Mobility, Economic Opportunity and New York City Neighborhoods

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The accompanying map on the NYU Rudin Center's website (www.NYURudinCenter.com) was created by Jeff Ferzoco (linepointpath) and Richard Dunks (Datapolitan).

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The Rudin Center for Transportation at NYU's Wagner School aims to strengthen our understanding of all modes of transportation through research, public forums, and educational programs. The Center draws upon faculty, students, and visiting scholars at NYU. Current areas of inquiry include:

- The flow of people, goods and information in and through New York City
- Information technology and transportation systems
- Inequality and access to employment
- Urban bike share systems
- The future of supercommuting

The Rudin Center was named in recognition of a gift from civic leader Lewis Rudin and receives support from leading firms in transportation, finance, and communications. The director of the Center is Mitchell L. Moss, Henry Hart Rice Professor of Urban Policy and Planning.

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KEY FINDINGS AND RECOMMENDATIONS

The **top 22 neighborhoods for job access are located in Manhattan**, with an average household income of $108,209.

Highest and Lowest Transit Access Neighborhoods (with rank/177)

Manhattan
North Chelsea (1) ↑ ↓ Fort George (78)

Bronx
Highbridge (64) ↑ ↓ City Island (174)

Brooklyn
Brooklyn Heights/Dumbo (27) ↑ ↓ Flatlands (171)

Queens
Central Long Island City (23) ↑ ↓ Belle Harbor (172)

Staten Island
Arrochar/Shore Acres (121) ↑ ↓ South Staten Island (177)

Low transit access typically leads to a car commute.

The percentage of people who commute by private car increased to 81% in the city's lowest-access areas in Staten Island.

In nearly 40 neighborhoods, walking is a more common commute mode than driving.

Public transportation remained the primary commute mode in the vast majority of NYC neighborhoods.

Limited transit access is linked to higher unemployment.

Neighborhoods with some, but not sufficient transit access – those in the middle third – faced higher rates of unemployment than those in the top or bottom third.

Proposed solutions:

Develop intelligent, informal transit.

It is time for policymakers to nurture the development of intelligent, independent transportation services that fill transit gaps through web-based hailing technologies for shared rides.

Bus Rapid Transit is essential.

Wide thoroughfares like Woodhaven Boulevard should be equipped with true BRT for increased speed and efficiency of commutes in transit-starved areas.

Make incremental improvements to transit.

Maximizing the existing infrastructure by using dormat subway track and expanding the functionality of CityTicket will help New Yorkers move around more efficiently through a variety of modes.

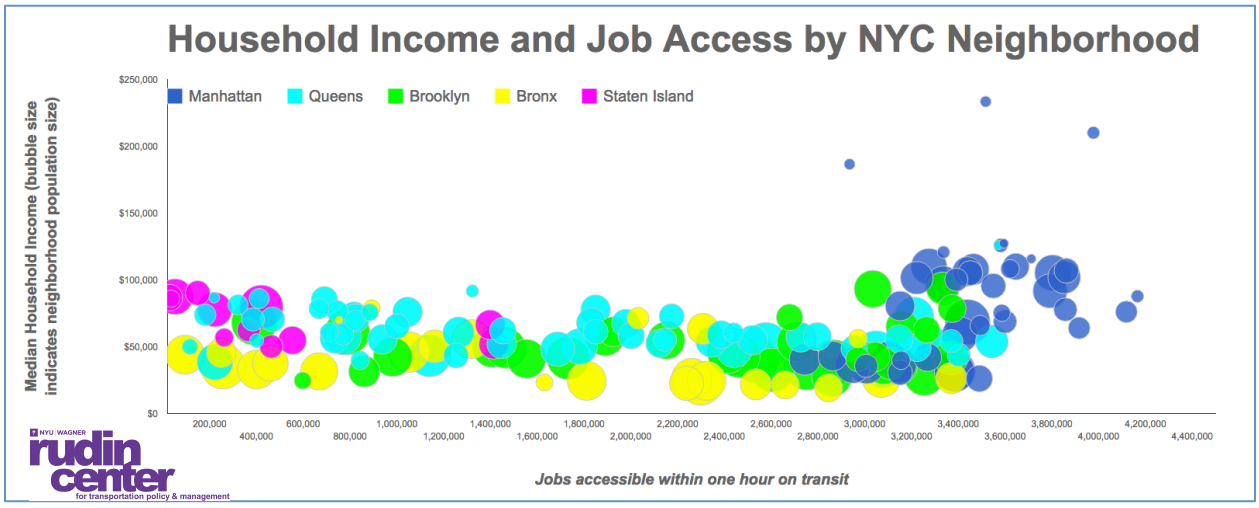
Foster smart, efficient workplaces.

More New Yorkers should be able to work remotely when possible. Policymakers should incentivize workplaces to allow employees to work from neighborhood office centers, reducing commute needs and congestion in traffic and transit.

EXECUTIVE SUMMARY

Although public transit provides access to jobs throughout the New York City region, there are actually substantial inequalities in mobility. By focusing on the neighborhood level, the NYU Rudin Center for Transportation has identified communities that are substantially underserved by the public transportation system.

The Rudin Center ranked New York City's 177 neighborhoods according to the number of jobs accessible from the neighborhoods by transit, within 60 minutes and completed by 9:00 a.m.on a Monday morning. The number of jobs accessible in this timeframe ranged from 42,275 (South Staten Island) to 4,839,253 (North Chelsea). Our analysis reveals substantial variation in levels of transit access across New York affect residents' employment levels, travel modes and incomes. Most notably, the rankings result in a swoosh-shaped relationship between transit and income: the highest incomes are connected to the areas with the most access, and low transit access still provides average incomes, because residents travel by private car rather than transit. (This chart is also available in interactive form: [http://bit.ly/RudinJobAccess)](http://bit.ly/RudinJobAccess)



The neighborhoods appearing in the middle-third of the rankings were those with the lowest household incomes: the areas with highest accessibility prefer transit or walking, and those with the fewest transit options often commute in private vehicles. The middle third has enough transit access to commute effectively, but insufficient transit options to provide significant job opportunities, leading to the city's highest unemployment rates and lowest incomes:

Ranked Areas	Median Household Income	Unemployment Rate	Commute by Transit or Walking	Commute by Car
1-59	$79,148.83	8.3%	79.1%	10.9%
60-119	$46,773.32	11.7%	66.9%	28.0%
120-177	$61,381.64	9.7%	43.5%	52.9%

These imbalances of access perpetuate issues of income inequality and traffic congestion, limiting both economic and physical mobility for many in the city. The NYU Rudin Center for Transportation offers several recommendations to mitigate access disparities, including:

Increase transportation options in New York City.

New York City works well when residents can easily switch between transportation modes, so they can always travel to their destinations using primary or secondary modes. Specifically, on-demand intelligent buses could help fill the gaps in transit service. Using web-based summoning of vehicles, a more flexible and efficient system can link riders from home to transit hubs or workplaces. In Red Hook, Brooklyn, for example, a smart shuttle bringing residents to Downtown Brooklyn would reduce travel times to Midtown Manhattan from 50 to 28 minutes, making 89,498 more jobs available within one hour on transit. This tool could also be used to significantly improve Access-A-Ride paratransit systems, which are currently run by phone reservations and are extraordinarily costly for the City to manage.

Improve roadways with Bus Rapid Transit.

As previously recommended by a study from Pratt Center for Community Development, Bus Rapid Transit should be developed on several corridors in New York City. Woodhaven Boulevard in Queens is an ideal location, with 30,000 bus riders daily and a width that allows sufficient space for a protected bus lane. Bus speeds would likely be increased by 30 percent, providing thousands of New Yorkers with vastly improved access to more job opportunities through multiple connections to subways along the route.

