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EFFECTIVENESS OF TRANSIT STRATEGIES TARGETING ELDERLY PEOPLE: SURVEY RESULTS AND PRELIMINARY DATA ANALYSIS

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A report of the findings of
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16. Abstract The U.S. Department of Health and Human Services has shown that America's senior population has been growing and will almost double by 2030. This trend continues to challenge researchers who are looking to increase seniors' awareness or favorable views toward public transportation and researchers who are developing innovative public transportation alternatives for seniors. These alternatives will try to wean seniors from their reliance on cars, while not compromising other transit riders' safety and comfort. The research team at the University of Illinois at Chicago undertook this study as a first step toward meeting this challenge. To collect information on seniors' travel attributes and their opinions about Northeastern Illinois' public transportation system and potential service alternatives, the research team developed a comprehensive survey, covering four common trip purposes (doctor visits, shopping trips, social or recreational travel, and work trips) and various travel modes. These modes included combinations of non-motorized travel, auto use, and three commonly used public transportation modes (Metra, Pace, and the Chicago Transit Authority). The research team tested this survey on a small sample of respondents; modified it to maximize the number of accurate, unbiased responses; and sent it to 2,000 seniors who have resided in one of metropolitan Chicago's six counties. Two hundred eighty seniors sent back complete and useful surveys that provided data for this study. Most of these seniors were unfamiliar with Northeastern Illinois' public transportation system and did not view it as a driving alternative, partly because they view it as more hazardous than driving their own cars and less convenient than getting a ride from friends or family members. To help change these perceptions, the research team suggests that Northeastern Illinois' public transit operators provide printed timetables and maps on their trains, buses, or stations; increase vehicle frequencies; provide real-time arrival information at stations and on cell phones; order more low floor and kneeling buses, clean their stations and vehicles better, and provide shuttle services specifically designed for seniors.			
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EXECUTIVE SUMMARY

The U.S. Department of Health and Human Services has shown that America's senior population has been growing and will almost double by 2030. This trend continues to challenge researchers who are looking to increase seniors' awareness or favorable views toward public transportation and researchers who are developing innovative public transportation alternatives for seniors. These alternatives will try to wean seniors from their reliance on cars, while not compromising other transit riders' safety and comfort.

The research team at the University of Illinois at Chicago undertook this study as a first step toward meeting this challenge. To collect information on seniors' travel attributes and their opinions about Northeastern Illinois' public transportation system and potential service alternatives, the research team developed a comprehensive survey, covering four common trip purposes (doctor visits, shopping trips, social or recreational travel, and work trips) and various travel modes. These modes included combinations of non-motorized travel, auto use, and three commonly used public transportation modes (Metra, Pace, and the Chicago Transit Authority).

The research team tested this survey on a small sample of respondents; modified it to maximize the number of accurate, unbiased responses; and sent it to 2,000 seniors who have resided in one of metropolitan Chicago's six counties. Two hundred eighty seniors sent back complete and useful surveys that provided data for this study. Most of these seniors were unfamiliar with Northeastern Illinois' public transportation system and did not view it as a driving alternative, partly because they view it as more hazardous than driving their own cars and less convenient than getting a ride from friends or family members.

To help change these perceptions, the research team suggests that Northeastern Illinois' public transit operators provide printed timetables and maps on their trains, buses, or stations; increase vehicle frequencies; provide real-time arrival information at stations and on cell phones; order more low floor and kneeling buses, clean their stations and vehicles better, and provide shuttle services specifically designed for seniors.

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CHAPTER 1 INTRODUCTION

The United States experienced a baby boom between 1946 and 1964 that will almost double the number of seniors (people who are 65 years old or older) by 2030. In 2002, more than 37 million people fell within this age group. Almost a tenth of them made less than the poverty level of \$8,626 and another 2.2 million seniors earned between \$8,626 and \$10,781. This latter figure was only slightly less than the average income (\$11,406) of senior women, but much lower than that of senior men (\$19,436).

Although these demographics suggest that a large pool of senior riders could benefit from free or low cost public transportation, most seniors continue to drive or be driven. Seniors, for example, only accounted for 0.2% of the nearly 643,000 surveyed trips in the 2001 National Household Travel Survey (NHTS). To change this situation, public transportation agencies and public transportation researchers need to examine different short- and long-term strategies that meet seniors' needs and limitations while also addressing their preferences and expectations. Unfortunately, little is known about the factors which may influence seniors' preferences and travel behavior.

The research team at the University of Illinois at Chicago, therefore, conducted a comprehensive survey to learn detailed information about seniors' shopping, medical, social/recreational, and work trips. This survey included questions about seniors' socio-demographic attributes and improvements, services, or technologies that might persuade respondents to more frequently use or switch to public transportation. The resulting data has helped the research team determine whether any correlations exist between seniors' survey responses and their socio-demographic attributes, such as age, ethnicity, income, residence, and number of vehicles owned. It has also allowed the research team to better analyze policies that may improve elderly programs on Northeastern Illinois' transit systems and increase seniors' transit ridership.

To increase response rates and enhance the completed survey's quality as much as possible, the research team applied various strategies found in their literature review on travel survey methods. Although some of these strategies failed, most of them were successful.

CHAPTER 2 LITERATURE REVIEW

Several studies, which are discussed below, have thoroughly described the baby boom generation's socio-demographic attributes and/or recommended strategies to encourage the baby boom generation and its predecessors to choose public transportation or increase their use of it.

Burkhardt *et al.* (1998), Evans (1999), Rosenbloom (2001), and Alsnih and Hensher (2003) projected in their studies that over 80% of all Americans will have a driver's license by 2020, including 100% of retired men and 60-90% of retired women. These people will likely continue to drive at pre-retirement levels, since studies have shown that people tend to maintain their travel behavior even after lifecycle changes. However, Bush (2005) found that travel usually decreases when people reach 75 years old.

According to Rosenbloom (2003), 56% of seniors lived in the suburbs and 23% lived in rural areas in 2003. She predicted that this demographic pattern will remain steady or increase until 2030. Many of these seniors drove more than 85% of the time and used public transportation less than 3% of the time.

To try to reverse this over-reliance on driving, transportation agencies and researchers have tried to better understand how seniors' travel behavior and needs have affected their decisions to drive or take public transportation. Stern (1993) found that age, sex, marital status, education level, and walking difficulties have greatly affected seniors' transportation decisions. Schmocker, *et al.* (2005) further asserted that disabilities (particularly, walking difficulties), household structure, ethnic background, difficulty understanding directions, age, car availability, geography, possession of a drivers license, and household income have significantly affected the number of trips seniors and people with disabilities make.

Rosenbloom (2003) recommended explicitly planning for seniors' mobility needs by targeting public transit services and facilities specifically for seniors, supporting alternative public transportation options, and improving highway and street infrastructure. Applying market research techniques, Koffman (2001) compared different improvements and technologies that may motivate seniors to more frequently use public transportation. He concluded that bus stop information, telephone information, and vehicle clearance are the least attractive improvements for seniors.¹ The U.S. Department of Transportation (2003) recommended developing and evaluating public transportation best practices for seniors and developing comprehensive, one-call-does-it-all mobility managers to coordinate local providers and their services. These approaches, however, can be very challenging, especially in suburban or rural communities.

Burkhart and Eberhard (2003) studied seniors' transportation mobility issues and emphasized that low-density areas need cost-effective public transportation solutions.

¹ This is inconsistent with the research team's findings in this study.

CHAPTER 3 PRELIMINARY ANALYSIS

Besides reviewing these studies, the research team analyzed survey designs and datasets from previous studies and consulted with various planners and stakeholders who studied seniors' travel behavior. One of these survey designs and datasets came from Pace, the suburban bus division of the Chicago metropolitan area's Regional Transportation Authority. This dataset contained detailed information about the socioeconomic attributes of 147 senior travelers in the Chicago metropolitan area in 2006, including their transit preferences and potential travel alternatives.

Using this information, the research team learned that senior respondents who usually drove alone had free parking and were unfamiliar with Northeastern Illinois' public transportation system, including its routes, services, and schedules. These seniors might take public transportation, however, if they knew more about it, and/or had to pay for parking. Please see Figures 1 and 2.

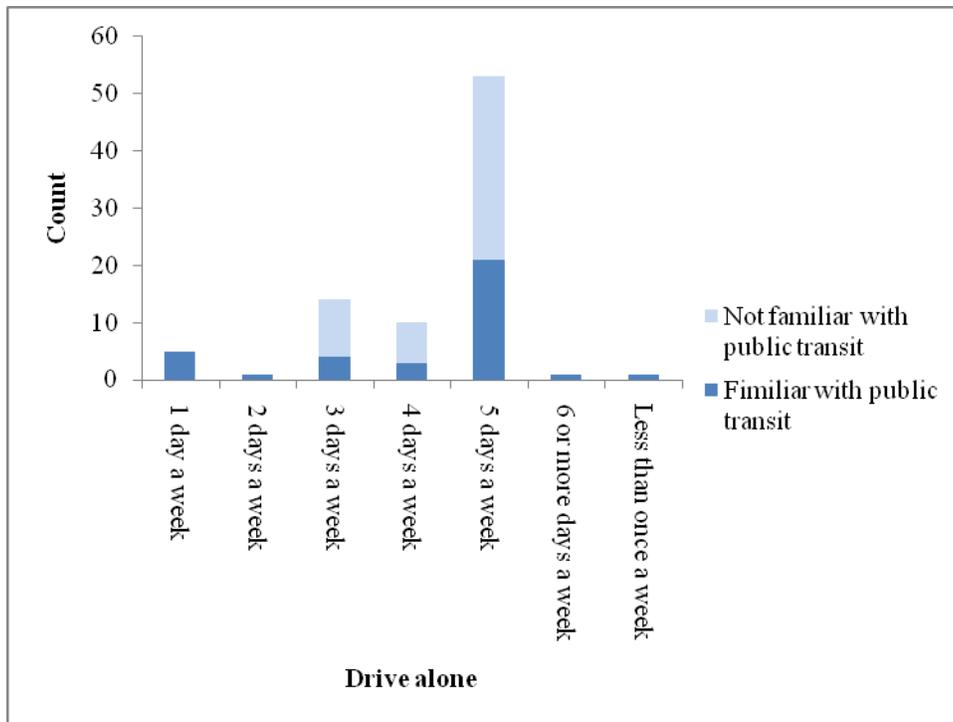


Figure 1. Relationship between driving alone and being familiar with the transit system.

Figure 1 shows that seniors who do not have enough information about Northeastern Illinois' public transit system are more likely to drive alone compared to those who are familiar with the public transportation network, schedules, and services. Not surprisingly, these seniors were unfamiliar with the public transportation network.

Figure 2 shows that a large portion of non-retired seniors do not pay for parking and drive to work alone. These results have led the research team to believe that charging for parking can significantly affect whether seniors choose to drive to their destination rather than take public transportation.

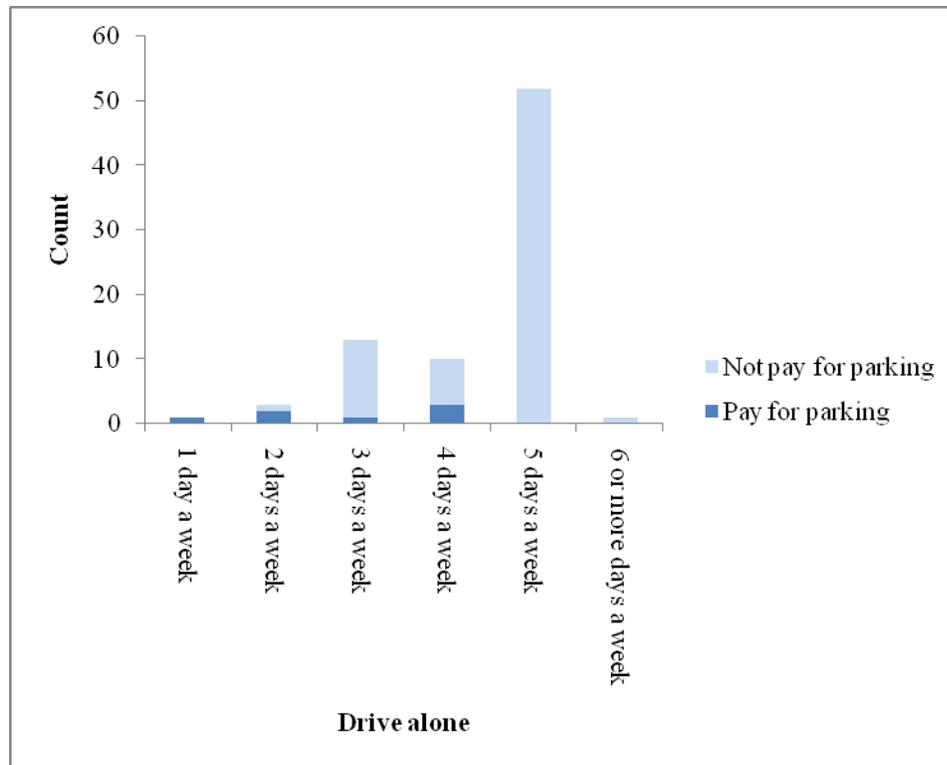


Figure 2. Relationship between driving alone and paying for parking

Pace's dataset also contained respondents' reasons for not using public transportation for their trips. As seen in Figure 3, seniors most often cited their personal safety as a deterrent to taking the bus. These beliefs were rooted in perception, rather than through experience since many of them were unfamiliar with Northeastern Illinois' public transportation system. Vehicle and station cleanliness would help alleviate their safety concerns even more than hidden cameras or guards on the vehicles or at the train stations or bus depots.

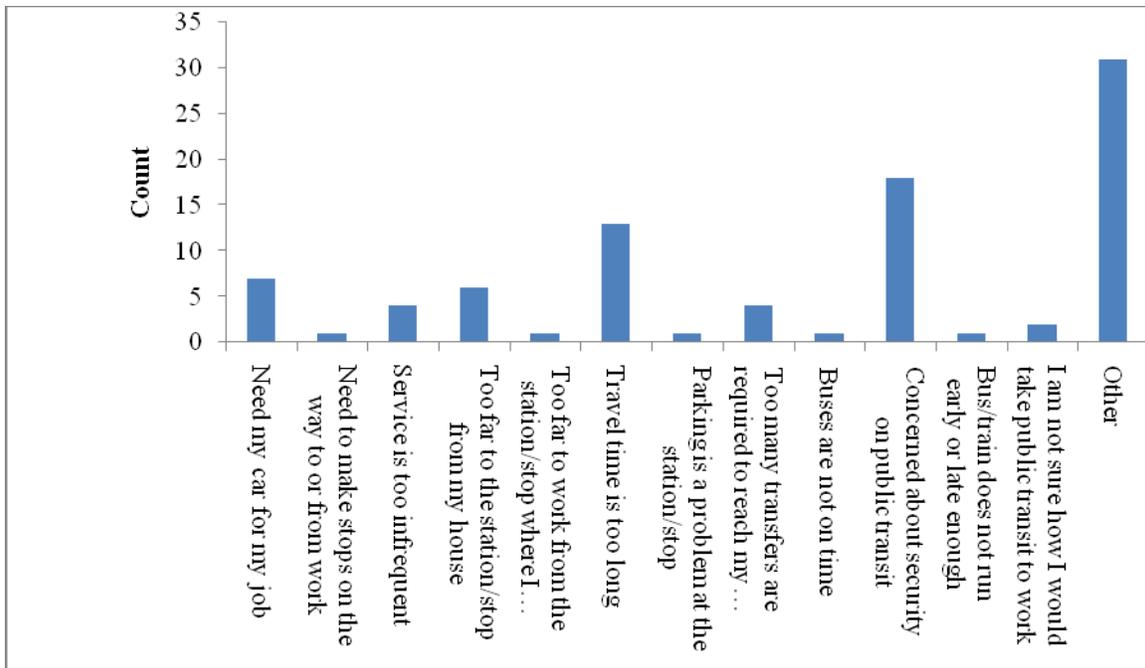


Figure 3. Reasons that people prefer not to use transit.

