

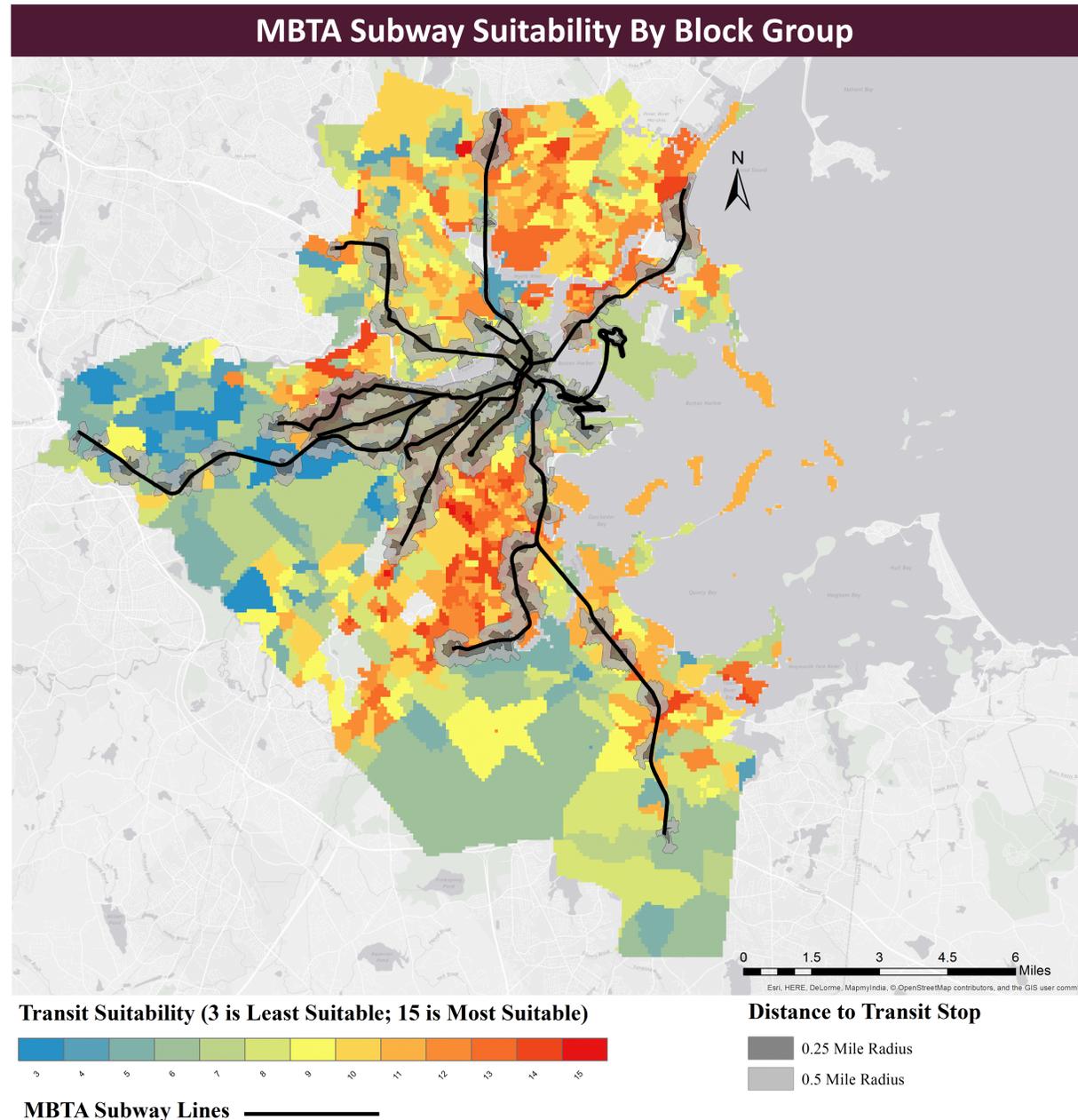
Assessing the Equity of Public Transportation in Boston, Massachusetts Through Evaluating Accessibility for “Suitable” Locations

Introduction

Transportation is a pervasive topic, as it plays a critical role in the movement of people, exchange of ideas, and interactions between groups, providing numerous benefits to the population at large. Public transportation enables social relationships and the transfer of knowledge, reduces congestion and a community’s carbon footprint, and provides access to job opportunities promoting economic growth amongst individuals. However, in order to enjoy these benefits, access to public transit is essential. In many urban areas, the implementation of public transportation systems does not always benefit the intended or “suitable” populations, but rather serves only a select subgroup. Given this concern of the unequal distribution of advantages, this project aims to assess the equity of Boston’s public transportation system, using accessibility as an indicator of equity. “Suitable” populations were identified based on several variables and these areas are evaluated on whether or not they receive access to the MBTA subway system.

