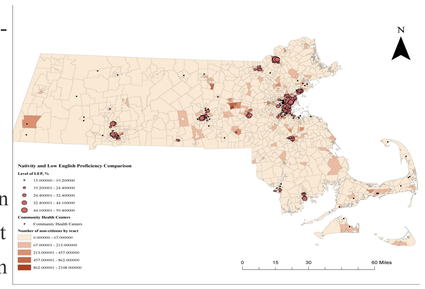
Community Health Centers and Immigrant Populations

Spatial Analysis of Proximity and Distribution Massachusetts

Introduction

Immigrant populations in the United States face significant barriers to optimal health. These may include poverty, language barriers, and a lack of familiarity with the health care system (Castañeda, et al, 2015; Yoshikawa, 2011). Community health centers (CHCs) are uniquely poised to serve immigrant populations in Massachusetts and across the U.S. Federally Qualified Community Health Centers (FQHC) are the result of federal legislation passed by President Kennedy in the early 1960s as part of efforts to strengthen the public safety net. The mission of these centers is to meet the health care needs of those who could not otherwise access care. Providing primary care regardless of an individual's ability to pay, these centers provided care to 20 million people in 2011. Two thirds of these patients were groups of ethnic and racial minorities and nearly 40 percent had no health insurance (Hing & Hooker, 2011).

This project explores the current locations of CHCs in relation to immigrant populations in Massachusetts. The distribution of large numbers of non-citizens and low-level English-speakers, according to The American Community Survey (ACS), are compared to the distribution of CHCs across the state. Additionally, methodology is explored through the use of spatial analysis with the goal of understanding best practices for spatial research on this understudied group. A Spatial join, together with Zonal Statistics, and Euclidean distance method. Were used. The adjacent map shows a simple spatial representation of the populations of interest and CHC locations.



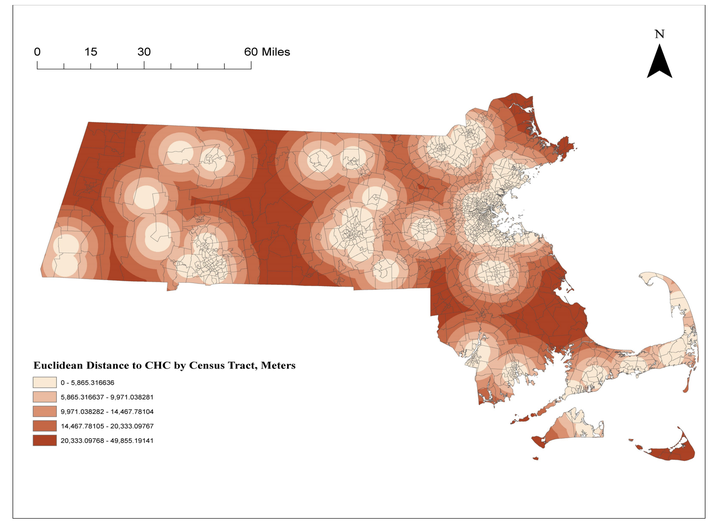
Variables

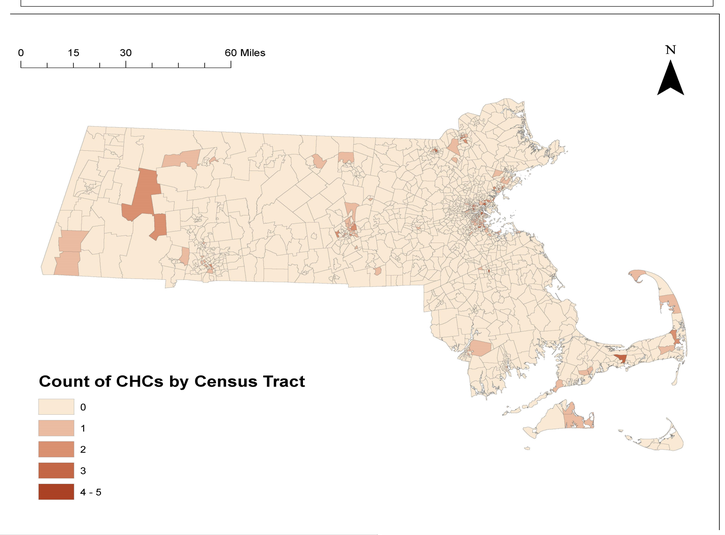
Methods

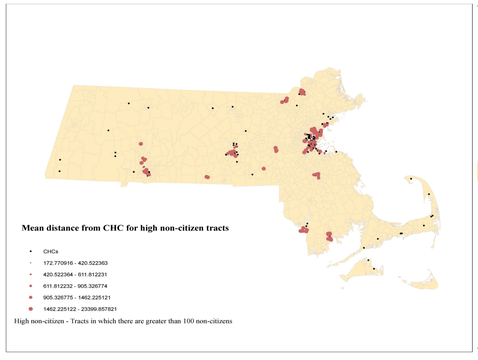
Key variables were selected using American Fact Finder, focusing on two measures: a) Nativity and b) English Language Proficiency. From the nativity table the specific variable of non-U.S. citizenship status was selected. Tracts were defined as having a high number of non-citizens if the count within the tract was 100 or more individuals. English Language Proficiency is measured in multiple ways by the ACS. For this analysis the chosen variable was percentage of households in the tract with no one in household over age 5 who speaks English. Tracts were defined as having a high percent of Low English Proficiency (LEP) if the percent of such households was 15 or greater. Additionally, Community Health Center points were taken from Mass GIS.