Seniors also cited door-to-door travel time as a major deterrent for taking public transportation. However, this concern is more difficult to resolve in the short-term because the effects of suburban land use patterns and the built environment have increased congestion and travel times. Suburbanization which began in 1950 has created land-use patterns that make origins and destinations typically distant from each other. Solutions such as centralization and smart growth have not resolved this problem. However, improving the transit network to decrease travel times and improve accessibility may encourage seniors to use public transportation more often.

The Pace dataset also contained seniors' ratings of the existing public transportation system and its alternatives. Pace had asked respondents to rate numerous transit-related statements from zero to ten. The average of these ratings and their standard deviations are presented in Table 1.

Table 1. Seniors' Rating of the Transportation System in the Pace Survey

	N	Minimum	Maximum	Mean	Standard Deviation
If safe and convenient Pace Bus service was available from near your home to your workplace, how likely would you be to use this service?	77	1	10	5.23	2.955
If safe and convenient Metra Rail service was available from near your home to your workplace, how likely would you be to use this service?	77	1	10	5.05	3.158
If safe and convenient CTA service was available from near your home to your workplace, how likely would you be to use this service?	77	1	10	7.36	15.191
If safe and convenient Pace Rapid Bus service was available from near your home to your workplace, how likely would you be to use this service?	78	1	10	5.90	2.877
How would you rate your overall satisfaction with Metra Rail on a 10 point scale?	40	3	10	8.13	1.897
How would you rate your overall satisfaction with CTA Bus Service on a 10 point scale?	36	3	10	6.78	2.099
How would you rate your overall satisfaction with CTA Rail Service on a 10 point scale?	34	3	10	7.09	2.275
I would change my form of travel if it would save me some time	146	1	10	6.52	2.829
I need to make work trips according to a fixed schedule	146	1	10	7.08	3.200
I need to make stops on the way to or from work	146	1	10	5.32	3.114
I need to travel mostly during the morning and afternoon rush hours	146	1	10	7.12	2.986
I would not mind walking a few minutes to get to and from a bus or train stop	146	1	10	7.42	2.504
Public transit vehicles in the Chicago area are usually clean	146	1	10	6.08	1.973
I do not mind transferring between buses or between bus and rail service	146	1	10	5.43	2.917

The research team has concluded from Table 1 that seniors are slightly less concerned about the safety and convenience of Metra trains than Pace buses and much more concerned about the safety and convenience of CTA buses and trains. This mirrors their overall satisfaction with Metra and their overall dissatisfaction with the CTA, especially with CTA's buses. Table 1 also shows that in-vehicle travel time is not very important in the respondents' minds, although they do not want to transfer between vehicles during their trips.

CHAPTER 4 SURVEY STRUCTURE

Using Pace's dataset, the research team designed and conducted a comprehensive survey to learn more about seniors' socio-demographic attributes, travel behavior, and travel preferences in Northeastern Illinois, which is fully presented in Appendix A. The survey design was partly based on guidelines recommended by Stopher et al. (2004).

This survey was 10 pages long on legal size paper in booklet form in order to contain all of the critical questions needed to be asked in an easy-to-read format. The font was Times New Roman and the letter size was no smaller than 12 points per inch to allow for easy reading. The booklet format made this survey as manageable and as easy to grasp as possible.

This survey had five parts. The first four parts each focused on a particular type of trip—the respondents' most recent shopping trips, doctors' visits, social/recreational trips, and work trips. Each of these parts listed the trip type in boldface, followed by symbols that illustrated the trip type. This may have helped respondents focus on the trip type being discussed.

The research team placed the most common trip types first to increase the likelihood that respondents will answer the questions. The fifth part was shown at the end of the booklet because it asked about respondents' socio-economic information. Given the personal nature of this data, the research team wanted to develop a rapport with the respondents before asking them personal questions. They also used euphemisms, which would likely increase respondents' willingness to answer these questions (such as using physical limitations for physical disabilities).

To help respondents recall their travel behavior, the research team only asked respondents about their most recent trip for each of the above trip types. This technique seemed to increase the quality of the answers.

In each of the first four sections, the research team asked respondents about their most recent trip characteristics, including their travel mode, trip frequency, trip length, origin, and destination. Other questions included trip price, if any, trip length, waiting time for the vehicle, and mode of travel from the transit stop to the final destination, if public transportation was used. The research team also asked respondents about potential incentives that might get them to more frequently use or switch to public transportation, including service improvements and technological conveniences, including the following:

- Reducing fares;
- Providing shuttle access to public transportation;
- Having brochures with schedules;
- Having brochures, which describe how to use transit;
- Increasing service frequency;
- Operating more services on weekends and holidays;
- Operating fixed routes specifically planned for seniors;
- Adhering to the schedule more;
- Adding early morning or evening services;
- Providing more wheelchair lifts and ramps;
- Having lower height buses;
- Providing audio-visual displays;
- Installing station telephones;
- Providing Braille signage;
- Displaying real time expected wait time information at stops and stations; and

- Providing real time transit information on cell phones.

In the final section, the research team asked about respondents' socio-economic attributes, such as age, ethnicity, income, residence, vehicle ownership, cell phone and/or Internet use, and employment status. The research team also asked the respondents whether they could contact them with follow-up surveys and/or phone calls.

CHAPTER 5 EXPERIMENTAL RESULTS AND DATA ANALYSIS

5.1 RESPONSE RATE ANALYSIS

The research team received 280 complete and useful surveys out of 2000 surveys mailed out to a randomly drawn, county-based list of seniors in the region. The research team recruited these seniors from a stratified sample of seniors by county of residence based on the population distribution in each county. Spatial distribution of the sample population by zip code is presented in Figure 4. This sample is consistent with the area's population distribution.

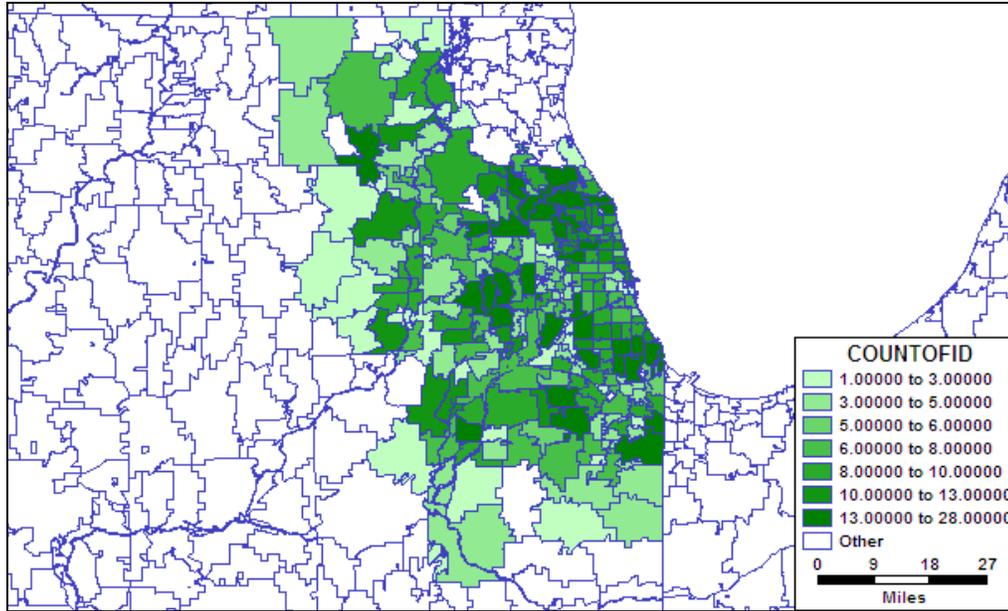


Figure 4. Spatial distribution of mailed surveys in the Chicago region.

The research team mailed these surveys on different days of the week to test whether seniors would more likely respond to these surveys on particular days of the week, as suggested in the literature review. Surveys that were mailed on Tuesdays or Wednesdays would likely have reached seniors by the weekend, thus giving them more leisure time to read and complete their surveys. Surveys that were mailed on Mondays, Thursdays, or Fridays would likely have reached seniors during the week, thus competing with other activities on seniors' schedules. Table 2 shows when these surveys were mailed and their response rates.

Table 2. Sensitivity of Response Rates by Day of the Week

Day	Total Sent	Total Received	Percentage
Monday	130	20	15.38
Tuesday	70	28	40.00
Wednesday	163	28	17.18
Thursday	726	89	12.26
Friday	926	120	12.96

This table shows no discernable link between day of the week and response rates. Surveys that were sent on Tuesdays had the best response rate, although response rates were fairly similar to each other on remaining days. Figure 5 shows the frequency distribution for the period when the research team sent the surveys out and received them back. However, the research team was not able to gather any more details, such as when respondents actually received their surveys, how long they took to complete them, and how long they took to send them back after completing them.

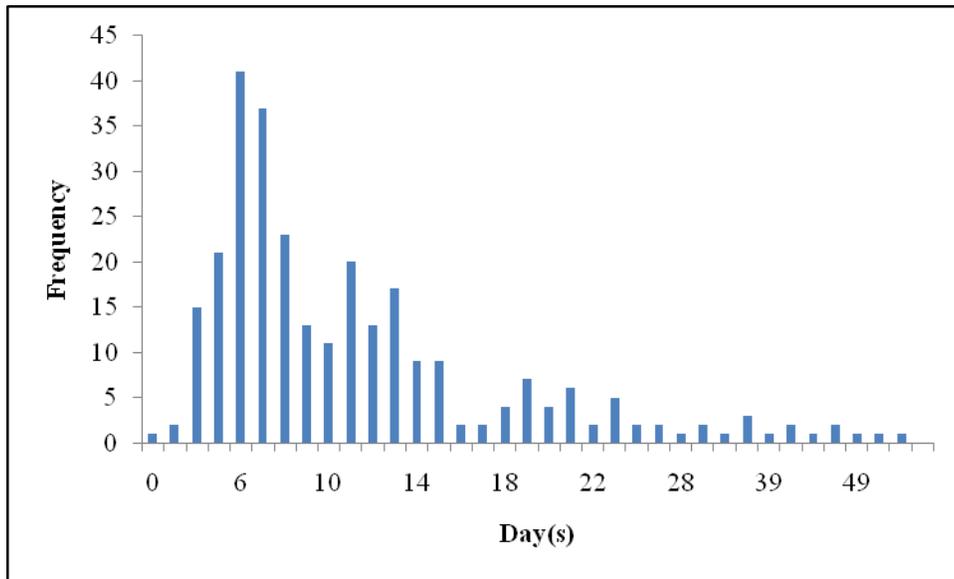


Figure 5. Duration Frequencies for Returning the Questionnaires

The research team also used commemorative stamps rather than prepaid, machine printed postage to test another theory proposed during the literature review—whether respondents would more likely open and read surveys that were in envelopes with commemorative stamps rather than machine printed postage. Several researchers from the literature review suggested that commemorative stamps personalize survey packages and thus increase response rates. The research team, therefore, tested this theory as well as whether different commemorative stamps can affect response rates. Figure 6 shows the different types of stamps used in this study and their response rates. Since the response rate for prepaid, machine printed postage was 17.50%, the research team could not conclude that commemorative stamps would automatically increase response rates or that machine printed postage would automatically reduce response rates.



Figure 6. Stamps used in this study and their response rates.

Besides these theories, the research team tested seven other theories that were originally proposed in the literature review. The significance of each of these theories is shown below.

Table 3. Average Response Rate and Percentage Difference for Various Scenarios

Scenario	Ave. Response Rate	Percentage Difference
Average response rate:	12.94%	0
Addressing Letter to " <i>Dear Sir/ Ma'am</i> ":	14.28%	10.35%
Using regular paper instead of watermarked paper:	19.04%	47.14%
Photocopied signature instead of real signature:	14.28%	10.35%
Excluding the IDOT Introduction letter:	0.00%	100.00%
Excluding the UIC Instruction letter:	14.28%	10.35%
Plain Envelope instead of watermarked envelope:	13.24%	2.31%

Table 3 shows that IDOT's introduction letter was essential to having seniors respond to the survey. None of the 40 surveys that were mailed without the IDOT letter were completed and returned in this survey. This may show that a letter from a governmental agency that is able to act upon the survey results may significantly increase response rates. All of the other survey items did not significantly impact response rates.

Other factors, such as income, ethnicity, and education level also affected response rates. Income is one of the most important socio-economic attributes in transportation studies because it allows researchers to infer other attributes or expected behaviors that could affect response rates. In this study, the research team geocoded all of the seniors' residences and linked their zip codes to the U.S. Census Bureau's zonal level, socio-economic data. This allowed the research team to infer some of the respondents' other socio-economic attributes. Figure 7 shows a strong relationship between these respondents' average zonal income and response rates.

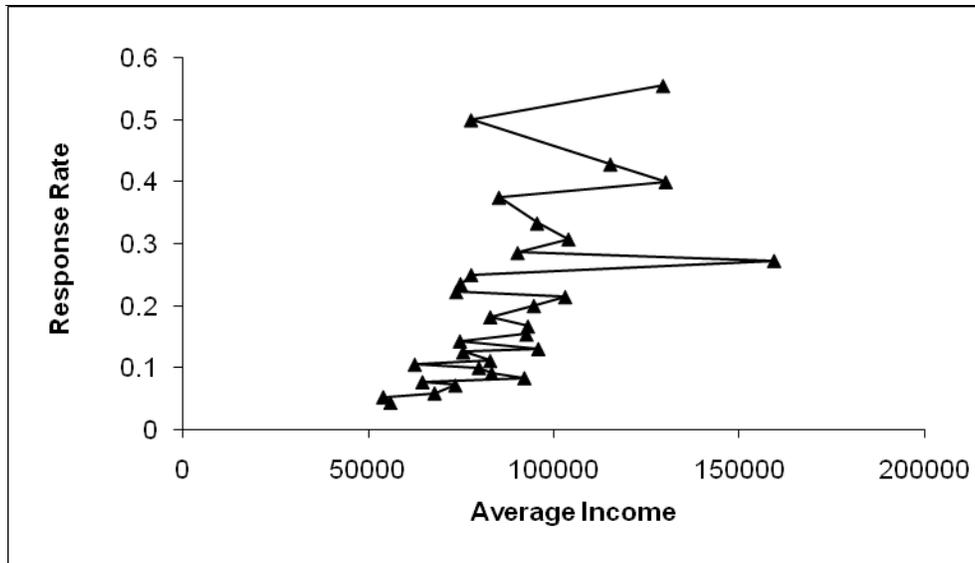


Figure 7. Average zonal income vs. response rate.