Maximize the efficiency of the existing transportation system.

Although New York's landscape makes it extremely difficult to build new infrastructure, the Metropolitan Transportation Authority should seek to improve upon existing resources, including unused tracks and building out simple transfers. In particular, the CityTicket should be extended to weekday usage, allowing New York City residents to ride commuter rail at a discount. In Norwood, in the Bronx, residents' commutes would be reduced from 48 to 33 minutes to Midtown Manhattan when using Metro-North, making 527,819 more jobs available.

Encourage remote work.

Due to advances in telecommunications tools, many information-based jobs can be conducted remotely. If policymakers incentivize distributing the workforce (to places like neighborhood office centers and co-working spaces), employees will reach their places of work more easily, the productive workday will be expanded without the hassle of commuting, workers in more isolated locations will have access to more job opportunities, and crowding on transit will be reduced. Approximately four percent of New Yorkers work from home; that number may increase significantly with the advent of the new citywide wi-fi system.

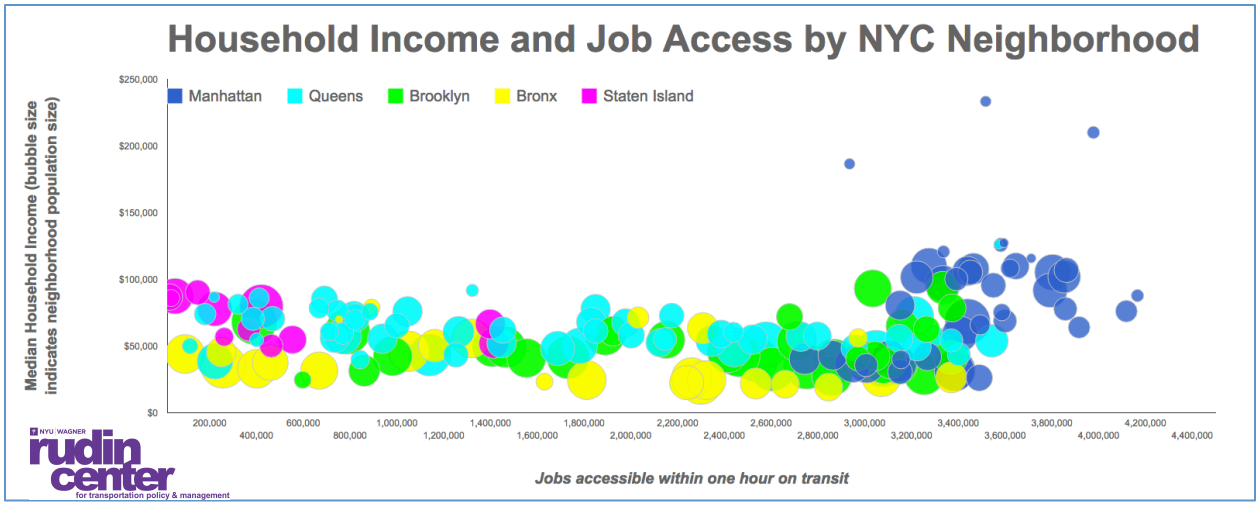
By focusing on underserved areas of the New York City job market, we can implement new policies and services to increase economic opportunity for New Yorkers, and ensure the transportation system is fully leveraged to connect workers with jobs. These improvements will benefit all New Yorkers' access to job opportunities and economic mobility.

INTRODUCTION

The ability of a public transportation network to physically link residents to jobs has become a central point of concern for urban policy in an era of uneven unemployment and rapidly changing job markets. The economy of New York City is unique in North America due to its high uptake of public transportation. Here, 56% of the population uses transit to reach work; an individual's ability to access a job is largely a function of how well their neighborhood is served by the public transportation system. This report presents direct measurements of job access in New York City, and contrasts the levels of access that are experienced in the city's many neighborhoods.

The NYU Rudin Center analyzed and ranked 177 New York City neighborhoods' access to job opportunities, household income and population size. Drawing on census data and the Google Maps Routing Application Programming Interface, the rankings showed the number of jobs available within one hour on public transportation, based on research showing that commuters prefer to travel less than one hour.

The data show that mass transit access is associated with job opportunities and household income levels in most New York City neighborhoods:



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The number of jobs accessible in this timeframe ranged from 42,275 (South Staten Island) to 4,839,253 (North Chelsea). The neighborhoods appearing in the middle-third of the rankings were those with the lowest household incomes: the neighborhoods with best accessibility prefer transit or walking, and those with the fewest transit options often commute in private vehicles. The middle third has enough transit access to commute, but insufficient transit options to provide significant job opportunities, leading to the city's highest unemployment rates.

The economic opportunities in neighborhoods without multiple transport options are shown to be tangibly inferior to areas with denser public transit services. By focusing on these underserved areas of the New York City job market, we can implement new policies and services to increase economic opportunity for New Yorkers, and ensure the transportation system is fully leveraged to connect workers with jobs. To improve economic opportunities citywide, the NYU Rudin Center recommends that policymakers increase the number of transportation modal options across the city, maximize use of existing transportation infrastructure, and foster the ability to work remotely. These solutions will benefit all New Yorkers' access to job opportunities and economic improvement.

Related Literature

Job access has recently become a substantial area of interest for policy makers and academics. Prior studies have provided a thorough analysis of job accessibility at the metropolitan level; drawing comparisons between regions. Fewer studies have attempted to analyze job access within a region, and investigate the effects that differential job access has at the neighborhood level. This study has been conducted at the neighborhood level but is closely related to prior studies, which have been conducted using larger geographic units.

In the most recent related work, the University of Minnesota analyzed job access from public transit in the largest United States cities (Owen, 2014). The report showed the exceptional breadth of New York's transit system in providing access to employment compared to other cities. This study provides a strong comparison between cities' overall access.

The Brookings Institute undertook a major study of the connection between public transportation and job accessibility (Brookings, 2011). Brookings relies primarily on metropolitan level analysis within the US, allowing for coarse comparisons, which rank metropolitan regions by characteristics of job access. One of three metrics used by Brookings is referred to as "Job Access" and represents the share of jobs accessible within a region to a "typical" resident. The study finds that the typical resident of a metropolitan area in the US can reach 30% of metropolitan jobs within 90 minutes. New York City ranks substantially above the average, at 37%. This analysis is interesting for broad policy debates, but reducing data points to the "typical" resident may be masking substantial inequalities wherein some neighborhoods have very high levels of job access, while others face economic isolation.

In 2013 the Pratt Center for Community Development and the Rockefeller Foundation jointly produced a report on mobility across New York City's neighborhoods. The report acknowledges the stark disparities in access experienced across New York City's many neighborhoods. In particular, the authors acknowledge that not only are many areas poorly served by the subway system, but that given financial constraints there is virtually no chance of the subway system expanding to these areas in the foreseeable future. As a solution for isolated neighborhoods the study recommended the construction of Bus Rapid Transit (BRT)

infrastructure to increase accessibility. The choice to compare accessibility across neighborhoods is a surprisingly uncommon approach in the related literature. The current study will embrace this approach to investigating job access.

The Urban Institute released a study in 2014 entitled Driving to Opportunity, which took a thorough look at the connection between household location, transportation, and employment outcomes. The report finds that the ability for households to access job markets leads to improved economic outcomes. The authors claim that the best way to increase job access for low-income households is to increase their level of automobile ownership. The data is able to demonstrate that car ownership is highly correlated with positive employment outcomes. The evidence presented in the study indicates that car ownership will improve job access for the marginal household; however, it seems unlikely this finding could be used as the basis of policy. Increasing the number of cars used within a region will slow down all road users due to congestion, potentially wiping out the gains that are accruing to the households who gain cars. Contrastingly, increasing the capacity of the public transportation system as a way to increase job access for low-income families does not suffer from this pitfall.

