Defining Healthy Communities

Within the Framework of Economic Vulnerability:

A Study of King County, Washington

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June 5, 2012

Theoretical Foundation of This Project

The goal of this GIS project is to spatially represent economic vulnerability, and how the quantity and quality of community assets dictates vibrancy, or 'health'. It uses quantitative census data to tease out qualitative representation, resulting in a relevant set of maps that integrate human geography with traditional GIS techniques (O'Sullivan, 2006). According to Matthews *et al.* (2005), utilizing ethnographic data will be helpful to "piece together how many of the contextual data sets …are relevant to low-income families and low-income communities"(p.76)

Tom Wolff has written extensively on community development and problem-solving. Wolff's (2010) approach is to assist those in need is by working within the community to facilitate change, encouraging collaboration between the different social services. Those organizations and institutions that would benefit from sharing resources too often remain isolated and pursue their visions parallel to each other instead of communicating and working together. Within the scope of my project, by giving a spatial reference to those social services located within healthy communities, I will show which communities can improve their communication and collaboration between organizations. Canada (1996) maintains that service institutions should be community-based, with a coordinated effort and vision. Local service organizations would be in the best place to facilitate actual change within their communities.

Black (2004) explains that sustainability within societies involves three dimensions – economic, social and ecological. A sustainable community is one which has a stable economic base, renewable resources, work opportunities, opportunities for success, and addresses basic needs, which are "good schools, safe streets, affordable and decent housing, and local

employment opportunities" (Canada, 1996). A healthy environment and economy are both necessary for a healthy society. Using GIS to spatially represent this qualitative data is especially applicable. Matthews *et al.* (2005) states that "…GIS is an effective tool in analysis. Maps can suggest interpretations that we might otherwise overlook. GIS can quickly identify families that are more isolated, have fewer supports, and access fewer outside resources and services. GIS can show how far families have to go for different types of services that enhance their children's development and well-being" (p. 86-87).

I referenced *Building Communities from the Inside Out: A Path Toward Finding and Mobilizing a Community's Assets* by Kretzman and McKnight (1993) to build an asset layer that would reflect a healthy community. Based on their Community Assets Map on page 7 I chose variables that target children and youth, which should be the basis of a healthy community: schools, community colleges, hospitals, medical clinics, parks, churches, and libraries.

To reflect the ethnographic makeup of economic vulnerability, I designed a socio-economic index based on information from the Ottawa Charter for Health Promotion (1986), which lists the following as healthy community basics: food, shelter, income, education, equity, and social justice.

This analysis can be used to identify vulnerable communities and pinpoint the associated characteristics: concentration of female head-of-households with young children, poverty, ethnicity, unemployment, housing abandonment (foreclosures), housing vacancy, housing overcrowding, and high rent-to-income ratio (Wong and Hillier, 2001). Referencing these attributes spatially would locate those communities at high risk.

According to Mangino and Silver (2010) "the geographic concentration of poverty in

specific neighborhoods has substantial social consequences." Being a poor family within a middle-class neighborhood is significantly different from living in a community whose majority are living in poverty. With this project I hope to identify communities in trouble: those that lack resources and services, leaving them isolated and without easy access to outside services (Matthews *et al.* 2005).

The Planning Process

The purpose of this project is to isolate neighborhoods of economic distress, and, by adding a layer of community assets, show both healthy and vulnerable communities. I started by volunteering for King County's One Night Count (www.homelessinfo.org). This is an annual event where volunteers are assigned areas of the county to walk or drive from 2:00 to 6:00 a.m., counting those sleeping on the streets or in their cars. The goal is to gather some data as to the number and family make-up of those living on the streets. I went as a member of the Wellspring Family Services team, and spent the walking time questioning them about their organizational vision, goals, and nuts and bolts of their efforts to end homelessness in King County.

