

A Typology of Senior Transportation Services in Westchester County

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Executive Summary

The society is aging. Today we have one eighth of the national population over 65 years old; by the year 2030, one in five Americans is a senior citizen. This population structural change brings several issues: when drivers are too old to drive, how would they travel around? Are there any special transportation services for them? Are the existing transportation services adequately meeting the needs of this population? In order to answer these questions, it is important for transportation professionals to develop a more complete picture of where and when these various special services are available and how they work. Documenting the essential supply characteristics of these transportation services will help us understand the existing services and identify potential gaps for improvement.

Senior transportation services from Westchester County in New York State are studied in this research. A survey of personal interviews was conducted within 35 municipalities of the overall 43 municipalities. The research objectives and tasks of this study are to: 1) identify all the services available for senior population within Westchester County, 2) select and describe the essential supply characteristics of these services, 3) identify limitations and obstacles of existing services, and 4) identify innovative senior transportation programs and possible directions for future efforts.

Three main options are typically offered by the public sector to transport seniors for their daily travel needs: fixed route public transit, paratransit, and community transportation services, which could be further split into five sub-types: transportation to/from senior centers/nutrition sites, shopping bus, medical trip programs, taxi subsidy programs and volunteer programs. Essential supply characteristics are selected, and the detailed description and analysis by character for each program was conducted.

The analysis results show that all the programs are playing important roles in seniors' daily travel. Bee-line public transit system transports more than 3000 daily one-way trips for seniors on weekdays, which plays most important role among all services. Bee-line paratransit are providing 600-800 daily one-way trips for their users, including both seniors and other aged disabled population. Community transportation programs are operated separately therefore serving with lower capacity, but they still serve a considerable portion of trips for seniors and are considered as an important complementary option, especially in the north county which is relative rural and the public transportation density is relatively low.

The main limitations and obstacles of each service are also identified. For public transit, the main problems include that the waiting time is long, routes do not always go to seniors' favored destinations, and some seniors never take bus before and do not know how to utilize the buses. For paratransit, two most frequently mentioned obstacles by interviewees are the strict requirement of eligibility for a certified user and the related procedures are complex and time consuming. For community programs, the obstacles

exist due to the limited service hours, service types and service area, which is determined by the local municipality-operation property.

Therefore efforts for public transit service would be targeted on how to attract more senior riders diverting from driving to public transit, routes modification or adding stops favored by seniors, education of seniors who never use the bus before and specific service modification according to senior riders' assessment and survey information. For paratransit, the major improvements are based on the simplification of the procedures of certification for an eligible user and door-to-door service provision instead of curb-to-curb. For community programs, the primary task for planners and operators is to expand or coordinate the services, so that all seniors are able to use the service in a much larger service area.

In the conclusion part, recommendations are made, including the development of innovative transportation programs for seniors, such as ITN American and Volunteer Friend Programs, in which seniors are driven by volunteers, and Carpool program in which younger people could utilize seniors' cars and they also need to drive for seniors, and coordination between different programs in order to bring a more efficient and comprehensive transportation network for seniors.

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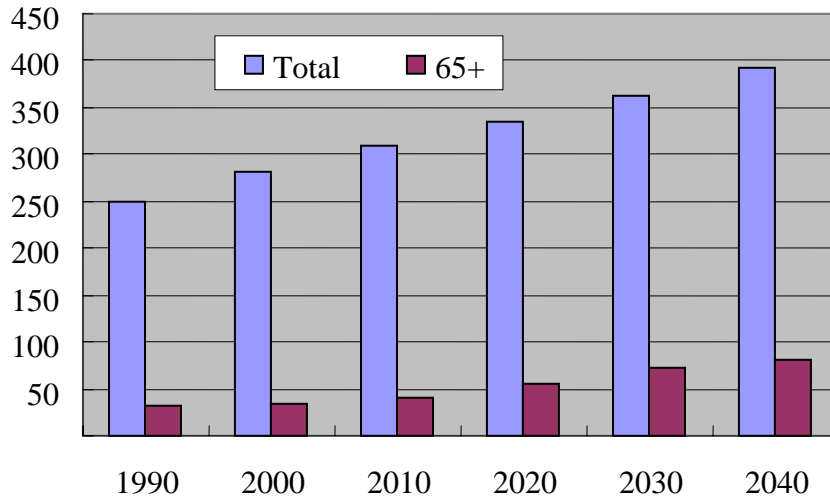
1. Introduction

1.1. Background: Senior Population Increasing Trend

The population in U.S. today is aging ever-increasingly. Today every eighth person in U.S. is greater than 65 years old (Census Bureau, 2003), and by year 2030, one in five Americans will be 65 or over. The figure below shows the increasing trend of national senior population and total population from 1990 to 2040, in terms of both the absolute value and the relative percentage. The calculated average yearly increasing rates of senior and total U.S. population growth shown in figure 1-2.

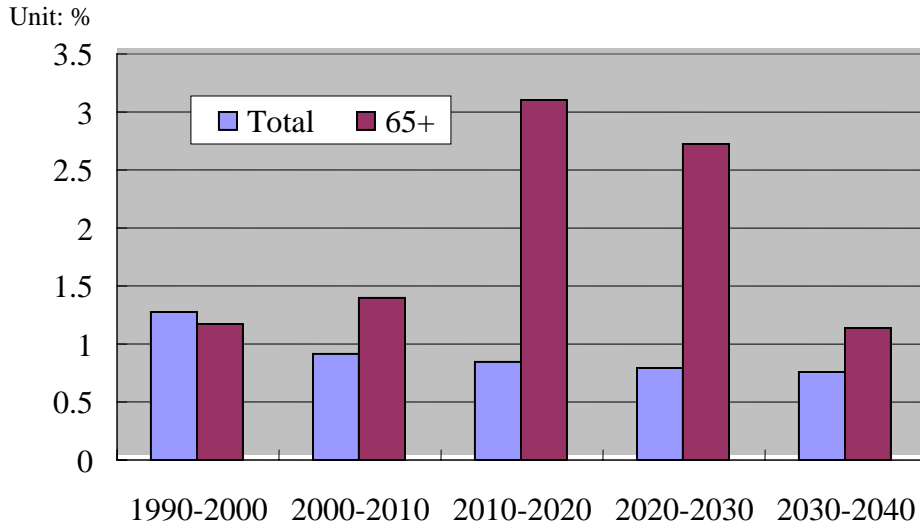
Figure 1-1. National Population and Senior Population from the year 1990 to 2040

Unit: Millions



Source: U.S. Census Bureau, 2004, “U.S. Interim Projections by Age, Sex, Race, and Hispanic Origin”, available on: <http://www.census.gov/ipc/www/usinterimproj/>. Last accessed on Sept 23, 2006.

Figure 1-2. Average Growth Rates of National Total and Senior Populations, 1990 to 2040



Source: U.S. Census Bureau, 2004, “U.S. Interim Projections by Age, Sex, Race, and Hispanic Origin”, available on: <http://www.census.gov/ipc/www/usinterimproj/>. Last accessed on Sept 23, 2006

As shown in the figures, senior population is growing fast and will reach the peak growth rate of 3.1% during the next decade, 2010-2020, as the “baby boomer” generation begins to reach the age of 65. Another significant factor that relates to this “Senior Boom” is the longer life expectancy and lower mortality. Advanced technology and medical developments also lead to much healthier life for seniors. The table 1-1 below shows the senior population distribution in the ten New York State counties in NYMTC region. Nassau, Westchester and Queens are three counties with highest percentages of senior population, while Brooklyn, Queens, and New York, the three most populous counties, and also own greatest senior population, close to 200,000 or above.

Table 1-1 Total Population and Senior Population in the Ten New York State Counties belonging to NYMTC region

County	Population, 2005 Estimate	65+ population Percent, 2004	65+ Population, 2004
Bronx	1,357,589	137,116	10.1%
Brooklyn	2,486,235	295,862	11.9%
New York	1,593,200	199,150	12.5%
Queens	2,241,600	291,408	13.0%
Staten Island	464,573	53,890	11.6%
Nassau	1,333,137	197,304	14.8%
Putnam	100,507	10,151	10.1%
Rockland	292,916	36,322	12.4%
Suffolk	1,474,927	178,466	12.1%
Westchester	940,807	129,831	13.8%

Resource: U.S. Census Bureau, 2004, "State & County Quick Facts", available on: <http://quickfacts.census.gov/qfd/states/36/36119.html>. Last accessed on Sept 23, 2006.

1.2. Seniors' Travel Need and Behavior Changes

Because most seniors are retired, they are free from the time and spatial constraints on their travel associated with commuting to work. As a result, seniors have different travel needs and behavior, in terms of trip purposes, travel time allocation and travel mode.

The total trip rates and trip miles of seniors are lower compared to their younger counterparts. (Rosenbloom 1993), seniors between 64 and 75 years old made more non-work trips than younger group (Rosenbloom 2001; Skinner and Stearns, 1999; Tacken, 1998). Seniors spend more time on shopping, volunteering, social and recreation activities. Local senior centers, nutrition sites, community centers and various clubs also attract lots of seniors' visits. A large share of seniors' trips occurs in the time periods between the two rush-hour peaks. In terms of travel mode, seniors are more and more relying on automobile than years ago while modes of public transit and walking are not frequently used outside the city (Alsnih and Hensher 2003).

Besides travel needs for discretionary activities, some individuals must make a significant number of trips for visits to hospitals and other medical facilities. Though seniors today are much healthier and live longer than decades ago, the proportion of aging population who are utilizing medical services is much higher than that of general population: those who are between 70 and 80 years old consume three times as many hospital days as that of the age groups under 65, and those older than 85 consume about ten times as many hospital days as many (Love and Lindquist, 1995).

1.3. Ability to Travel Around

There has been a longstanding trend toward higher driver license rates among the elderly population (Rosenbloom, 2001). The increasing reliance on automobile and higher license rates lead to more and more aged drivers on road. National data show that seniors (65+) drive approximately two thirds of trips by themselves (Rosenbloom, 2001). Even for people who are more than 85 years old, they drive alone for more than 50% of total trips.

