Older New Yorkers and Access-A-Ride Forecasts

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November 2016

Supported by The New York Community Trust

Introduction

More than 993,000 people, or 12 percent of the New York City population, are adults over the age of 65.[1] As the "baby boomer" cohort begins to age past 65, adults over the age of 65 are projected to reach 20% of the nation's population by 2030[2]. New Yorkers over 65 grew by 5.5 percent between 2000 and 2010[3], presenting a challenge to New York City's transportation infrastructure. Many older adults are not physically able to use public transportation, often because of a lack of subway station accessibility. Instead, they rely on the Access-A-Ride (AAR) paratransit system, an American with Disabilities Act (ADA) mandated service operated by the Metropolitan Transportation Agency (MTA) and partially subsidized with New York City funds, that provides door-to-door transportation for riders who are unable to use the buses or subways. In 2015, AAR users over the age of 65 accounted for 69 percent of all registrants. AAR operations will cost a projected $505.7 million in 2016 and have experienced annual growth, according to the MTA: in 1994, AAR provided 424,239 trips to 25,446 registrants; in 2015, AAR provided 6,360,165 trips to 144,692 registrants[4]. Demand for AAR is expected to increase as the city's population of older adults grows; the MTA forecasts that the year 2022 will see 14,322,120 trips for 316,907 users[5], requiring a scaling up of the already overburdened system. This report attempts to forecast an increase in demand for AAR by location and make recommendations for accessibility reform.

By 2030 it is projected to grow by 35.3 percent to 1.84 million.

[1] U.S. Census Bureau; 2010 Census Summary File 1; generated using American FactFinder; <http://factfinder2.census.gov>; December 2011

[2] "Profile on Older Americans," U.S. Department of Health and Human Services Administration on Aging, 2015.

[3] U.S. Census Bureau; 2010 Census Summary File 1; generated using American FactFinder; <http://factfinder2.census.gov>; December 2011

[4] MTA Paratransit Operations briefing, April 2016.

[5] MTA Paratransit Operations briefing, April 2016.

Findings

While New York City's population over the age of 60 is projected to increase by 35.3 percent, with 96 percent of older New Yorkers remaining in their apartments rather than relocating[6], growth likely will be concentrated in specific neighborhoods. This factor, compounded by the lack of accessible subway stations and bus stops, equates to a sharp expected increase in demand for Access-A-Ride services in locations where these two factors overlap. Two approaches were used to predict future demand:

1. Identifying the **geography of the growing population** of older adults and **predicting future growth.**
2. Identifying current Access-A-Ride **pick-up hotspots**.

The methodology is discussed in the appendix of this report.

Concentrations of Older New Yorkers

The NYU Rudin Center found that AAR pickup demand is most concentrated in those areas that also exhibit concentrations of the age 65-74 population. Based on the current geographies of 45-54 and 55-64 age cohorts, we projected the geography of the older (65+) population for the year 2030, shown in the map below.

[6] "Mayor, DFTA, City Council speaker release 'Aging in Place' guide to help older New Yorkers," New York City Department for the Aging, July 1, 2016.