A thorough attempt to modeling job access in metropolitan regions is provided by Prud'homme and Lee (1999). The authors suggest that the optimal size of a city is a function of the quality of transportation planning. As cities grow they increase total jobs available but traffic congestion increases simultaneously, cities that are successful in combating congestion will therefore have a larger 'optimal' size, and will be able to supply more jobs to typical residents. Prud'homme and Lee (1999), looking at a sample of French cities, find a general link between the productivity of residents and the number of jobs that residents have access to within 60 minutes. Cox (2014) recently provided a discussion of how these findings should be understood in an international context.

Several authors have referred to a general link between public transportation access and the ability to find employment. Thomas Sanchez provides US case studies which directly look at transit characteristics – such as the nearness to a bus or subway stop, or transit frequency – and relates transportation access to lower levels of unemployment (Sanchez 1999; Sanchez et al. 2004). O'Regan and Quigley provide a series of papers on the connection

between neighborhood accessibility and youth employment rates, but elect for a definition of access which is "broadly defined to include traditional measures of geographical distance, as well as measures of social isolation and social access" (O'Regan and Quigley 1998; see also O'Regan and Quigley 1996).

Whereas previous studies rely on proxies and heuristics to contrast job access between neighborhoods, this report will suggest methods that directly measure the number of jobs accessible to a given neighborhood and investigate how differentials in job access may translate into differentials in neighborhood conditions and the opportunities of individuals.

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METHODOLOGY

DATA SOURCES

Routing: Google Maps Application Programming Interface

Google integrates local public transportation service information into its online mapping service for estimates of travel times between origins and destinations. Google Inc. provides access to the back end of their Google Maps service, through the Google Maps Application Programing Interface (API). The API can be queried with origin and destination pairs to output the estimated travel time according to Google's algorithm. This project utilized this service to generate a data set containing all zip code-level travel times in the region, which originated in New York City and terminated anywhere in the New York, New Jersey, Connecticut region.

For this project, the precise start and end locations of each trip are assumed to be the geographic center of the specific zip code. Google will estimate a walk time from the center of the zip code to the initial transit connection (e.g., subway station or bus stop) and consider the walk time as a component of the total trip time. Similarly, the conclusion of the trip terminates in a walk to the center of the destination zip code. This means that travel times will be dependent on how close a zip code's geographic center is to a transit stop; this may be a more valid assumption for some zip codes more than others. This project looks at a 60-minute time horizon, meaning the initial and final minutes spent walking will only be a small component of total trip time at this threshold.

Specific assumptions present in the resulting data set are as follows:

- For zip code 10035–East Harlem (North)–the centroid calculated by Google is placed on Randalls Island, which is contained within the eastern bound of the zip code; however, the population center of this neighborhood is located on Manhattan Island. Rather than using the centroid in this instance, the origin/destination point is set at 122nd Street and 3rd Ave, which is the geographic center of the Manhattan portion of this zip code.
- The centroid for zip code 10033 –which Google places in the Hudson River– is instead assumed to be at 181st Street and Broadway.
- The centroid for zip code 11234, which is cited in an inaccessible marsh area adjacent to Belt Parkway, is moved to the center of the zip code's developed area at Avenue M and 55th Street.

A second assumption deals with the public transit options contained within Google's algorithm. Public transit travel times are to some extent contingent on the time of day the trip is made. The time parameter is set assuming the trip is completed on a Monday morning, and allows the traveler to reach their destination by 9:00 a.m. In accordance with this project's focus on public transportation service and mobility, the trip must be completed through either walking, public transportation services or both. The possible public transportation options available through Google's algorithm in the New York City region include: New York City Subway, PATH train, Long Island Rail Road, Metro North Railroad, New Jersey Transit Rail, MTA Bus Company, MTA New York City Transit services, Staten Island Ferry, Nassau Inter-County Express bus service, Rockland County Department of Transportation services, and the Downtown Alliance shuttle bus. Rarely, Google's algorithm will include short taxi trips when public transportation and walking cannot provide a reasonably convenient route. This can occur in areas where public transportation coverage is sparse, particularly in zip codes outside of New York City. These instances are rare, and only affect destination zip codes with relatively low job counts, meaning the effect of allowing taxi trips on overall job counts will be very low; however, it is worth noting that the maps produced by this report may display a zip code as accessible, when in fact this only holds true when the commuter is allowed use of a taxi.

In rare instances during automated data collection Google's servers were unable to return a commute time estimate for a given route due to technical reasons. There has been every effort made to catch these instances and input the travel time manually. The number of missed observations is low, and will not meaningfully affect the trends presented in this report.

U.S. Census, 2008-2012 American Community Survey:

Data for neighborhood demographics is taken exclusively from the 2008-2012 American Community Survey (ACS) Five-Year Estimate Data at the level of Zip Code Tabulation Areas (ZCTAs). ZCTAs are delineated by the Census Bureau. Although the documentation on supported geographies for the 2008-2012 5 Year ACS does not list ZCTAs, they are listed for the previous set and were applied to this ACS for this research.

The Census Bureau aggregates the demographic data from the ACS by ZCTA and makes that data available. The data for this report was accessed through the Application Programmer Interface (API). In most cases, the data in this report is exactly as reported by the ACS. However, in some cases, these assumptions were made:

- For the total number of unemployed persons 16 or over in the labor force by race, the number had to be summed together from constituent variables (unemployed white males 16 to 64 in the labor force, unemployed white males 65 or over in the labor force, unemployed white females 16 to 64 in the labor force, unemployed white females 65 and over in the labor force).
- For education level attained, the NYU Rudin Center only listed degrees attained, and not "some high school," "some college," and so forth.

It should be noted that the Census estimates do not account for margin of error. The Census publishes a comprehensive methodology for calculating margins of errors. In cases where ZCTA level data is unavailable, census tract data is cross-walked to conform to ZCTA boundaries using an allocation algorithm provided by the Missouri Census Data Center.

U.S. Census, 2011 LEHD Origin-Destination Employment Statistics Version 7.0:

The US Census releases a series of data products concerning workforce characteristics known as Longitudinal Employer-Household Dynamics (LEHD) data sets. One of these products is the LEHD Origin-Destination Employment Statistics (LODES) dataset that provides employment counts by subcategories at the census block level. LODES provides a level of detail regarding employment that is not available in either the Decennial Census or the American Community Survey. LODES data has been "cross-walked" from census blocks to zip codes using the Missouri Census Data Center tool described above. Because census blocks are even smaller than the census tracts used for demographic data, there is essentially no loss of precision due to cross-walking to the much larger zip code level. LODES is released annually, this report uses the most recent data release, which presents information for 2011.

PROCESSING

Data points from the three aforementioned sources are merged together to create a single observation for each zip code in New York City. LODES data has been downloaded for all of New York State, New Jersey, and Connecticut; this allows job counts to be assigned to zip codes for the entire region. Google routing data is collected for journeys originating within a zip code in New York City, but ending in any zip code within the larger region. American Community Survey data is collected for New York City only.

New York City fully contains 186 Zip Code Tabulation Areas (ZCTAs) as defined in the 2010 US Census. In this work, ZCTAs are only included as a unit of observation if they contain a population of at least 2,500 persons according to the 2008-2012 American Community Survey. The population threshold is used to ensure accurate demographic data exists within the zip code (unlike park areas), and to avoid small areas that would not be representative of a larger neighborhood. Of the 186 zip codes, 177 have a population of at least 2,500.