For seniors who are between 65 and 75, who are mostly still able to drive safely and independently, their transportation needs could be served well with a car and a driver license. However, many individuals entering their 80s experience vision and hearing impairment, along with higher incidence of dementia, Alzheimer's and other aging related diseases. For these seniors, driving no longer remains a safe or feasible transportation option.

1.4. Key Travel Options for Seniors Who Do Not Drive

A senior who gives up or sharply reduces driving needs to find travel alternatives in order to maintain the mobility and accessibility to various daily activities desired. For a senior living outside an urban center, walking is not a feasible option for most trips. Moreover, many aging seniors continue to live independently (either alone or with their spouses), which makes it more difficult to depend on children or other relatives to drive them frequently.

Finally, three main options are typically offered by the public sector to transport seniors for their daily travel needs: fixed route public transit, paratransit, and community transportation services.

Fixed route public transit refers to the traditional fixed route public transportation system in the region, including buses, subways, ferries, and commuter trains. Public transit has large capacity, operates on a comprehensive fixed-route network, and is regulated, frequent and reliable.

Paratransit is the flexible counterpart of public transit that does not operate on fixed routes or schedules. When operated by the public sector, these services are often targeted for the disabled population, using low capacity vehicles for individual trip requests.

Community transportation services comprise various forms of local transportation services, operated by local government/organization, using either buses or low capacity vehicles, targeted on local senior groups. The forms are diversified with communities, such as shopping buses, transportation to/from nutrition sites, taxi subsidy program and volunteer programs. Compared to public transit and paratransit, these services are more limited in terms of trip purposes, travel time and service boundary.

1.5. Research Objective

In order to assess whether existing transportation services are adequately meeting the needs of the population, it is important for transportation professionals to develop a more complete picture of where and when these various special services are available and how they work. Documenting the essential supply characteristics of these transportation services will help us understand the existing services and identify potential gaps for improvement.

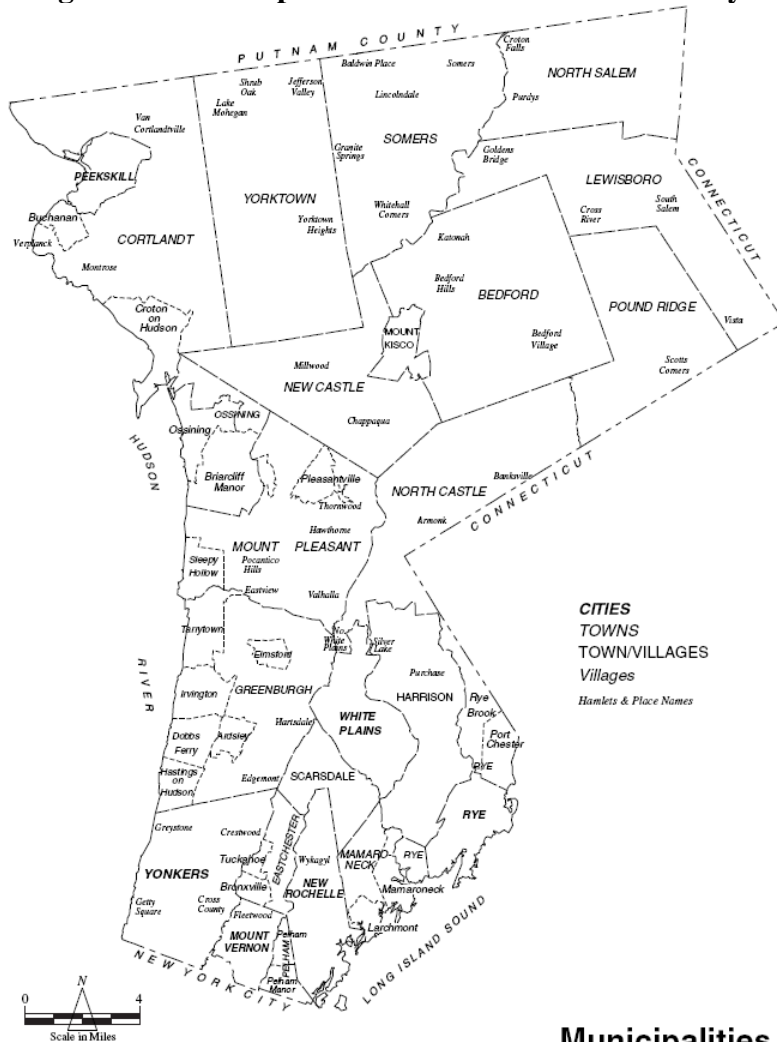
Based on the issues discussed above, the research objectives of this study are to: 1) identify all the services available for senior population within Westchester County, 2) select and describe the essential supply characteristics of these services, 3) identify limitations and obstacles of existing services, and 4) identify innovative senior transportation programs and possible directions for future efforts.

Westchester County was chosen as the focus of this research. Westchester County has been engaged in efforts to improve senior services. As a pioneer in this field, it convened a Pre-White House Conference on Aging Mini-Series of conferences, workshops and

other activities throughout the county to generate discussion about the needs of its aging community. These efforts included the formation of a “Transportation Caucus” chaired by the county’s Commissioner of Transportation.

The total county population is 923,459 (Census Bureau, 2000), coming from six cities, 15 towns and 22 villages. The land use of municipalities within the county varies as well: the southern part of the county, adjoining the Bronx, is a suburban area with some significant urban centers, especially Yonkers and White Plains. The northern part of the county is relatively rural (see Figure 1-3).

Figure 1-3 Municipalities of the Westchester County



Municipalities

Source: Senior Population Changes, 1990 to 2000. Westchester County Department of Planning, October 2002.

Seniors over 65 years old comprise 14% of the county’s population. Among the population of 129,300 seniors, 35,587 are greater than 80 years old, accounted for 28% (Census Bureau, 2000).. By the year 2000, Westchester gained a dramatic increase in its population 85 years old and above, 24% more than 1990. The median household income

of the Westchester County is \$63,582/year, 11% higher than the region-wide mean value of \$57,284/year (Census Bureau, 2000). The share of Westchester senior households without a vehicle available is 15%, while the region wide median value is 11% (Census Bureau 2000).

The rest of the report is organized in the following way. In Section 2, we describe a set of supply characteristics that are chosen for this study. In Section 3, we discuss the observed obstacles in the existing services. Then in the last Section, we provide our thoughts on future efforts.

2. Existing Transportation Service Programs for Seniors and Their Characteristics

2.1. Supply Characteristics of Senior Transportation Service Programs

Before documenting the details of each senior transportation program, it is important to select the specific supply characteristics of interest. They can point to inter-mode differences, reflect factors that play important roles in service quality, and reveal existing operating obstacles. Five main categories of characteristics are considered: administration, objective, capacity, accessibility and adaptability, all of which could be further split into several elements. The description and associated elements are listed as follows:

Objective

The foremost task of the program operators and administrators is to set up the objective for their program(s), to identify the targeted population, define the service area and target trips (e.g., medical appointments, shopping, or visits to senior centers).

Administration

The administration category involves all administration issues that are needed to run the service. In particular, we describe who runs the service, where the funding comes from, and who the main supporting staff and personnel are.

Capacity

This category presents how many trips and riders could the program the program is designed to serve. We will describe characteristics of travel mode, number of vehicles and drivers, trip frequency, and annual ridership.

Accessibility

Accessibility here means how accessible the service is to the rider. Whether the service is able to meet its goals depends on how well the service meets the needs of the users. From a customer's point of view, are the operating hours set properly and matched with his/her daily activity schedule? Is the service affordable? Is the service easy to obtain? Does it require advance planning to make reservation? Even a program that is intended to cover every senior in a certain area, may not be useful to some seniors because of financial inability, or schedule mismatch. So factors of user costs, operating hours, procedures to travel, and reservation time are worthy for assessment.

Adaptability

Finally, special requirements for users must be considered as important service indicators, such as where to pick up riders, whether round trip service is available, whether private destinations are served, and whether they offer curb-to-curb or door-to-door service. Due to special needs from senior population, issues such as deployment of equipment for wheelchair users, assignment of escorts on board, and requirements for

aides if any are important factors to take into account when seniors decide to travel. Programs with high level of adaptability are attractive for seniors with mobility limitations, while programs without such adaptability may be more efficient to operate but may not serve this particular group. Based on these concerns, this category of characteristics includes: pick up location, round trip acceptable, escorts/assistance available, aides acceptance, wheelchair accessible, and destination fixity.

The essential supply characteristics are listed in Table 2-1 below. A key product of this research effort was to complete this table for each type of the service program through an extensive series of interviews.

Table 2-1 Essential Supply Characteristics Lists of Senior Transportation Program

Administration			Capacity			
Administrators /operators	Funding sources	Personnel	Travel mode	No. vehicles /drivers	Headway/Trip frequency	Senior ridership
Objective			Accessibility			
Target population	Service area	Trip purposes	User costs	Operating hours	Procedures	Reservation
Adaptability						
Pick-up location	Round trip/One-way	Escorts / assistance available	Aides acceptance	Wheelchair accessible	Destination fixity/private	

2.2 Fixed Route Bee-Line Bus (Senior Reduced Fare Program)

The Bee-Line Bus System, the fixed route public transit service operated by the Westchester County Department of Transportation, plays a substantial role in the daily travel activities of the whole county’s population. More than 65% of all Westchester County residents are within walking distance of a Bee-Line bus route [Transit Guide 2006]. Shuttles that connect main employment centers with MTA Metro-North Railroad stations, express buses between White Plains and Manhattan (BxM4C), and frequent local services are provided. The Bee-Line generally offers discounted fares of 50 percent or more off the base fare to seniors and persons with disabilities. On the regular Bee-Line routes, seniors pay 85¢ per trip per person, an extra 10¢ charged for a transfer, compared to \$1.75 plus 25¢ transfer for a regular fare. On shuttles, the discounted fare is \$1, half of the full fare of \$2. On the Westchester - Manhattan Express line, seniors pay half price, or \$3.50 per ride during off-peak hours and full \$7 fare during peak hours; disabled customers may pay the reduced fare at all hours.

