

MBTA MINORITY BUS RIDERSHIP:

Does Census Data Predict Who Rides the Bus?

INTRODUCTION

Public transportation provides access to jobs, education and other services for people who are unable to drive, who cannot afford to drive or who wish not to drive. Those who cannot afford a car, often minority populations, must use public transportation to move from place to place (Kramer & Goldstein 2015). Fast, reliable and comfortable public transportation is necessary for the equitable mobility of groups who rely on public transportation due to lack of other options (Wellman 2015).

In order to operate public transportation that does not disadvantage minority riders, public transportation administrators must understand the minority ridership on their buses. According to a study by Karner and Golub in 2015, there are two ways to understand the minority ridership on bus routes. Public transportation administrators can either examine U.S. census data for the bus service areas or conduct a rider census survey to find the percentage of minority riders on their buses. The study examined the two methods and found that, because minorities disproportionately ride buses, U.S. census data was inaccurate when compared to rider census data. The study therefore, suggested that public administrators conduct a rider census survey in order to understand when service improvements will disadvantage minorities (Karner & Golub 2015).

The current analysis seeks to examine if minority populations disproportionately ride the bus when compared to the white population in the Boston Area in order to understand if U.S. census data is predictive of minority bus ridership.

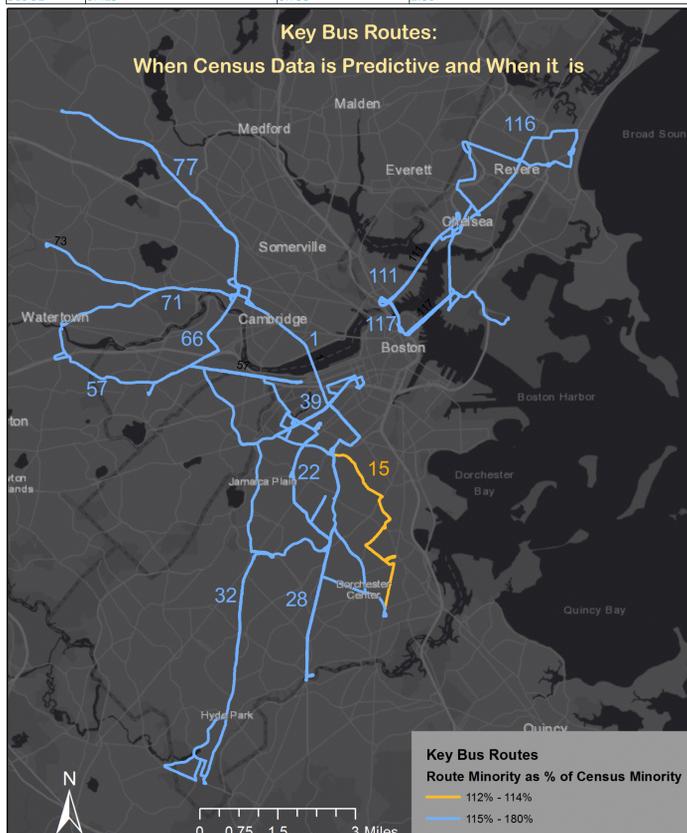
METHODOLOGY

This analysis examined the MBTA key bus routes and all MBTA bus routes with a daily ridership of over 600 passengers. The analysis used MBTA rider census data, MassGIS bus stop and bus route data and 2010 U.S. census block and population data.