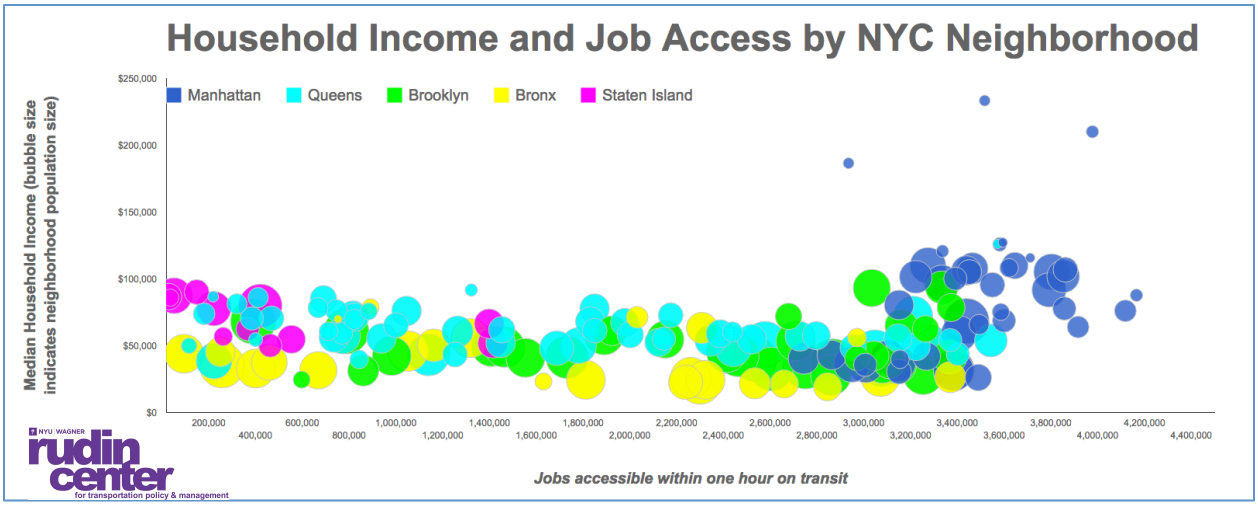
All 177 zip codes have been assigned a neighborhood name to improve the readability of the report. These names are not meant to be definitive but to conform as closely as possible to common neighborhood boundary definitions in New York City. Several zip codes straddle the boundaries of multiple neighborhoods, and names have been chosen to reflect this as clearly as possible.

The appendix and much of the analysis in this report assign a 60 minute commute cutoff as a way to measure “accessible” jobs, reflecting extensive literature showing 60 minutes as the preferred cutoff for travel times. The analysis limits travel to 60 minutes by taking the generated list of all zip codes reachable within 60 minutes and summing job totals across all reachable zip codes, including the origin zip code.

For the demographic breakout of population by race group, an individual is considered Hispanic if they answered affirmatively to being of Hispanic origin. Only non-Hispanic respondents are allocated to the other race groups.

NEIGHBORHOOD RANKINGS

The NYU Rudin Center ranked New York City's 177 neighborhoods by the number of jobs accessible within one hour on public transit during a rush-hour commute. The overall outcome shows that income and access to job opportunities are often linked:



This chart is also available in interactive form: http://bit.ly/RudinJobAccess

The following pages show the detailed results of the NYU Rudin Center's neighborhood ranking analysis. Although the neighborhoods of origin are all located within New York City, the jobs are not limited to the city's borders; in fact, many jobs in Long Island and northern New Jersey are highly accessible from parts of Manhattan and the outer boroughs. The neighborhoods, which were delineated by zip code, are also listed with their median household incomes and population counts for increased context. A discussion of these rankings follows the listing; full descriptions of every neighborhood can be found in the Appendix Factsheets, which show job access details and demographic categorizations for every neighborhood.

NEIGHBORHOOD RANKINGS BY NUMBER OF JOBS ACCESSIBLE WITHIN ONE HOUR

Rank	Neighborhood	Jobs Accessible	Median Income	Borough	Population
1	Chelsea (North)	4,839,253	$76,138	Manhattan	20,579
2	Hell's Kitchen (Central)	4,775,820	$64,013	Manhattan	22,413
3	Hell's Kitchen (South)	4,741,602	$87,813	Manhattan	6,147
4	Tribeca (South)	4,403,734	$210,125	Manhattan	6,188
5	Midtown (North-East)	4,253,972	$106,888	Manhattan	29,317
6	SoHo	4,206,289	$77,853	Manhattan	24,703
7	East Village/Midtown (South)	4,179,025	$91,767	Manhattan	56,614
8	Kips Bay/Murray Hill	4,154,581	$101,979	Manhattan	52,624
9	Financial District (West)	4,142,097	$115,787	Manhattan	2,696
10	Tribeca (North)	4,127,987	$68,790	Manhattan	26,090
11	Midtown East (South)	4,125,579	$108,250	Manhattan	16,137
12	Upper West Side (North-East)	4,093,881	$105,311	Manhattan	60,447
13	Financial District (South)	4,050,845	$127,281	Manhattan	2,780
14	Chelsea (South)	4,030,672	$101,515	Manhattan	51,853
15	West Village	4,030,672	$105,144	Manhattan	30,893
16	Battery Park City (North)	4,028,749	$233,409	Manhattan	5,507
17	Upper East Side (South)	3,990,704	$109,960	Manhattan	32,807
18	Midtown (South-East)	3,974,957	$95,556	Manhattan	29,396
19	Hell's Kitchen (North)	3,969,734	$80,519	Manhattan	40,351
20	Battery Park City (South)	3,949,380	$125,830	Manhattan	7,610
21	Financial District (East)	3,945,483	$120,729	Manhattan	5,724
22	Financial District (North-East)	3,907,304	$65,934	Manhattan	20,042
23	Long Island City (Central)	3,831,272	$43,909	Queens	24,405
24	Roosevelt Island	3,799,958	$75,325	Manhattan	12,311
25	Long Island City (West)	3,770,015	$126,225	Queens	3,272
26	Woodside	3,752,696	$49,528	Queens	87,284
27	Brooklyn Heights/Dumbo	3,734,895	$93,693	Brooklyn	52,242
28	East Harlem (North)	3,695,296	$26,214	Manhattan	34,709
29	Upper West Side (Central)	3,688,199	$110,091	Manhattan	58,991

