4
Rio Grande Fruit Market	Independent Supermarket	Rio Grande Fruit Market	4	10	14
Speedway	Gas station food mart	Speedway	0	1	1
LuckyCandy	Corner Store	LuckyCandy	0	3	3
Foremart Liquor	Liquor store with food	Foremart Liquor	0	0	0
North & Kedzie Foot Mart	Independent Supermarket	North & Kedzie Foot Mart	3	3	6
La Prinavera	Corner Store	La Prinavera	2	8	10
Sabana Grande Food	Independent Supermarket	Sabana Grande Food	0	2	2
M & A Food Mart	Corner Store	M & A Food Mart	2	0	2
Aldi	National/Reginal chain supermarket) Dominick's Jewel	Aldi	6	11	17
M & M Food Mart	Corner Store	M & M Food Mart	2	1	3
Central Park Produce	Independent Supermarket	Central Park Produce	5	12	17
Market Fresh Foods	Independent Supermarket	Market Fresh Foods	7	14	21
Food & Lotto		Food & Lotto	1	5	6

Summary, Conclusion, Recommendations

Using data gathered by the anthropology class we were able to map out the location of stores and create a food index using fresh produce only. We also collected Census Data by tract to compare income levels in the community to store locations we created several maps depicting the relationship between income levels, location of stores, and quality of produce in each stores.

Based on our maps produced we were unable to find any definite conclusion because data was not sufficiently collected and a food index was not provided.

We recommend that the rest of the data be collected by anthropology students, so there may be a complete map of fresh produce, store locations. We also recommend that CMAP provide a well thought out food index so that the quality of stores is assessed. We have several reccomendations for this project in the future. These would be to encourage community groups to meet with the students at least twice during the quarter to "map out" a plan. We would also recommend that data be collected by anthropology students one quarter and given to Geography students the next quarter for better analysis and access to reports by anthropology students. We would recommend that the survery be revised to suit various ethnic neighborhoods and to clearly define what types of food are considered nutritious. Finally we would recommend that COOP continue to educate community residents about a nutritious diet – holding in mind that not one diet fits everyone, but that there are some basic guidelines.