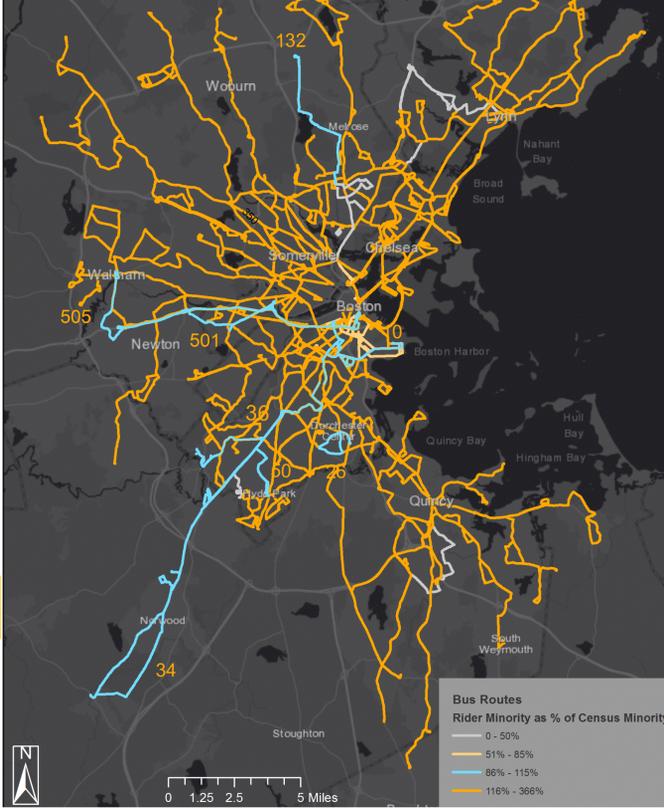
In order to find service areas for the key bus routes, a network analysis on the key routes' bus stops was conducted using Massachusetts streets. The census block polygons intersecting the service area polygons generated from the network analysis were then selected. For all bus routes with daily ridership over 600 passengers, a simpler analysis was conducted to find the service area. For these 121 bus routes, the census blocks within a quarter mile radius of the bus routes' bus stops were selected to create the bus routes' service area.

After finding the service areas for key routes and for all bus routes, the average percent census minority for each buses' service area was calculated. The U.S. census minority data was then compared to the MBTA rider census data for each of these routes, to see if the census minority population data predicted the bus minority ridership. A field was created for every route by dividing the MBTA rider minority percentage by the U.S. census minority percentage. This number was then multiplied by 100, indicating the rider census data, as a percentage of the U.S. census minority population within each bus service area. These percentages were then mapped, along with several individual bus routes and the bus routes with the highest disparity between minority bus ridership and the minority population in the service area.

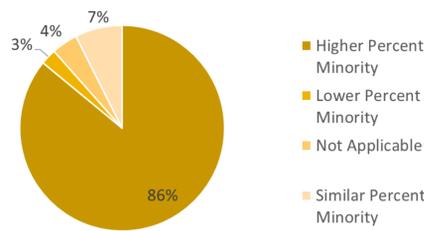
Key Bus	% Minority in Service Area	% Minority Riders	% Minority Riders/% Minority in Service Area
Bus 15	0.674	0.753	1.12
Bus 73	0.164	0.199	1.21
Bus 23	0.696	0.849	1.22
Bus 116	0.47	0.599	1.27
Bus 1	0.279	0.367	1.32
Bus 77	0.17	0.240	1.41
Bus 66	0.267	0.398	1.49
Bus 117	0.393	0.599	1.52
Bus 22	0.585	0.896	1.53
Bus 57	0.171	0.265	1.55
Bus 28	0.573	0.922	1.61
Bus 39	0.208	0.36	1.73
Bus 71	0.139	0.246	1.77
Bus 111	0.353	0.626	1.77
Bus 32	0.419	0.755	1.80



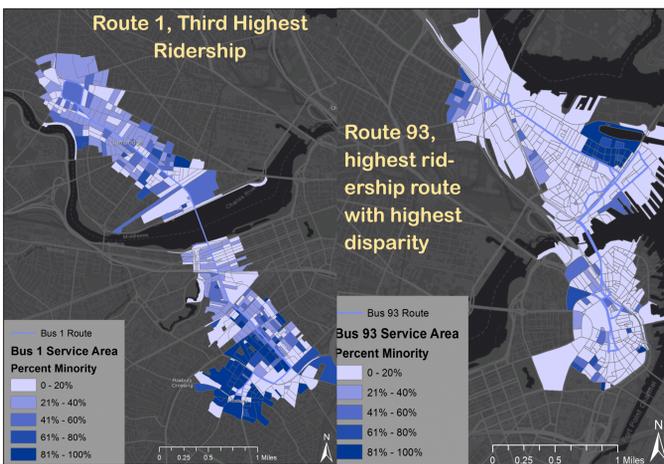
MBTA Bus Routes Where Census Data is Predictive of Minority Ridership