30	Boerum Hill (East)/Park Slope (North)	3,683,145	$78,591	Brooklyn	38,398
31	Lower East Side	3,668,779	$32,265	Manhattan	80,323
32	Harlem (South)	3,665,913	$42,058	Manhattan	36,797
33	Upper East Side (Central)	3,654,111	$100,206	Manhattan	24,148
34	Sunnyside	3,647,802	$54,188	Queens	26,321
35	Central Harlem/Morningside Heights	3,635,810	$35,694	Manhattan	61,018
36	Upper West Side (North)	3,631,842	$68,463	Manhattan	96,449
37	Williamsburg	3,627,620	$44,173	Brooklyn	90,510
38	Upper East Side (North-Central)	3,619,681	$107,976	Manhattan	45,799
39	Bedford-Stuyvesant (South-West)	3,591,174	$41,688	Brooklyn	53,662
40	Briarwood/Jamaica Center	3,548,072	$53,914	Queens	52,288
41	Alphabet City	3,544,679	$59,034	Manhattan	62,397
42	Upper East Side (North)	3,521,991	$96,974	Manhattan	59,443
43	Upper East Side (South-Central)	3,508,821	$106,236	Manhattan	42,646
44	Bushwick (North)	3,435,799	$37,636	Brooklyn	53,031
45	Bed-Stuy (North)/East Williamsburg	3,426,071	$28,584	Brooklyn	80,086
46	East Harlem (South)	3,398,393	$31,254	Manhattan	79,031
47	Harlem (East)	3,387,794	$39,897	Manhattan	17,099
48	Lincoln Square (West)	3,356,294	$186,569	Manhattan	5,359
49	Bedford-Stuyvesant (East)	3,323,357	$35,620	Brooklyn	67,661
50	Washington Heights (South)	3,320,278	$36,095	Manhattan	61,650
51	Greenpoint	3,316,094	$62,634	Brooklyn	33,718
52	Prospect Heights/Clinton Hill (South)	3,307,417	$64,981	Brooklyn	52,033
53	Harlem (Central)	3,287,430	$30,674	Manhattan	29,364
54	Bushwick (South)	3,264,807	$37,608	Brooklyn	80,254
55	Washington Heights (North)	3,253,038	$41,352	Manhattan	57,073
56	Forest Hills	3,245,315	$72,538	Queens	69,745
57	Harlem (West)	3,233,571	$36,495	Manhattan	59,708
58	Astoria (East)	3,202,814	$55,844	Queens	36,724
59	Elmhurst	3,191,703	$44,964	Queens	97,430
60	Greenwood	3,147,313	$40,565	Brooklyn	28,703

61	Prospect Lefferts Gardens	3,132,184	$40,481	Brooklyn	60,179
62	Crown Heights (East)	3,129,390	$35,344	Brooklyn	61,495
63	Astoria (Central)	3,120,485	$49,371	Queens	36,958
64	Highbridge	3,114,484	$26,636	Bronx	74,520
65	Inwood	3,095,022	$43,049	Manhattan	41,200
66	Harlem (North-East)	3,086,570	$35,710	Manhattan	25,372
67	Mott Haven/Port Morris	3,084,177	$19,271	Bronx	37,850
68	Sunset Park	3,071,702	$38,267	Brooklyn	100,476
69	Jackson Heights (South)	3,068,380	$47,750	Queens	62,857
70	Astoria (North)	3,064,855	$48,548	Queens	33,742
71	East New York (West)	3,053,090	$32,642	Brooklyn	92,054
72	Park Slope	3,041,619	$93,184	Brooklyn	67,195
73	Clinton Hill (North)	3,010,429	$42,434	Brooklyn	40,125
74	Melrose/Mott Haven	2,984,791	$26,541	Bronx	45,931
75	Brownsville	2,977,140	$27,901	Brooklyn	81,267
76	Fort George	2,966,899	$40,385	Manhattan	43,650
77	Carroll Gardens/Red Hook	2,953,084	$71,999	Brooklyn	34,393
78	Ditmars Steinway	2,934,271	$57,576	Queens	37,438
79	Woodhaven	2,902,984	$57,091	Queens	41,872
80	Rego Park	2,859,191	$54,868	Queens	42,484
81	Borough Park	2,844,595	$34,590	Brooklyn	95,069
82	Kensington	2,816,985	$53,251	Brooklyn	74,571
83	Ditmas Park	2,809,416	$40,146	Brooklyn	99,285
84	Bedford Park	2,771,271	$56,058	Bronx	15,647
85	Longwood (South)	2,713,749	$21,379	Bronx	38,114
86	Kew Gardens	2,704,115	$60,287	Queens	19,464
87	Richmond Hill (North)	2,691,175	$58,965	Queens	36,821
88	Longwood	2,683,076	$21,913	Bronx	47,000
89	Ozone Park (North)	2,641,875	$55,225	Queens	24,977
90	Corona	2,630,962	$46,325	Queens	104,486
91	Tremont	2,610,927	$24,445	Bronx	69,411
92	Midwood	2,561,665	$42,568	Brooklyn	84,707
93	Morris Heights	2,540,969	$26,120	Bronx	79,143

94	East New York (East)	2,534,140	$35,665	Brooklyn	93,998
95	Jackson Heights (North)	2,509,644	$52,489	Queens	37,755
96	Glendale	2,464,241	$51,258	Queens	99,508
97	Morrisania	2,461,617	$22,604	Bronx	87,796
98	Bensonhurst	2,437,221	$45,112	Brooklyn	80,341
99	West Farms	2,355,792	$22,625	Bronx	56,011
100	Midwood (East)/Flatlands (West)	2,343,272	$54,664	Brooklyn	64,041
101	Middle Village	2,321,414	$67,516	Queens	35,680
102	Richmond Hill (South)	2,270,618	$53,815	Queens	48,119
103	Ozone Park (South)	2,229,512	$61,284	Queens	30,325
104	Bayside	2,191,929	$72,837	Queens	29,197
105	Spuyten Duyvil/Kingsbridge	2,108,075	$63,352	Bronx	43,897
106	Bay Ridge	2,093,947	$57,713	Brooklyn	72,434
107	Soundview	2,044,676	$23,297	Bronx	12,723
108	Fordham (North)	2,008,615	$24,478	Bronx	74,911
109	Laurelton	1,993,637	$77,739	Queens	39,291
110	Maspeth	1,965,517	$58,317	Queens	32,187
111	Kew Gardens Hills	1,873,402	$52,199	Queens	39,424
112	Murray Hill (East)	1,855,569	$67,924	Queens	39,143
113	East Elmhurst	1,844,949	$55,553	Queens	40,160
114	Dyker Heights	1,836,520	$61,213	Brooklyn	43,396
115	Flushing (South)	1,817,996	$43,248	Queens	83,938
116	Jamaica Hills (North)	1,735,787	$50,130	Queens	58,705
117	Flushing (Central)	1,715,490	$48,236	Queens	55,543
118	Williamsbridge/Baychester	1,637,265	$71,286	Bronx	21,792
119	Gravesend	1,546,324	$40,960	Brooklyn	74,700
120	Hunts Point	1,429,613	$78,766	Bronx	14,178
121	Arrochar/Shore Acres	1,395,371	$66,478	Staten Island	41,309
122	East Flatbush	1,359,833	$49,002	Brooklyn	80,202
123	Norwood	1,343,058	$55,724	Bronx	71,580
124	Bath Beach	1,342,608	$41,246	Brooklyn	81,428
125	Douglaston	1,338,342	$91,712	Queens	7,442

126	Hollis	1,258,710	$61,948	Queens	31,425
127	Jamaica Hills (South)	1,196,845	$43,419	Queens	30,851
128	Stapleton/Clifton	1,166,573	$51,852	Staten Island	41,845
129	Whitestone	1,160,751	$76,014	Queens	40,705
130	Canarsie	1,145,522	$60,758	Brooklyn	97,084
131	Sheepshead Bay	1,075,115	$49,629	Brooklyn	79,268
132	Parkchester/Van Nest	1,064,002	$46,001	Bronx	75,709
133	Manhattan Beach	1,052,051	$42,298	Brooklyn	72,447
134	Howard Beach	942,047	$65,295	Queens	28,769
135	Coney Island	929,664	$31,415	Brooklyn	44,047
136	Morris Park	896,732	$50,329	Bronx	51,599
137	College Point	880,978	$59,289	Queens	22,947
138	Fresh Meadows (South)	865,412	$75,729	Queens	13,593
139	South Ozone Park (West)	848,857	$60,603	Queens	48,226
140	Woodlawn	775,333	$31,594	Bronx	67,915
141	Rosedale	770,393	$85,151	Queens	33,116
142	South Ozone Park (East)	738,376	$60,820	Queens	17,316
143	Bellerose/Floral Park	688,509	$78,415	Queens	18,847
144	East New York (South)	658,748	$24,640	Brooklyn	12,850
145	Queens Village (North)	654,970	$69,758	Queens	19,784
146	St. Albans	646,899	$71,292	Queens	36,660
147	Oakland Gardens	623,674	$73,079	Queens	35,106
148	North Staten Island	595,969	$54,792	Staten Island	38,851
149	Springfield Gardens/Rochdale	550,583	$57,393	Queens	61,853
150	Arverne	545,296	$39,817	Queens	16,870
151	Hollis Hills	529,317	$70,438	Queens	24,601
152	Fresh Meadows/Utopia	519,725	$56,131	Queens	41,520
153	Clason Point	493,438	$45,460	Bronx	41,625
154	Bay Terrace	471,046	$76,438	Queens	20,688
155	Port Richmond	451,135	$62,457	Staten Island	24,454
156	Bellaire	442,843	$70,478	Queens	28,571
157	Little Neck	434,988	$86,051	Queens	18,220
158	Glen Oaks	414,030	$54,611	Queens	8,091