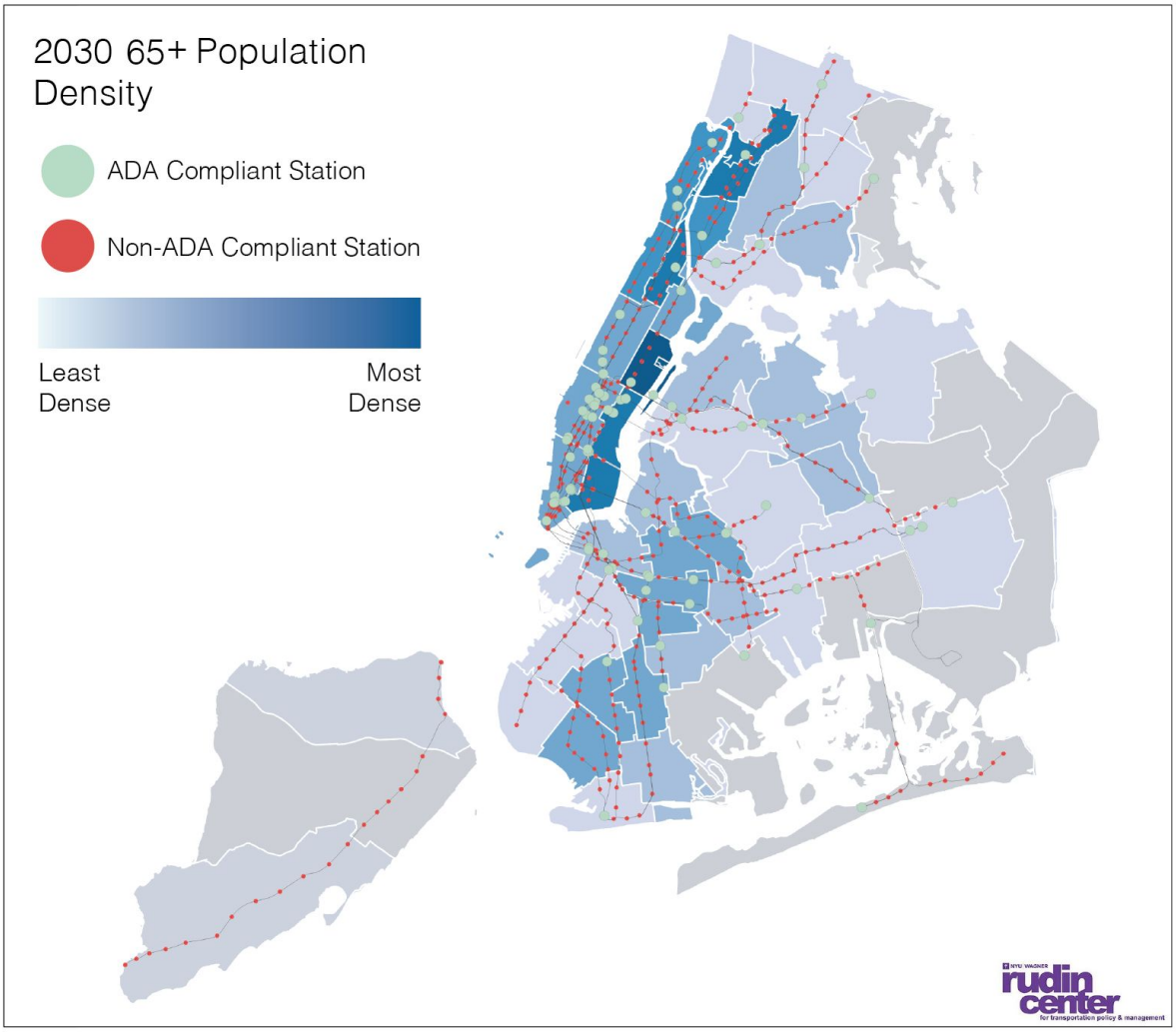

Figure 1: Population density for predicted 2030 elderly populations was mapped at the PUMA level. Shades of blue are used to delineate relative density, with lighter shades denoting less dense areas and darker blues denoting more dense areas. Green dots represent subway stations that have ADA compliant entrances. Red dots are represent subway stations that have no ADA compliant entrances.

Although older adults are living throughout the five boroughs, the NYU Rudin Center estimates that the population of adults over the age of 65 will concentrate in several neighborhoods, which have been aggregated to the Public Use Microdata Area (PUMA) level. Data was provided by the Department of City Planning of the City of New York. As shown in the map above, the Upper East Side, Lower East Side, Harlem, and the West Bronx are forecasted to have higher than average populations of older adults per square mile by 2030.

Forecasted PUMAs with the Highest Predicted Density of Adults Over Age 65 in 2030
1. Upper East Side (59 St - 96 St, Manhattan)
2. Lower East Side (14 St - Fulton St Manhattan)
3. Bronx I (Fordham, Bronx)
4. East Manhattan (14 St - 59 St, Manhattan)
5. Harlem (110 St - 166 St, Manhattan)
6. Bronx II (Woodlawn, Bronx)
7. Bronx III, (Mott Haven, Bronx)
8. West Harlem, (106 St - 153 St Manhattan)
9. Washington Heights, (155 St - 230 St Manhattan)
10. Crown Heights, (Brooklyn)

Additional concentration of the over-65 age group is projected in Brooklyn immediately north of Crown Heights in Bedford-Stuyvesant and Bushwick, ranked 11th and 18th respectively. South of Crown Heights and Prospect park is also expected to have a high concentration of those over the age of 65 in Flatbush, ranked 16th, Borough Park, ranked 17th, and Bensonhurst, ranked 20th.

The top 10 PUMA projection neighborhoods already exhibit a relatively high concentration of older New Yorkers, however. Mapping the change in population density between 2010 and 2030 reveals a different pattern of emerging hot spots for older New Yorkers. Williamsburg and Greenpoint are predicted to experience the largest change in the over-65 age group, with a 43% increase. North of Greenpoint, the neighborhoods of Long Island City, Sunnyside and Woodside are expected to experience a 34% increase in those over 65. Chelsea and Hell's Kitchen, will receive the next largest increase in the 65 and over population, at 32%. The fourth ranked DUMBO neighborhood's population over the age of 65 is expected to grow by 25%, followed by the Tremont and Mott Haven neighborhoods in the Bronx and East Harlem in Manhattan.