A strong relationship also seems to have appeared in response rates for various ethnicities in each average income zone as seen in Table 8. African/American and Hispanic people are dominating ethnicities in zones where response rates are low and Caucasians are dominant in zones where response rates appear significantly higher.

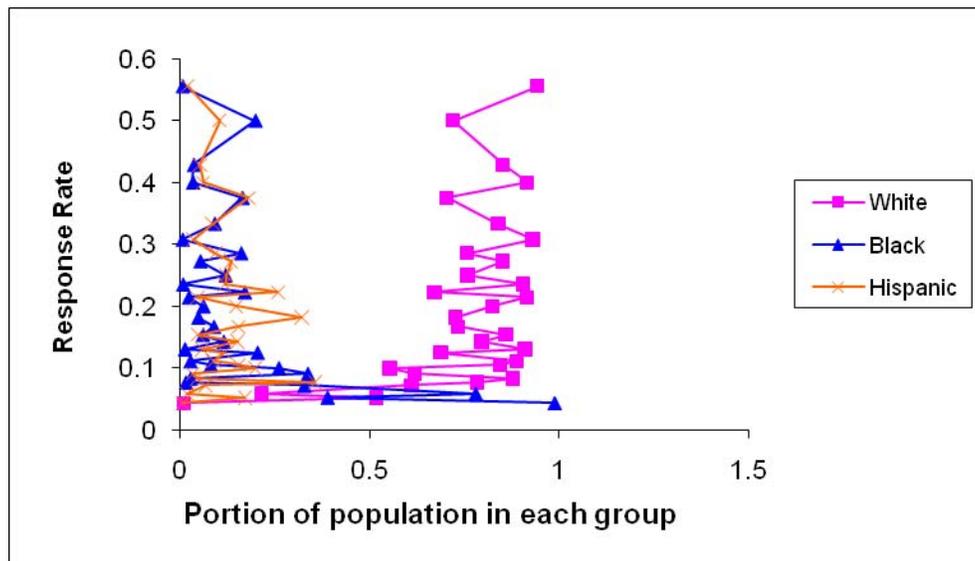


Figure 8. Interactions between zonal level ethnicity distribution and response rate.

5.2 SOCIO-ECONOMIC STATISTICS AND SAMPLE VALIDATION

After having received all of the respondents' surveys, the research team tabulated the socio-economic attributes and demographic characteristics that are presented in this section. The research team compared these results to the corresponding U.S. Census statistics to validate the sample distribution.

The survey results in Tables 4 and 5 show that empty-nest couples or individuals living alone comprised most of the surveyed households. This distribution of household sizes in the sample is consistent with the 2000 Census, except for Lake County where the sample size was small.

Table 4. Sample Distribution of Household Size

Household size	Total
N/A	4
One	114
Two	138
Three	15
Four	5
Five	3
Six or more	1

Table 5. Distribution of Household Sizes in the Sample and in the U.S. Census

HH Size	Cook		Kane		DuPage		Will		McHenry		Lake	
	Census	Sample	Census	Sample	Census	Sample	Census	Sample	Census	Sample	Census	Sample
1	45.56%	42.29%	43.24%	34.21%	42.28%	47.37%	41.04%	50.00%	39.54%	38.46%	40.52%	20.00%
2+	54.44%	57.71%	56.76%	65.79%	57.72%	52.63%	58.96%	50.00%	60.46%	61.54%	59.48%	80.00%

The populations considered in this study were at least 65 years old. Table 6 shows the age distribution among this survey's respondents.

Table 6. Distribution of Age Groups in the Sample

Age	Total	Percentage
N/A	1	0.35
65-70	101	36.07
71-75	61	21.78
76-80	62	22.14
81-85	36	12.85
More than 85	19	6.78

A comparison of the distribution of the different age groups in the sample and the 2000 Census in the six Northeastern Illinois counties verifies that the sample distribution accurately reflects the actual population. Table 7 shows the percentage of seniors in each age group by county compared to the total number of seniors in the six counties for both the sample and the 2000 Census.

Table 7. Distribution of Different Age Groups in the Six Northeastern Illinois Counties in the Sample and the 2000 U.S. Census

	Cook		Kane		DuPage		Will		McHenry		Lake	
	Census	Sample	Census	Sample	Census	Sample	Census	Sample	Census	Sample	Census	Sample
Age 65 to 74	37.75%	35.25%	2.05%	3.24%	5.23%	8.99%	2.61%	2.52%	1.30%	3.24%	3.52%	4.68%
Age 75 to 84	25.86%	25.54%	1.35%	2.16%	3.63%	3.60%	1.64%	1.08%	0.82%	1.44%	2.10%	1.44%
Age 85+	8.79%	3.24%	0.50%	1.44%	1.33%	1.08%	0.53%	0.00%	0.28%	0.00%	0.69%	1.08%

As previously mentioned, the research team recruited respondents from a random sample of senior residents in the Chicago region, which was stratified by population distribution in each county from 2000 U.S. Census data. Table 8 shows the distribution of respondents by county.

Table 8. Distribution of Respondents in Each County

County	Total	Percentage	Census
Cook	178	63.56%	72.40%
DuPage	38	13.58%	10.20%
Kane	19	6.78%	3.90%
Lake	20	7.14%	6.32%
McHenry	13	4.64%	2.44%
Will	10	3.57%	4.78%

Most respondents were retired, while 9% of them were still employed full time and 13% were employed part-time.

Table 9. Employment Status Distribution in the Sample

Employment status	Total
Employed full time	25
Employed part time	36
Home maker	12
Retired	207

These respondents represented a variety of ethnic backgrounds—86% white, 7% black, and 2% Hispanic. The African-American and Hispanic ethnicity results are not consistent with the 2000 Census results, but the other group's results are close, as previously expected.

Table 10. Distribution of Various Ethnicity Groups and Their Comparison with the 2000 Census Results

Ethnicity	Total	Percentage	2000 Census
Unknown	7	2.5%	-
African American	19	6.78%	16%
Asian/Pacific Island	4	1.42%	-
Hispanic	5	1.78%	5%
Native American	1	0.35%	-
White/Caucasian	241	86.07%	79%
Others	3	1.07%	1%

Ninety percent of these respondents are licensed drivers, supporting the earlier hypothesis that most seniors in 2030 will likely use their own vehicle unless improvements are made to encourage seniors to change their travel mode to transit.

Table 11. Vehicle Ownership Distribution in the Sample

Household vehicle	Total
N/A	2
Zero	27
One	129
Two	104
Three or more	18

5.3 STATED PREFERENCE ANALYSIS

As previously mentioned, the survey asked about four different trip purposes. Results show that 96% of respondents answered the shopping trip questions, 91% answered the doctor visit and social or recreational trip questions, and just 35% answered the work trip questions. This supports the aforementioned data that most of the respondents were retired.

For each of these trip types, the research team asked the respondents about which technologies and service improvements may encourage them to use transit more often and grouped their responses by education level, ethnicity, and trip purpose. Tables 12 and 13 discuss choices in technology and Tables 14 and 15 discuss service improvements.

Table 12. Descriptive Analysis of Transit Technologies Grouped by Trip Purpose and Ethnicity

	Other	Real time transit information available by cell phone	Real time expected wait time information displayed	Braille signage	Station telephones	Audio_visual displays	Lower height buses	Providing more wheelchair lifts and ramps
Average values for different ethnicity								
Unknown	0	1	0	1	0	1	0	0
African American	0	2	0	1	0	6	2	0
Asian/Pacific Islander	0	0	0	1	0	2	1	0
Hispanic	0	1	0	1	0	0	2	0
Native American	0	0	0	0	0	0	0	0
Others	0	0	0	1	0	0	0	0
White/Caucasian	7	20	4	7	0	41	12	4
Total								
Percentage of each ethnicity group preferring specific technology								
Other	0	30	0	30	0	30	0	10
Real time expected wait time information displayed	0	17	0	10	0	55	19	0
Braille signage	0	0	0	29	0	43	29	0
Station telephones	7	21	0	21	0	7	43	0
Audio_visual displays	-	-	-	-	-	-	-	-
Lower height buses	0	0	0	100	0	0	0	0
Providing more wheelchair lifts and ramps	8	21	4	7	0	42	13	4
Total	6.4	20	3.4	9.7	0.2	42	14	3.9
Total values for different trip purposes								
Doctor visit	10	32	6	13	1	64	22	4
Shopping	13	34	5	17	0	70	24	10
Social or recreational	7	27	5	13	0	57	20	4
Work	1	9	3	3	0	23	11	1
Percentage of each trip purpose group preferring specific technology								
Other	6.6	21	3.9	8.6	0.7	42	14	2.6
Real time expected wait time information displayed	7.5	20	2.9	9.8	0	40	14	5.8
Braille signage	5.3	20	3.8	9.8	0	43	15	3
Station telephones	2	18	5.9	5.9	0	45	22	2

Table 12 consists of four sub-tables. The top left sub-table shows the average number of people, categorized by ethnicity, who asked for a specific technology or service improvement to be made available. The top right sub-table shows this data by percent. These two tables show that real time expected wait time information is the most interesting alternative for seniors, followed by lower height buses.

The other two sub-tables group the number of people and average number of respondents who are interested in having various technologies by trip purpose. For work trips, it is interesting to note that the respondents wanted real time transit information on their cell phones more than lower height buses.

Table 13 correlates respondents' technology choices with their education level. Respondents who attended college or graduate school were more interested in receiving real time, expected wait time information displayed at transit facilities and real time transit information on their cell phones than seniors who received a high school degree or less formal education.

Table 13. Different Technologies Grouped by Education Level

	Providing more wheelchair lifts and ramps	Lower height buses	Audio_visual displays	Station telephones	Braille signage	Real time expected wait time information displayed	Real time transit information available by cell	Others
N/A	0	0	0	0	0	0	1	0
Some high school or less (Grade1-11)	0	3	0	0	0	2	2	0
High school graduate or equivalent	2	6	0	1	0	6	0	1
Some college or technical school	2	9	3	4	0	14	3	1
College graduate	1	4	1	3	0	16	5	1
Graduate or professional degree	3	4	0	4	0	17	9	2

Frequency for different levels of education

Percentage of each improvement in various levels of education

N/A	0	0	0	0	0	0	100	0
Some high school or less (Grade1-11)	0	40.7	3.7	3.7	0	25.9	25.9	0
High school graduate or equivalent	14	38	2	6	0	38	0	3
Some college or technical school	6	25	8	10	0	37	9	3
College graduate	3	13	4	8	0	53	15	4
Graduate or professional degree	7	10	0	11	1	43	24	5
Total	6.07	20	3.72	9	0.2	41.9	15.1	3.72

Table 14 shows the proposed improvements grouped by trip purpose and ethnicity. These results imply that printed transit schedules, increased service frequencies, and fixed routes that are specifically planned for seniors are the most attractive alternatives among the presented ones.

Table 14. Proposed Improvements Grouped by Trip Purpose and Ethnicity

	Others	Brochures describing how to use transit	Early morning or evening services	Adhering to the schedule more	Reducing the fares	Shuttle access to transit	Brochures providing the schedule	Increasing the frequency of services	More services on weekends and holidays	Fixed routes specially planned for seniors
Frequency for ethnicity										
N/A	0	1	0	1	2	0	0	1	1	1
African American	0	2	3	1	4	3	4	5	1	4
Asian/Pacific Island	0	1	0	1	1	1	3	2	2	2
Hispanic	1	1	1	0	2	0	1	0	1	0
Native American	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	1	0	0	0	1	1
White/caucasian	8	19	9	13	24	24	36	34	14	31
Total	9	23	12	16	33	28	44	41	19	38
Percentage of each ethnicity group preferring specific improvement										
Others	4	15	0	15	26	0	4	15	11	11
Brochures describing how to use transit	1	8	10	4	13	13	16	17	5	13
Early morning or evening services	0	6	2	9	9	9	21	15	15	15
Adhering to the schedule more	10	10	10	5	29	0	14	0	19	5
Reducing the fares	0	0	0	0	0	0	0	0	0	0
Shuttle access to transit	0	0	0	0	33	0	0	0	33	33
Brochures providing the schedule	4	9	4	6	12	11	17	16	6	15
Increasing the frequency of services	3	9	5	6	13	11	17	16	7	14
More services on weekends and holidays										
Fixed routes specially planned for seniors										
Frequency for different trip purposes										
Doctor visit	12	27	15	19	43	36	59	54	22	50
Shopping	12	35	16	22	53	41	62	59	24	57
Social or recreational	9	28	17	21	35	34	52	47	29	39
Work	25	2	13	8	7	16	11	23	21	8
Percentage of each trip purpose group preferring specific improvement										
Others	3.6	8	4.5	5.6	13	11	18	16	6.5	15
Brochures describing how to use transit	3.1	9.2	4.2	5.8	14	11	16	15	6.3	15
Early morning or evening services	2.9	9	5.5	6.8	11	11	17	15	9.3	13
Adhering to the schedule more	19	1.5	9.7	6	5.2	12	8.2	17	16	6

The top right sub-table shows the average number of respondents who were interested in specific transit improvements. Many of these respondents wanted written transit schedules, which supports one of the conclusions in Pace’s study of elderly travel behavior. (Please see Chapter 3.) Many of these respondents also wanted increased service frequencies and fixed routes specifically designed for seniors.

The other two sub-tables show these improvement preferences grouped for doctor visits, shopping trips, social or recreational travel, and work trips. Similar to Table 12’s results, work trip preferences are different from other trip purposes. These seniors, for instance, placed greater priority on more weekend and holiday transit service than on the need for printed timetables.

Table 15 shows proposed service improvements aggregated by education level. Respondents from all education levels were fairly consistent with how they would improve public transportation services in Northeastern Illinois.

Table 15. Proposed Improvements Grouped by Education Level

Others	Brochures describing how to use transit	Early morning or evening services	Adhering to the schedule more	Fixed routes specially planned for seniors	More services on weekends and holidays	Increasing the frequency of services	Brochures providing the schedule	Shuttle access to transit	Reducing the fares
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Frequency for different levels of education

N/A	1	0	1	1	2	1	1	1	1	0
Some high school or less (Grade1-11)	2	2	1	1	1	1	1	1	1	0
High school graduate or equivalent	5	3	7	5	3	9	2	2	4	2
Some college or technical school	10	11	15	7	9	11	4	6	6	4
College graduate	11	7	14	12	2	9	5	1	7	1
Graduate or professional degree	9	8	11	20	5	9	6	4	7	2

Percentage of each education group preferring specific technology

N/A	14	0	14	7	21	14	7	7	14	0
Some high school or less (Grade1-11)	14	18	9	11	7	11	9	9	11	0
High school graduate or equivalent	12	7	17	12	8	20	4	5	10	4
Some college or technical school	12	14	18	9	11	14	4	7	8	4
College graduate	17	10	21	17	2	13	7	2	10	2
Graduate or professional degree	11	10	14	25	6	11	8	4	8	3
Total	13	11	17	16	7	14	6	5	9	3

Tables 12-15 suggest that transit agencies should consider making printed schedules more readily available, increasing route frequencies, designing some routes specifically for seniors, providing more low-floor buses, adding real time information at stations, and making real time transit information available on cell phones.

