CHILD HEALTH ASSESSMENT MAPPING PROJECT (CHAMP)

PART 1: SUPPORT FOR ACTIVE LIVING & CHILD DENSITY

Background

This GIS project supports the current mapping needs of the **Boston Child Health Study (BCHC)**. The goal of this Boston based study is to provide data on the prevalence of child heath issues, specifically between environment and child health.

The BCHC is divided into three parts; (1) a phone survey of Boston parents and caregivers of children ages 0 to 17 years; (2) an analysis of Medicaid claims; and (3) an environmental assessment of Boston neighborhoods through data collection and citywide GIS analysis, known as the **Child Health Assessment Mapping Project (CHAMP)**. The premise is to provide outputs that can help establish new tools for informing and advocating for family-centered approaches to improving the health of children in Boston.

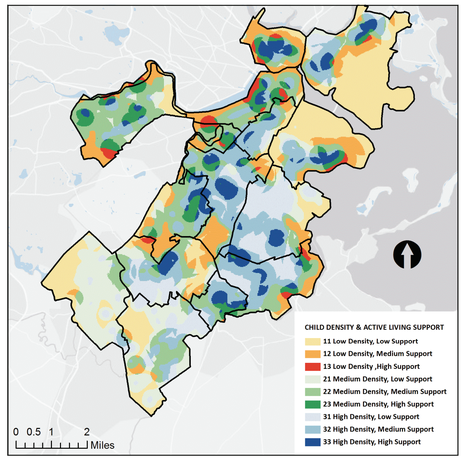
Purpose

Over the last 20 years, obesity rates have dramatically increased in the United States.[1] In 2009, one third of adults and close to 17% of children and adolescents were obese.[2] As of 2010, 27% of Boston public high school students reported engaging in regular physical activity.[3] Physical inactivity can promote the onset of chronic diseases such heart disease, diabetes, and some cancers. One of the many factors contributing to this public health crisis is the built environment; structures and resources built to support human activities.

Considering these trends and the serious threat to child health, the built environment is worth exploring with GIS. This project solely focuses on CHAMP, part three (3) of the BCHS. There are currently five (5) established spatial elements that CHAMP will explore (Table 1). This analysis will only focus on the **"Support for Active Living"** element. Active living is defined as a way of life that integrates physical activity into individuals' daily routines. This can be achieved in various ways, from walking to the metro station, biking, or playing in a nearby park or recreation facility.

Research Questions

- How supportive is Boston in terms of active living?
- How does support for active living rank with density of children per household?



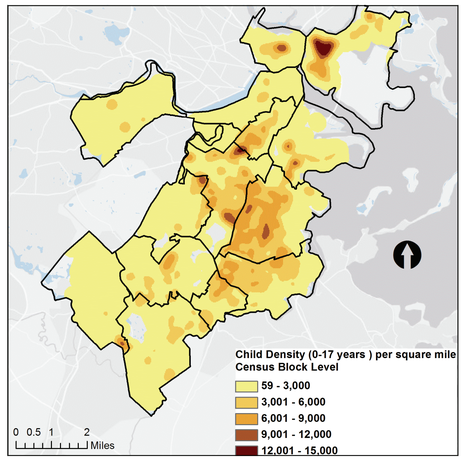


Table 1. CHAMP Spatial Elements

Spatial Elements	Citywide Data Layers
Support for Active Living	**Open space, bike lanes/paths, recreation facilities, public transportation**
Support for Healthy Eating	**Supermarkets, food pantries, soup kitchens, farmers' markets, community gardens, use of**
Support for Healthy Relationships	**Childcare, cultural resources, houses of wor-**
Support for Learning	**Rates of educational attainment, noise and air pollutions measures, transportation (train, bus) distance from schools, school attendance, rates of household occupancy**
Intact Neighborhood Environment	**Tobacco outlets, liquor stores per capita, air pollution (from major roads/intersections), vacant buildings, crime rates, fatal and non-fatal shootings, abandoned vehicles, street lighting, street trees**

Methodology

First, it was determined which indicators should be used to measure active living. These variables included public recreation facilities, open space (> 5 acres), public transportation, and biking infrastructure (paths/lanes).