Despite ranking 8th and 9th in predicted density for 2030, West Harlem and Washington Heights are expected to see an overall decline in population density for those over the age of 65, falling by .1 and 1% respectively.

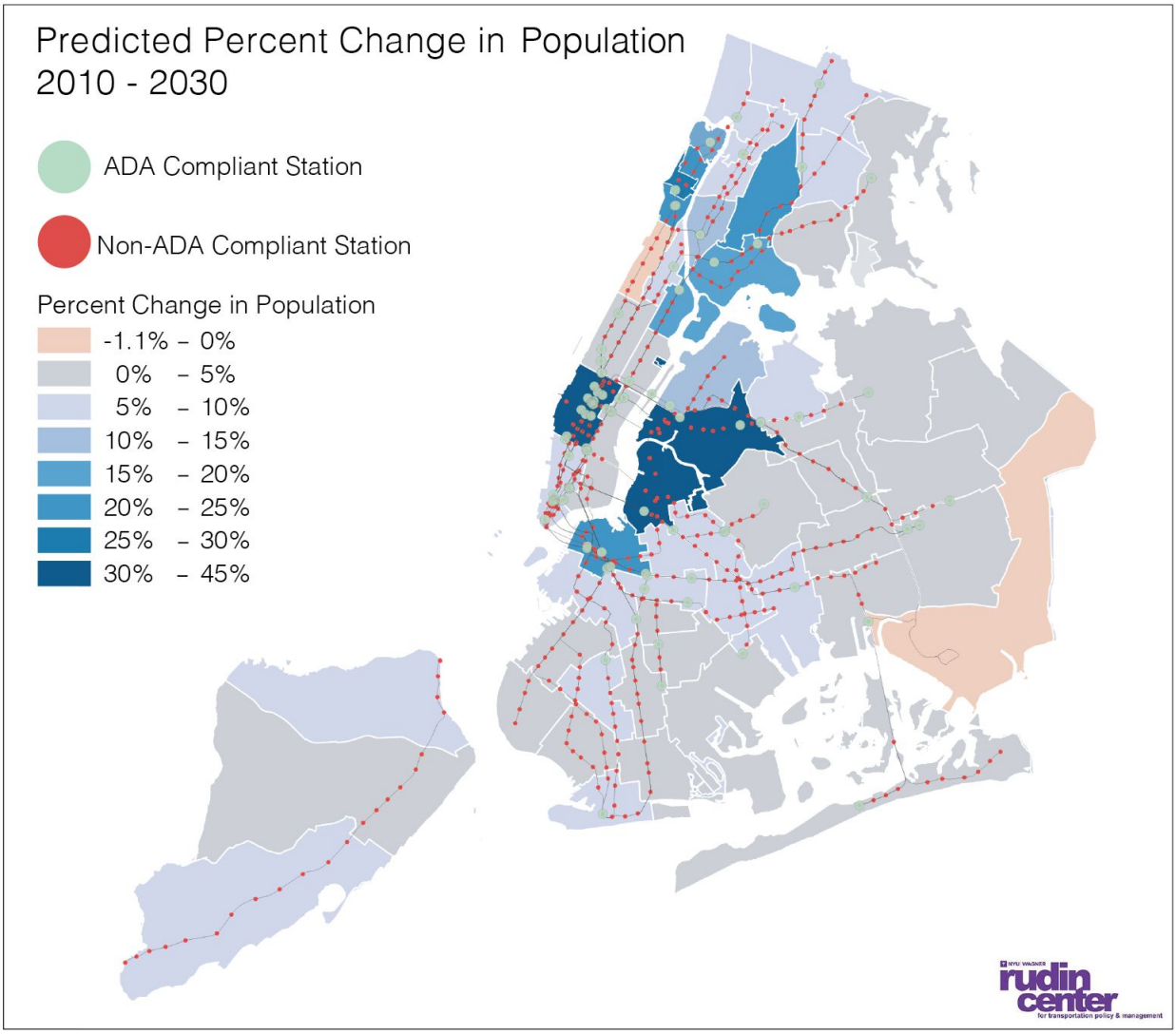

Figure 2: Predicted percent change in population for predicted 2030 elderly populations was mapped at the PUMA level. Shades of blue are used to delineate relative growth, with darker shades denoting higher percentage change and lighter colors denoting less growth, or a reduction in the senior population. Green dots represent subway stations that have ADA compliant entrances. Red dots are represent subway stations that have no ADA compliant entrances.