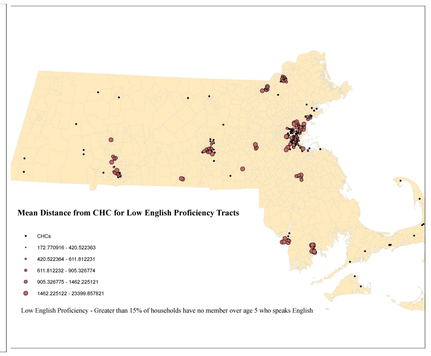
Tools and Analysis

Multiple maps were created to demonstrate the distribution of Community Health Centers (CHCs) in Massachusetts relative to census tracts. Euclidean Distance was used to measure the distance from tracts to CHCs. A Spatial Join was completed to produce a count of CHCs per census tract. Finally, applying Zonal Statistics based off the Euclidean Distance results, mean distance from CHC per census tract was calculated. Next, counts of the populations of interest were completed and compared to CHC local









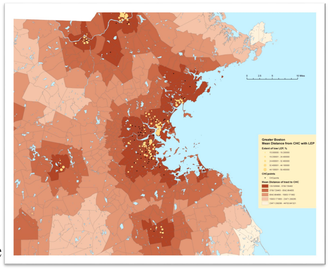
well as CHC counts per tract. These maps are included in the central column of the poster. However, a review of initial analysis at the state level showed that a fine grain view offers better insight into the distribution and count of CHCs relative to the population of interest. A less broad view also provides a better demonstration of the differences between the Euclidean Distance and Spatial Join methods. As a result, multiple maps were created at the level of Suffolk County. In the interest of parsimony only the LEP variable was used..

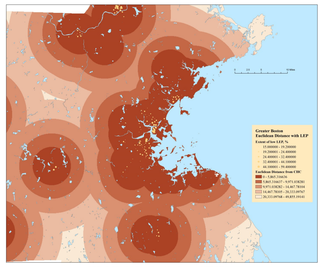
Results

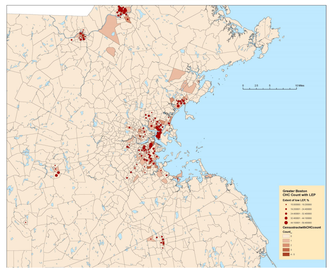
Results are interpreted across two domains: methodology and spatial analysis of CHC access versus the populations of interest. Regarding methodology, Euclidean distance, together with zonal statistics, appears to provide a more accurate and practical representation of access to CHCs for Low English Proficiency (LEP) and High Non-citizen (HN) count census tracts. Table 1 demonstrates how even tracts with a low CHC count (produced through spatial join) may be near a CHC (calculated with zonal statistics from Euclidean Distance). Thus, the wide variation in mean distance across tracts with the same CHC count shows the utility of the distance measurement over the count. The spatial analysis clearly shows a strong correlation between the location of CHCs and LEP and HN communities in Massachusetts. As expected, tracts with high LEP and HN status overlap as well.

Mean Distance from CHC	Count of CHCs
249.02	0
5483.49	0
129.52	1
978.82	1
172.77	2
705.33	2
1077.73	2
358.85	3
396.59	3

Methods Comparison for Suffolk County







Discussion

This exploratory analysis provides insight into how location of CHCs compares to the distribution of immigrant populations in Massachusetts, confirming a strong spatial correlation between the two. A comparison of the two methods applied suggests that Euclidean Distance is a better choice for this type of analysis. Two significant areas of future research are suggested by this project. First, more detailed analysis completed at smaller geographic units could likely provide more information. Specifically, network analysis using roads and/or public transportation would further elucidate barriers. Breaking down the population further could also show how access differs by other demographic variables. Second, comparative analysis between Massachusetts and a state with a lower level of CHC resources or more varied distribution of immigrants may provide insight into differences in access across state and regional levels in the United States.

References

Castaneda, H. Holmes, Seth M., Madrigal, Daniel S., Young, Maria-Elena DeTrinidad, Beyeler, Naomi, & Quesada, James. (2015). Immigration as a Social Determinant of Health. *Annual review of public health (36),* 375-392.

Hing, E., & Hooker, R. (2011). Community Health Centers: Providers, Patients, and Content of Care. *Centers for Disease Control* (Ed.). Hyattsville, MD.

Yoshikawa, H. (2011). Immigrants raising citizens. *Undocumented Parents and their Young Children. New York: Russell Sage Foundation.*

Data sources

Massachusetts Community Health Centers layer; Hydro_poly layer; Oceanmask_poly layer, Mass GIS

Nativity and Citizenship Status in the United States. U.S. Census Bureau, 2010-2014 American Community Survey 5-Year Estimates

Language Spoken at Home by Ability to Speak English for the Population 5 years and over U.S. Census Bureau, 2010-2014 American Community Survey 5-Year Estimates

Background information

Cartographer: Rebecca Nuernberger

Projection/Coordinate System: NAD_1983_StatePlane_Massachusetts_Mainland_FIPS_2001 Lambert_Conformal_Conic

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