159	Mariners Harbor	381,486	$50,137	Staten Island	24,933
160	Edenwald	356,718	$32,985	Bronx	73,205
161	Riverdale/Fieldston	353,558	$37,616	Bronx	58,403
162	West Staten Island	342,996	$79,820	Staten Island	87,921
163	Elm Park	312,729	$56,883	Staten Island	17,090
164	Cambria Heights	294,671	$81,390	Queens	19,357
165	Hammels	278,582	$50,006	Queens	11,415
166	Co-Op City	247,287	$70,036	Bronx	1,963
167	Far Rockaway	229,325	$38,631	Queens	61,442
168	Oakwood	228,381	$77,720	Staten Island	55,692
169	Throggs Neck	225,901	$35,358	Bronx	96,319
170	Breezy Point	208,834	$86,731	Queens	4,344
171	Flatlands	198,371	$68,177	Brooklyn	95,390
172	Belle Harbor	192,142	$73,893	Queens	21,281
173	Great Kills	181,997	$90,196	Staten Island	28,782
174	City Island	92,544	$44,038	Bronx	71,631
175	Annadale/Arden Heights	58,442	$87,426	Staten Island	61,136
176	Tottenville	56,933	$86,011	Staten Island	14,418
177	South Staten Island	42,275	$86,759	Staten Island	31,943
	Average NYC Neighborhood	2,331,586	$62,352		45,910

DISCUSSION OF RANKINGS

Several factors are evident from the data:

Income and access are related at the top and bottom of the rankings.

Specific neighborhoods exemplify the close relationship between access and economic standing: Tribeca in Manhattan is ranked fourth in job access, and has the second-highest median incomes in the city ($210,125). Unemployment is at a low 6%, and 83% of working residents commute either by public transportation or walking. The neighborhood enjoys seamless access to job opportunities and reflects this factor in its high employment rates and incomes.

The southern end of East New York, in the southeastern section of Brooklyn, has a median income of $24,640, an unemployment rate of 14%, and a low job access rank (144/177). The neighborhood's major housing complex, Spring Creek Towers, sits 15 minutes by bus from the nearest subway station. It is likely that the residents of East New York are missing out on job opportunities for economic improvement due to their extensive commutes.

However, the relationship between access and income is not always evident. Some neighborhoods are outliers, with above-average incomes despite limited mass transit access: Douglaston (Queens), for example, is a small neighborhood (population of 7,442) with limited transit access (rank 125/177), but the median household income is $91,712 and the unemployment rate is 8%. Most working residents commute by private car (68%); only 26% commute by public transportation, accessing job opportunities that would not otherwise be available.

The middle third of job accessibility seems to suffer the most.

The rankings, along with the summary chart above, show the swoosh-shaped relationship between transit and income in New York City: the highest incomes are connected to the areas with the most access, and low transit access still provides average incomes, because residents travel by private car rather than transit. Thus, the middle third have some, but not a choice of,

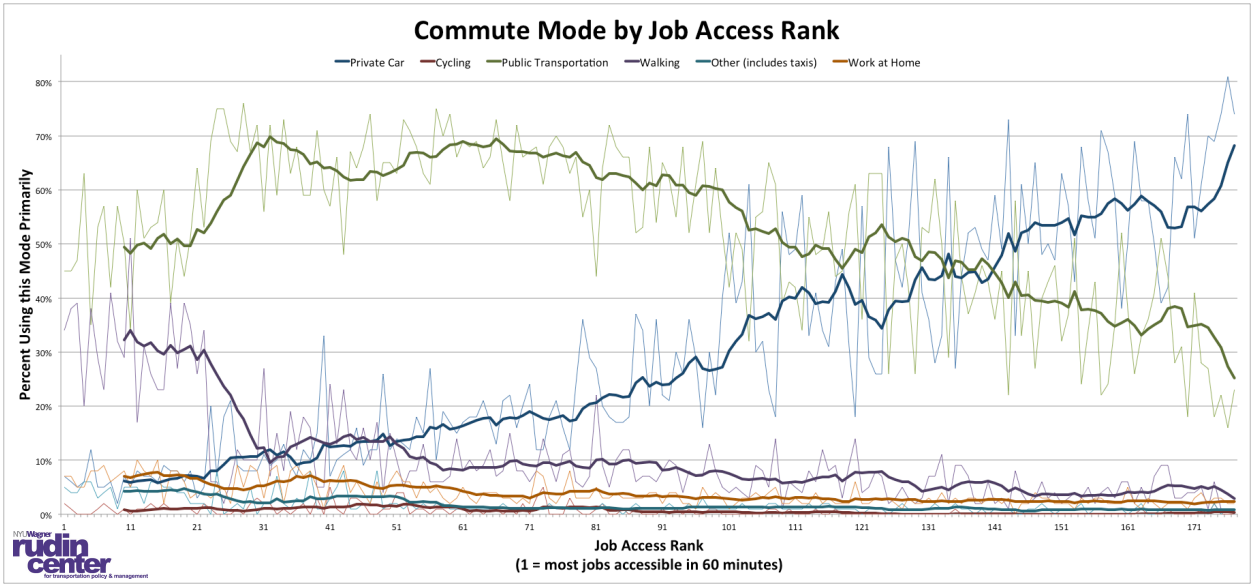
transit options (usually involving transfers), and thus are the most limited in job opportunities, and have the lowest incomes of the three sets:

Ranked Areas	Median Household Income	Unemployment Rate	Commute by Transit or Walking	Commute by Car
1-59	$79,148.83	8.3%	79.1%	10.9%
60-119	$46,773.32	11.7%	66.9%	28.0%
120-177	$61,381.64	9.7%	43.5%	52.9%

This chart shows the mode of transportation among the ranked neighborhoods; note the high proportion of transit usage in high-access neighborhoods and majority of car usage in low transit access. The middle third uses a mix, but neither option is especially productive in these areas.

Cars compensate for low transit access.