5.4 TRANSIT PERFORMANCE ANALYSIS

Besides seeking information about respondents' preferences, the research team asked respondents to rate their satisfaction with existing transit services, highlighting its strengths and weaknesses. Table 16 shows respondents' average satisfaction ratings with Northeastern Illinois' existing transit services and standard deviation for total values. These ratings could range from "1" meaning highly dissatisfied to "5" meaning highly satisfied.

Generally, respondents were more satisfied with Pace than with the Chicago Transit Authority, even though they clearly value the Chicago Transit Authority's non-peak hour, early morning, late evening, and weekend services. None of the respondents, however, took Pace to get to and from work. Respondents who took the Chicago Transit Authority were more satisfied with their public transportation trips than those who used it for other trip purposes.

Table 16. Average Rankings by Different Trip Purposes for the CTA and Pace

	Doctor visit			Shopping			Social/Recreational			Work						
	Total	St.Dev.	PACE	CTA	Total	St.Dev.	PACE	CTA	Total	St.Dev.	PACE	CTA	Total	St.Dev.	PACE	CTA
Overall Service	3.85	0.90	4.60	3.62	3.87	0.83	4.00	3.64	4.07	0.89	4.60	3.54	4.35	0.74	-	4.22
Service Coverage	3.68	0.99	3.50	3.84	3.80	0.76	3.71	3.70	3.81	0.90	3.75	3.54	4.21	0.80	-	4.20
Reliability	3.54	0.97	4.50	3.53	3.65	0.98	4.00	3.61	3.84	1.08	4.80	3.18	3.93	1.03	-	3.80
Courtesy of Driver	4.11	1.07	4.20	4.20	4.18	0.84	4.25	4.20	4.39	0.94	4.80	4.00	4.46	0.74	-	4.60
Cleanliness of Vehicle	3.50	0.90	4.40	3.26	3.46	0.87	3.75	3.14	3.59	1.21	4.00	3.00	3.93	0.85	-	3.72
Comfort on Board	3.66	0.76	4.40	3.50	3.58	0.86	3.75	3.54	3.73	1.04	4.40	3.18	3.93	0.79	-	3.80
Noise on Board	3.30	0.87	3.25	3.28	3.00	0.86	3.00	2.75	3.26	1.09	2.75	3.10	3.66	0.97	-	3.50
Cost of Transit	3.61	1.23	4.60	3.53	3.53	1.10	4.00	3.23	3.96	0.91	4.40	3.54	4.00	1.07	-	4.10
Route Information	3.63	1.17	3.75	3.77	3.50	1.14	3.71	3.18	4.04	1.08	4.40	3.44	3.78	0.97	-	3.55
Shelter Availability	3.19	1.07	2.00	3.44	3.42	0.98	3.60	3.15	3.30	1.30	3.50	2.91	4.15	0.80	-	3.88
Service Frequency	3.37	0.97	3.33	3.50	3.28	1.01	3.16	3.35	3.29	1.26	4.00	2.91	3.76	1.01	-	3.60
Early Morning	3.52	1.34	2.75	4.00	3.45	1.14	2.80	3.88	3.30	1.34	3.00	3.22	4.18	0.87	-	3.83
Late Evening	2.42	1.50	1.00	3.50	2.76	0.97	2.40	3.00	2.50	1.27	1.50	2.78	3.44	1.13	-	2.80
Saturday	2.50	1.34	1.00	3.50	2.73	0.96	2.50	3.00	2.43	1.20	1.60	2.63	3.00	0.63	-	3.00
Sunday	2.40	1.40	1.00	3.22	2.52	1.23	2.00	3.00	2.17	1.18	1.40	2.55	2.66	0.81	-	2.66
Station Condition	3.22	0.73	2.00	3.38	3.52	0.87	3.50	3.40	3.41	0.95	3.00	3.27	3.85	0.86	-	3.90
Priority Seating	3.71	0.91	4.50	3.81	3.77	1.01	3.83	3.76	3.47	0.96	4.66	3.20	4.20	0.56	-	4.10
Audio Visual	4.05	0.87	4.50	4.16	3.82	0.77	3.20	3.91	3.50	0.85	4.00	3.37	4.30	0.67	-	4.28
Seat Availability	3.95	0.78	4.50	3.92	3.68	0.80	3.57	3.76	4.04	0.84	4.40	3.80	4.14	0.86	-	3.90
Safety	4.04	0.92	4.20	4.07	4.07	0.82	4.00	4.09	3.96	0.85	4.20	3.66	4.46	0.74	-	4.30
Observations	27		5	16	32		8	14	27		5	14	15		0	10

5.5 MODE CHOICE STATISTICS

Table 17 shows the number and percentage of trips by trip mode and purpose and the average per capita number of vehicles available in the household.

It appears that respondents in this study predominantly used their cars to travel for all trip purposes. For trip purposes such as doctor visits or social or recreational trips, respondents have had a good chance of receiving a ride from a friend or relative (carpool). They also took public transportation when auto drive was not an option. However, it appears that for shopping and work trips, respondents took public transportation more often than the carpool alternative.

Table 17. Share Percentage of Different Transportation Mode Use, Grouped by Trip Purpose

Trip Purpose	Mode	Number in each Group	Percentage	Avg # of Veh / HH Size
Doctor Visit		1	0.40%	1.000
Doctor Visit	Multimodal	4	1.59%	0.500
Doctor Visit	Auto Drive	179	71.31%	0.957
Doctor Visit	Carpool	29	11.55%	0.721
Doctor Visit	CTA bus	17	6.77%	0.706
Doctor Visit	CTA train	1	0.40%	0.000
Doctor Visit	Taxi	4	1.59%	0.500
Doctor Visit	PACE bus	7	2.79%	0.333
Doctor Visit	Para-transit system	2	0.80%	0.000
Doctor Visit	Walk	7	2.79%	0.429
Doctor Visit	Others	1	0.40%	0.500
Shopping		2	0.75%	0.750
Shopping	Multimodal	6	2.26%	1.111
Shopping	Auto Drive	200	75.47%	0.945
Shopping	Carpool	19	7.17%	0.671
Shopping	CTA bus	15	5.66%	0.367
Shopping	Metra	1	0.38%	1.000
Shopping	Taxi	3	1.13%	0.000
Shopping	PACE bus	8	3.02%	0.500
Shopping	Para-transit system	1	0.38%	0.000
Shopping	Walk	10	3.77%	0.500
Shopping	Others	2	0.75%	0.250
Social or Recreational	Bike	1	0.45%	2.000
Social or Recreational	Multimodal	6	2.68%	1.000
Social or Recreational	Auto Drive	140	62.50%	0.926
Social or Recreational	Carpool	42	18.75%	0.744
Social or Recreational	CTA bus	11	4.91%	0.288
Social or Recreational	CTA train	5	2.23%	1.300
Social or Recreational	Metra	6	2.68%	0.917
Social or Recreational	Taxi	3	1.34%	0.667
Social or Recreational	PACE bus	5	2.23%	0.400
Social or Recreational	Walk	5	2.23%	0.700
Social or Recreational	Others	4	1.79%	1.000
Work	Multimodal	3	3.37%	0.667
Work	Auto Drive	59	66.29%	1.047
Work	Carpool	3	3.37%	1.167
Work	CTA bus	8	8.99%	0.875
Work	CTA train	4	4.49%	0.750
Work	Metra	4	4.49%	1.000
Work	Taxi	3	3.37%	0.833
Work	Suttle	1	1.12%	0.500
Work	Walk	4	4.49%	0.875

Table 18 shows these results in aggregated form. It shows that the auto drive mode was the most popular mode among seniors, especially for shopping and doctors' visits (82%, 83%). Public transportation was more attractive for work trips (17%), with these seniors using CTA and Metra. Seniors who were not retired also used the CTA

more than Pace for other trips. The denser, urbanized land uses in the CTA's service area may have been the primary reason for this pattern.

The combination mode also may be considered a transit mode since it mainly covers those who either parked their cars in a suburban parking lot and took Metra or Pace or walked to their transit connection.

Table 18. Share Percentage of Aggregated Transportation Modes, grouped by Trip Purpose

Trip_Purpose	ModeName	Mode	Percentage
Doctor Visit	Auto drive	209	83%
Doctor Visit	CTA	18	7%
Doctor Visit	PACE	6	2%
Doctor Visit	Non-Motorized	7	3%
Doctor Visit	Multimodal	12	5%
Shopping	Auto drive	219	82%
Shopping	CTA	15	6%
Shopping	PACE	8	3%
Shopping	Metra	1	0%
Shopping	Non-Motorized	10	4%
Shopping	Multimodal	14	5%
Social or Recreational	Auto drive	182	80%
Social or Recreational	CTA	16	7%
Social or Recreational	PACE	5	2%
Social or Recreational	Metra	6	3%
Social or Recreational	Non-Motorized	6	3%
Social or Recreational	Multimodal	13	6%
Work	Auto drive	62	70%
Work	CTA	12	13%
Work	Metra	4	4%
Work	Non-Motorized	4	4%
Work	Multimodal	7	8%

5.6 TRIP ATTRIBUTE STATISTICS

The main part of the survey asked questions about respondents' most recent shopping, doctor visit, social and recreational, or work trips. The research team divided questions for each of these trip purposes into four sections. The first section for each trip type asked respondents general questions about trip attributes, such as time-of-day, mode, flexibility, etc. The next three sections covered trip attributes like travel time, trip cost, and waiting time for each travel mode. The results of these questions are tabulated and summarized in this section.

Table 19 shows the distance (in miles) between respondents' origins and destinations for doctor's visits, shopping trips, social or recreational travel, and work trips.

Table 19. Share Percentage of Distance Categories Grouped by Trip Purpose

Trip_Purpose	Distance	Count	Percentage
Doctor Visit	0-1	33	13%
Doctor Visit	1-5	111	44%
Doctor Visit	5-10	64	25%
Doctor Visit	10-15	21	8%
Doctor Visit	15-25	19	8%
Doctor Visit	>25	4	2%
Shopping	0-1	60	22%
Shopping	1-5	148	55%
Shopping	5-10	40	15%
Shopping	10-15	10	4%
Shopping	15-25	5	2%
Shopping	>25	4	1%
Social or Recreational	0-1	24	11%
Social or Recreational	1-5	86	38%
Social or Recreational	5-10	48	21%
Social or Recreational	10-15	19	8%
Social or Recreational	15-25	28	12%
Social or Recreational	>25	23	10%
Work	0-1	12	13%
Work	1-5	31	35%
Work	5-10	16	18%
Work	10-15	10	11%
Work	15-25	10	11%
Work	>25	10	11%

Most shopping and doctors' visit trips were less than five miles away from their trip origin. Because many of these seniors live in suburbs where transit does not adequately serve these short trips, many of them drove or got rides from friends or relatives.

Since it is impossible to have a transit system similar to downtown Chicago throughout the Chicago metropolitan area to handle these short trips, the research team suggests applying other creative and appealing alternatives, such as shuttle routes in which interested seniors could be identified and scheduled with other seniors for their shopping trips, doctor visits, and social or recreational trips. Alternatives like this are recommended to encourage elderly people to give up driving to almost all of their destinations.

Although Table 19 shows the distribution of trip distances among different trip purposes, it does not indicate the modes that these seniors chose for each trip type. Figure 10, however, compares the frequency of private vehicle mode to public transit. The frequency of private vehicle mode is far greater than other modes for seniors.

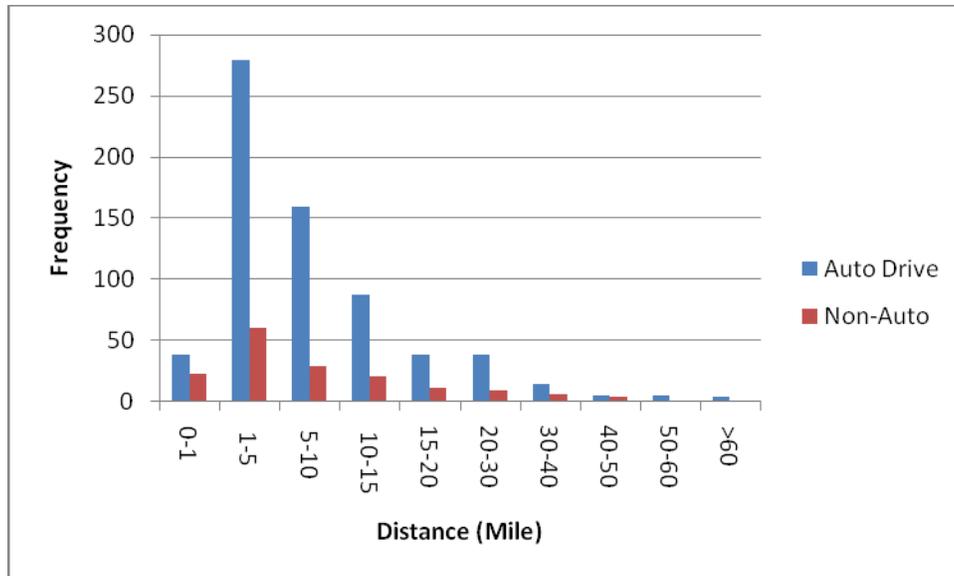


Figure 10. Frequency of Auto and Public Transit Modes at Different Distance Categories

Details of the frequency of non-auto modes are presented in Figure 11. This figure shows that seniors primarily chose the CTA as their primary non-auto mode, although they did not like it for longer trips.