Bus Lines: Minority Bus Ridership Compared to Minority in Service Area:



	% Minority in Service Area	% Minority Bus Ridership	Minority bus ridership as % of census minority population
Bus 1	28.40%	36.70%	129.20%
Bus 93	9.90%	30.30%	306.10%



REFERENCES

Alex Karner and Aaron Golub, "Comparison of Two Common Approaches to Public Transit Service Equity Evaluation" *Transportation Research Record: Journal of the Transportation Research Board*, 2531 (2015): 20.

Anna Kramer and Alexandra Goldstein, "Meeting the Public's Need for Transit Options: Characteristics of Socially Equitable Transit Networks" *Institute of Transportation Engineers Journal* 85, no. 9 (2015): 23-30.

Gerard C. Wellman, "The Social Justice of Movement: How Public Transportation Administrators Define Social Justice," *Public Administration Quarterly* 39, no. 1 (2015): 117-146.

MBTA, *Rider Census Data* (Boston, MBTA, 2017).

MBTA *Bus Route 1*, Wikimedia Commons (8 November 2009).

MassGIS, *Bus Routes, Bus Stops and Massachusetts Streets* (2017), <https://goo.gl/jDS7Nx>.

RESULTS

This analysis found that census data only predicts minority ridership 7.5% of the time. The only buses where U.S. census minority percentages predict rider minority percentages are on buses 26, 501, 34E, 34, 505, 132, 10, 36, and 50. The minority ridership percentage is between 85% and 115% of the U.S. census minority percentage for these buses. Buses 11, 9, and 92 have ridership minority below the U.S. census minority, and data for buses 40, 97, 105, 429 and 236 was incomplete, as the MBTA percentage minority data was not available for these bus routes. The rest of the bus routes (86%) 104/121 have a higher percent minority ridership than percent minority in their service area.

Among key bus routes, census data can only be used for bus 15 to predict ridership, and even on bus 15, the rider minority percentage is 111% of the census minority percentage in the service area. On all other bus routes, the rider minority percentage is over 115% of the census minority percentage in the service area.

Finally, the analysis found that around 18% (22/121) percent of buses have over two times as large a percent minority ridership as minority living within the service area. The bus route with the highest discrepancy between the minority percent in the service area and the minority ridership is route 350 with a minority ridership 3.7 times the minority percentage living within the service area (10.4% census minority vs. 38% rider minority). The bus route with the highest ridership with the highest discrepancy is Bus 93 that runs from Haymarket, through Downtown to Sullivan Square.

CONCLUSION

Based on this analysis, the MBTA census data within bus service areas cannot predict the minority ridership on MBTA buses and conducting a rider census every few years is critical for the MBTA to know the demographic information of those riding their buses.

The disproportionate minority ridership on buses also opens up the conversation of transportation equity in Boston. Buses are the least reliable form of public transportation in the Boston Area. Improving the reliability and quality of the transportation provided by MBTA buses could promote transportation equity in the Boston Region. Kramer and Goldstein 2015 suggest ways to improve bus service to further transportation equity in their article "Meeting the Public's Need for Transit Options: Characteristics of Socially Equitable Transit Networks." The article suggests increasing speed by reducing dwell times, having separated bus lanes, and improving the efficiency of stop spacing. Second, the article advises improving the frequency and span of all-day service, so that buses leave frequently and have high network coverage for those who rely on the service during the day. Public transportation administrators can improve the reliability of transit, decrease crowding and increase capacity by taking these steps. This will significantly help those who rely on buses as a way to get to work, especially for those who work off-peak jobs.

Buses should receive the same attention as other types of public transportation in order to allow Boston's minority population equitable access to services necessary for a high quality of life. The MBTA can use the minority population data they have to make sure that service improvements do not disadvantage minority populations.