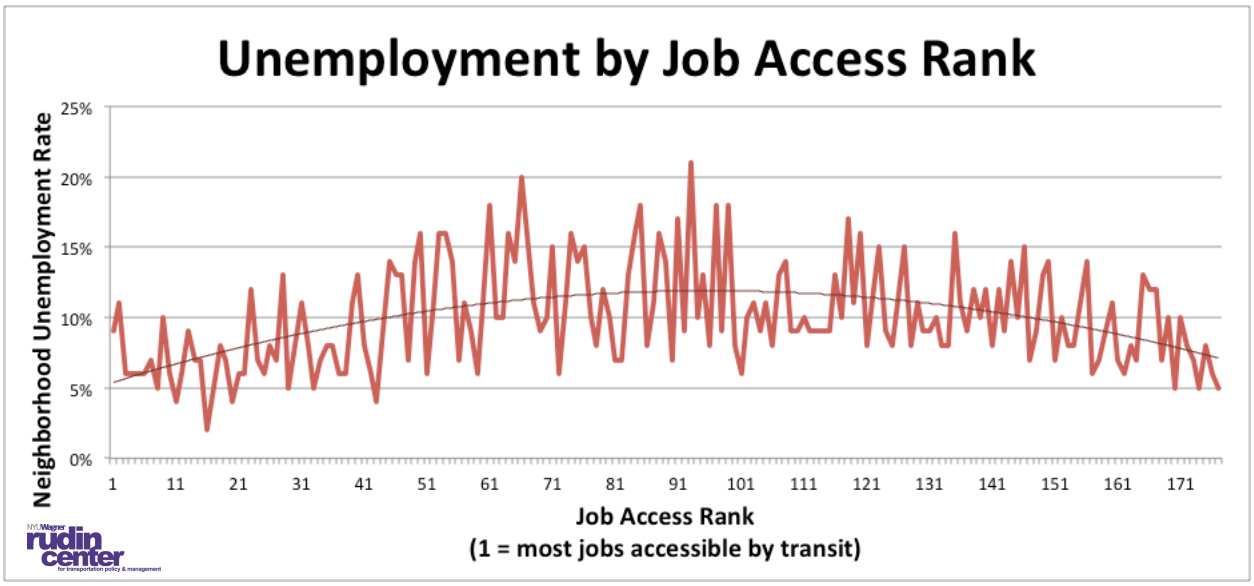
In areas lacking sufficient transit access, commuters rely on private vehicles. In the chart below showing commute mode by job access rank, the predominance of car usage in low transit-access areas is evident.



Greater transit access also diversifies modes of commuting. In neighborhoods with dense transit access, other commuting modes, including walking, cycling and telecommuting are also prominent. This diversification of commute modes demonstrates the opportunities afforded in these areas to larger numbers of job opportunities through multiple means of access.

The middle third has the highest rates of unemployment.

The rate of unemployment across New York City neighborhoods peaks in the middle third. In the chart below, neighborhoods unemployment rates are shown by rank; unemployment peaks at 21 percent in the Bronx neighborhood of Morris Heights, which is ranked 93.

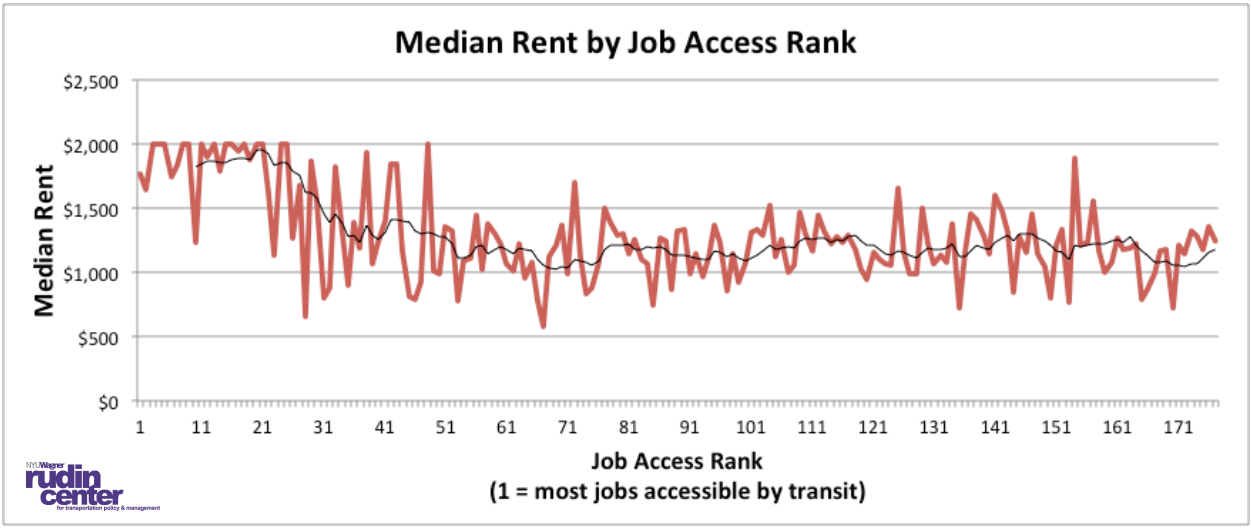


The relationship between transit access and employment levels was recently explored in a study showing that that improved transit access lessens the duration of unemployment. (Andersson, 2014.) In New York, those improvements are essential for the middle-third of neighborhoods.

Rents rise with number of jobs accessible by transit.

Greater access to job centers consistently correlates with higher rents. The chart below shows that median rents in the ten highest-access areas average $1,891, while the rents for the ten

lowest-access areas average $1,122. These figures demonstrate the ever-present New York feature of the desire to be close to transit for both employment and entertainment.



Analysis of the neighborhood rankings shows that two-thirds of New York City's neighborhoods need improved transportation access: the lowest-access third should have more options that allow them to avoid driving, which adds congestion to the streets and expenses to car-owning households. The middle-third should have access to more options that help them fill in the gaps that they are experiencing through limited transit options. These neighborhoods would be benefitted by expanded transit, more modal options, and intelligent transit systems. On the following pages, these recommendations will be explored for application to particular neighborhoods.

RECOMMENDATIONS

To improve access to employment opportunities, the NYU Rudin Center recommends these infrastructure and policy modifications:

Increase the number of transportation modal options across the city.

New York works because its residents can switch between transportation modes instantaneously, so they can always travel to their destinations using a primary or alternate mode. This speaks to both the adaptability of New Yorkers and the presence of subways, buses, taxis, sidewalks, cars and car shares, bikes and bike share. However, many of these options are not available in concentration citywide; to improve economic opportunity, New Yorkers need at least three modes regularly available. Specifically:

Develop smart bus systems that transport clusters of New Yorkers from low-access neighborhoods to transit hubs.

These 12-passenger buses should be summoned via smartphone and be able to accept multiple forms of payment: cash, MetroCards, credit cards, and Apple and Google Pay. These buses, which can augment the existing transit and dollar van system, will be privately owned and operated by systems like Bridj, which is already transporting commuters through Boston.[1] Bridj uses search and social data to refine bus routes according to user needs, and could serve as a valuable model for intelligent transit in the future. In New York, the NYU Rudin Center recommends smart buses for these neighborhoods in particular:

- From Red Hook and Bay Ridge in Brooklyn to the Downtown Brooklyn transit hubs
- Whitestone and Maspeth in Queens and Throggs Neck in the Bronx to East

Neighborhood Spotlight

Red Hook, Brooklyn (ranked 77/177)

Recommended improvement: Smart shuttle to bring Red Hook residents to Downtown Brooklyn transit centers.

Travel time reduction: From 50 to 28 minutes to Midtown Manhattan

Additional jobs accessible within one hour: 89,498

[1] Seelye, Katharine Q. "To Lure Bostonians, New 'Pop-Up' Bus Service Learns Riders' Rhythms," *The New York Times*, June 4, 2014.

Midtown Manhattan

- Hunts Point in the Bronx to transit connections at 149th Street and Grand Concourse

Smart buses will carry commuters to transit quickly, which will reduce their travel time to job centers. This new mode will also help them avoid driving, which will mitigate congestion on city roadways and reduce household expenses. New York City should nurture development of these alternate modes of transportation by allowing and encouraging them to operate in low-transit areas.