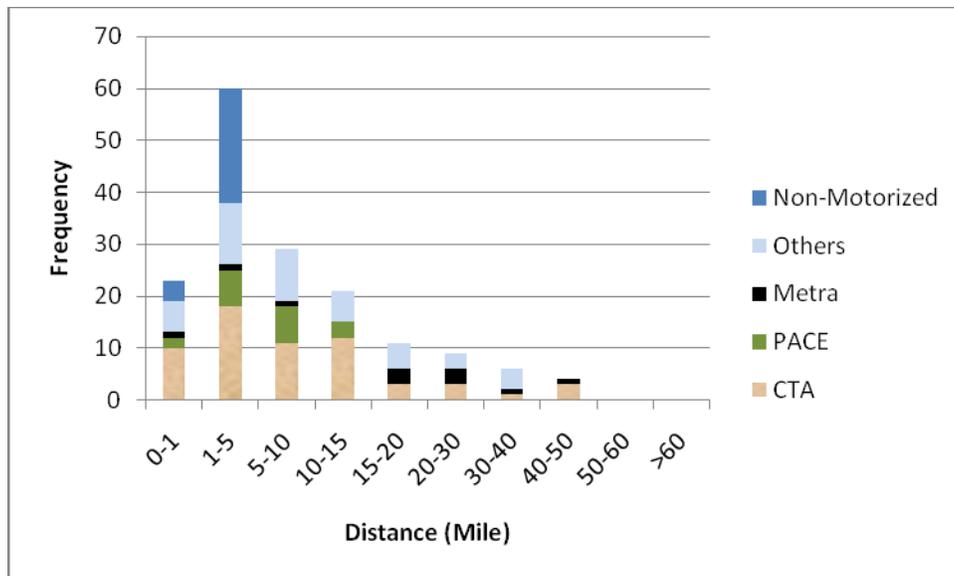


Figure 11. Frequency of Different Non-Auto Modes at Different Distance Categories

Time-of-day is another issue included in this survey. Shifting non-essential trips from peak hours to non-peak hours requires a brief understanding of the reasons behind these peak hour trips. Five time period categories are defined in this project according to the frequency distribution of trips within a day. In this study, a day is divided into five

time periods, namely, early morning (“EM”, 4:00 – 7:59), morning peak (“AM”, 8:00 – 10:59), midday (“MD”, 11:00 – 14:59), afternoon peak (“PM”, 15:00 – 19:59), and nighttime (“NT”, 20:00 – 3:59). The research team devised these five time periods by considering the daily trip distribution that the respondents reported. In total, 7% of the entire reported trips occurred in the early morning, 43% in the morning peak, 30% midday, 17% in the afternoon peak, and 3% at night. Time-of-day frequency distribution is shown in Figures 12-15 for these four trip purposes.

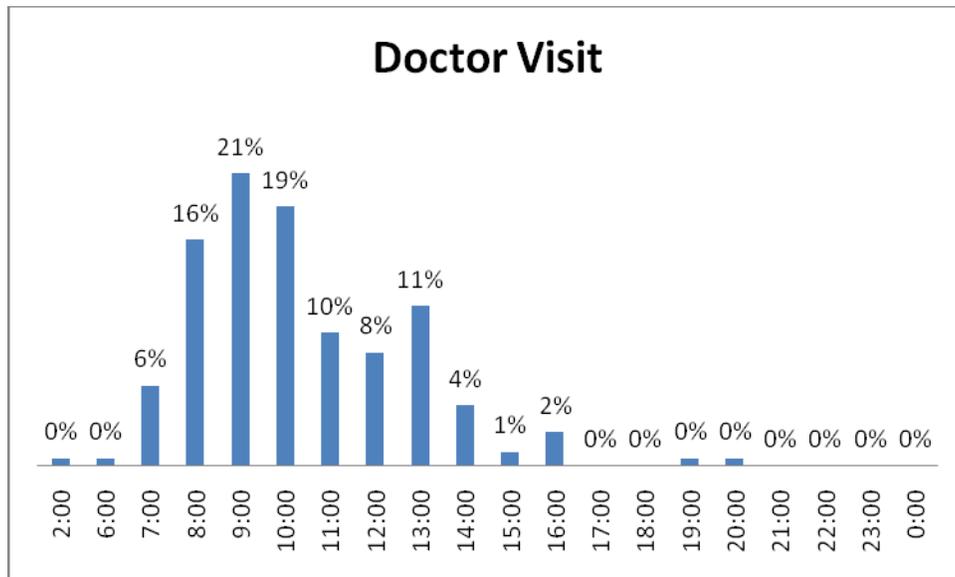


Figure 12. Time-of-Day Frequency Distribution for Doctor Visit Trips

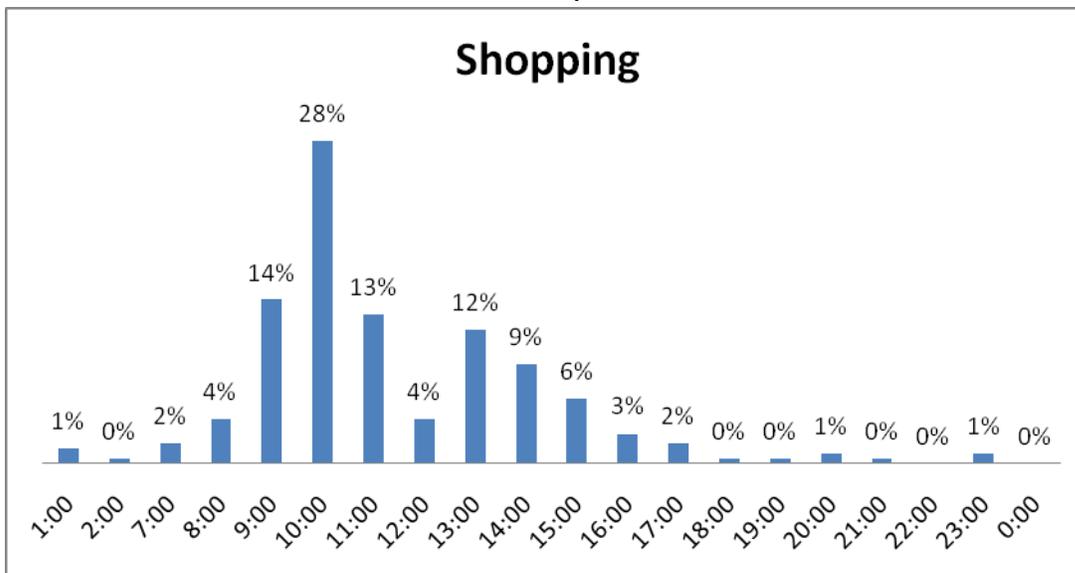


Figure 13. Time-of-Day Frequency Distribution for Shopping Trips

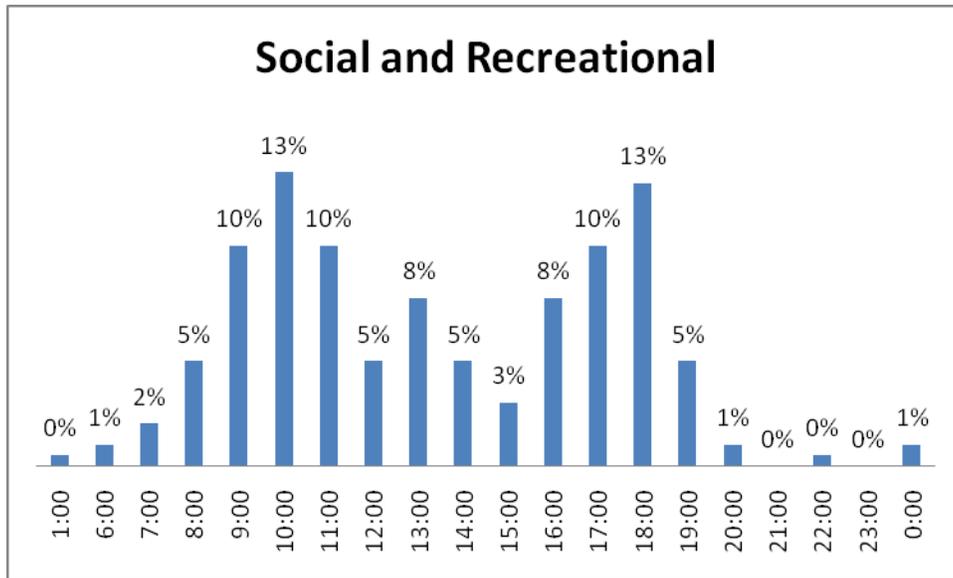


Figure 14. Time-of-Day Frequency Distribution for Social and Recreational Trips

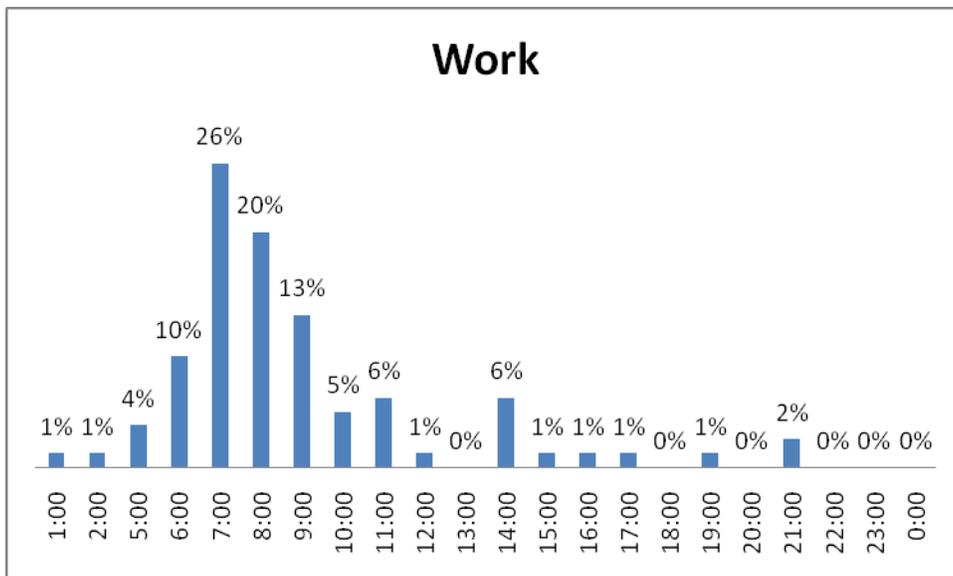


Figure 15. Time-of-Day Frequency Distribution for Work Trips

The doctor visit and shopping trip distributions have just one peak which occurs in the morning peak period. The work trip peak is spread over the early morning and morning peak periods, but mainly falls in the morning peak period. The social and recreational trip pattern has two peaks that begin in the morning peak period and end in the afternoon peak period.

Transportation Demand Management (TDM) strategies may be used to shift these trips from peak to non-peak. These strategies also can potentially cause mode change and are less costly than those strategies aimed at changing transportation mode. Again, seniors living in suburban areas in which transit accessibility parameters

are very low are not willing to use transit; therefore, other options should be applied to make them give up driving their cars, such as transit routes designed just for seniors.

The research team also asked respondents about whether they regularly make the same trips each month. The average number of times a trip was repeated is shown in Table 20 grouped by trip purpose and standard deviation.

Table 20. Per Month Trip Frequency for Various Trip Purposes

Trip Purpose	Mean	Standard Deviation	# of Non- Zero Observations	Total
Doctor Visit	1.14	2.04	243	252
Shopping	6.52	4.91	262	267
Social or Recreational	3.73	4.12	217	228
Work	11.73	7.54	88	89

Despite the fact that standard deviation values are not small, the mean values are meaningful. The number of reported trips for doctor visits, shopping trips, and social or recreational travel are almost the same, but their frequencies are very different, as seen in Table 20. The number of work trips is small for seniors, however, because of their high frequency, they occur more often than social and recreational trips. Since shopping and work trips are frequent for seniors, planning for these trips rather than other trips may mitigate the transportation challenges brought about by licensed senior drivers.

Most of the respondents are suburbanites, as evidenced by the survey, which shows that almost 90% of their trips were made in Chicago's suburbs. Table 21 shows the results of the origin-destination matrix for reported trips, including actual values and percentage estimations. Most of these trips ended in suburban areas, even those which originated from downtown Chicago (69% of recreational and work trips originated from downtown Chicago destined to suburbs). Table 21 includes entire reported trips and whether they were made by auto, transit, or other mode of transportation. Improving the CTA system, therefore, does not seem to be an efficient alternative for encouraging seniors to use transit more often because less than 5% of trips happen in Chicago on average. It is also worth noting that a small portion of trips happen in rural areas and that providing transit services for them is nearly impossible.

Table 21. Origin-Destination Tables for the Four Trip Purpose Categories

	City of Chicago Other Than Downtown	Chicago Downtown	Suburb	Rural Area
Shopping Trip				
City of Chicago Other Than Downtown	23 (82%)	2 (7%)	3 (11%)	0 (0%)
Chicago Downtown	9 (53%)	4 (24%)	4 (24%)	0 (0%)
Suburb	10 (5%)	0 (0%)	180 (91%)	7 (4%)
Rural Area	0 (0%)	0 (0%)	3 (43%)	4 (57%)
Doctor Visit				
City of Chicago Other Than Downtown	26 (79%)	4 (12%)	3 (9%)	0 (0%)
Chicago Downtown	4 (57%)	3 (43%)	0 (0%)	0 (0%)
Suburb	13 (6%)	0 (0%)	188 (91%)	5 (2%)
Rural Area	2 (11%)	0 (0%)	10 (53%)	7 (37%)
Social Recreational				
City of Chicago Other Than Downtown	15 (50%)	3 (10%)	12 (40%)	0 (0%)
Chicago Downtown	6 (21%)	3 (10%)	20 (69%)	0 (0%)
Suburb	15 (10%)	4 (3%)	129 (87%)	0 (0%)
Rural Area	1 (7%)	0 (0%)	8 (57%)	5 (36%)
Work				
City of Chicago Other Than Downtown	7 (54%)	2 (15%)	4 (31%)	0 (0%)
Chicago Downtown	4 (25%)	1 (6%)	11 (69%)	0 (0%)
Suburb	6 (11%)	2 (4%)	47 (85%)	0 (0%)

Seniors were also asked to report whether they were alone on their most recent trips or if they had other people accompanying them. Results from these questions are presented in Table 22. This table shows that most seniors commonly travel alone for their work trips (90%) and less commonly for social and recreational trips (35%).

Table 22. Summary of Answers to the Question about Number of People Accompanying the Respondent

	Alone	With Another Adult	With More Than One Adult	With Child or Children
Shopping	172(65%)	76(29%)	9(3%)	7(3%)
Doctor Visit	171(69%)	74(30%)	3(1%)	
Social or Recreational	78(35%)	106(48%)	33(15%)	2(0%)
Work	78(90%)	6(7%)	1(1%)	1(1%)

One of the most common reasons for driving alone is the number of stops on the trip route, but this does not appear to be a factor for seniors. Table 23 shows that more than 80% of seniors' trips on average are a straight route from their origin to destination without any intermediate stops.

Total travel time is one of the main components of the travel cost estimation. In this study, seniors were asked about their waiting time, in-vehicle and out-of vehicle travel times, and approximate cost of travel. Table 23 reports the results of non-motorized travel time. According to this study's results, seniors generally do not prefer non-motorized destinations that are more than a 15 minute walk.

Table 23. Non-Motorized Travel Time Categories

Non-Motorized Transportation	Count	Percentage
Less than 5 Minutes	3	9.67%
6-10 Minutes	8	25.8%
11-15 Minutes	10	32.25%
16-20 Minutes	6	19.35
21-30 Minutes	2	6.45%
More than 30 Minutes	2	6.45%

Transit travel times are shown in Table 24. As shown in the table, travel times between 15-45 minutes are the most common (Avg: 35%).