Concentrations of Access-A-Ride pickups

An analysis of all AAR pick-ups in 2015 revealed similarities to the predicted elderly population distributions, but also some key differences. AAR pick-up density was concentrated throughout Manhattan, particularly in the Upper East Side, East Harlem, Murray Hill and in Lower Manhattan in the Financial District and Two Bridges neighborhoods. In Brooklyn, high concentrations of pick-ups are found in DUMBO and Brooklyn Heights, extending south-eastwards towards Bedford-Stuyvesant, Crown Heights and Brownsville.

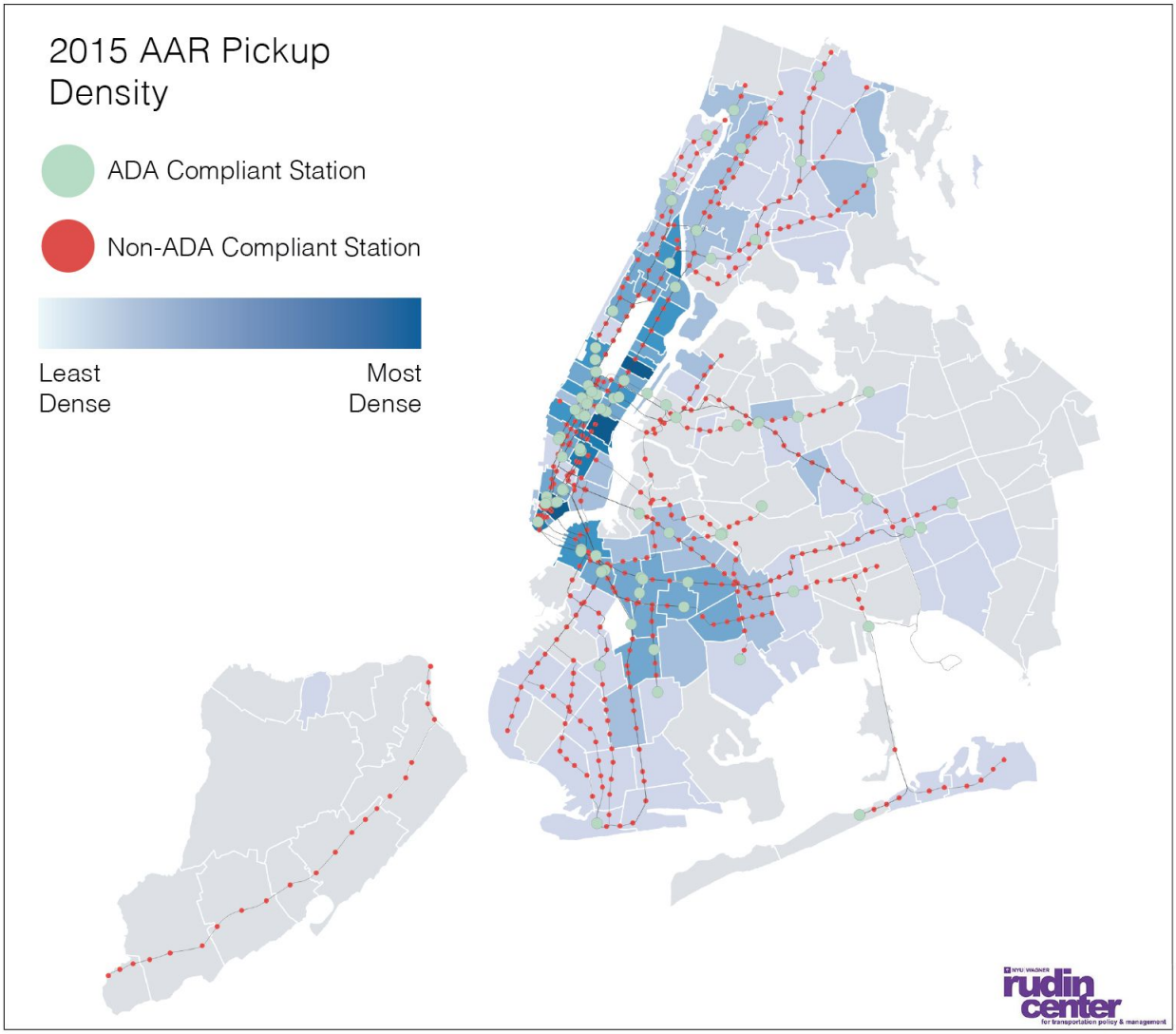

Figure 3: AAR pick up density for all 2015 pickups were mapped on the the ZIP code level. Shades of blue are used to delineate relative density, with lighter shades denoting less dense ZIP codes and darker blues denoting more dense ZIP does. Green dots represent subway stations that have ADA compliant entrances. Red dots are represent subway stations that have no ADA compliant entrances.