Using the above articles as my foundation, I define a healthy community as one where energetic and vibrant groups of people engage with each other and have access to police and fire stations, public transit, health clinics and hospitals, food banks, libraries, activity centers, and museums. I have set the parameters for economic vulnerability (or high risk areas) using the following factors: higher than average rates of non-white, child, and elderly populations, school-age non-attendance, poverty and low income, single head-of-household, housing vacancy, rent and mortgage-to-income, use of public transportation, language isolation, and school dropout rate for adults.

My goal is to give a visual representation of the high risk communities the Seattle metro region which have the support of organizations and programs, and bring to attention high risk communities which are lacking social support systems or other positive community elements. The latter target areas would benefit from attention by social service organizations.

The Methods and Implementation

I obtained basemap shapefiles from previous TGIS labs and the King County GIS Center, as well as Community Assets point shapefiles from KC GIS. These were already correctly projected to NAD 1983 HARN StatePlane Washington North FIPS 4601 US Feet, and clipped to a King County boundary extent.

I downloaded the following socio-economic block group data from the U.S. Census website (www.census.gov): nonwhite population, child population, elderly population, school attendance, poverty, family low income, single head-of-household, housing vacancy, rent-to-income, mortgage-to-income, public transportation use, language isolation, and dropout rate. I extracted King County block group data and then aggregated the data in Microsoft Excel by isolating the fields needed in each dataset, dividing by the population total to find a percentage of total, and copying to a "SES Index" spreadsheet. After preparing the census data in Excel I joined the tables to a King County block group shapefile in ArcMap.

I then created an index by first using the mean and standard deviation of the percentages to find z-scores, then classified the z-scores into five classes relative to how high or low they were for each variable: Z<-2 = **-2**, Z>-2 and <-.5 = **-1**, Z>-.5 and <.5 = **0**, Z>.5 and <2 = **1**, Z >2 = **2**; This resulted in 5 groups of block groups: those with very low (variable), somewhat low,

average, somewhat high, and very high. The reclassified z-scores were totaled resulting in a SESIndex score.

Using a Getis-Ord Gi* Hot Spot Analysis I isolated the block groups that were statistically significant. From those I isolated the HighGiZscore block groups and turned them into points. I then aggregated those points to clusters with a 1 mile buffer. Using the Smooth Polygon tool I rounded the corners of the clusters for aesthetic effect.

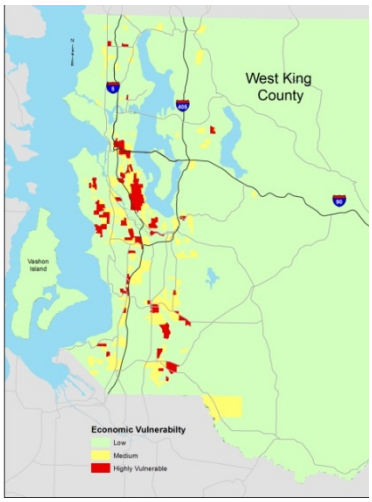
I next built an asset layer that would reflect a healthy community. I obtained addresses from online sources for libraries, museums, food banks, YMCAs, Boys & Girls Clubs, and churches/temples/mosques. After inputting the data into MS Excel tables I imported the data tables into my project geodatabase. I then geocoded the addresses and exported them into my Community Assets feature dataset as point layers. To those I added fire stations, police stations, public and private schools, farmers markets, medical facilities, and public health clinics (all from King County GIS Center).

I made two new layers: Food Bank Service Areas and Medical Facilities Service Areas. I clipped the King County food banks shapefile and a merged shapefile of public health clinics and medical facilities to show those within one-half mile of the target clusters, as there were a few facilities that were located just outside of the target clusters.