Methodology

The most “suitable” block groups for public transit use were identified through a raster suitability test based on three characteristics: household income, vehicle availability, and travel time to work. Based on literature and available data, suitable block groups were defined as those with a low median household income, households with zero vehicles, and households with a travel time to work of greater than 30 minutes. Each of these measures was ranked from 1-5, indicating lower to higher suitability. Using raster analysis and calculations, these values were aggregated to determine the final suitability locations for public transportation access. To measure accessibility to public transportation, the network analyst tool was used to create quarter-mile and half-mile service areas around each transit stop part of the MBTA subway system.



Results and Limitations

The resulting suitability map exhibits the block groups around the MBTA subway lines that are best fit for public transportation—the darker red areas are the most suitable, while the darker blue areas are the least suitable. The grey service areas around each subway stop portray accessibility, and are equivalent to approximately a 5 minute walk and a 10 minute walk. As shown, the block groups that are “most suitable” are located south of downtown Boston, and are not within walking distance of MBTA stops. Additionally, block groups in the north east part of the map are “suitable”, however, MBTA stops are not accessible to them either. Given these results, there is clear inequality within the MBTA subway system in Boston. The main limitation of this analysis is the subjectivity with which “suitability” was defined. Based on research, this analysis determined the most appropriate factors contributing to suitability and decided the measurements that made certain block groups more “suitable” for public transportation than other block groups.

Discussion and Policy Implications

The results of this analysis demonstrate the need for change in the public transportation system in Boston, as transit use is not accessible to the “most suitable” populations. The extension of an existing subway line or the creation of a new subway line that would reach the identified block groups would allow for the societal, environmental, and economic benefits gained through public transportation. The conclusions from this analysis can provide a better understanding of the true impacts of Boston’s MBTA subway system, highlighting the existing inequality and lack of suitable access. These outcomes can hopefully serve as impetus for equality reform in one of the nation’s most thriving cities.

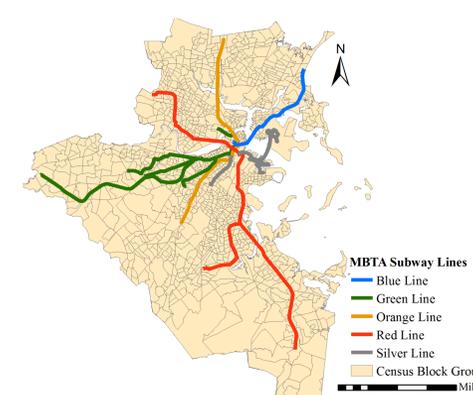
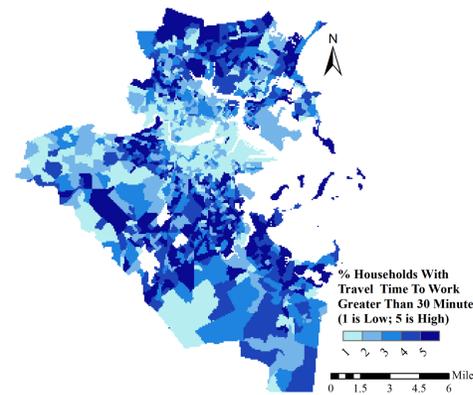
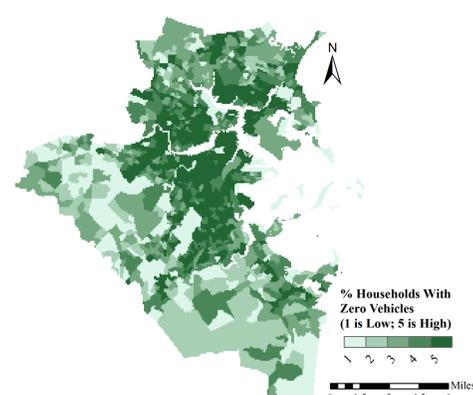
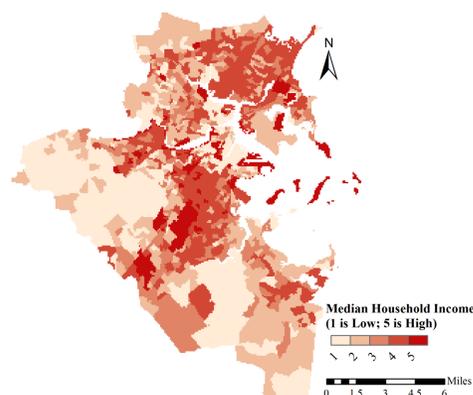
Suitability Factors

Median Household Income

Zero Vehicle Households

Travel Time To Work > 30 Minutes

MBTA Subway System



Sources

Cartography by Bhavna Sivasubramanian
 December 19, 2016
 GIS 101 Introduction to Geographical Information Systems, Fall 2016

Data Sources: U.S. Census American Community Survey 2011-2015; EPA Smart Location Database; ESRI DataMaps10; MassGIS

References:

- Walsh, M. M. J. (2014). *Housing a Changing City: Boston 2030*. City of Boston.
- Tomer, A. (2011). Transit access and zero-vehicle households. Metropolitan Policy Program at Brookings.
- Ramsey, K., & Bell, A. (2014). Smart location database. Washington, DC.

Coordinate System and Projection: NAD 1983 State Plane Massachusetts Mainland; Lambert Conformal Conic