Table 24. Transit Travel Time as Reported by Transit Users

Transit Travel Time	Count	Percentage
Less than 15 Minutes	9	8.03%
16-30 Minutes	46	41.07%
31-45 Minutes	35	31.25%
46-60 Minutes	18	16.07%
More than 60 Minutes	4	3.57%

Similarly, waiting time for transit is presented in Table 25. Six to ten minutes is the time that most respondents reported waiting during their most recent trip. In other words, the accepted waiting time for seniors is 6-10 minutes, depending on many other factors such as shelter conditions.

Table 25. Transit Waiting Time as Reported by Transit Users

Waiting Time	Count	Percentage
Less than 5 Minutes	16	14.67%
6-10 Minutes	44	40.36%
11-15 Minutes	31	28.44%
16-20 Minutes	9	8.25%
21-30 Minutes	6	5.50%
More than 30 Minutes	3	2.75%

The last table regarding travel time is about reported driving travel time. In contrast to the other travel time data, auto drive travel time is almost uniformly distributed for trips longer than five minutes.

Table 26. Driving Travel Time Reported in the Questionnaires

Auto Travel Time	Count	Percentage
Less than 5 Minutes	33	5.49%
6-15 Minutes	163	27.12%
16-30 Minutes	140	23.29%
31-45 Minutes	66	10.98%
46-60 Minutes	62	10.31%
More than 60 Minutes	137	22.79%

Transit users were also asked about the way in which they access transit. Walking is the dominant mode to accessing transit and the final destination from transit.

Table 27. Access Type from the Origin to Transit Station

Access Type	Count	Percentage
Walk	59	53.63%
Bike	1	0.90%
Driving Alone Then Park	31	28.18%
Being Dropped-off	13	11.81%
Taxi	2	1.81%
Other	4	3.63%

Table 28. Access Type from Transit Station to Final Destination

Access Type	Count	Percentage
Walk	83	80.76%
Being Picked Up	13	12.50%
Using Wheelchair	1	0.96%
Taxi	1	0.96%
Other	6	5.76%

Paying for transit can be done using different methods, but seniors mainly preferred to pay by cash or single ticket (52.24%). Seniors also occasionally used a reduced fare option, mainly for the CTA, as shown in Table 30.

Table 29. Transit Payment Method

Options	Count	Percentage
Cash/Single Ticket	58	52.24%
Monthly Transit Pass	8	7.20%
10-Ride Ticket	9	8.10%
Chicago Card	13	11.71%
Chicago Card Plus	3	2.70%
Others (Esp. Reduced Fare Ticket)	20	18.01%

Table 30. Answer to the Question about Using Reduced Fare Tickets for Transit Fare

Transit Provider	Yes	No
CTA	53	8
Pace	15	4
Metra	8	3

5.7 Mode Choice Cross Classification Tables

One of this project's primary goals is to recommend ways for increasing senior citizens' transit ridership. Since the number of licensed seniors will double in the next two decades, this objective is very important. Having the survey data summarized and tabulated, the research team will then need to apply the dataset for modeling purposes. This section provides two simple cross classification models for doctor visits, shopping trips, social or recreational travel, and work trips, considering disability and income as independent variables.

The research team initially considered income, which plays a significant role in mode choice as mentioned in the literature. It was postulated that people with higher incomes tend to use their vehicles and non-motorized modes more than other transportation alternatives, whereas, people with lower incomes mainly use transit.

Table 31. Cross-Classification Table Representing the Interaction between Mode Choice and Income for Four Trip Purposes

	Under \$15,000	\$15,000-\$29,999	\$30,000-\$44,999	\$45,000-\$59,999	More than 60,000
Shopping Trip					
Auto Drive	12 (8%)	28 (20%)	25 (17%)	25 (17%)	53 (37%)
CTA	4 (33%)	4 (33%)	3 (25%)	0 (0%)	1 (8%)
PACE	0 (0%)	1 (33%)	2 (67%)	0 (0%)	0 (0%)
Non-Motorized	0 (0%)	2 (29%)	1 (14%)	1 (14%)	3 (43%)
Others (Esp. Combination)	2 (20%)	4 (40%)	1 (10%)	1 (10%)	2 (20%)
Doctor visit trip					
Auto Drive	13 (9%)	32 (21%)	30 (20%)	25 (17%)	50 (33%)
CTA	4 (33%)	5 (42%)	2 (17%)	0 (0%)	1 (8%)
PACE	2 (50%)	0 (0%)	1 (25%)	1 (25%)	0 (0%)
Non-Motorized	1 (11%)	0 (0%)	1 (11%)	3 (33%)	4 (44%)
Others (Esp. Combination)	2 (20%)	4 (40%)	1 (10%)	0 (0%)	3 (30%)
Social and Recreational trip					
Auto Drive	12 (9%)	29 (22%)	24 (18%)	18 (14%)	49 (37%)
CTA	3 (27%)	2 (18%)	2 (18%)	2 (18%)	2 (18%)
PACE	0 (0%)	0 (0%)	1 (50%)	1 (50%)	0 (0%)
Metra	0 (0%)	0 (0%)	0 (0%)	3 (60%)	2 (40%)
Non-Motorized	1 (17%)	1 (17%)	1 (17%)	1 (17%)	2 (33%)
Others (Esp. Combination)	12 (9%)	29 (22%)	24 (18%)	18 (14%)	49 (37%)
Work trip					
Auto Drive	2 (4%)	4 (8%)	9 (18%)	8 (16%)	28 (55%)
CTA	2 (29%)	2 (29%)	2 (29%)	0 (0%)	1 (14%)
PACE	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Metra	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)
Non-Motorized	1 (33%)	1 (33%)	0 (0%)	0 (0%)	1 (33%)
Others (Esp. Combination)	2 (4%)	4 (8%)	9 (18%)	8 (16%)	28 (55%)

Disabilities, which happen to be more common among seniors, may also significantly influence mode choice behavior. The interaction between disability and mode choice is shown in Table 32.

Table 32. Cross-Classification Table Representing the Interaction between Mode Choice and Disability for Four Trip Purposes

	Hearing impairment	Visual Impairment	Restricted mobility	Wheelchair user	Other	None
Doctor Visit Trip						
Auto Drive	11 (5%)	7 (3%)	18 (9%)	1 (0%)	0 (0%)	172 (82%)
CTA	1 (6%)	1 (6%)	3 (17%)	1 (6%)	2 (11%)	10 (56%)
Pace	0 (0%)	0 (0%)	3 (50%)	0 (0%)	0 (0%)	3 (50%)
Metra	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Non-Motorized	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	7 (100%)
Others	0 (0%)	0 (0%)	7 (58%)	0 (0%)	1 (8%)	4 (33%)
Shopping trip						
Auto Drive	9 (4%)	6 (3%)	25 (11%)	1 (0%)	2 (1%)	176 (80%)
CTA	1 (7%)	1 (7%)	2 (13%)	0 (0%)	0 (0%)	11 (73%)
Pace	1 (13%)	1 (13%)	2 (25%)	0 (0%)	0 (0%)	4 (50%)
Metra	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)
Non-Motorized	1 (10%)	1 (10%)	0 (0%)	0 (0%)	0 (0%)	8 (80%)
Others	1 (7%)	0 (0%)	6 (43%)	0 (0%)	1 (7%)	6 (43%)
Social and recreational trip						
Auto Drive	9 (5%)	4 (2%)	19 (10%)	2 (1%)	2 (1%)	146 (80%)
CTA	1 (20%)	1 (20%)	2 (40%)	0 (0%)	1 (20%)	0 (0%)
Pace	0 (0%)	0 (0%)	2 (40%)	0 (0%)	0 (0%)	3 (60%)
Metra	0 (0%)	1 (17%)	0 (0%)	0 (0%)	0 (0%)	5 (83%)
Non-Motorized	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6 (100%)
Others	0 (0%)	1 (8%)	3(23%)	0 (0%)	0 (0%)	9 (69%)
Work trip						
Auto Drive	4 (6%)	2 (3%)	2 (3%)	1 (2%)	0 (0%)	53 (85%)
CTA	0 (0%)	0 (0%)	2 (17%)	0 (0%)	1 (8%)	9 (75%)
Pace	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Metra	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (100%)
Non-Motorized	0 (0%)	0 (0%)	1 (25%)	0 (0%)	0 (0%)	3 (75%)
Others	0 (0%)	0 (0%)	2 (29%)	0 (0%)	1 (14%)	4 (57%)

CHAPTER 6 CONCLUSION AND RECOMMENDATIONS

Despite commonly held beliefs, seniors greatly lessen the number of trips once they stop driving, not because they get older or retire. The burgeoning senior population and seniors' reliance on their cars will continue to result in more highway congestion and age-related accidents across the United States. Immediate attention is therefore required to develop strategies to encourage seniors to use or more frequently use public transportation.

- 1) More research and data collection should be done to understand seniors' transportation requirements and come up with better solutions for managing huge increases in elderly drivers over the next two decades.
- 2) Surveys targeting seniors require a variety of scenarios to increase survey response rates. However, each survey scenario should include a letter from a governmental agency that has the authority to use the collected data in order to significantly increase response rates.
- 3) According to the results of Table 8, this study's results are consistent with the results of the 2000 Census, so that it can be used for modeling purposes and further analysis. Follow-up surveys for those respondents who have expressed an interest in them are highly recommended because they have already been recruited and therefore may more carefully respond to these surveys.
- 4) Safety significantly influences seniors' choices about transit. Providing a cleaner and more organized environment is recommended to allay seniors' concerns about the transit systems' safety.
- 5) Seniors do not make many stops on their trips and usually do not transfer between various modes. Therefore, providing services that require many stops along the routes are not useful for them.
- 6) Real time expected wait time information displayed in the station, real time transit information available by cell phone, and lower height buses are the most appealing technologies in the respondents' view.
- 7) Brochures providing transit schedules, increased service frequencies, and fixed routes specially designed for seniors are the highest ranked improvements that respondents chose.
- 8) Seniors mainly travel during peak hours. Transit Demand Management (TDM) strategies should therefore be applied to motivate seniors to make their trips during non-peak hours.
- 9) The fact that seniors are living mainly in suburban areas makes it difficult to provide accessible public transportation for them. Most transit services are designed for work trip purposes, so planning services designed specifically for seniors would encourage them to use public transportation (e.g. shuttle services that pick up prescheduled users from their origins and drop off at their destinations like shopping malls, social and recreational centers, or health care centers.)
- 10) Seniors frequently walk to public transportation and do not often transfer between vehicles. Therefore, kiss-and-ride options, free transfer tickets, and similar options are not recommended.
- 11) Accepted waiting time for seniors is less than 10 minutes according to the results shown in Table 25. Providing better station and stop conditions may increase this accepted waiting time and consequently increase the number of senior transit users.

12) Reducing transit fares is not recommended for encouraging seniors to give up driving their own vehicles.

REFERENCES

1. 2001 National Household Travel Survey, US Department of Transportation, <http://nhts.ornl.gov/2001/index.shtml>
2. A Statistical Profile of Older Americans Aged 65, 2003. Administration on Aging, U.S. Department of Health and Human Services. http://www.aoa.dhhs.gov/press/fact/pdf/ss_stat_profile.doc
3. Alsnih R., D. A. Hensher, The Mobility and Accessibility of Seniors in an Aging Population, *Transportation Research Part A*, 37, 2003, 903-916.
4. Burkhardt, J.E., Berger, A.M., Creedon, M., McGavock, A.T., 1998. Mobility and Independence: Changes and Challenges for Older Drivers. Available from www.aoa.gov/research/drivers.html, January 2003.
5. Burkhardt, J.E. and Eberhard J., technical background for symposium on transportation mobility for elderly, NCHRP PROJECT 20-24(24), National Cooperative Highway research Program, Transportation Research Board, National Academies and the American Association of State Highway and Transportation Officials, October 15, 2003.
6. Bush, S., "Forecasting 65+ Travel, an Integration of Cohort Analysis and Travel Demand Modeling", TRB 2005 Annual Meeting CD-ROM.
7. Evans, E.L., Influences on Mobility Among Non-driving Older Americans. In: Transport Research Board Conference Proceedings, Personal Travel: The Long and the Short of It, June 28–July 1, 1999.
8. Koffman D. and R. Salstrom, How Best to Serve Seniors on Existing Transit Services, Publication of Mineta Transportation Institute, MTI Report 01-04, September 2001.
9. Rosenbloom S., The mobility Needs of Older Americans: Implications for Transportation Reauthorization, The Brookings Institution Series on Transportation Reform, Center on Urban and Metropolitan Policy, 2003.
10. Rosenbloom, S. Sustainability and Automobility Among the Elderly: An International Assessment. *Transportation* 28, 2001, 375-408.
11. Schmocker, J.D., Quddus, M.A., Noland, R.B. and Bell, M.G.H, 2004. "Estimating Trip Generation of Elderly and Disabled People: An Analysis of London Data", TRB 2005 Annual Meeting CD-ROM.
12. Stern, S. "A disaggregate discrete choice model of transportation demand by elderly and disabled people in rural Virginia", *Transportation Research A*, 27(4), 1993, 315-327.
13. Stopher P.R., Wilmot C.G., Stecher C. and Alsnih R., 2004. Household Travel Survey: Proposed Standards and Guidelines," Keynote paper, International Steering Committee for Travel Survey Conferences (ISCTSC), Costa Rica. August 1-6, 2004.
14. U.S. Department of Transportation, Safe Mobility for Maturing Society: Challenges and Opportunities, November 2003, Washington, D.C.