Figure 2-1 Westchester County Bus System Map

Source: Westchester County Department of Transportation. 2005. <http://Bee-Linebus.westchestergov.com/images/Transit%20Guide%20Map%202005.pdf>

Table 2-2 Supply Characteristics of Bee-Line Bus Reduced Fare Program

Administration			Capacity			
Administrators /operators	Funding sources	Personnel	Travel mode	Average number of vehicles*	Average headway(min) *	Average daily elderly ridership
County DOT	FTA	Program operators, drivers, information referral, and workers.	Bus	Weekday:3 Saturday:1 Sunday:1 Vehicles per route, off-peak	Headway Weekday:33 Saturday:50 Sunday:65	Weekday:3391 Saturday:1694 Sunday: 720
Objective			Accessibility			
Target population	Service area	Trip purposes	User costs	Typical operating hours	Procedures	Reservation
65+, disabled and Medicare Holders	All over the county	Any	85¢ (+ 10¢ for transfer), and \$3.5 on BxM4C during off-peak	8:00 a.m. to 6:00 p.m.	Apply a specific ID. Show the ID on bus and deposit per ride.	Unnecessary
Adaptability						
Pick-Up Location	Round trip/One-way	Escorts / assistance available	Aides acceptance	Wheelchair accessible	Destination fixed/Private	
Bus stops	One way	Assistance on board available from the driver	W/ fare	44%** now and 100% by 12/31/2008	Private	

* Non peak-hour values are applied rather than peak-hour value if both values are available.

**Information from the Westchester Transit Guide 2005, all 66 routes with nine shuttle loops are included.

Table 2-2 describes the characteristics of Bee-Line Bus Reduced Fare Program. This program is operated by Westchester County Department of Transportation. The reimbursement for reduced part of senior and disabled population’s fare is obtained from Federal Transit Administration. This program shares the same personnel with the whole Bee-Line bus system, mainly comprising program operators, coordinators, drivers, information referral, and workers for maintenance and repair.

This reduced fare program is not only available for seniors, but also for a certified disabled person or a Medicare cardholder. When they get on the bus, they show the driver a specific identification card or their Paratransit I.D., and deposit the reduced fare.

The summarization of capacity-related characteristics is based on “Bee-Line System Route Profiles-2003 Final Report” provided by the Westchester County Department of

Transportation, and 2003 onboard passenger survey. Sixty routes are analyzed here¹. The total daily ridership of all the sixty routes is about 100,539 on weekdays, Saturday ridership is 52,950, and Sunday ridership is 22,850. According to the 2003 Bee-Line Bus On Board Survey, the share of senior riders is 3.7% overall, and the estimated total daily senior ridership from all routes is, 3391, 1694, and 720 on weekdays, Saturdays, and Sundays respectively. More than half routes, 53% of the sixty routes, run on five weekdays a week, 37% of the routes provide both Weekday and Saturday services regardless of Sunday services, and 30% of the routes provide both Weekday and Weekend services.

Table 2-3. Overall and Senior Ridership of Bee-Line Bus Route

Day	Ridership	Number of Routes	Mean	Maximum daily Ridership	Minimum daily ridership	Standard Deviation	Sum
Weekday	Overall	60	1,676	10,010	17	2,387	100,539
	Senior	60	57	394	0	92	3,391
Saturday	Overall	28	1,891	8,885	54	1,945	52,950
	Senior	28	61	267	0	60	1,694
Sunday	Overall	18	1,269	4,967	215	1,149	22,850
	Senior	18	40	149	0	37	720

Table 2-3 shows senior ridership and total ridership from all groups of population on the routes studied. On weekdays, the overall ridership ranges from 17 to 10,010, and the average ridership among all the sixty routes is 1676 per day. On Saturdays and Sundays, the average ridership is 1,891 and 1,269 respectively, the approximate maximum ridership is 8,900 and 5,000, and the lowest ridership is 54 and 215. The increase of average/minimum ridership on weekend could be explained by the limited routes available on weekends, without lower ridership routes running on weekends. In terms of senior passengers' ridership, the weekday senior ridership is averaged 57, with a maximum of 394. On Saturdays, the maximum senior ridership by individual route drops to 267, and on Sundays, the maximum route's ridership is even lower.

Table 2-4 below lists the three routes of Bee-Line Bus which take the highest senior ridership and overall ridership across different days. For senior ridership, Routes 2 (the Bronx-Tudor Woods), 20/21 (the Bronx-White Plains), 25 (the Bronx-Yonkers) and 28(BXM4C, Manhattan-White Plains express) own the highest ridership on weekdays or weekends. These routes connect Manhattan, the Bronx, and main cities in lower Westchester, where the population is dense. On weekdays, these routes provide more than 300 trips for seniors. Routes 2 and 20/21 also take the most riders, more than 6000 single trips are provided on weekdays on both routes. Routes 7 (Yonkers-Mount Vernon-New Rochelle) and 60(Bronx-New Rochelle- White Plains) are also two of the routes with highest ridership. Thirteen of the total sixty routes (13%) that transport more than 100 single way trips for seniors per weekday.

¹ Several routes are combined, such as routes 1C, 1T and 1W are combined as route 1. Routes 20 and 21 are combined as route 20/21. Summer service routes are not included.

Table 2-4 Top Three Bee-Line Bus Routes with Highest Senior and Overall Ridership

Day	Ridership	Highest		2 nd Highest		3 rd Highest	
		Route	Ridership	Route	Ridership	Route	Ridership
Weekday	Overall	20/21	10010	7	7705	2	6653
	Senior	28	394	2	333	21	300
Saturday	Overall	20/21	8885	7	4488	60	4418
	Senior	20/21	267	2	169	25	147
Sunday	Overall	20/21	4967	60	2068	7	2026
	Senior	20/21	149	25	79	28	61

In terms of the relative percentage of overall senior ridership, the average share is 3.7%. Route individually, as seen in Table 2-5 below, the maximum share is 20%, on route 28(BXM4C), transporting almost 400 seniors and 2,000 riders roughly per weekday, followed by Routes 26(Bronx-Yonkers-Bronxville) and 76(Rye-Port Chester, the east lower Westchester local), with the share of 11% and 10%, but the absolute senior ridership is estimated no higher than 30 even on weekdays. All these routes with largest absolute senior ridership or share of senior passengers are local or express routes that connecting cities of South Westchester and Bronx, or the corridors that link major cities of south Westchester. Majority of the local routes in North Westchester serve take no more than 700 single trips on weekdays, while most of the south routes daily ridership is over 1000. Regarding to the share of senior ridership, there is no significant differences of the percentages in north and south County.

Table 2-5 Top Three routes with highest Senior Ridership Share of Bee-Line Bus on Weekdays

Rank	Route	Ridership	Senior Ridership	Senior Share
1 st	28	1971	394	20%
2 nd	26	268	29	11%
3 rd	76	184	18	10%

We assume that most trips by seniors are in the time period between 8:00 a.m. and 6:00 p.m. We found that 87% of the routes provide service during these hours on weekdays. On Saturdays, among the 28 available routes, 23 routes are running during that period, and on Sundays, 10 routes provide services during those hours.

In terms of the vehicle quantities and headways, the average number of vehicles allocated for each route is three on weekdays and one bus on weekends. All the figures are based on off-peak hour statistics with the assumption that seniors might avoid the commuter peaks to travel. In terms of the headways during off-peaks, i.e. the departure time difference between two consecutive buses, the average headway is about 33 minutes on weekdays, 50 minutes on Saturdays and 65 minutes on Sundays. Table 2-6 lists the distribution of headways across weekdays, Saturdays and Sundays. On weekdays, about a third of the routes depart within less than 20 minutes after previous bus, and 78% are

within half an hour. Less than 2% of the routes departure with headways more than an hour. On weekends, a majority of the routes are running with more than half hour headways. On Sundays, about one third of buses pass by the same stop more than one hour after the previous departure.

Table 2-6. Bee-Line buses Headway distribution during off-peak hours

Day	Headway during off-peak	No.	%
Weekday	<=20 min	21	35%
	20-30 min	26	43%
	30-45 min	4	7%
	45-60 min	8	13%
	60 + min	1	2%
	Total	51	100%
Saturday	<=20 min	1	4%
	20-30 min	10	37%
	30-45 min	0	0%
	45-60 min	14	52%
	60 + min	2	7%
	Total	27	100%
Sunday	<=20 min	0	0%
	20-30 min	3	17%
	30-45 min	3	17%
	45-60 min	6	33%
	60 + min	6	33%
	Total	18	100%

Amongst the total sixty-six bus routes and nine loop shuttle services (not including subway routes connecting with bee-line buses), twenty-four bus routes and all the nine loop shuttle services are deployed with wheelchair lifts. The wheelchair lift is for anyone who cannot use the stairs. Seniors and disabled people who need to use the wheelchair lift, ask the driver to lower the lift. Drivers are not allowed to help riders outside the vehicle, but could assist the riders on board. The bus routes with wheelchair lifts are: 6, 9, 13, 14, 16, 18, 19, 20, 21, 23, 25, 26, 30, 34, 38, 39, 40, 41, 52, 55, 70, 71, 76, and 78. And the Shuttle Loops are A, B, C, D, E, F, G, H and T. According to the senior ridership, six of the 13 routes with senior ridership over 100 per day, are not deployed with Wheelchair lifts so far. All transit routes will be accessible by 12/31/06. Route 28, the BxM4C express to Manhattan, has the highest share of senior ridership, and will become accessible by 12/31/08. If the seniors have an aide traveling with them, the aides need to purchase the ticket for a ride as well. The general price policy is applied to the aide.

2.3 Bee-Line Paratransit

Under American Disabled Act, Paratransit of Westchester County, i.e., Bee-Line Paratransit is required to provide service for riders who could not functionally take Bee-Line buses, if both the origin and destination of a trip are located within 3/4 mile of a regular Bee-Line bus route. However, Bee-Line Paratransit service in Westchester has been expanded to serve the entire county. All riders, as long as they live in the county,

can travel to any destination within Westchester during Core Service Hours, i.e., Monday through Friday from 6:00 a.m. to 7:00 p.m., on Saturdays from 8:00 a.m. to 7 p.m.