Expand vehicle-share options, including car and bike shares.

With access to vehicles when New Yorkers need them, transportation around the city will be vastly improved. Resources like Car2Go can transport residents from low-transit areas to transit-dense locations with the convenience of car travel, minus the congestion of driving into central business districts. Citi Bike share and related bicycle infrastructure also improves transportation options while providing an active transport mode. These sharing modes are becoming essential segments in New York's transportation landscape, and their expansion should be encouraged for reduced congestion, increased health, and increased access to employment.

Build Bus Rapid Transit in key corridors.

New York City's Select Bus Service, its variation on Bus Rapid Transit, has been markedly successful in its current buildouts. However, a true Bus Rapid Transit system – with exclusive lanes, pre-boarding fare payment and traffic signal priority – should be built out in key locations:

- Woodhaven Boulevard: Initially identified by the Pratt Institute, would connect LaGuardia Airport to the Rockaways on Woodhaven Boulevard, along with the A, E, F, J,

M, R, Z, and 7 trains, plus the Long Island Railroad at Woodside. By the Rudin Center's calculations, BRT on Woodhaven Boulevard would especially reduce travel times for areas especially distant from job centers, including Ozone Park and East New York.

- Flatlands Avenue: A BRT corridor should start at Spring Creek Towers, follow Flatlands Avenue across the lower midsection of Brooklyn, stop at the hospital cluster on 8th Avenue and 62nd Street, and end at Industry City in Sunset Park. This route will connect riders with the B, D, F, L, N, Q and R trains, and jobs throughout Brooklyn's growing health care industry and burgeoning Sunset Park innovation hub.

Neighborhood Spotlight

East New York (South), Brooklyn (ranked 144/177)

Recommended improvement: Incorporate the BM5 bus, which currently runs from Spring Creek Towers to Manhattan, into a Bus Rapid Transit route along Woodhaven Blvd.

Travel time reduction: From 48 to 36 minutes to Midtown Manhattan

Additional jobs accessible within one hour: 1,328,088

Support informal transportation networks.

Many New York City commuters rely on "unofficial" transportation networks. Dollar vans, which carry up to 120,000 passengers every day, fill in transit gaps throughout Brooklyn and Queens, often with 45-60 vans an hour running through corridors where buses only pass through four times an hour.[2] More formalized non-public transportation systems also support large numbers of riders: for example, the Senior Citizen Transportation Program at Coney Island's Jewish Community Center, provides 5,400 riders free trips throughout Brooklyn annually.[3] This JCC transportation resource is sponsored by the Federal Transit Administration, New York State Department of Transportation, and New York City Departments of the Aging and Youth and Community Development. However, both the JCC program and the dollar vans are not affiliated officially, or integrated fully, with the New York City transportation landscape. Policymakers should work to integrate these services with

[2] Margonelli, Lisa. "The (Illegal) Private Bus System That Works," *The Atlantic*, October 5, 2011.
[3] Jewish Community Council of Greater Coney Island: Senior Transportation. Accessed November 12, 2014. http://www.jccgci.org/services/senior-services/senior-transportation/

existing resources to ensure transportation access across the city through both formal and informal mechanisms.

More modes will increase likelihood that New Yorkers can reach their jobs on time, will alleviate congestion on existing modes, and increase the number of jobs accessible from residences.

Encourage remote work.

Many information-based jobs can now be conducted anywhere, and can and should be distributed across New York City. If policymakers incentivize distributing the workforce (to places like neighborhood libraries and co-working spaces), employees will reach their places of work more easily, the productive workday will be expanded without the hassle of commuting, and workers in more isolated locations will have access to more job opportunities. Approximately four percent of New Yorkers work from home; that number is as high as 10 percent in the West Village and the Upper West Side, despite those neighborhoods' dense transportation access. Because New York City will soon have citywide free wi-fi, working remotely will now be even simpler.[4] These employees are reducing congestion on transit and in traffic, and can work as needs arise, rather than during traditional business hours, which are becoming increasingly irrelevant. Working remotely will be beneficial to employees, employers, and New York's transportation system.

Maximize the existing system.

Although New York's landscape makes it extremely difficult to build new infrastructure, the Metropolitan Transportation Authority should seek to improve upon existing resources:

[4] Engel, Evan. "NYC announces free city-wide Wi-Fi with next-gen pay phones," Mashable.com. November 17, 2014.

Revitalize unused tracks and build essential transfers.

- Revitalize express service on the #5 track between 180th Streets and Nereid Avenue in the Bronx using dormant tracks and platforms. This express capacity, which complements #2 train service, has been discontinued, but should be re-opened to shorten commutes between the Bronx and Manhattan.
- Opening key transfer points will help New Yorkers improve their use of the subway system. For example, the Junius Street stop on the #3 is only three blocks from the Livonia Avenue stop on the L train, and the stations are connected by an unsafe walkway that requires additional payment to transfer between lines.[5] Building a safe passage within the fare payment area will provide residents of southeast Brooklyn with access to points west in Brooklyn and fast commutes to Lower Manhattan.

These adjustments should be included in the MTA's next capital plan to improve the system incrementally for thousands of New Yorkers.

Neighborhood Spotlight

Norwood, Bronx (ranked 123/177)

Recommended improvement: Expand the CityTicket to weekdays, allowing NYC residents to ride commuter rail at a discount; Norwood residents would board Metro-North at the Williams Bridge Station.

Travel time reduction: From 48 to 33 minutes to Midtown Manhattan (versus subway alone)

Additional jobs accessible within one hour: 527,819

Expand CityTicket to make commuter railroads more inclusive.

The CityTicket, which allows riders to take Metro-North and Long Island Rail Roads within New York City at a reduced rate, is currently limited to weekends. While the railroads operate at maximum capacity during rush hours, they should be available to city residents off-peak on weekdays. This option would allow city residents in

[5] Son, Hugh. "It's An L of A Transfer Getting to 3 Line Costly & Risky, Critics Say," *New York Daily News*, May 21, 2004.

subway-sparse areas to ride the railroads to their workplaces often in half the time, giving them access to more job opportunities and maximizing revenue on in-service trains.

Rapidly expand wireless access on subways.

As subway stations are lit with wireless access for customer use, pairing Transit Wireless' work with ongoing track work should accelerate the program. With internet and mobile phone service in more subway stations, commutes will become more productive, and subway agents will become more informed about the system's status.

CONCLUSION

It is evident that the varied levels of transit access across New York affect residents' employment levels, travel modes and incomes. Reduced transit access is correlated with higher rates of unemployment, and low transit access typically causes residents to drive to work. These imbalances perpetuate issues of income inequality and traffic congestion, limiting both economic and physical mobility for many in the city.

By improving transportation access across New York City, policymakers can help to improve the standing of those residents with insufficient modes to reach significant numbers of job opportunities. More job opportunities will lead to upward economic mobility.

To improve citywide transportation access, the NYU Rudin Center recommends:

New York City policymakers must increase the number of transportation modal options across the city. This includes championing the development of new modes, such as intelligent bus systems, incentivizing expansion of emerging modes, such as vehicle and bike shares, working toward the buildout of existing modes, including Bus Rapid Transit, and supporting the functions of informal transportation networks.

Transportation infrastructure is unwieldy to build, so New York City policymakers must maximize use of the existing transportation landscape: unused infrastructure should be revitalized, policies should encourage use of all modes, and wireless access should be rapidly deployed throughout the subway system to make commute times more productive.

By improving existing transportation resources and expanding them citywide, all New Yorkers will benefit in access to job opportunities and economic mobility.

APPENDIX – NEIGHBORHOOD FACT SHEETS