Forecasted ZIP Codes with the Highest Density of AAR Pick-ups in 2030
1. Financial District I (Civic Center, Manhattan) (10007)
2. Two Bridges, Manhattan (10038)
3. Kips Bay / Murray Hill, Manhattan (27 St - 40 St) (10016)
4. Upper East Side, Manhattan (69 St - 76 St) (10021)
5. Kips Bay II, Manhattan (20 St - 27 St) (10010)
6. Financial District II, Manhattan (S of Exchange St) (10004)
7. Financial District III, Manhattan (World Trade Center) (10006)
8. Harlem, Manhattan (10037)
9. Gramercy Park, Manhattan (10003)
10. East Harlem, Manhattan (10029)

Geographic Relationship of Older Adults, AAR Pick-ups and Accessible Subway Stations

Accessible Subway stations are one potential alternative to AAR for residents who live in high-density areas with access to existing fixed route subway infrastructure. However, only 112 of New York City's 491 subway stations (including those on Staten Island) are fully accessible under the ADA's accessibility guidelines. There is only one ADA-compliant subway station (Lexington Avenue/63rd St station) servicing the Upper East Side of Manhattan, an area predicted to have among the highest concentration of New Yorkers over the age of 65 by 2030. Three additional stations on the Second Avenue Subway, predicted to open in 2017, will be accessible. Similarly, in the Upper West Side ZIP codes predicted to have a significant density of older adults, just three of fourteen stations (66th Street/Lincoln Center, 72nd Street and 96th Street) are ADA-accessible. Of the subway lines servicing ZIP codes that make up southern Brooklyn (including south of Prospect Park) just four of 63 total stations are ADA-accessible. Relative to adjacent Queen's neighborhoods, high concentration of AAR pick-ups are seen through the Jackson Heights, Elmhurst and Rego Park neighborhoods. Of the eight subway stops that service these neighborhoods, only two are ADA compliant. In the Bronx, the highest

concentrations of pickups are seen along its western edge, following the subway lines servicing the area. Of the twenty four subway stations in these neighborhoods, just three are ADA-accessible.

ADA Compliant Subway Stations by Neighborhood		
Neighborhood	**Total Subway Stations**	**ADA Compliant Stations**
Upper West Side	14	3
Upper East Side	5	1
Upper Manhattan: Harlem, Washington Heights, Inwood	33	5
Southern Brooklyn: Borough Park, Midwood, Gravesend, Sheepshead Bay, Bensonhurts, Dyker Heights, Bay Ridge, Sunset Park, Brighton Beach	63	4
Bronx: High Bridge, Morris Heights, Tremont, Fordham, University Heights	68	8
Queens: Rego Park, Elmhurst, Jackson Heights	8	2

Proximity to Hospitals

Paratransit users often call on Access-A-Ride for visits to hospitals and their co-located medical offices. The NYU Rudin Center compared all Access-A-Ride trips in 2015 to hospital locations and found significant correlations. Trips were aggregated by census block; the hospitals located within the census blocks of greatest activity are listed in the chart below.

Access-A-Ride Activity by Hospital-Based Census Blocks, 2015[7]

Hospital	Borough	AAR Pickups in Census Block	AAR Dropoffs in Census Block	AAR Total Activity
Bellevue Medical Center	Manhattan	45,947	51,544	97,491
Mt. Sinai Hospital	Manhattan	30,251	35,449	65,700
South Queens Community Health Center	Queens	29,903	25,892	55,795
New York-Presbyterian/Weill Cornell Medical Center / Hospital for Special Surgery *	Manhattan	22,970	26,048	49,018
Memorial Sloan Kettering Cancer Center	Manhattan	20,760	23,449	44,209
New York Methodist	Brooklyn	18,374	21,367	39,741
North Central Bronx Hospital / Montefiore Medical Center *	Bronx	17,176	21,154	38,330
NewYork-Presbyterian/Lower Manhattan Hospital	Manhattan	16,978	19,116	36,094
James J Peters Veterans Administration Medical Center	Bronx	16,660	17,917	34,577
Brooklyn Veterans Administration Medical Center	Brooklyn	16,017	17,694	33,711

* Shared census block

This data helps to identify areas of heavy Access-A-Ride usage. The Mt. Sinai Hospital census block, for example, averaged 83 dropoffs and 97 pickups per day. This frequency presents numerous opportunities for employing intelligent ride-sharing using Access-A-Ride, yellow and green taxis, for-hire vehicles and ride-sharing companies like Uber, Lyft and Via. By tapping into these networks of vehicles for both the ambulatory disabled and people in wheelchairs, rides

[7] Access-A-Ride trip data, 2015, provided by the Metropolitan Transportation Authority, and American Community Survey, 2014.

could be reserved more efficiently. Users would reserve trips on-demand and be matched to the correct vehicle type. In addition, these medical facilities could establish specific paratransit passenger pickup and dropoff points, which would limit "missed connections" and help to organize shared rides.