I calculated walk time for the Network Analysis based on findings by Hilgenkamp, van Wijck, and Evenhuis (2012), who found that older adults walked an average of 2 miles per hour. I hypothesized that those walking to food banks and medical clinics would walk slower than the 3 mph adult average, as they could have the added variables of children in tow, streetlights to wait for, and/or health issues to slow them down. I calculated drive time at 20 miles per hour,

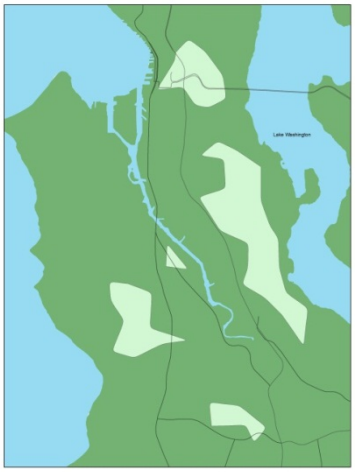
based on findings by the Puget Sound Regional Council (February 2011). In *T2040 Monitoring: Congestion and Mobility Report 2010 Existing Conditions*, they reported that southwest King County traffic moves at 70 percent of posted speeds during peak flow times. I averaged the posted speeds of 25 and 35 mph to 30mph, and took 70 percent of that to come up with 21 mph, which I rounded down to 20 mph for analysis purposes.

I then performed Network Analyses to find the service areas of those food banks and medical facilities within a 5 and 10 minute drive time, and 5,10,and 20 minute walk time. I added a bus route layer to show target areas with bus service routes to food banks and medical facilities.



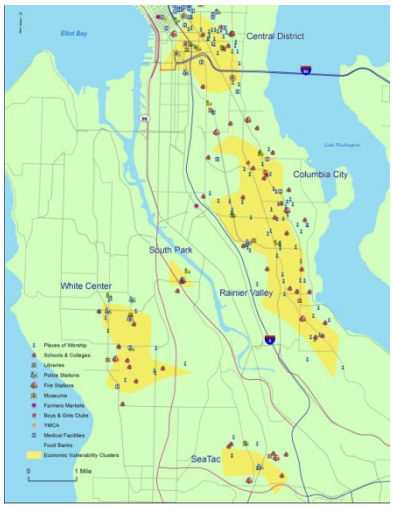
Results

The z-score classification resulted in the identification of 82 block groups with a score of 8 or higher, which I designated as theoretical areas of high socio-economic distress. I disregarded the isolated solitary block groups and some unusable ones made up of malls, industrial areas, and the UW Seattle campus.

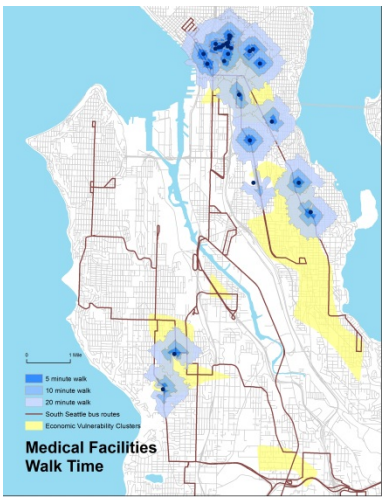


The Getis-Ord Gi* Hot Spot Analysis isolated 5 clusters which corresponded roughly to the Central District, Columbia City-Rainier Valley, South Park and White Center regions of south Seattle, and North SeaTac, in south King County. These

areas are all distinct neighborhoods, making them ideal for an in-depth study of community assets.

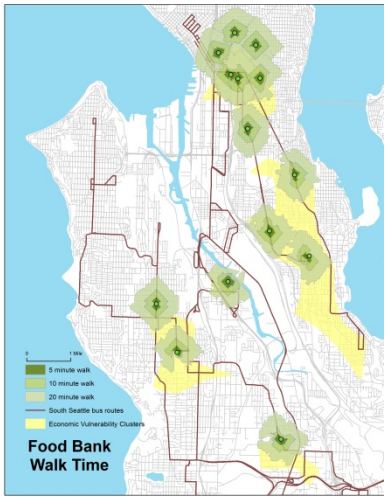


Mapping the community assets resulted in a very visual representation of the dispersion of those assets. The Central District is bisected by I-90, resulting in two distinct areas. North of I-90 there is a bustling, interdependent community with many meeting places, while south of I-90 the lack of similar meeting places is noticeable. South Park is very isolated because the June 2010 closing of the bridge over the Duwamish cut them off from services and local access to South Seattle. North SeaTac is an area affected by the noise pollution from SeaTac airport, resulting in depressed land values. It has a large population of East Indian, Hispanic, and Somali immigrants, but is lacking any community centers where they could gather. Also absent are any parks, public green spaces, or playgrounds. This target area is part of a newly incorporated city (1990), and so community facilities and social services may still be in the developmental stage.