For those whose trips begin and end in an area within 3/4 mile of a regular Bee-Line bus route, additional service hours are available, depending on the hours of the regular Bee-Line bus schedule in those areas. On weekdays, the service span is from 6:00 a.m. to 11:00 p.m., extended for four hours longer in the night. On Saturdays, the service hours begin at 6:00 a.m., two hours earlier, end at 11:00 p.m., four hours later. On Sundays, service is provided from 8:00 a.m. to 8:00 p.m. Certain routes offer trips after 11:00 p.m.

To be eligible for a Bee-Line Paratransit ride, seniors as well as disabled people need to be a qualified Bee-Line Paratransit User. Under the ADA, disability alone does not qualify a person to ride paratransit. A person must prove his/her functional inability to use the fixed-route regular Bee-Line service. Generally speaking, paratransit service is provided to the following three groups of persons who are 12 years old and over:

- 1) “Persons who have specific impairment-related conditions which make it impossible — not just difficult — to travel to or from the bus stop.
- 2) Persons who need a wheelchair lift-equipped bus, but it is not available on the fixed-route when they need to travel.
- 3) Persons who are unable to board, ride or exit from the regular Bee-Line buses even if they are able to get to a bus stop and the bus is equipped with a wheelchair lift.”

(Quoted from “Paratransit Eligibility Guidelines”, Prepared by Office for Disabled at Westchester County, http://www.westchestergov.com/paratransit/paratransit_eligibility_guidelines.htm)

Once a person’s condition satisfies any group above, he/she could apply for Bee-Line Paratransit. They may call or write to the Office for the Disabled for information and/or to request an Application for Certification of ADA eligibility. After completion of the application form, applicants need to visit the Office for the Disabled for an interview set up for application review; with all supporting documentation requested on the application form and other related information. Transportation to/from the interview is provided, \$3 each way, the same price as a paratransit user is charged.

Based on the application form and the information submitted, the Office for the Disabled determines eligibility and notice the applicant within 21 business days of the date they completed application was filed with the Office of the Disabled. Applicants also have the right to appeal the denial of eligibility. Paratransit riders who are under 75 must submit new applications every three years. Riders over the age of 75 will be sent forms every three years to update their addresses, phone numbers, and other information.

Table 2-7 Supply Characteristics of Bee-Line Paratransit

Administration			Capacity			
Administrators /operators	Funding sources	Personnel	Travel mode	Number of vehicles	Trip frequency	Average Total ridership
County DOT, Office for the Disabled	Federal funds and state levies. \$54 million/y.	Program operators, drivers, information referral, and workers.	Seven-passenger van	About 50.	NA	Weekday: 600-800 one-way trips. Weekends: 200-300 one-way trips.
Objective			Accessibility			
Target population	Service area	Trip purposes	User costs	Core operating hours	Procedures	Reservation
12+ years old and population who are functionally unable to use regular transit.	All over the county	Any	\$3.00 one way	Weekdays: 6am – 7pm Saturdays: 8am – 7pm	Apply for certification and set up interview. Advance trip reservations required.	Same day, and 1-4 days
Adaptability						
Pick-Up location	Round trip/One-way	Escorts / Assistance Available	Aides acceptance	Wheelchair accessible	Destination fixed/Private	
Curb-to-curb	Yes	Limited assistance from drivers on board.	Yes, no need to pay fare	Yes	Private	

Table 2-7 above summarizes the essential supply characteristics of Bee-Line Paratransit. The service started in the year 1983. The current annual capital cost is about 5.4 million dollars, including managing, operating, maintenance and other components. The Office for the Disabled operates and supervises Bee-Line Paratransit, in charge of applications, information and complaints. Generally, riders make reservations in advance by phone. They may also make same-day reservations on a space-available basis. Same-day requests must be made at least two hours in advance.

The operating budget of Paratransit is obtained from state levies while the capital budget is subsidized by Federal funding. There are currently 49-52 wheelchair accessible vehicles circulating for paratransit services. The van could take seven passengers at most without users sitting in wheelchairs, and the maximum number of wheelchairs is two. Individual trips are provided, and seniors could take their own aides on the van. In case two reservations share similar destination, time, and route, those two riders might be on the same trip.

Riders make the phone call reservation one to four days in advance, leaving information on the location and desired arriving time. The time for reservation is from 9:00 a.m. to 5:00 p.m., every weekday. If the reservation is for the next day, the request must be

made before 3 p.m. on the prior day. Due to a high call volume, passengers are allowed to make two round trip reservations or one round trip requiring a transfer per call. If a trip reservation request cannot be accommodated at the exact time wished, he/she will be offered alternative travel time. A time is offered within one hour of the requested time. In order to achieve the most efficient scheduling, the Office for the Disabled may adjust the scheduled pick-up time. Ride times can be adjusted up to 30 minutes on either side of the requested arrival time. When a pick-up time is adjusted more than 15 minutes, the rider will be informed of the change on the day before.

Riders need to provide detailed information on the planned trip when making reservation, as well as special transportation needs, such as use of wheelchair and aides. The morning and afternoon peak periods are between 7 a.m. and 10 a.m. and 2 p.m. to 4:30 p.m. The vans offer 600-800 trips one-way per weekday, and many fewer on weekends, 200-300 sing trips per day. According to the interview with Mr. Chris Andritsopoulos, the supervisor of Bee-Line Paratransit, though the drivers have a busy schedule, they are able to serve all the requests from users, so there is no waiting list. Round trips or a series of stops are accepted, but the vehicle will not wait for the rider even if one of the stops is going to be a brief one. The next pick up time must be one hour later than the previous part of the trip.

The user cost is \$3.00 each way and \$6.00 for a two-way trip. The service is curb to curb. Vans do not enter private driveways and drivers are not allowed to go to the door or assist the riders. If someone needs assistance during the way from home to the curb where the vehicle stops, he or she may ask help from caregivers or someone else as companion. The rider may ask his/her own aide to accompany them while taking Paratransit. Aides will be allowed to travel with their companions and will not be required to pay a fare as long as they board and alight at the same place with the seniors. Companions, guests or friends, who are not serving as aides of the riders, pay the full fare of the service, \$3 per one way. By regulation, drivers may only assist passengers at the curbside when they are boarding or exiting the van. On the vehicle drivers assist only by fastening seat belts or wheelchair securement devices.

2.4 Community Transportation Services

Community transportation service programs could be considered as the supplemental programs. They take various forms, depending on the individual municipality or community providing them. Typical programs include shopping buses, transportation to and from nutrition sites, taxi subsidy programs and volunteer programs. All these services except volunteer programs are operated and administered by local municipal governments, and are open to all elderly residents of the municipality. Different municipalities may have similar types of programs, but they are run separately and independently from each other.

Following is a detailed description and discussion of each type of community transportation service. Five typical and major programs are listed below: transportation to and from nutrition sites and senior centers, shopping buses, medical trips, taxi subsidy

programs and volunteer programs. The detailed information on each program was obtained from a survey with program directors or coordinators from throughout the county. The survey was conducted via personal interviews on phone or in person. Among the total forty-three municipalities of the Westchester County, i.e., six cities, 15 towns and 22 villages, this research effort was able to obtain service information from 35 municipalities, including five cities, 14 towns and 16 villages.

Transportation to and from senior centers and nutrition sites

Local senior citizen centers are usually administered by local office of aging or department of recreation. Seniors may visit these centers to participate in various recreational, social, and fitness activities. Many senior centers provide nutritious and cheap lunches. Transportation services are often offered to ensure that those in greatest need of these programs are able to access them.

Table 2-8 Supply Characteristics of Transportation to/from Senior Centers and Nutrition Sites

Administration			Capacity			
Administrators /Operators	Funding sources	Personnel	Travel mode	Number of vehicles	Trip frequency	Average daily ridership
Office of Aging, Department of recreation, and senior centers.	Federal, State, County funding, local subsidy, or combination	Program coordinators and drivers.	Bus or Van	1-10*	1-6 days per week	City: 10 – 120
						Town: 10 – 30
						Village: 5 – 30
Objective			Accessibility			
Target population/ Eligibility	Service area	Trip purposes	User costs	Core operating hours	Procedures	Reservation
Senior residents who are frail and in need of transportation	Local	Meals, recreational and social activities at senior centers	Free, or no more than \$3 per round trip	9:00 a.m. – 4:00 p.m.	Initial registration, then call or ask in person for reservation	1-2 days in advance or the same day
Adaptability						
Pick-up location	Round trip/One-way	Escorts / Assistance available	Aides acceptance	Wheelchair accessible	Destination Fixed/Senior designated	
Door to door or curb to curb	Round trip	A few with escorts and some drivers assist seniors	Yes	Most are equipped with lifts	Fixed	

* Some municipalities do not use all the vehicles for this program, since the driver has multiple tasks the officer rotates the vehicles for different usage.

Of the 35 municipalities surveyed, eight (23%) do not offer senior center related transportation services. Some of the remaining 27 municipalities are operating cooperated programs at senior centers, in total contributing to 23 separate programs.

About 15 (65%) of the 23 programs provide access to centers that also serve as nutrition sites (or both sites are located in the same facility). Most of the senior centers operate

from 9:00 a.m. to 4:00 p.m. every weekday. Drivers start to pick up seniors on the reservation list in the morning. Depending on the routes and level of demand, the driver may make one or several large loops to pick up all the passengers. After lunch, some remain at the senior center, participating in recreation activities, and others are driven home. Since these programs are operated independently, their details vary. Table 2-8 above list characteristics typical for these programs.