Because some hospitals are co-located in census blocks with others, reside on the border of two census blocks, or have campuses straddling two census blocks, the numbers may be skewed higher or lower. Further research is needed to assess precise hospital paratransit locational activity.

Policy Recommendations

The research conducted for this report identified the ZCTAs with the highest density of 45-64 year-olds per square mile (as a predictor of the density of adults over the age of 65 by 2030) and the ZCTAs with the highest density of AAR pick-ups per square mile.

Neighborhood Priority Areas for Policy Focus	
ZIP Codes with the Highest Predicted Density of Adults Over Age 65 by 2030	**ZIP Codes with the Highest Density of AAR Pick-ups in 2015**
1. Upper East Side I (10075)	1. Financial District I (10007)
2. Upper East Side II (10128)	2. Two Bridges (10038)
3. Upper West Side I (10025)	3. Kips Bay / Murray Hill (10016)
4. Upper East Side III (10028)	4. Upper East Side (10021)
5. Upper West Side II (10023)	5. Kips Bay II (10010)
6. Upper East Side IV (10021)	6. Financial District II(10004)
7. East Village (10009)	7. Financial District III (10006)
8. Battery Park City (10280)	8. Harlem (10037)
9. Jackson Heights (11372)	9. Gramercy Park (10003)
10. Harlem (10030)	10. East Harlem (10029)

These hotspots signal different needs for AAR alternatives. In neighborhoods with a high density of AAR pick-ups, MTA, the City of New York and the private sector must work toward

near-term solutions to address the high costs of paratransit rides today. In neighborhoods with high densities of people aged 45-64, which only overlap with the density of AAR pick-ups on the Upper East Side between 69th and 76th Street, policymakers must develop long-term strategies to address a high concentration of adults over the age of 65 by the year 2030.

Near-Term Recommendations

Encourage ADA eligible transit riders to utilize fixed route transit when possible.

The most effective tool for reducing the cost of paratransit service is to shift ridership to existing fixed-route transit facilities. Many transit agencies, including Pierce Transit (Seattle, WA), the Utah Transit Authority (Salt Lake City, UT) and Access Services, Inc. (Los Angeles, CA) have experienced significant cost savings from introducing feeder services to fixed route transit, improving travel training programs, and offering free fares.[8] Like these other agencies, New York City offers travel training and services for ADA-eligible seniors to use subways and buses: the MTA offers free fares to paratransit-eligible riders, has more than 100 accessible subway stations and operates a 100 percent accessible bus fleet. Many AAR trips are merely last-mile service to the local bus stop. By making transit easier for this population to ride, more users would like opt for riding fixed route transit over AAR.

However, challenges remain for those riders who cannot use fixed route transit. Riders who qualify for reduced fare cards should be able to apply for them by mail, by phone, in person, or online. Currently, riders cannot apply online. Although some older adults may not be comfortable using the Internet, others - particularly baby boomers who are often comfortable using online applications and, like younger generations, rely on them - will likely prefer being able to apply online. Enabling people to apply for and obtain reduced fare Metrocards online (as well as in person, on the phone or by mail) will increase the number of people who choose to do so. This resource will make the process for obtaining these cards faster for users and more efficient for the MTA.

[8] Transit Cooperative Research Program Synthesis Program, "TCRP Synthesis 76: Integration of Paratransit and Fixed-Route Transit Services," The National Academies Press, 2008.

Although this report maps accessible subway stations, bus accessibility is also a key concern for older and disabled adults. MTA and the City of New York should collaborate on a process and methodology for ensuring that all bus stops are not only ADA compliant, but also comfortable and accessible at all times of year. Even those older adults who can walk to the bus may need a seat when they wait; benches are not always available. Additionally, bus stops that seem accessible at first glance may not be so under extraneous circumstances. For example, snow piles, ice and construction can limit or prevent access for people who are mobility-impaired. The City must ensure safe passage to bus stops after weather events by shoveling and salting, and ensuring that construction does not restrict access to buses.

Incentivize Ridesharing.

While shifting riders from paratransit to fixed route transit reduces costs, it will not be feasible for all users. Some of these riders may be good candidates for ridesharing or using for hire vehicle transportation (FHV) on demand, including yellow and green taxis and Transportation Network Company (TNC) services like Uber, Lyft and Via. As discussed in the findings above, ride-sharing can be optimized for cluster areas like hospitals. For lighter usage areas, the taxi and for-hire vehicle network should be tapped for more effective vehicle type and on-demand scheduling needs.