The network analyses of drive time to food banks and medical facilities proved unenlightening. The 10-minute drive time from food banks covered all target communities, and all except North SeaTac and the southern tip of Rainier Valley for medical facilities. I decided to focus on walk times. The medical facilities 5, 10, and 20-minute walk times showed that many are clustered north of the Central area of Seattle, but there is bus service from all communities to their closest facility. Rainier Valley, North SeaTac and South

Park are without local clinics, and have to travel some distance for health care. The food bank 5, 10, and 20-minute walk times showed that while all the target communities have access to food banks, the food bank in Rainier Valley is too far for most residents to walk to, and they would have to rely on bus service.



Discussion of results

My initial hypothesis was proven false when the data showed that almost all of the economically vulnerable areas were in the South Seattle and southwest King County regions. I expected there to be pockets of low income and economic depression in greater King County, but if there are they did not show up at the block group level.

Interesting observations:

- There are 31 Boys and Girls Clubs in Seattle and West King County, many of them offering before and after school child care. A total of seven are in south King County, but only three of those are in target neighborhoods. Those three do not specify if they offer before or after school childcare.
- Although all target communities have parks and playgrounds, some are located in unsafe areas (White Center), and/or seemed abandoned (White Center and South Park). North SeaTac has parks and a community center, but all are outside of the target area, and not within a reasonable walking distance.

Critical analysis of my project

Through this study, I have highlighted six areas of high socio-economic risk, and, by adding community assets, the abundance or lack thereof designates them as 'healthy' or 'unhealthy'. At one end of the spectrum the Central District of Seattle, whether through the work of community volunteers or gentrification, is a thriving hub of an ethnically diverse population with many community gathering facilities and social services in place. At the other end, North SeaTac and South Park represent forgotten populations, of which their neighborhoods would improve with an influx of social services, programs, and guidance.

The variables for the socio-economic index, while not random, were chosen at my discretion. I consulted research articles and scholarly books for examples, but this is one area that could benefit from a more scientific approach.

This project would be useful as a model for other communities. With additional work in ArcGIS ModelBuilder, I could set up a tool that would only need specific data to work. The starting point would be to ask my social services contacts if my project is informative and useful, and what information should be added to make it more so.

If I were able to do some follow-up work on this project, the next step would be to enlist the communities in participatory GIS by holding community meetings to ask for their input as to where additional support is needed and what services they would find beneficial to add. Holding multiple meetings in each community would allow more individuals a voice in the process. After that, asking social service organizations, such as the YMCA or Wellspring Family Services, for additional services would improve the health of each community.

There are community websites for South Park, www.allaboutsouthpark.com, White Center Community Development Association, wccda.org, Seatac, www.ci.seatac.wa.us, Columbia City/Rainier Valley, www.rainiervalley.org, and the Central District, www.centraldistrictnews.com. They all contain articles about upcoming neighborhood events, advertisements for local businesses, and links to services, showing one way the residents can stay informed and participate in their community.

This project combined my interest in social issues with new-found skills in GIS. While not an easy project to envision and carry out, I am pleased with the results. I have yet to run it by my friends/contacts/advisors, but look forward to their critical assessment and advice. I would like this to be a truthful representation, and asking the experts to find my flaws is the best way I know to make it so.

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Maps were projected in NAD 1093 HARN StatePlane Washington North FIPS 4601 Feet. Census data was provided courtesy of US Census Bureau, King County orthographic map courtesy of WSDOT, and shapefile data by permission of King County.