APPENDIX A: Survey

<p style="text-align: center;">Shopping Trip</p> <div style="text-align: center;">  </div> <p>1) How did you travel in your <u>most recent shopping trip</u>? I....</p> <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Walked all the way</td> <td><input type="checkbox"/> Took CTA bus</td> </tr> <tr> <td><input type="checkbox"/> Drove alone</td> <td><input type="checkbox"/> Took CTA train</td> </tr> <tr> <td><input type="checkbox"/> Someone gave me ride</td> <td><input type="checkbox"/> Used Pace Bus</td> </tr> <tr> <td><input type="checkbox"/> Biked</td> <td><input type="checkbox"/> Took Metra</td> </tr> <tr> <td><input type="checkbox"/> Used Para-transit system</td> <td><input type="checkbox"/> Took taxi</td> </tr> <tr> <td><input type="checkbox"/> Used Vanpool</td> <td><input type="checkbox"/> Used Shuttle</td> </tr> <tr> <td colspan="2"><input type="checkbox"/> Combination of these (Specify:</td> </tr> <tr> <td colspan="2"><input type="checkbox"/> Others (Specify:</td> </tr> </table> <p>2) Was this a regular weekday trip? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>3) What was the approximate distance from your origin to the destination of this trip? ----- (<input type="checkbox"/> Miles/ <input type="checkbox"/> Feet)</p> <p>4) What time did you depart your origin for this trip? <input type="text"/> : <input type="text"/> (<input type="checkbox"/> AM/ <input type="checkbox"/> PM)</p> <p>5) How often do you repeat similar shopping trips? ----- times per</p> <p><input type="checkbox"/> Week <input type="checkbox"/> Month <input type="checkbox"/> Year</p> <p>6) Where did you go?</p> <p><input type="checkbox"/> Chicago downtown <input type="checkbox"/> Suburb <input type="checkbox"/> Rural area <input type="checkbox"/> City of Chicago-other than downtown</p> <p>7) What is the closest major intersection to your shopping destination? ----- and ----- City of -----</p> <p>8) My trip start time for this trip was</p> <p><input type="checkbox"/> Very flexible <input type="checkbox"/> Flexible <input type="checkbox"/> Fixed <input type="checkbox"/> Very fixed</p> <p>9) How many other destinations did you consider for this trip?</p> <p><input type="checkbox"/> Zero <input type="checkbox"/> One <input type="checkbox"/> Two <input type="checkbox"/> Three <input type="checkbox"/> Four or more</p> <p>10) I traveled for shopping</p> <p><input type="checkbox"/> Alone <input type="checkbox"/> with more than one adult <input type="checkbox"/> with another adult <input type="checkbox"/> with a child or children</p>	<input type="checkbox"/> Walked all the way	<input type="checkbox"/> Took CTA bus	<input type="checkbox"/> Drove alone	<input type="checkbox"/> Took CTA train	<input type="checkbox"/> Someone gave me ride	<input type="checkbox"/> Used Pace Bus	<input type="checkbox"/> Biked	<input type="checkbox"/> Took Metra	<input type="checkbox"/> Used Para-transit system	<input type="checkbox"/> Took taxi	<input type="checkbox"/> Used Vanpool	<input type="checkbox"/> Used Shuttle	<input type="checkbox"/> Combination of these (Specify:		<input type="checkbox"/> Others (Specify:		<p style="text-align: right;">Page 1 of 10</p> <p>11) Which of these improvements would encourage you to use transit more often? (Check all that apply)</p> <p><input type="checkbox"/> Reducing the fares <input type="checkbox"/> Shuttle access to transit <input type="checkbox"/> Brochures providing the schedule <input type="checkbox"/> Brochures describing how to use transit <input type="checkbox"/> Increasing the frequency of services <input type="checkbox"/> More services on weekends and holidays <input type="checkbox"/> Fixed routes specifically planned for seniors <input type="checkbox"/> Adhering to the schedule more <input type="checkbox"/> Early morning or evening services <input type="checkbox"/> Others (Specify :----- -----)</p> <p><input type="checkbox"/> I would never use transit</p> <p>12) What additional services or technologies would encourage you to use transit more often? (Check all that apply)</p> <p><input type="checkbox"/> Providing more wheelchair lifts and ramps <input type="checkbox"/> Lower height buses <input type="checkbox"/> Audio-visual displays <input type="checkbox"/> Station telephone <input type="checkbox"/> Braille signage <input type="checkbox"/> Real time expected wait time information displayed at stops/stations <input type="checkbox"/> Real time transit information available by cell phone <input type="checkbox"/> Others (Specify :----- -----)</p> <p>13) Did you need to make stops on your way to this destination? (Besides transfers)</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <hr/> <p>Part A) If you biked or walked or used your wheelchair for your shopping trip answer part A, otherwise, skip to part B.</p> <p>A1) How long did your trip take?</p> <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Less than 5 Minutes</td> <td><input type="checkbox"/> 16-20 Minutes</td> </tr> <tr> <td><input type="checkbox"/> 6-10 Minutes</td> <td><input type="checkbox"/> 21-30 Minutes</td> </tr> <tr> <td><input type="checkbox"/> 11-15 Minutes</td> <td><input type="checkbox"/> More than 30 Minutes</td> </tr> </table>	<input type="checkbox"/> Less than 5 Minutes	<input type="checkbox"/> 16-20 Minutes	<input type="checkbox"/> 6-10 Minutes	<input type="checkbox"/> 21-30 Minutes	<input type="checkbox"/> 11-15 Minutes	<input type="checkbox"/> More than 30 Minutes
<input type="checkbox"/> Walked all the way	<input type="checkbox"/> Took CTA bus																						
<input type="checkbox"/> Drove alone	<input type="checkbox"/> Took CTA train																						
<input type="checkbox"/> Someone gave me ride	<input type="checkbox"/> Used Pace Bus																						
<input type="checkbox"/> Biked	<input type="checkbox"/> Took Metra																						
<input type="checkbox"/> Used Para-transit system	<input type="checkbox"/> Took taxi																						
<input type="checkbox"/> Used Vanpool	<input type="checkbox"/> Used Shuttle																						
<input type="checkbox"/> Combination of these (Specify:																							
<input type="checkbox"/> Others (Specify:																							
<input type="checkbox"/> Less than 5 Minutes	<input type="checkbox"/> 16-20 Minutes																						
<input type="checkbox"/> 6-10 Minutes	<input type="checkbox"/> 21-30 Minutes																						
<input type="checkbox"/> 11-15 Minutes	<input type="checkbox"/> More than 30 Minutes																						

Part B) If you used CTA, Metra, Pace or Para-Transit System please answer **part B**, questions below, otherwise, skip to **part C**.

B1) How did you pay for your trip?

Cash/Single ticket Chicago Card
 10-Ride ticket Chicago Card Plus
 ADA Para-transit Book 1-Day Pass
 Monthly Transit Pass 7-Day Pass
 Others (Specify:-----)

B2) Did you use reduced fare? Yes No

B3) How long were you in the vehicle for this trip?

Less than 15 minutes 46-60 minutes
 16-30 minutes More than 60 minutes
 31-45 minutes

B4) How long were you waiting for the vehicle?

Less than 5 minutes 16-20 minutes
 6-10 minutes 21-30 minutes
 11-15 minutes More than 30 minutes

B5) How did you access transit service for this trip?

Walked (How many minutes?-----)
 Biked
 Drove alone then parked
 Used wheelchair or scooter (How many minutes?----)
 Was dropped off
 Other (Specify :-----)

B6) How did you get to your final destination from the transit stop/station?

Walked (How many minutes?-----)
 Biked
 was picked up by another person
 Used wheelchair or scooter (How many minutes?----)
 Other (Specify :-----)

B7) If there was no Transit service, how would you make this trip?

Drive alone Walk
 Someone would drive me Bike
 Carpool or vanpool Would not make this trip
 Taxi
 Others (Specify:-----)

B8) Please rate the transit service that you used? (Please answer all that apply to your most recent shopping trip)

	Very Poor	Poor	Average	Good	Very Good	No Opinion
Overall service	1	2	3	4	5	0
Service coverage area	1	2	3	4	5	0
Reliability of schedule	1	2	3	4	5	0
Courtesy of drivers	1	2	3	4	5	0
Cleanliness of Vehicle	1	2	3	4	5	0
Comfort on board	1	2	3	4	5	0
Noise on board	1	2	3	4	5	0
Cost of transit	1	2	3	4	5	0
Route & schedule information	1	2	3	4	5	0
Availability of shelters	1	2	3	4	5	0
Frequency of service	1	2	3	4	5	0
Early morning service	1	2	3	4	5	0
Late evening service	1	2	3	4	5	0
Saturday service	1	2	3	4	5	0
Sunday service	1	2	3	4	5	0
Condition of stops/Station	1	2	3	4	5	0
Priority seating areas	1	2	3	4	5	0
Audio-visual display	1	2	3	4	5	0
Availability of seats	1	2	3	4	5	0
Safety	1	2	3	4	5	0

B9) How much did you pay for this one-way trip? \$-----

Part C) If you drove alone or someone gave you ride or you used taxi for this shopping trip answer **part C**.

C1) How much did you pay for this trip (taxi fare, or average cost of this trip)? \$-----

C2) How long did your trip last?

Less than 5 Minutes 31-45 Minutes
 6-15 Minutes 46-60 Minutes
 16-30 Minutes More than 60 Minutes

Next Page

1) **How did you travel in your most recent doctor visit trip? I....**

Walked all the way Took CTA bus
 Drove alone Took CTA train
 Someone gave me ride Used Pace Bus
 Biked Took Metra
 Used Para-transit system Took taxi
 Used Vanpool Used Shuttle
 Combination of these (Specify:)
 Others (Specify:)

2) **Was this a regular weekday trip?** Yes No

3) **What was the approximate distance from your origin to the destination of this trip?**
 ----- (Miles/ Feet)

4) **What time did you depart your origin for this trip?** : (AM/ PM)

5) **How often do you repeat similar doctor visit trips?**
 ----- times per
 Week Month Year

6) **Where did you go?**
 Chicago downtown Suburb Rural area
 City of Chicago-other than downtown

7) **What is the closest major intersection to your doctor visit destination?**
 ----- and -----
 City of -----

8) **My trip start time for this trip was**
 Very flexible Flexible Fixed Very fixed

9) **How many other destinations did you consider for this trip?**
 Zero One Two Three Four or more

10) **I traveled for doctor visit trip**
 Alone with more than one adult
 with another adult with a child or children

11) **Which of these improvements would encourage you to use transit more often? (Check all that apply)**

Same as shopping trip
 Reducing the fares
 Shuttle access to transit
 Brochures providing the schedule
 Brochures describing how to use transit
 Increasing the frequency of services
 More services on weekends and holidays
 Fixed routes specifically planned for seniors
 Adhering to the schedule more
 Early morning or evening services
 Others (Specify :-----
 -----)
 I would never use transit

12) **What additional services or technologies would encourage you to use transit more often? (Check all that apply)**

Same as shopping trip
 Providing more wheelchair lifts and ramps
 Lower height buses
 Audio-visual displays
 Station telephone
 Braille signage
 Real time expected wait time information displayed at stops/stations
 Real time transit information available by cell phone
 Others (Specify :-----
 -----)

13) **Did you need to make stops on your way to this destination? (Besides transfers)**
 Yes No

Part A) **→ If you biked or walked or used your wheelchair for your doctor visit trip answer part A, otherwise, skip to part B.**

A1) **How long did your trip take?**
 Less than 5 Minutes 16-20 Minutes
 6-10 Minutes 21-30 Minutes
 11-15 Minutes More than 30 Minutes



Part B) If you used CTA, Metra, Pace or Para-Transit System please answer **part B**, questions below, otherwise, skip to **part C**.

B1) How did you pay for your trip?

Cash/Single ticket Chicago Card
 10-Ride ticket Chicago Card Plus
 ADA Para-transit Book 1-Day Pass
 Monthly Transit Pass 7-Day Pass
 Others (Specify:-----)

B2) Did you use reduced fare? Yes No

B3) How long were you in the vehicle for this trip?

Less than 15 minutes 46-60 minutes
 16-30 minutes More than 60 minutes
 31-45 minutes

B4) How long were you waiting for the vehicle?

Less than 5 minutes 16-20 minutes
 6-10 minutes 21-30 minutes
 11-15 minutes More than 30 minutes

B5) How did you access transit service for this trip?

Walked (How many minutes?-----)
 Biked
 Drove alone then parked
 Used wheelchair or scooter (How many minutes?-----)
 Was dropped off
 Other (Specify :-----)

B6) How did you get to your final destination from the transit stop/station?

Walked (How many minutes?-----)
 Biked
 was picked up by another person
 Used wheelchair or scooter (How many minutes?-----)
 Other (Specify : -----)

B7) If there was no Transit service, how would you make this trip?

Drive alone Walk
 Someone would drive me Bike
 Carpool or vanpool Would not make this trip
 Taxi
 Others (Specify:-----)

B8) Please rate the transit service that you used? (Please answer all that apply to your most recent doctor visit trip)

Same as shopping trip

	Very Poor	Poor	Average	Good	Very Good	No Opinion
Overall service	1	2	3	4	5	0
Service coverage area	1	2	3	4	5	0
Reliability of schedule	1	2	3	4	5	0
Courtesy of drivers	1	2	3	4	5	0
Cleanliness of Vehicle	1	2	3	4	5	0
Comfort on board	1	2	3	4	5	0
Noise on board	1	2	3	4	5	0
Cost of transit	1	2	3	4	5	0
Route & schedule information	1	2	3	4	5	0
Availability of shelters	1	2	3	4	5	0
Frequency of service	1	2	3	4	5	0
Early morning service	1	2	3	4	5	0
Late evening service	1	2	3	4	5	0
Saturday service	1	2	3	4	5	0
Sunday service	1	2	3	4	5	0
Condition of stops/Station	1	2	3	4	5	0
Priority seating areas	1	2	3	4	5	0
Audio-visual display	1	2	3	4	5	0
Availability of seats	1	2	3	4	5	0
Safety	1	2	3	4	5	0

B9) How much did you pay for this one-way trip? \$-----

Part C) If you drove alone or someone gave you ride or you used taxi for this doctor visit trip answer **part C**.

C1) How much did you pay for this trip (taxi fare, or average cost of this trip)? \$-----

C2) How long did your trip last?

Less than 5 Minutes 31-45 Minutes
 6-15 Minutes 46-60 Minutes
 16-30 Minutes More than 60 Minutes

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1) How did you travel in your most recent social or recreational trip? I....

Walked all the way Took CTA bus
 Drove alone Took CTA train
 Someone gave me ride Used Pace Bus
 Biked Took Metra
 Used Para-transit system Took taxi
 Used Vanpool Used Shuttle
 Combination of these (Specify:)
 Others (Specify:)

2) Was this a regular weekday trip? Yes No

3) What was the approximate distance from your origin to the destination of this trip?
----- (Miles/ Feet)

4) What time did you depart your origin for this trip? : (AM/ PM)

5) How often do you repeat similar social or recreational trips?
----- times per

Week Month Year

6) Where did you go?

Chicago downtown Suburb Rural area
 City of Chicago-other than downtown

7) What is the closest major intersection to your social or recreational destination?
----- and -----
City of -----

8) My trip start time for this trip was

Very flexible Flexible Fixed Very fixed

9) How many other destinations did you consider for this trip?

Zero One Two Three Four or more

10) I traveled for social / recreational trip

Alone with more than one adult
 with another adult with a child or children

11) Which of these improvements would encourage you to use transit more often? (Check all that apply)

Same as shopping trip

Reducing the fares
 Shuttle access to transit
 Brochures providing the schedule
 Brochures describing how to use transit
 Increasing the frequency of services
 More services on weekends and holidays
 Fixed routes specifically planned for seniors
 Adhering to the schedule more
 Early morning or evening services
 Others (Specify :-----
-----)
 I would never use transit

12) What additional services or technologies would encourage you to use transit more often? (Check all that apply)

Same as shopping trip

Providing more wheelchair lifts and ramps
 Lower height buses
 Audio-visual displays
 Station telephone
 Braille signage
 Real time expected wait time information displayed at stops/stations
 Real time transit information available by cell phone
 Others (Specify :-----
-----)

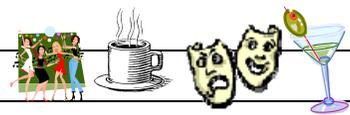
13) Did you need to make stops on your way to this destination? (Besides transfers)

Yes No

Part A) If you biked or walked or used your wheelchair for your social or recreational trip answer part A, otherwise, skip to part B.

A1) How long did your trip take?