As Table 2-9 below illustrates, about half of the senior centers have more than one vehicle available. About 80% of the programs run at least four days a week, while fewer than 10% of the programs run once a week. In terms of the eligibility, 87% of the services are available to seniors who are 60 and over, and the other three municipalities set the age limits as 50 and above. About one third of the programs are free, and another third suggests a donation or charge less than \$1 per round trip. The maximum user charge is \$3 per round trip. All the services allow aides to take the bus without any charges. About 13% of the programs also provide escorts on board, who assist seniors to get on/off the bus safely and provide instruction or help. Most of the vehicles stop at house or apartment door. All the services need reservations, and 74% require at least one day in advance. Two of the programs, fewer than 10%, can accommodate trips to customers' choice of senior centers while the other programs transport seniors only to predetermined centers. More than 85% of the programs are running buses/vans which are equipped with wheelchair accessible lifts, so that wheelchair users' needs are accommodated.

Table 2-9 Analysis of Supply Characteristics for Transportation Programs to/from Senior Center/Nutrition Sites

No. Veh	No.	%	Trip freq	No.	%
1	12	52%	Weekly	2	9%
2-3	8	35%	2-3 d/wk	3	13%
4+	3	13%	4-5d/wk	17	74%
Total	23	100%	Weekday & Saturday	1	4%
			Total	23	100%
Eligibility	No	%			
50+ residents	3	13%	User costs (round trip)	No.	%
60+ residents	20	87%	Free	8	36%
Total	23	100%	\$1 or less	8	36%
			\$1-3	6	28%
Pick-up location	No.	%	Total	22	100%
Door-to-door	14	61%			
Curb-to-curb	9	39%			
Total	23	100%	Reservation	No.	%
			Same day	3	13%
Escorts	No.	%	1 day+	17	74%
Available	3	13%	2 days+	3	13%
Unavailable	20	87%	Total	23	100%
Total	23	100%			
Destination Fixed	No.	%	Wheelchair accessible	No.	%
Fixed	21	91%	Yes	20	87%
Senior designated	2	9%	No	3	13%
Total	23	100%	Total	23	100%

Source: Author’s survey

Shopping Bus

Twenty-eight (75%) of the 35 municipalities interviewed also provide a “Shopping Bus” for trips to grocery stores, stores and malls, and functional activities, such as visits to banks and post offices, for a total of 25 independent or cooperative programs. Senior bus is operated by local aging office, senior centers, or department of recreation. The general description of the essential characteristics is listed in the Table 2-10 below.

Table 2-10. Supply Characteristics of Shopping Bus

Administration			Capacity			
Administrators /operators	Funding sources	Personnel	Travel mode	Number of vehicles*	Trip frequency	Average daily ridership
Office of Aging, Department of recreation, or senior centers.	Federal, State, county, local subsidy, or combination	Program coordinators and drivers.	Bus or Van	1-10	Biweekly – 5 days/wk	Citywide 12-100
						Town wide 5-40
						Village wide 3-25
Objective			Accessibility			
Target population and eligibility	Service area	Trip purposes	User costs	Core operating hours	Procedures	Reservation
Senior residents who are frail and in need of transportation	Local and surrounding area	Shopping, functional activities, and personal errands	Free or suggested donation/charges no more than \$3 per round trip	Half day or daytime	Initial registration, then call or ask in person for reservation	The same day or up to a week
Adaptability						
Pick-up location	Round trip/One-way	Escorts / Assistance available		Aides acceptance	Wheelchair accessible	Destination fixed/Senior designated
Door to door, curb to curb	Round trip	A few with escorts and some drivers assist seniors		Yes	Most are equipped with lifts	Fixed, predetermined but alternated, or private

* Some municipalities do not use all the vehicles for Shopping Bus, since the driver has multiple tasks the officer rotates the vehicles for different usage.

A typical Shopping Bus program has different supply characteristics from a program serving senior centers and nutrition sites. Table 2-11 below gives the detailed analysis of the supply characteristics.

Table 2-11. Analysis of Supply Characteristics for Senior Bus

No. Veh	No.	%	Trip freq	No.	%
1	18	72%	Biweekly	1	4%
2	4	16%	Weekly	7	28%
4+	3	12%	2-3 d/wk	12	48%
Total	25	100%	4-5d/wk	4	16%
			Total	25	100%
Eligibility	No	%			
50+ residents	4	16%	Operating Hours	No.	%
60+ residents	21	84%	Mornings: 9:00 a.m.– 12:00 p.m.	4	16%
Total	25	100%	Afternoons: 12:00 p.m. – 3:00 p.m.	4	16%
			All day: 9:00 a.m. to 4:00 p.m.	17	68%
Pick-up location	No.	%	Total	25	100%
Door-to-door	14	56%			
Curb-to-curb	9	36%	Escorts	No.	%
Senior center started	2	8%	Available	2	8%
Total	25	100%	Unavailable	23	92%
			Total	25	100%
Reservation	No.	%			
Same day	3	12%	Wheelchair Accessible	No.	%
1 – 2days	20	80%	Yes	19	76%
5 days+	2	8%	No	6	24%
Total	25	100%	Total	25	100%
User costs (round trip)	No.	%	Destination Fixed	No.	%
Free	9	36%	Fixed	11	44%
\$1 or less	7	28%	Fixed but alternated	9	36%
\$1-3	8	32%	Senior designated	5	20%
Total	25	100%	Total	25	100%

As Table 2-11 shows, almost seventy percent of the senior bus programs run at least two days a week, and 16% of the programs almost every weekday. Only one program runs biweekly. In terms of the eligibility, most services are open to local residents who are 60 years old or over, and some services are extended for residents over 50. About a third of the programs are free, 28% of the programs charge or suggest no greater than a dollar’s donation. The maximum charge is \$3 per round trip. More than half of the programs provide door-to-door service. Two programs are combined with the senior center transportation program s: passengers all gather at the senior center, and the shopping bus departs after lunch and returns them to their homes directly from the shopping trip. Customers need to make reservation by phone or in person, and the days in advance could be from the same day request to one week. Most programs are able to accommodate the requests of 1-2 days in advance. Two programs, fewer than 10%, also provide escorts on board, assisting seniors getting on/off the bus, carrying the bags, giving some instruction, etc. Some of these services return to a fixed set of destinations every time, others allow customers to choose their destinations, and some alternate among a predetermined set of destinations. The supermarkets or the shopping centers are not necessarily located within the municipalities providing the service. All the services are round trip, and allow seniors to take their own aides, charges/donation not applied. Similar to senior centers/nutrition site services, the trips are provided as shared rides,

usually with at least five passengers on board. For the buses without escorts on the bus, the driver may assist passengers with bags or provide other kinds of help.

Medical Trips

Twenty separate medical trip transportation programs are provided for seniors coming from twenty two municipalities (63% of the municipalities in the sample).

Table 2-12. Supply Characteristics of Medical Trips

Administration			Capacity			
Administrators /operators	Funding Sources	Personnel	Travel Mode	Number of Vehicles*	Trip Frequency	Average Daily Ridership
Office of Aging, Department of recreation, or senior centers.	Federal, State, or County funding, local subsidy, or combination	Program coordinators and drivers.	Bus or Van	1-10	Weekly to every weekday	City: 3-40 Town: 2-10 Village: 1-4
Objective			Accessibility			
Target population and eligibility	Service area	Trip purposes	User costs	Core operating hours	Procedures	Reservation
Senior residents who are frail and in need of transportation	Local and surrounding area	Medical trips	Free or suggested donation/charges no more than \$10 per round trip	Half day or daytime	Initial registration, then call or ask in person for reservation	The same day to at least a week
Adaptability						
Pick-up location	Round trip/One-way	Escorts / Assistance available	Aides acceptance	Wheelchair accessible	Destination fixed/Senior designated	
Door to door, or curb to curb	Most are round trips	Escorts as requested or no escorts	Yes	Most are equipped with lifts	Senior designated	

* Some municipalities do not use all the vehicles for medical trips, since the driver has multiple tasks the officer rotates the vehicles for different usage.

Medical Trips transportation programs provide individual trips for seniors who are going to doctor’s appointments, clinics, hospitals or other medical facilities. Typically, the wheelchair- accessible van takes one or two individuals, if they share similar destinations and arrival times. Only 20% of the programs require that the destinations be local, while 75% of the programs provide transportation to doctors’ offices outside of the municipality, One municipality, Mamaroneck village even could ride seniors within the whole county.

Table 2-13 lists the detailed characteristics of this type of program. The operating days per week are diversified across the municipalities. About half of the programs run almost every weekday, while about a third of the services run only one day per week. In terms of

the operating hours, a quarter of the programs run only on mornings or afternoons. Most of the services require that riders be greater than 60 years old. The drivers usually stop at the house/apartment door. Seniors need to make reservation in advance. One municipality is able to accommodate same-day requests, while the others ask for at least one day in advance for reservation. Most trips are free or cost less than \$2 per round trip; two municipalities, 10% of the programs identified, cost over \$3 per single trip (i.e. \$6 per round trip). Aides are generally allowed to travel for free. Most of the programs provide round trip service, with wheelchair-accessible lifts. One municipality’s program also provides escorts if requested.

Table 2-13 Analysis of Supply Characteristics for Medical Trips Program

No. veh	No.	%	Trip freq	No.	%
1	15	75%	Weekly	7	35%
2	3	15%	2-3 d/wk	2	10%
5+	2	10%	4-5d/wk	11	55%
Total	20	100%	Total	20	100%
Eligibility	No	%	Operating Hours	No.	%
50+/55+ residents	2	10%	Mornings: .9:00 a.m.– 12:00 p.m.	4	20%
60+ residents	17	85%	Afternoons: 12:00 p.m. – 3:00 p.m.	1	5%
65+	1	5%	All day: 9:00 a.m. to 4:00 p.m.	15	75%
Total	20	100%	Total	20	100%
Pick-up location	No.	%	Escorts	No.	%
Door-to-door	16	84%	Available	1	5%
Curb-to-curb	3	16%	Unavailable	19	95%
Total	19	100%	Total	20	100%
Reservation	No.	%	Wheelchair-accessible	No.	%
Same day	1	6%	Yes	13	68%
1 – 3days	14	78%	No	6	32%
5 days+	3	17%	Total	19	100%
Total	18	100%			
			User costs (per one-way trip)	No.	%
Round Trips	N	%	Free	7	37%
One way	3	16%	\$1 or less	5	26%
Round tip on availability	1	5%	\$1-3	5	26%
Round trip	15	79%	\$3+	2	11%
Total	19	100%	Total	19	100%

Taxi Subsidy Program

Some municipalities, mainly in villages, also provide taxi subsidy programs for seniors. There are three forms of this program: (1) a free one-way trip for seniors, but limited to trips that departure from home only; (2) a directly \$1-2 discount per single trip for senior riders; and (3) discounts that are offered by means of tickets or vouchers that are purchased in advance. For the last form, the actual payment is half of the price marked on the ticket. Customers can call for a cab from a participating company as would any other customer. The drivers accepting the vouchers get reimbursed by local government.

