

Evaluating Bike Share and E-Scooter Programs in the US and NJ

Charles T. Brown, MPA and Aashna Jain Voorhees Transportation Center at Rutgers, The State University of New Jersey New Jersey Tech Talk Event Panel Session: Micromobility's Launch in NJ and Beyond February 20, 2020 | 1:30 am – 3:30 pm Trenton, New Jersey



Equity

- Equity involves trying to understand and give people what they need to enjoy full, healthy lives.
- Equity is the presence of justice and fairness within the procedures, processes, and distribution of resources by institutions or systems.
- Facing equity issues requires an understanding of the underlying or root causes of inequalities and oppression within our society.





Research Objectives

- Explore inequalities in spatial distribution of bike share stations across different socioeconomic groups.
- Rank the BSS of the 10 cities by their spatial densities in the mostdisadvantaged socioeconomic category.
- Serve as a reference model for assessing existing and developing bike share systems in the State of New Jersey.







Methodology

- Defining the BSS Study Areas
- Preparing Predictor Variables for the BSS Study Areas
 - Four of the 8 variables were taken from the Smith et al. (2015) study.
- Computing Socio-economic Hardship Scores at block group level and classifying them into Socio-Economic Hardship Quintiles
- Computing Station Densities for each block group and Socio-Economic Quintiles
- Social-economic quintiles: Most Advantaged, Advantaged, Neither Advantaged or Disadvantaged, Disadvantaged, and Most Disadvantaged



Predictor Variables

- Carless households (CL_HH)
- More than 30 percent of gross income as rent (MT30INC)
- Health insurance (NO_HI)
- Median household income (HINC100000)
- Education (LT_HS_EDU)
- Household size by median number of rooms (HHS_MNR)
- Minority population (MIN_POP)
- Unemployment (UNEMP)



Predictor Variables

Average Station Density by Population in a block group in a socio-economic category (or the BSS study area)

$$=\frac{\Sigma\left(\frac{NUM_BS \times 1000}{ADULT_POP}\right)}{N}$$

Average Station Density by Area in a block group in a socio-economic category (or the BSS study area)

$$=\frac{\Sigma\left(\frac{NUM_BS}{AR}\right)}{N}$$

Where NUM_BS = Total number of bike stations in the block group

ADULT_POP = Total adult population in the block group

AR = Area of the block group in square miles

N = Total number of block groups in the socio-economic category (or the BSS study area)



Analysis

New York City, NY



Oakland, CA



Jersey City, NJ





Map 13: Bike share stations and socio-economic categories in Jersey City, NJ





Figure 1a: Spatial densities by population in socio-economic categories - Portland, OR



Figure 1b: Spatial densities by area in socio-economic categories - Portland, OR





Figure 6a: Spatial densities by population in socio-economic categories - Miami Region, FL



Figure 6b: Spatial densities by area in socio-economic categories - Miami Region, FL





Figure 10a: Spatial densities by population in socio-economic categories - Houston, TX



Figure 10b: Spatial densities by area in socio-economic categories - Houston, TX





Figure 11a: Spatial densities by population in socio-economic categories - Asbury Park, NJ



Figure 11b: Spatial densities by area in socio-economic categories - Asbury Park, NJ





Figure 12a: Spatial densities by population in socio-economic categories - Hudson County, NJ



Figure 12b: Spatial densities by area in socio-economic categories - Hudson County, NJ





Figure 13a: Spatial densities by population in socio-economic categories - Jersey City, NJ



Figure 13b: Spatial densities by area in socio-economic categories - Jersey City, NJ



	Socio-economic Category						
	Most Advantaged	Advantaged	Neither Advantaged nor Disadvantaged	Disadvantaged	Most Disadvantaged	Study Area Average	
Atlanta	0.38	0.34	0.28	0.14	0.12	0.25	
Metro Boston	0.41	0.26	0.32	0.29	0.21	0.30	
Chicago	0.40	0.21	0.26	0.17	0.30	0.27	
Houston	0.05	0.04	0.01	0.00	0.01	0.02	
Miami Region	0.88	0.92	0.76	0.32	0.14	0.60	
New York City	0.32	0.16	0.23	0.05	0.04	0.16	
Oakland	0.13	0.46	0.41	0.26	0.12	0.28	
Portland	0.05	0.22	0.26	0.32	0.43	0.25	
San Francisco	0.20	0.15	0.15	0.20	0.16	0.17	
Metro DC	0.29	0.54	0.51	0.48	0.30	0.42	

	Most Advantaged	Advantaged	Neither Advantaged nor Disadvantaged	Disadvantaged	Most Disadvantaged	Study Area Average
Atlanta	1.69	1.69	1.42	0.39	0.41	1.12
Metro Boston	2.42	2.82	2.09	3.14	2.07	2.51
Chicago	4.15	2.20	1.45	1.03	1.52	2.07
Houston	0.18	0.11	0.05	0.01	0.02	0.08
Miami Region	8.86	5.83	4.44	4.23	1.28	4.91
New York City	7.96	3.21	3.02	1.44	1.19	3.36
Oakland	0.74	2.44	3.26	2.42	1.06	1.98
Portland	0.15	0.97	0.97	1.49	2.13	1.14
San Francisco	2.26	1.71	1.99	2.81	3.49	2.45
Metro DC	0.99	3.35	4.12	3.80	2.51	2.96

Socio-economic Category

Table 1a: Average spatial densities by population in a block group, by Socio-economic Category

Table 1b: Average spatial densities by area in a block group, by Socio-economic Category



Discussion

By Population

- 2 cities Portland and San Francisco have their highest average station density by population in one of the two disadvantaged socio-economic categories.
- 3 systems Portland, San Francisco and Metro DC have their lowest spatial densities by population in either of the advantaged categories.

By Area

 3 systems – Portland, San Francisco and Boston – have their highest average station density by population in one of the two disadvantaged socio-economic categories.



Conclusion

Station Density by Population Rankings

- 1. Portland
- 2. Chicago
- 3. Metro DC
- Metro Boston
- 5. San Francisco
- 6. Miami Region
- 7. Atlanta
- 8. Oakland (East Bay)
- 9. New York City
- 10. Houston

Station Density by Area Rankings

- 1. San Francisco
- 2. Metro DC
- 3. Portland
- 4. Metro Boston
- 5. Chicago
- 6. Miami Region
- 7. New York City
- 8. Oakland (East Bay)
- 9. Atlanta
- 10. Houston



Potential Next Steps

- Analyze spatial equity across socio-economic characteristics of jobs (workers).
- Future research to incorporate additional factors such as street network density, availability of bikes and presence of bicycle infrastructure in the analysis.





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Research Report Overview

- Pilots/Program Structure & Regulations
- Equipment & Operations Requirements
- Managing the Right-of-Way
- Methods of Community Outreach & Education
- Equity Practices and Policies
- Data Analytics and Data Sharing
- Lessons Learned
- Appendix: City Summaries





Tips for Implementing E-Scooter Share Programs in NJ

- 1. Establish Clear Operational Regulations & Permitting Requirements
 - Align selection criteria with program objectives
 - Implement fee structure to reinforce program accountability and sustainability
 - Address operational concerns, especially maximum e-scooter speeds
- 2. Effectively Manage the Right-of-Way
 - Clearly identify parking zones
 - Prioritize development of safe, comfortable and complete streets
- 3. Incorporate Equitable Service Standards
- 4. Engage, Educate and Collaborate
- 5. Provide Open and Standardized Data and Reporting



Research Report Overview

www.njbikeped.org





THANK YOU

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