

Health Scores of Areas in Cambridge

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Fundamentals of GIS

Introduction

Cambridge, a city in Massachusetts, is part of the Boston metropolitan area. The population is approximately 228,977 in 2018. As one of the Cambridge residents and a nutrition student, the cartographer is interested the differences in healthiness in Cambridge. According to literatures, the predictors of better health include higher income, more education, better access to health care, better availability of healthy foods, and etc. (Saegert, 2003 Braveman, 2006)

This GIS project measures the healthiness of areas with a health score and generates a map. The health score is determined by the income and education level; and the access to health care centers, grocery stores, fast food stores and open spaces. The health score map of Cambridge tells the readers where need improvements like having more health care centers and open spaces.

Data

Table 1: Datasets used in this Project

Data	Type	Source	Attributes Used
Census block groups	Vector	MassGIS	GEOID
Community boundaries	Vector	MassGIS	Location data
Health care centers	Vector	MassGIS	Location data
MBTA stops	Vector	MassGIS	Location data
Open spaces	Vector	MassGIS	Location data
Income	Table	MassGIS	Median household income
Education attainment	Table	MassGIS	Higher-education percentage
Grocery stores	Table	Reference USA	Location data
Fast food store map	Table	Ian Spiro	Location data

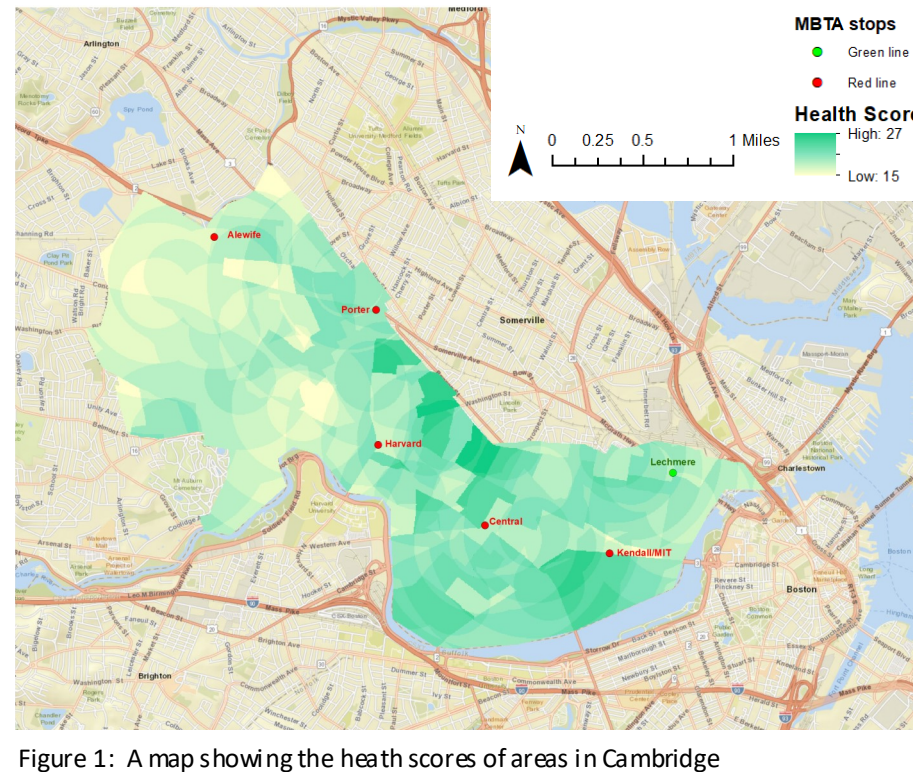


Figure 1: A map showing the health scores of areas in Cambridge

Method

First, joined the demographic tables to the census block groups layer based on GEOID. For education level, calculated the percentage of population with highest education attainment above high school graduate (higher-education percentage).

Converted the block group polygon into raster. Reclassified income and education into 5 classes with natural breaks, and assigned 1 to 5 health scores. Areas with higher income and education got higher health scores.

Used the Euclidean distances for health centers, fast food stores, grocery stores, and open spaces. Reclassified all into "<5-min walk", "5~10-min walk", "20~15-min walk", "15~20-min walk" and ">20-min walk", and assigned 1 to 5 health scores. Classes were calculated based on the average human walking speed, 3.1 mph (Rose, 1994). Areas closer to health centers, open spaces and grocery stores; and further away from fast food stores got higher health scores.

Used the Weighted Sum tool to add all the health scores. The lowest possible score is 5 and the highest possible score is 25.

Result

In the final map (Figure 1), areas with lower health scores have lighter yellow color while areas with higher health scores have darker green color. Areas west of Harvard Station has lighter color than areas in the east. Areas north of Harvard Station have the darkest green color.

Conclusion

Areas west of Harvard Station have lower health scores, so they need improvements. Compare the west and east of Harvard Station, the distributions of grocery stores, fast food stores, and open spaces are pretty similar. The areas with the darkest green color are where health care centers locate. Therefore, the cartographer recommends building a health care center in the areas west of Harvard Station to improve the healthiness.