Nine municipalities among those surveyed are currently running such programs. One municipality runs in the first form, seniors could take taxi free as long as they start at home, so this program only provides one-way trip. Seniors are also required to make the trips between 10:00 a.m. – 2:00 p.m., when the taxi is not busy, and the reservation must be made a week in advance at the office of aging. Three municipalities run programs in the second form, in which seniors get \$1, \$1.50 or \$2 discounts per single one-way trip, with no other limitations. Five municipalities are sell discounted taxi vouchers or tickets to seniors, four of which are discounted 50%, and the other one of which is two-thirds off the original price. Among all the nine programs, a third of the services only provide services avoiding the peak hours thus limited four or five hours in the midday; the others operate 24 hours a day. One of the municipalities also provides this program to people who are disabled. A majority of the municipalities provide trips to any customer-designated destinations, but two require the trips to be local only. Aides are allowed, but one program asks for an extra dollar’s charge for the aide.

Table 2-14. Supply Characteristics of Taxi Subsidy Program

Administration			Capacity			
Administrators /operators	Funding sources	Personnel	Travel mode	Number of vehicles	Trip frequency	Average daily ridership
Office of Aging, Department of recreation, or municipal hall	Local subsidy	Program Coordinators, and drivers.	Taxi	NA	daily	3-10 one-way trips
Objective			Accessibility			
Target population and eligibility	Service area	Trip purposes	User costs	Core operating hours	Procedures	Reservation
Senior residents who are frail and in need of transportation	Local and surrounding area	Medical trips	Free or \$2-4 per one-way trip	10:00 a.m. – 3:00 p.m. or no limitation	(Purchase the ticket, and) call a cab	Only one program needs reservation one week in advance
Adaptability						
Pick-up location	Round trip/One-way	Escorts / Assistance available		Aides acceptance	Wheelchair accessible	Destination fixed/Senior designated
Door to door	One-way	Driver assistance		Yes	no	Senior designated

Volunteer Program

Five municipalities of the total 35 run a volunteer-based program as well. These programs mainly serve medical trips. All the drivers are volunteers, proving free trips for seniors and people who need transportation. Usually there is a coordinator who picks up the phone calls and makes a schedule for these requests, trying to have each driver volunteer evenly. The group of volunteers comprise of 10-40 volunteers, varied by community. The drivers’ driving frequency could be once a week, or once a month. Drivers may also assist the rider if they need help. All the funding is from donations, and all the services are free. Some drivers wait with the seniors at the medical offices, and

then take them back home, while other customers are sent back home only after calling to arrange the next part of trip. The average daily ridership is about 3-4 round trips per day.

Table 2-15. Supply Characteristics of Volunteer Program

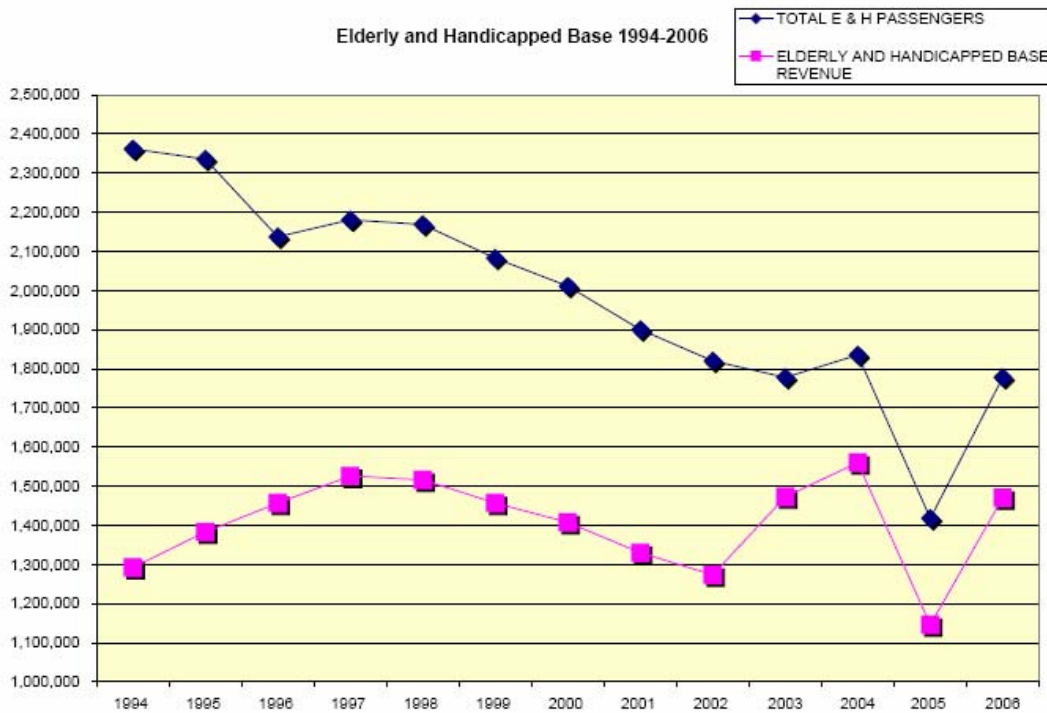
Administration			Capacity			
Administrators /operators	Funding sources	Personnel	Travel mode	Number of vehicles	Trip frequency	Average daily ridership
Community or Local organization	Donation	Program Coordinators, and volunteer drivers.	Private vehicles	NA	Weekday	3-4 round trips
Objective			Accessibility			
Target population and eligibility	Service area	Trip purposes	User costs	Core operating hours	Procedures	Reservation
Residents who are frail and/or in need of transportation	Local and surrounding area	Medical trips	Free	10:00 a.m. – 4:00 p.m.	Make reservation by phone or in person	One day and encouraged as early as possible
Adaptability						
Pick-up location	Round trip/One-way	Escorts / Assistance available		Aides acceptance	Wheelchair accessible	Destination fixed/Senior designated
Door to door	Round trip	Driver assistance		Yes	No	Senior designated

3 Operating Obstacles and Difficulties of Existing Senior Transportation Service Programs

This section examines the existing and potential operating obstacles and other problems for each type of service.

3.1 Bee-Line Fixed Route Bus

Figure 3-1 Bee-Line Fixed Route Ridership and Base revenue



Source: 2004 Annual Report for the Westchester County Bee-Line Transit System

Bee-Line Fixed Route bus is a comprehensive network which provides a great number of trips for various groups of population. According to Figure 3-1, the trend of Bee-Line Fixed Route elderly and handicapped ridership is slightly decreasing in recent 10 years. The significant reduction of revenue and ridership of the year 2005, is due to the Bee-Line Bus Strike which ran from March 3 to April 23, 2005. Moreover, no fare was applied to all the users from (including Paratransit) from April 23 to May 31.

In the 2003 on-board survey, customers rated Bee-Line Fixed Route Bus services in eight categories: overall quality, cleanness, driver courtesy, service hours, comfort, convenience, seat availability, service frequency, service reliability, and availability of time tables. The ratings are ranged from 1-5, representing from very poor to excellent.

Table 3-1 Ratings of Bee-Line Bus from 2003 On Board Survey by Senior Participants

Rating	Overall		Cleanness		Driver Courtesy		SeviceHr		Comfort	
	No.	%	No.	%	No.	%	No.	%	No.	%
1	6	3%	8	4%	6	3%	23	11%	7	3%
2	12	5%	12	5%	9	4%	19	9%	10	4%
3	45	20%	46	20%	28	12%	41	19%	45	20%
4	83	37%	84	37%	69	30%	67	32%	85	37%
5	79	35%	75	33%	118	51%	62	29%	80	35%
Total	225	100%	225	100%	230	100%	212	100%	227	100%
Mean	3.96		3.92		4.23		3.59		3.97	
Rating	Convenience		SeatAvailb		ServiceFreq		Reliability		TimeTableAvailb	
	No.	%	No.	%	No.	%	No.	%	No.	%
1	10	5%	5	2%	18	8%	16	7%	33	15%
2	13	6%	9	4%	23	10%	13	6%	23	10%
3	32	14%	37	16%	51	23%	44	20%	42	19%
4	81	37%	82	35%	63	29%	79	35%	63	28%
5	85	38%	99	43%	66	30%	73	32%	64	28%
Total	221	100%	232	100%	221	100%	225	100%	225	100%
Mean	3.99		4.13		3.62		3.80		3.45	

Table 3-1 indicates that on average, all the characteristics listed receive positive assessments from senior riders who participated in the survey. The overall ratings average around 4, only 8% of the 225 respondents selected ratings of “poor.” All the average ratings of the eight characteristics are over 3.4. The top two ratings are from the Driver Courtesy and Seat Availability, rated more than 4.1, which means that seniors are satisfied with the driving and always have seats on board. The two lowest mean ratings are from Availability of Time Tables and Service Hours, rated 3.45 and 3.59 respectively. Similarly, in terms of the share of each rating, Driver Courtesy and Seat Availability have highest percentage of “excellent” ratings, and lowest percentages of “very poor” ratings. On the other hand, Availability of Time Tables and Service Hours have the lowest percentage of “excellent” ratings, and highest percentages of “very poor” ratings.

According to previous analysis of service hours in section 2.1, most of the Bee Line bus’ service hours on weekdays are sufficient enough to cover the seniors’ daily activities hours, 8:00 a.m. – 6:00 p.m. However, on Saturdays, only 23 routes of the total 60 routes are available during those hours, less than 40%; and on Sundays, only 10 routes still run from 8:00 a.m. to 6:00 p.m. This could partly explain the reason of lower ratings for Service Hours.