The NYU Rudin Center's 2016 report, *Intelligent Paratransit*, presents a paratransit technology framework that includes introducing this type of technology into an existing program. The Massachusetts Bay Transportation Authority, which operates public transit in the City of Boston, recently began a pilot program with Uber and Lyft to provide some door-to-door paratransit service. Under the program, the rider hails an Uber or Lyft with a mobile app, and then is charged two dollars for the ride. The MBTA pays up to $13 for the rest of the trip.[9] New York City can capitalize on the advancement of ride-hailing technologies for taxis and TNCS to provide on-demand door-to-door service for paratransit riders.

[9] Kaufman, et al. "Intelligent Paratransit." NYU Rudin Center for Transportation, September 2016.

New York City's existing taxi infrastructure has a distinct advantage over for-profit companies who offer rides for hire. In their 2014 Taxicab Fact Book, the NYC Taxi and Limousine Commission (TLC) committed to selling more than 2,000 wheelchair-restricted medallions over the next several years.[10] Between 2014 and 2016, the number of wheelchair accessible medallion taxis (yellow cabs) grew from 581 to 596, while the number of wheelchair accessible street hail liveries (green borough cabs) grew from 961 to 1,275.[11]

The TLC also already has an Accessible Dispatch Program (ADP) operating in Manhattan in which customers in wheelchairs or with other mobility disabilities can request a wheelchair-accessible cab by dialing 311, using a smartphone app, making an online request, sending a text message, or calling the dispatcher directly.[12] Furthermore, medallion taxi drivers and street hail livery drivers who operate wheelchair-accessible vehicles and participate in ADP receive additional income for trips completed compared with drivers that are not a part of the program. Moving forward, the TLC has issued a Request for Proposals to select a vendor to operate ADP citywide. Furthermore, the Commission has set a goal to make 50 percent of medallion taxis wheelchair accessible by 2020.[13]

The TLC's growing ADP program, including driver incentives and trainings, as well as its commitment to enlarging the fleet of wheelchair accessible vehicles puts it in a prime position to support Access-A-Ride services. As with bus stop maintenance, providing this type of service will require a partnership between the MTA and the City of New York. However, both the city and the state stand to gain from such a partnership. Under a taxi-MTA partnership, the MTA could set up a model similar to that in Boston, in which the rider pays a fixed fee comparable to the price of an Access-a-Ride trip and the MTA subsidizes the remainder of the trip up to a certain amount. Taxi drivers who participate in the program can continue to receive higher incomes for these rides, and will receive a higher volume of these calls as passengers switch from Access-a-Ride to wheelchair accessible taxis.

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[10] 2014 Taxicab Fact Book. Available at: http://www.nyc.gov/html/tlc/downloads/pdf/2014_tlc_factbook.pdf
[11] 2016 TLC Factbook. Available at: http://www.nyc.gov/html/tlc/downloads/pdf/2016_tlc_factbook.pdf
[12] New York City Taxi and Limousine Commission 2015 Annual Report. Available at: http://www.nyc.gov/html/tlc/downloads/pdf/annual_report_2015.pdf
[13] 2016 TLC Factbook

Many of the ZCTAs with the highest density of AAR pick-ups in 2015 were also ZCTAs that had a large number of ADA-accessible subway stations. This indicates that either the stations in these neighborhoods are not accessible enough for those who need them, the accessibility resources (elevators) are not sufficiently reliable, the receiving station (i.e., passenger destination) is not ADA accessible, or that the passenger is not able to use fixed route transit for some other reason. In these cases, many AAR pick-ups could likely be replaced by utilizing accessible taxi trips. Furthermore, replacing AAR trips with accessible taxi trips in low-density areas such as Staten Island, South Brooklyn, Eastern Queens, and the northern parts of the Bronx and Manhattan could be highly beneficial for riders and for the MTA. For passengers, reservations could be made on-demand, unlike the day-before reservations requirement currently in place for AAR. In addition, passengers would likely not share a ride with another person, thus shortening the trip. The MTA would not be required to dispatch AAR vehicles as far, which will reduce costs.

Long-Term Strategies

Invest in Accessible Subway Stations.

While there is no question that many people who rely on AAR require the door-to-door service that AAR provides, there are likely many others who are not able to use other transportation modes due accessibility. In the Upper West Side and the Upper East Side, both of which are predicted to have a high density of adults over the age of 65 by the year 2030, there is a dearth of sufficiently accessible subway stations.

According to Project FIND, an organization dedicated to providing low- and moderate-income and homeless seniors with support to live independently, the most common reason that older adults avoid the subway system is the stairs.[14] In Singapore, 100 percent of the MRT rail stations are equipped with a lift and tactile guidance system to provide barrier-free entry to older adults and people with disabilities.[15] The MTA should consider the feasibility of constructing elevators

[14] Project FIND. "Topics in Aging." Available at: http://www.projectfind.org/topics_in_aging
[15] Singapore Ministry of Transport. "Accessibility." Available at: https://www.mot.gov.sg/About-MOT/Land-Transport/Accessibility/

where possible or chair lifts on stairways where the construction of elevators is not viable. The cost - estimated at $7.5-$13 million per station[16] - would be a long-term investment in reducing AAR costs.