A citywide proximity analysis was performed for each of these indicators using the raster euclidean distance tool (output cell size 100 ft.). Using the raster calculator, these measures were combined to create a citywide "active living" support map. Support levels are ranked based on distances to indicators from 1(low support) to 5 (high support).

Next, a child density raster was created based on census block data centroid points. In order to convert the block polygons to centroid data, the feature to point tool was used. Once the child density was converted to a point shape file, the kernel density was use to create a density raster (search radius 400 meters). This raster was reclassified using quintiles and ranked from 1[low density] to 5 [high density].

Finally, the active living and child density rasters were reclassified and combined using the raster calculator. This matrix analysis combined the active living raster and ranked these measures in relation to where children are most concentrated across the city.

Results

Citywide, Boston shows an overall high support for active living based on the active living support raster. Some isolated areas at the neighborhood level do show a lower support for active living; including parts of Dorchester and East Boston.

Furthermore, the matrix raster pinpoints areas of active living support in relation to child density. Areas with high child density and low active living support include Dorchester, Roslindale, Hyde Park, and parts of West Roxbury.

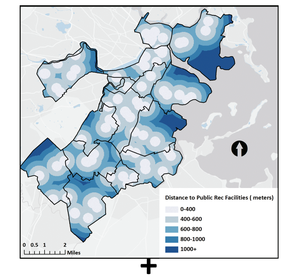
Next Steps

This project is a good first step in looking at the connection between child health and environment. Based on the indicators measured, Boston's built environment is rather supportive at the citywide level. Still, the matrix analysis map has the potential to inform CHAMP about Boston's current active living environment for children, and where resources, programs, and/or city policies could be targeted in the future.

Next steps should include reevaluating the indicators and adding data layers such as linear miles of sidewalk, crime levels, intersection density, and traffic/walk signals. Moving beyond just facilities to physical activity programs and sport leagues should be explored. Also, socio-economic spatial elements should be considered.

Lastly, access to child health data for this project was difficult due to HIPPA privacy laws. Compiling child health data as it becomes available will be crucial when looking at individual spatial elements and how they may relate to health outcomes such as obesity, asthma, diabetes, and mental health.

Support for "Active Living" Raster Layers



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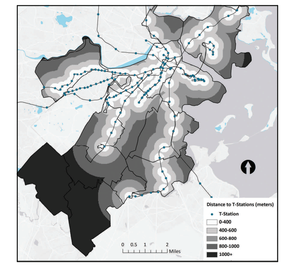

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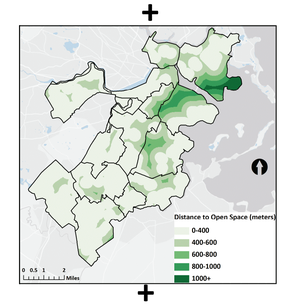

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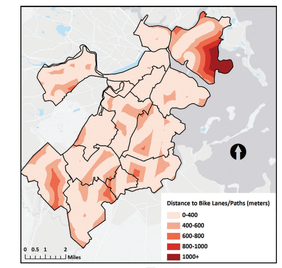

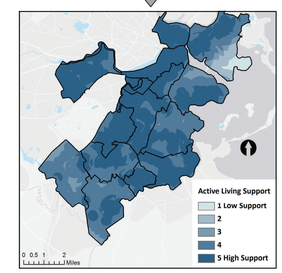

Cartographer: Jennifer Molina May 2012 TUFTS UEP232
Projection: NAD 1983 State Plane Massachusetts Mainland (feet)
Data Sources: MassGIS, MassDot, Census 2010 Block Level Data, Suffolk County
Other Sources:[1] CDC (Center for Disease Control and Prevention). 2010. Fact Sheets. Center for Disease Control and Prevention. http://www.cdc.gov/obesity/data/childhood.html [2] Ogden, Cynthia, Margaret Carroll, Brian Kit, and Katherine Flegal. 2012. Prevalence of Obesity in the United States, 2009–2010. National Conference on Health Statistics (NCHS) Data Brief No. 82. http://www.cdc.gov/nchs/data/databriefs/db82.pdf. [3] Health of Boston 2011, Boston Public Health Commission Research and