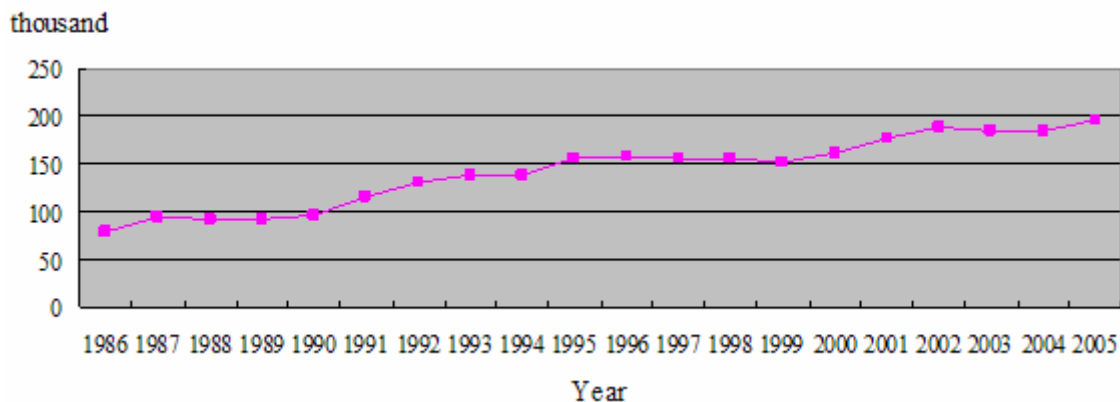
Meanwhile, most of the routes are targeted at major sites of employment, and the schedule is most frequent during morning and afternoon peak hours for employed commuters, while during the midday, the bus service is less frequent. According to the Table 2-6 Bee-Line buses Headway distribution during off-peak hours, only 35% of the routes’ headways are less than 20 minutes, which means that 65% of seniors have to wait at least 20 minutes if they just missed a bus, and the share is 15% for waiting more than 45 minutes. On weekends, seniors need to wait even longer since fewer than 4% of the

routes' headways are less than 20 minutes, and about 60% of the routes' headways are more than 45 minutes.

During the interviews, some officers working at senior centers also reflected comments from seniors at their sites, such as a lack of bus routes serving senior centers or grocery stores. This was particularly the case in north part of the County, where the population and bus routes density are sparse, with only one or two routes passing by a municipality's commercial area. Some seniors also complained about the difficulty of climbing the stairs on the bus. Long waiting time, especially in bad weather and winters, was also a critical issue mentioned.

3.2 Bee-Line Paratransit

Figure 3-2 Bee-Line Paratransit Ridership



Source: County DOT

Compared to the fixed route bee-line bus, although the fare is more expensive, \$3 compared to less than \$1 per one-way trip, paratransit has many advantages: it is a convenient, small-volume vehicle for individual trips, makes seniors feel more comfortable and drives on a more efficient route. All of Bee-Line Paratransit vehicles are equipped with wheelchair lifts, and each trip only takes 1-2 passengers, directly going to seniors' destinations. Moreover, for seniors living close to the bus routes, they are offered services even in longer hours than fixed routes and to a far wider range of destinations. Another great advantage is that, seniors do not need to stand at the bus stops waiting for a bus, which can be difficult in bad weather or winter days. Paratransit riders only need to wait at home, and once the van arrives, they only walk from the house/apartment to the curb.

Figure 3-2 above shows the yearly ridership of paratransit users. Though this program serves both seniors and the disabled population, it is reasonable to assume that majority of the users are seniors. The ridership is increasing steadily, from about 80,000 twenty years ago to 200,000 today. However, the dramatic 150% increase does not mean that

there are no difficulties with the program. The most common complaint observed from seniors is the complicated and time-consuming application process. Seniors need to prove eligibility, prepare various documents, visit the county office of disabled for an interview, and wait for a long time for approval. These procedures can take up to 2-3 months, and must be repeated every three years by seniors under 75 years old. Another obstacle is the strict qualification requirements. Having a disability is not sufficient to qualify for this service; seniors must show they cannot functionally use the Bee-Line bus. Many seniors complain that they are frail, not steady on bus, or can not endure the long walking to bus stops or the long waiting times, but are still not considered as “functional unable to use Bee-Line fixed route bus.”

Other comments on Bee-Line Paratransit include that a round trip of \$6 is too expensive for some seniors, customers must wait for a long time to be picked up and brought home if they have made a round trip reservation, and the van will not enter a driveway, which may result in an inconvenient walking distance for certain riders.

3.3 Community Based Programs

Community based programs have both shared obstacles and unique challenges facing by individual type of programs.

Earlier in this paper, the community based programs were classified into five different types of programs, transportation to/from nutrition sites, shopping buses, medical trip programs, taxi subsidy programs, and volunteer programs. In practice, the first three programs tend to be combined into a single operation by most of the municipalities, sharing the same drivers and vehicles. So the drivers usually have multiple tasks on the same day, and making an efficient schedule in order to accommodate all the requests becomes a tough task for program operators. The driver might be extremely busy some day, and as a result, some trips may not be served.

Another problem is that not all the municipalities have all these types of programs. For example, for seniors of certain municipalities, shopping needs can be satisfied by the shopping bus program, but services to medical appointments are not available. Only some daily travel needs are satisfied, and a gap of unmet needs still exists, especially for those who are not qualified for paratransit, and must make trips not well served by fixed-route transit.

Most of the interviewees also indicated that only a small percentage of local seniors are using these services. For example, the majority of senior center visitors are still driving by themselves, with fewer than 10% of the regular visitors taking the senior center bus. This share is far less than that of the risky drivers. Most of the senior centers have held lectures to persuade seniors give up driving or drive limitedly when their physical capabilities decline. And most of the senior drivers know that continuation of driving can get increasingly dangerous. However, the psychological barrier is hard to overcome. Americans usually consider the keys as the symbol of self esteem, freedom, or even status. To turn in one's keys may mean a transition from an independent life to a life

dependant on some one else. Therefore improvements on supply of senior transportation services need to accompany to efforts of educating seniors to give up driving gradually and persuading seniors to divert to other options.

Each of the individual services also faces a unique set of obstacles and challenges:

1) Transportation to/from Senior Center/Nutrition Sites

Programs providing transportation to and from senior centers and nutrition sites are prototypical community based services with a long operating history. Most of the senior center and nutrition sites are running five days a week, therefore transportation to/from senior centers are offered every weekday as well.

At senior centers, visitors can have recreation and social activities, possibly with a nutritious lunch. Usually the participants visit regularly, every weekday or every other weekday. The service is cheap, less than \$1 per round trip mostly, and is convenient to make reservation, even same-day requests can be served. Seniors just wait at home for pick up, and most of the vehicles are equipped with wheelchair lifts. The service seems to work well, but the question remains how well senior centers meet all their customers' needs? With regard to recreation trips, the answer is no: seniors like everybody want diversified social and recreational lives, and also want to attend parks, museums, different clubs, malls, theaters, and other activities. Because these transportation services are focused exclusively on senior centers, they do not afford mobility-limited senior citizens the benefits of participation in this broader range of activities.

2) Shopping Bus

Shopping bus programs are also a typical senior transportation programs with a long history. The primary existing problems, according to the interviews, are that the destinations are local and designated by the operators, which might not satisfy diversified needs of individual riders. If seniors want to go to specific destination, this service may not help. Some operators indicated that they had conducted surveys to identify additional destinations wanted by their customers. Based on the responses, they added several popular supermarkets, even a local Chinatown. This effort received very positive feedback from passengers.

One interviewee mentioned that before the Shopping Bus was provided, some seniors ended up spending much more on taxi costs than on their grocery costs. The Shopping Bus plays a critical role in many seniors' daily maintenance activity needs, but about one fourth of the municipalities surveyed still lack this program. Even among the municipalities with a Shopping Bus, more than one third of the programs only provide trips once a week, during very limited hours.

3) Medical Trips

This program is a relatively new program compared to the previous two programs, and mostly started several years ago. Medical Trips program offers individualized trips, with no fixed origins or destinations, so the charges tend to be relatively higher than the previous two programs. Another reason leading to higher charge is that previous trips are

mainly local, while medical trips are designated by senior themselves, could be outside of the city/town, with more than half an hour driving, especially in the northern area, where many municipalities are residential, with no medical facilities within walking distance.

The main problem of this program is that, though most are round trip services, the driver does not wait with the senior at the hospital. The passenger might need to wait a long time to get a trip back home, or may even need to arrange an alternate means of travel home, particularly when the service only runs half day or limited hours. Meanwhile, these programs also require reservations further in advance than other municipal programs. Some operators mentioned that they may not be able to accommodate the requests made 1-2 days in advance. An interesting fact indicated by two interviewees is that, though this service is very convenient and affordable, the usage is relatively lower than other programs. Only a few seniors are regularly users and no reservations are made on quite a few days. Some seniors prefer to take a taxi rather than this service even when the destinations are within the service area.

4) Taxi Subsidy Program

This program is only operated in a few villages, and tends not to be used in cities or large size towns. This program is flexible, transporting seniors to any private place for any purpose. But the drawback is that taxis are not equipped with wheelchair-accessible lifts. Seniors need to fold their wheelchairs, which is not an easy task. Another problem is that some of the taxi services are only available during limited hours in the midday, when the drivers are not busy. This significantly reduces the usefulness of this service for many potential customers. In some areas, even the half discounted ticket is not cheap, when seniors must go outside of the town to visit the doctor's offices. Psychological barriers also play a role. For some taxi subsidy programs, which charge seniors \$1-2 less than ordinary price, one interviewee mentioned that seniors could be too embarrassed to ask for the reduced fare, and instead prefer to pay the full price.