Conclusion

In New York City, and across the United States, the aging population requires a robust and accessible transportation system that enables them to obtain healthcare and participate in community events, social outings and errands. However, transporting this population is costly; unfortunately there is no single solution for reducing the costs associated with providing accessible transportation for disabled and senior riders. New solutions, including affordable transit, ridesharing from high-usage clusters, and creating accessible subway stations could improve the experience for older New Yorkers while also reducing costs for the City and MTA.

[16] Elevator installation costs ($7.5 million for elevated and at-grade stations; $13 million for underground stations) provided by MTA Capital Program Budget Office.

Methodology Notes

To justify basing our predictions for demand increase on age-dependent population data, we used historical AAR records from 2015, provided by the MTA, to identify correlations between age cohorts and pickups. Pickup locations were aggregated to the ZIP Code Tabulation Area (ZCTA) level so as to be comparable to population datasets from the 2010 decennial census. As expected, we found the spatial distribution of the city's elderly population to be closely associated with the spatial distribution of AAR pickup demand, peaking at the 65-74 population with an R value of .739. This finding suggests that AAR pickup demand will be most concentrated in those areas that also exhibit concentrations of the age 65-74 population.

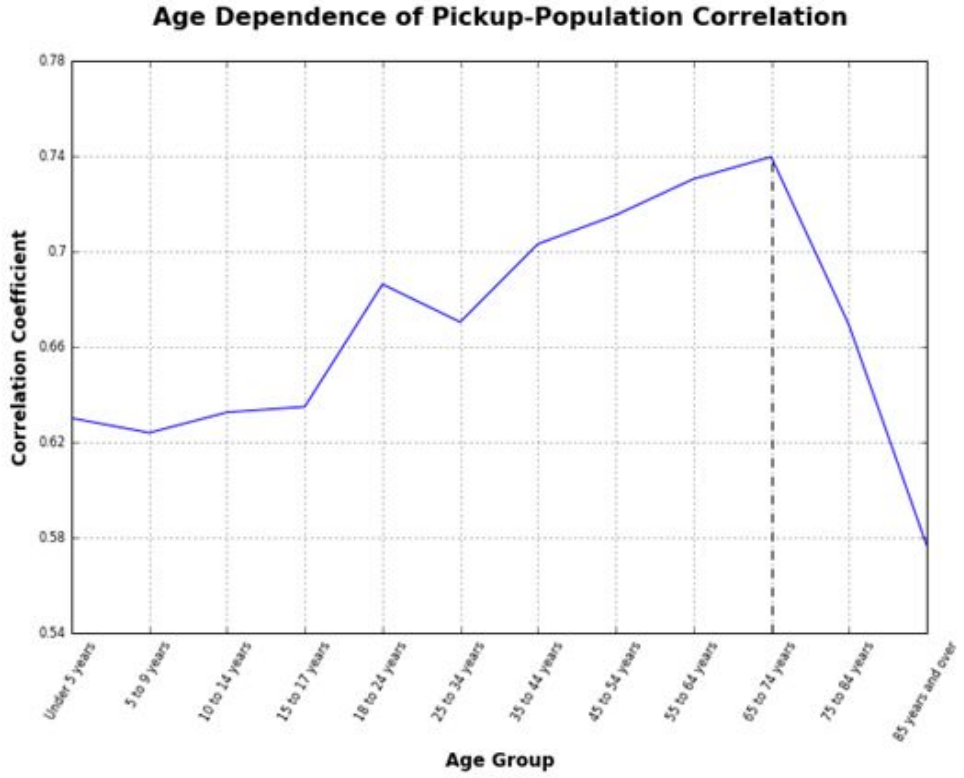

Figure 4: After removing records that are labeled as driver breaks, we were left with data on 6,284,188 trips between 01/21/15 to 12/11/15. When the correlations between number of Access-A-Ride pickups within ZIP Codes and various populations within those ZIP Codes are calculated, one finds the strength of correlation increases with age group, peaking at the 65-74 age group (r=.739).

Understanding this correlation, we used population forecast data provided by the Department of City Planning of the City of New York as a predictor for future ride demand over the next decade

and a half based on the distribution of certain age cohorts. Population density was mapped to show the concentration and overall distribution of the predicted population over the age of 65 in the year 2030, shown in Figure 1.

Access-A-Ride relative pickup density for all 2015 pickups were mapped on the ZIP code level in Figure 3.