Why Walkability?

Walkable neighborhoods are associated with a host of benefits, including those to health, the environment, finances and communities. Those who live in walkable neighborhoods weigh 6-10 less than their counterparts in ‘sprawling neighborhoods.’ Walkable access to amenities is linked with promotion of happiness. Moreover, walking more reduces pollution, as 82% of carbon dioxide emissions stem from burning fossil fuels. Walking more even adds to communities—studies have shown that for each 10 minutes spent during an individual’s commute, they spend 10% less time engaged in community activities. For these and likely other reasons, the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) are pushing to improve walkability in cities to “combat obesity, promote fitness and increase sustainability.”

Since walkable neighborhoods are so beneficial, improving access to such neighborhoods could have a marked improvement on society. In order to determine how walkability in neighborhoods can be enhanced, I’ve decided to take a look at Northampton, Massachusetts and some of the surrounding towns to see who currently lives in walkable neighborhoods.

Walkability is the effectiveness of a community’s design that makes people more apt to walk to destinations than seek other forms of transportation. Other GIS trailblazers have looked at different ways of modelling “walkability” using population density, job density and diversity—in terms of percentage of residents who lived within a defined walking distance of a destination with “diverse uses.” However, for my purposes, I chose to focus on my model of “walkability” as a matter of intersection density, which is the number of intersections in an area. Intersection density is closely correlated with block size—for instance, a greater intersection density corresponds with smaller blocks. Moreover, smaller blocks are associated with higher walkability. Walkable neighborhoods are well-connected through intersections, which provide direct and convenient routes to a wide variety of destinations. Northampton is a mid-size city in Western Massachusetts, with a “downtown” city area likely to have more intersections than its sprawling, rural areas. I’d expect the walkability to be greater in such a city area than those farther afield from shops and other businesses.

Methods

To model walkability, I used the MassGIS Roads Layer to determine what is feasible for walkability in Northampton. This data was originally collected and interpreted as part of the Black and White Orthophoto Project, and are now maintained by the Massachusetts Department of Transportation - Office of Transportation Planning. The key feature of this roads layer for this analysis was the road intersections, which calculate a kernel density estimation based on the number of intersecting roads.

For data on the income of Northampton residents, I looked at 2010 U.S. Census data and stratified them by income level. These data were collected as part of the American Community Survey, a yearly survey that collects and subsequently provides information on the American people, helping to determine how federal and state funds are spent annually. One in every 38 households in the U.S. receives an invitation to participate in this survey, and the data collected from these households is subsequently “combined into statistics.” I used the 5-year estimate, which includes 60 months of collected data.

To make this map, I added different breakdowns of income level to the data provided by the U.S. Census Bureau. For these purposes, I split the income of these residents into 5 income brackets by adding and then calculating these fields from the income ranges living within the highly walkable areas. This data was originally collected and interpretable subject area.

Results

There is a loose correlation between income level and the walkability of neighborhoods within this study area, showing primarily Northampton, but also snippets of neighboring towns Hatfield, Hadley and Easthampton. Areas with lower walkability scores seemed to generally have an income greater than $100,000, suggesting that these individuals may live in bigger houses on bigger chunks of land, and may primarily get around by car (though driving may be what Northampton residents do, generally, anyway). Within the area of the map with the highest walkability scores, there were more people who were making less than $25,000, suggesting that these lower-income individuals may live in these areas. One reason may be due to lower housing in the city center. Or, perhaps these families live downtown so they have greater access more establishments, either to save on gas or to prevent them from driving at all. There do also seem to be a decent quantity of those in the middle income ranges living within the highly walkable area, suggesting that these may be working professionals who moved to the center of town as it gentrifies. Again, most of these neighborhoods seem to have a smattering of income levels, suggesting that this correlation between income level and walkability of neighborhoods is not strong, and that the question would require more analysis and perhaps a less car-friendly subject area.

Caveats

Certainly, there are some issues with using these data for my decision-making context. The primary issues stem from interpreting the ACS 5-year census data verbatim. One such issue is possible statistical bias when using the block groups provided by the U.S. Census Bureau, as their seemingly arbitrary aggregation of aerial units into groups may be seen as more meaningful as they really are. These “block groups,” outlined on the map in purple, should not be seen as particularly distinct from their neighbors in terms of anything resembling political representations, or school districts, etc. Additionally, due to the ACS only including every 1 in 38 households, this sample may not be as representative as census taking into account a greater percentage of Americans. Also, the counts may be off or have changed since the census data were collected (as the 5-year estimate is least current of the ACS products), despite not much in terms of walkability changes. For these reasons, we should not look at the income levels of these Northampton residents as being more meaningful than they possibly could be—instead, they may just give us a guess at the income distribution within these areas, generally.

To improve upon this model, I would first attempt to plot the walkability rating with the income level distributions, showing the associations between the two in a scatterplot. Moreover, I could look into possible walking distance of amenities of interest to determine the value added for families looking to live in these neighborhoods. Adding the element of distance will bring lots of interesting concepts into the model. I could also work toward displaying the income levels and walkability in different associations to gain a greater understanding of how these concepts interplay.

Who’s Up for a Walk?
Assessing Income and Walkable Neighborhoods in and around Northampton, MA

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