5) Volunteer Program

Volunteer Programs are targeted for any people who need transportation services, not exclusively seniors. From the interview information, the main problem operating this program is coordinating the drivers to serve all of the riders' requests. The volunteers' schedules may not always match the requests. The coordinators also need to assign the volunteers with similar serving frequencies or mileages. Sometimes the volunteer drivers may not be familiar with certain destinations or neighborhoods, which bring challenges for the scheduling task as well. Insurance issues also add to the complexity of this service. A long term challenge is the recruitment of the volunteer drivers. The interviewee mentioned that most of the drivers are themselves retirees, but younger and healthier than the elderly who tend to use the service. This leads a potential problem, in a few years, when these volunteers themselves become users of the service, and the gap between supply and demand will significantly increase.

4 Future Improvements and Innovative Programs

The data from Westchester County Department of Senior Programs and Services shows that all the transportation to and from senior centers/nutrition sites programs that obtain Title III B Grand offered trips for 500-600 individuals per month in the year 2005(2006, County dept of senior programs and services). The number of individuals served with medical, shopping and other trips is slightly higher, ranged from 550-700 per month. Compared to the other two types, this program is operated with lower capacity, which is determined by the local municipality-operation property, but it serves a significant portion of trips and is considered as an important complementary of public transportation services, with flexible services for seniors' group or individual trips.

4.1 Potential future improvements to existing programs

A general recommendation suitable for each type of services is to conduct survey in order to understand the needs and assessment on existing services. All the goals must base on the understanding of the special needs from seniors. This refers to work such as 1) market research to find out where the seniors are living. For example, clusters of nursing homes or senior housing units, communities with higher share of very old seniors or poor seniors who could afford driving. 2) Travel needs and behavior of senior riders. What types of trips do seniors conduct frequently? Grocery shopping, doctor visits or other recreation activities? How frequently do they travel? During what time do they prefer to travel out? Do they have any specific requirement? What characters of the service quality do they concern about? One effective way to study related information is to conduct community survey or focus group study. Once the needs and exiting supply are matched, planners could develop efficient transportation service network to accommodate seniors' trips. This also helps planners to develop new routes or modify the current routes with the assessment of senior riders. Recommendations for each type of program are also listed in the following paragraphs.

Bee-Line Fixed Route Bus

County DOT currently is starting several new programs, including bus-riding training programs, focus group study for route service improvement and pricing strategy study. The objective is to 1) educate seniors how to take buses to meet their daily activity schedules; 2) understand seniors' assessments of bus service so that primary improvement directions could be identified, and 3) encourage and attract more seniors to utilize bus services especially on off-peak hours.

A recommendation here is to develop coordination programs between public transit and local agencies of other programs. Coordination brings significant benefits to all the coordinators. No doubt that the public transit and local community programs for seniors somehow overlap and duplicate each other. This could lead to underutilized capacity on both programs. The benefits brought by the coordination include not only fully utilized resources, enhanced service quality, more consistent service characters, but also the elimination of the limitation by separate programs, instead all the seniors could use multiple programs in a consistent manner without much limitations. Meanwhile, coordination bring economic benefits as well: the sources are integrated and used in a more efficient way, while the costs are saved since duplication is eliminated. For

example, the smaller buses operated by local municipality could run along or close to certain public transit route passing by popular destinations of seniors. Particularly in winter seasons and bad weathers, when seniors could not stand long waiting time.

Meanwhile, education programs are developed. Seniors who are not familiar to using buses or never take buses before are to be identified. This information could be obtained via the community survey mentioned earlier or the interviews with people working with seniors, such as social workers. Coordination work could be conducted between transit operators and local aging offices/senior centers. People working at local aging offices could be trainers and thus lectures and free trails could be held frequently at local places.

Bee-Line Paratransit

Bee-Line Paratransit, with the frequent and efficient service quality, also serves with a significant portion of seniors daily trips, especially for the most fragile seniors. Some potential future improvement directions include: 1) simplifying the application process, for example, instead of the interview model adopted currently, other models of the application could be applied: self certification plus professional verification models, functional assessment by expertise models, or combination of two models, so that seniors do not need to pay a trip to the County Office of Disabled for interview. 2) Try to accommodate riders' special needs, such as allowing the van going on the driveway, door-to-door trips provided rather than curb-to-curb, and lower the price for seniors who are not able to afford the services. 3) Make more efficient schedules to decrease passengers' waiting time if a round trip is requested. This requires the training and educating of program operators so that more seniors would be served on time with other conditions being equal.

Municipality/Community Programs

Based on the interviews, some new directions are indicated, such as 1) providing multiple types of programs to serve multiple travel needs of seniors, and 2) to extend the service hours, such as from half day extended to the whole daytime, or expanded from 2-3 days per week to four days/week, and 3) go to diversified destinations or activities to serve the needs of more individuals. Clearly these programs are designed to be "safety net" programs, to ensure that seniors receive adequate nutrition and medical care. But to the extent that capacity and/or funding exists to expand these programs through marginal increases to their flexibility, large social welfare benefits can be gained for an underserved and growing segment of the population. Thought the aggregation of all the programs provides a significant portion of the trips, the fact is that the service would accommodate more if the services are coordinated rather than separate from each other since they share similar service characteristics. Most of the services are only available for local seniors and limited to local trips. If the services are coordinated, and the individual program does not only look at their own clients but also other seniors who need their trips, much more needs are met with effective cost savings.

4.2 Ideas for innovative services

Besides pointing out the future improvement directions, I also recommend consideration of some innovative programs for seniors' daily transportation

ITNAmerica

ITN America is a national nonprofit transportation network, which provides car and driver for people 65 years and older. It runs within Portland, Maine, where about 1,000 people regularly use the local ITN. Communities in California, Florida, New Jersey, and South Carolina are initializing similar networks. The Federal Transit Administration also encourages the national implementation of this non-profit transportation services for seniors. In this program, customers make reservation and pay through prepaid accounts. ITN drivers are partly from both volunteer and paid drivers. Volunteer drivers use their personal vehicles, and paid drivers use the seven automobiles owned by ITN.

The primary challenge of this non-profit network is to accommodate the increasing travel needs with affordable charges while to maintain the operating well and pay for it all. Take Portland for example, the average trip cost is \$8, which covers about a half of the service costs. The remaining part of this program is covered by the contributions from various sectors, such as local shop, supermarkets, and stores that want to keep their senior costumers, and doctors, dentists, and other health providers who are doing business with seniors.

Volunteer friends program

One of the most challenges of the volunteer programs is the recruit of the drivers. North Hollywood, California started a program that allows seniors to hire friends and family members to drive around, with reimbursement of mileages. The benefits of the programs are: 1) avoid the process of recruiting and scheduling by a special coordinator, but seniors themselves recruit and arrange the trip. 2) The driver and rider are familiar to each other, which makes seniors more comfortable during the trip and the trip is more efficient. This project is hoped to expand throughout the Los Angeles area. One of the important obstacles is that the friends are not always available while seniors want to travel out if the friends themselves are younger employees. So this could be served as a complementary program of local volunteer program or community program.

Carpool Program

This carpool program could be formalized in two ways: seniors who are still able to drive could take seniors who are no long able to drive as long the driver's route is close to the rider's place and they both go to the same senior center or nutrition sites. The other form is that the driver is not necessarily a senior as well, but a younger person who needs a car to work or travel to other places. So the senior provides the vehicle while the young person provides driving skills. Both the driver and rider are benefited while no extra costs are needed.

Coordination program

Community programs might be open to non clients, such as public transit riders. If applicable, the small buses run by municipalities would travel along or close to the bus

routes, while seniors who are waiting for buses or planning to take the buses would be served by the local small buses. This meaning of this program is particularly crucial in bad weather or cold season, when seniors could not hold the long standing and waiting. This coordination model does not suit between municipality programs and public transit, but also between paratransit and public transit.

Successful development and implementation of all the programs above are based on the match between seniors' special travel needs and the existing supply. Planners and operators need to understand both supply and demand sides thoroughly, therefore the growing needs from seniors are able to afford.

4.3 Conclusion

Seniors are a special group in our society. Although seniors are more healthy and independent than their counterparts years ago, many face the difficult situation of losing their driving ability even while they are able to maintain an otherwise active lifestyle. Unmet travel needs has multiple layer impacts, the unsatisfied daily maintenance activities, lower quality of life, and the direct association of isolation and loneliness, two most critical issues facing by senior population. One interviewee indicated that they encouraged seniors just take their shopping bus to go out of home, even he/she has nothing to buy. Just traveling out with other seniors could be helpful on isolation and loneliness prevention. Seniors need to know that they still have multiple options that are sufficient to maintain their daily activity needs, and on the other hand, transportation professionals need to try the best to accommodate seniors various travel needs for comprehensive senior transportation network with organized administration, abundant capacity, high accessibility and creative versatility.

Like other counties in the nation, seniors in Westchester County are facing three transportation alternatives besides driving: public transit, paratransit and community programs. Public transit system, with the largest capacity, provides about 3,000 daily trips for senior population. Paratransit, though the service is strictly limited to certain seniors with severe functional disease, are still able to accommodate a significant portion of seniors' trips within an extended service span all over the county. Community program is the most flexible option among all. Typically group trips are served with designated destinations (except for medical trips). In terms of the essential supply characteristics, all the three options are different from each other and serve as complementary each other. By no means could one be replaced by another. Five categories of supply characteristics, objective, administration, capacity, accessibility and adaptability are critical technical tools, with which the planners and operators would assess and improve the services in a more efficient way.

Based on the analysis per program, obstacles and limitations are pointed out, as well as the directions of future efforts. For Bee-Line fixed route bus, the efforts would be targeted on how to attract more senior riders diverting from driving to public transit, education of seniors who never use the bus before and specific service modification according to senior riders' assessment and survey information. For paratransit, the major

improvements are based on the simplification of the procedures of certification for an eligible user and door-to-door service provision instead of curb-to-curb. For community programs, the primary task for planners and operators is to expand or coordinate the services, so that all seniors are able to use the service in a much larger service area.

This work has mainly examined the supply side of transportation services. Further work is needed to better analyze seniors' travel needs, and to conduct a more thorough program evaluation based on both supply characteristics and need analysis. As mentioned before, all these efforts need to be accompanied by education efforts to ensure that aging seniors understand the risk of continued driving and encourage them begin using public transit and other senior transportation programs when necessary.

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