Less than 5 Minutes 16-20 Minutes
 6-10 Minutes 21-30 Minutes
 11-15 Minutes More than 30 Minutes



Part B) If you used CTA, Metra, Pace or Para-Transit System please answer **part B**, questions below, otherwise, skip to **part C**.

B1) How did you pay for your trip?

Cash/Single ticket Chicago Card
 10-Ride ticket Chicago Card Plus
 ADA Para-transit Book 1-Day Pass
 Monthly Transit Pass 7-Day Pass
 Others (Specify:-----)

B2) Did you use reduced fare? Yes No

B3) How long were you in the vehicle for this trip?

Less than 15 minutes 46-60 minutes
 16-30 minutes More than 60 minutes
 31-45 minutes

B4) How long were you waiting for the vehicle?

Less than 5 minutes 16-20 minutes
 6-10 minutes 21-30 minutes
 11-15 minutes More than 30 minutes

B5) How did you access transit service for this trip?

Walked (How many minutes?-----)
 Biked
 Drove alone then parked
 Used wheelchair or scooter (How many minutes?-----)
 Was dropped off
 Other (Specify :-----)

B6) How did you get to your final destination from the transit stop/station?

Walked (How many minutes?-----)
 Biked
 was picked up by another person
 Used wheelchair or scooter (How many minutes?-----)
 Other (Specify : -----)

B7) If there was no Transit service, how would you make this trip?

Drive alone Walk
 Someone would drive me Bike
 Carpool or vanpool Would not make this trip
 Taxi
 Others (Specify:-----)

B8) Please rate the transit service that you used? (Please answer all that apply to your most recent social or recreational trip)

Same as shopping trip

	Very Poor	Poor	Average	Good	Very Good	No Opinion
Overall service	1	2	3	4	5	0
Service coverage area	1	2	3	4	5	0
Reliability of schedule	1	2	3	4	5	0
Courtesy of drivers	1	2	3	4	5	0
Cleanliness of Vehicle	1	2	3	4	5	0
Comfort on board	1	2	3	4	5	0
Noise on board	1	2	3	4	5	0
Cost of transit	1	2	3	4	5	0
Route & schedule information	1	2	3	4	5	0
Availability of shelters	1	2	3	4	5	0
Frequency of service	1	2	3	4	5	0
Early morning service	1	2	3	4	5	0
Late evening service	1	2	3	4	5	0
Saturday service	1	2	3	4	5	0
Sunday service	1	2	3	4	5	0
Condition of stops/Station	1	2	3	4	5	0
Priority seating areas	1	2	3	4	5	0
Audio-visual display	1	2	3	4	5	0
Availability of seats	1	2	3	4	5	0
Safety	1	2	3	4	5	0

B9) How much did you pay for this one-way trip? \$-----

Part C) If you drove alone or someone gave you ride or you used taxi for this social or recreational trip answer **part C**.

C1) How much did you pay for this trip (taxi fare, or average cost of this trip)? \$-----

C2) How long did your trip last?

Less than 5 Minutes 31-45 Minutes
 6-15 Minutes 46-60 Minutes
 16-30 Minutes More than 60 Minutes

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Work Trip	Page 7 of 10
1) How did you travel in your <u>most recent work trip</u> ? I....	1) Which of these improvements would encourage you to use transit more often?

<input type="checkbox"/> Walked all the way <input type="checkbox"/> Drove alone <input type="checkbox"/> Someone gave me ride <input type="checkbox"/> Biked <input type="checkbox"/> Used Para-transit system <input type="checkbox"/> Used Vanpool <input type="checkbox"/> Combination of these (Specify:) <input type="checkbox"/> Others (Specify:) 2) Was this a regular weekday trip? <input type="checkbox"/> Yes <input type="checkbox"/> No 3) What was the approximate distance from your origin to the destination of this trip? ----- (<input type="checkbox"/> Miles/ <input type="checkbox"/> Feet) 4) What time did you depart your origin for this trip? <input type="text"/> : <input type="text"/> (<input type="checkbox"/> AM/ <input type="checkbox"/> PM) 5) How often do you repeat similar work trips? ----- times per <input type="checkbox"/> Week <input type="checkbox"/> Month <input type="checkbox"/> Year 6) Where did you go? <input type="checkbox"/> Chicago downtown <input type="checkbox"/> Suburb <input type="checkbox"/> Rural area <input type="checkbox"/> City of Chicago-other than downtown 7) What is the closest major intersection to your work destination? ----- and ----- City of ----- 8) My trip start time for this trip was <input type="checkbox"/> Very flexible <input type="checkbox"/> Flexible <input type="checkbox"/> Fixed <input type="checkbox"/> Very fixed 9) How many other destinations did you consider for this trip? <input type="checkbox"/> Zero <input type="checkbox"/> One <input type="checkbox"/> Two <input type="checkbox"/> Three <input type="checkbox"/> Four or more 10) I traveled for work trip <input type="checkbox"/> Alone <input type="checkbox"/> with more than one adult <input type="checkbox"/> with another adult <input type="checkbox"/> with a child or children	(Check all that apply) <input type="checkbox"/> Same as shopping trip <input type="checkbox"/> Reducing the fares <input type="checkbox"/> Shuttle access to transit <input type="checkbox"/> Brochures providing the schedule <input type="checkbox"/> Brochures describing how to use transit <input type="checkbox"/> Increasing the frequency of services <input type="checkbox"/> More services on weekends and holidays <input type="checkbox"/> Fixed routes specifically planned for seniors <input type="checkbox"/> Adhering to the schedule more <input type="checkbox"/> Early morning or evening services <input type="checkbox"/> Others (Specify :-----) ----- <input type="checkbox"/> I would never use transit 11) What additional services or technologies would encourage you to use transit more often? (Check all that apply) <input type="checkbox"/> Same as shopping trip <input type="checkbox"/> Providing more wheelchair lifts and ramps <input type="checkbox"/> Lower height buses <input type="checkbox"/> Audio-visual displays <input type="checkbox"/> Station telephone <input type="checkbox"/> Braille signage <input type="checkbox"/> Real time expected wait time information displayed at stops/stations <input type="checkbox"/> Real time transit information available by cell phone <input type="checkbox"/> Others (Specify :-----) ----- 12) Did you need to make stops on your way to this destination? (Besides transfers) <input type="checkbox"/> Yes <input type="checkbox"/> No ----- Part A) If you biked or walked or used your wheelchair for your work trip answer part A, otherwise, skip to part B. A1) How long did your trip take? <input type="checkbox"/> Less than 5 Minutes <input type="checkbox"/> 16-20 Minutes <input type="checkbox"/> 6-10 Minutes <input type="checkbox"/> 21-30 Minutes <input type="checkbox"/> 11-15 Minutes <input type="checkbox"/> More than 30 Minutes
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  	Page 8 of 10
Part B) If you used CTA, Metra, Pace or Para-Transit System please answer part B, questions	B8) Please rate the transit service that you used? (Please answer all that apply to your most

below, otherwise, skip to part C.

B1) How did you pay for your trip?

Cash/Single ticket Chicago Card
 10-Ride ticket Chicago Card Plus
 ADA Para-transit Book 1-Day Pass
 Monthly Transit Pass 7-Day Pass
 Others (Specify:-----)

B2) Did you use reduced fare? Yes No

B3) How long were you in the vehicle for this trip?

Less than 15 minutes 46-60 minutes
 16-30 minutes More than 60 minutes
 31-45 minutes

B4) How long were you waiting for the vehicle?

Less than 5 minutes 16-20 minutes
 6-10 minutes 21-30 minutes
 11-15 minutes More than 30 minutes

B5) How did you access transit service for this trip?

Walked (How many minutes?-----)
 Biked
 Drove alone then parked
 Used wheelchair or scooter (How many minutes?-----)
 Was dropped off
 Other (Specify :-----)

B6) How did you get to your final destination from the transit stop/station?

Walked (How many minutes?-----)
 Biked
 was picked up by another person
 Used wheelchair or scooter (How many minutes?-----)
 Other (Specify : -----)

B7) If there was no Transit service, how would you make this trip?

Drive alone Walk
 Someone would drive me Bike
 Carpool or vanpool Would not make this trip
 Taxi
 Others (Specify:-----)

recent work trip)

Same as shopping trip

	Very Poor	Poor	Average	Good	Very Good	No Opinion
Overall service	1	2	3	4	5	0
Service coverage area	1	2	3	4	5	0
Reliability of schedule	1	2	3	4	5	0
Courtesy of drivers	1	2	3	4	5	0
Cleanliness of Vehicle	1	2	3	4	5	0
Comfort on board	1	2	3	4	5	0
Noise on board	1	2	3	4	5	0
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Route & schedule information	1	2	3	4	5	0
Availability of shelters	1	2	3	4	5	0
Frequency of service	1	2	3	4	5	0
Early morning service	1	2	3	4	5	0
Late evening service	1	2	3	4	5	0
Saturday service	1	2	3	4	5	0
Sunday service	1	2	3	4	5	0
Condition of stops/Station	1	2	3	4	5	0
Priority seating areas	1	2	3	4	5	0
Audio-visual display	1	2	3	4	5	0
Availability of seats	1	2	3	4	5	0
Safety	1	2	3	4	5	0

B9) How much did you pay for this one-way trip? \$-----

Part C) If you drove alone or someone gave you ride or you used taxi for this work trip answer part C.

C1) How much did you pay for this trip (taxi fare, or average cost of this trip)? \$-----

C2) How long did your trip last?

Less than 5 Minutes 31-45 Minutes
 6-15 Minutes 46-60 Minutes
 16-30 Minutes More than 60 Minutes

Next Page

General Questions		Page 9 of 10
1) What is the highest level of education that you have completed? <input type="checkbox"/> Some high school or less (Grade 1-11)	5) Do you have driver's license? <input type="checkbox"/> Yes	

<input type="checkbox"/> High school graduate or equivalent <input type="checkbox"/> Some college or technical school <input type="checkbox"/> College graduate <input type="checkbox"/> Graduate or professional degree <input type="checkbox"/> Others (Specify:) 2) Including yourself how many people live in your household? <input type="checkbox"/> One person <input type="checkbox"/> Two persons <input type="checkbox"/> Three persons <input type="checkbox"/> Four persons <input type="checkbox"/> Five persons <input type="checkbox"/> Six or more persons 3) How many cars, trucks or vans are available to your household? <input type="checkbox"/> Zero vehicles <input type="checkbox"/> One vehicle <input type="checkbox"/> Two vehicles <input type="checkbox"/> Three or more vehicle 4) What is your age? <input type="checkbox"/> Less than 65 <input type="checkbox"/> 66-70 <input type="checkbox"/> 71-75 <input type="checkbox"/> 76-80 <input type="checkbox"/> 81-85 <input type="checkbox"/> More than 85	<input type="checkbox"/> No 6) Are you <input type="checkbox"/> Employed full time <input type="checkbox"/> Employed part time <input type="checkbox"/> Retired <input type="checkbox"/> Home maker 7) What is your gender? <input type="checkbox"/> Male <input type="checkbox"/> Female 8) Does any of the following physical limitations apply to you? <input type="checkbox"/> Restricted mobility <input type="checkbox"/> Wheelchair user <input type="checkbox"/> Visual impairment <input type="checkbox"/> Hearing impairment <input type="checkbox"/> Other (Specify: ----- -----) 10) Where do you live? <input type="checkbox"/> Chicago Downtown <input type="checkbox"/> City of Chicago other than downtown <input type="checkbox"/> Suburb <input type="checkbox"/> Rural area 11) What is your ethnicity <input type="checkbox"/> White/ Caucasian <input type="checkbox"/> African American <input type="checkbox"/> Hispanic <input type="checkbox"/> Asian/Pacific Island <input type="checkbox"/> Native American <input type="checkbox"/> Others
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General Questions		Page 10 of 10
12) Do you have cell phone? <input type="checkbox"/> Yes <input type="checkbox"/> No		

<p>13) Do you usually use internet?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>14) What was your household's income before tax last year?</p> <p><input type="checkbox"/> Under \$15,000 <input type="checkbox"/> \$15,000 - \$29,999 <input type="checkbox"/> \$30,000 – \$44,999 <input type="checkbox"/> \$45,000 – \$59,999 <input type="checkbox"/> \$60,000 or more</p> <p>14) Can we contact you if we have any further questions?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If yes please complete:</p> <p>Address:----- ----- ----- ----- -----</p> <p>Tel:-----</p> <p>I prefer to be contacted by: <input type="checkbox"/>mail <input type="checkbox"/> telephone</p> <p>Best time to call:-----</p>	
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APPENDIX B: Survey Letters



Illinois Department of Transportation

Division of Public and Intermodal Transportation
300 West Adams Street / 2nd Floor / Chicago, Illinois / 60606

January 29, 2007

To Whom It May Concern:

The Illinois Department of Transportation is interested in improving the effectiveness of public transportation for senior citizens in Northeastern Illinois. As part of this effort, the Department would greatly appreciate your help by filling out the attached survey that the University of Illinois has developed. This survey should take approximately thirty minutes to complete and all of the collected information will be kept strictly confidential. Thank you for your help.

Sincerely,

A handwritten signature in cursive script that reads "Charles W. Abraham".

Charles W. Abraham
Program Support Chief

A sample cover letter that was printed on a University of Illinois at Chicago Letter Head:

DATE

Dear XXX XXX:

We at the **University of Illinois at Chicago** are conducting a research study on transit system services available for seniors in Northeastern Illinois and would much appreciate participation of a **senior member of your household**. If you are not over the age of 65, we would be grateful if you could pass this letter on to a senior family member, friend, neighbor, or relative.

We are studying transit services for senior citizens because your service needs and expectations may be different from other transit users. We are interested in understanding why the percentage of senior transit users is low in Northeastern Illinois and what strategies can be implemented to attract seniors to transit. If we can understand the nature of your transit use, then the knowledge can be used in recommending policy decisions aimed at providing enhanced transit services in the region. Your contribution will greatly help the researchers at University of Illinois at Chicago to understand the importance, quality, and reliability of transit services, **even if you never use any transit service.**

Answering the survey is voluntarily and normally takes about 30 minutes to complete. **All information that you provide to us will be kept strictly confidential** and will be used for university research purpose only. Once the survey is complete, your name will be removed from the database, and the information will only be used to construct average statistics about the population of Chicago region. While we would be grateful if you could complete the entire survey, please feel free to skip any question that you do not feel comfortable to answer. The survey asks you about your recent one-way travel experiences for four different trip purposes (shopping, doctor visit, recreational, and work). Please note that while this may seem to be a long survey, when you complete shopping trip questions on pages 1 and 2, the rest of the questions are very similar to the first part and are just repeated for different trip purposes. Therefore, you can complete them very quickly.

If you would like further explanation of the study or the purpose of the survey, please contact us at 312-996-0962. If you have any general questions about being a research subject, you may call the University of Illinois at Chicago Office for the Protection of Research Subjects at 312-996-1711. Thank you in advance for your cooperation and we look forward to receiving your completed survey in the enclosed pre-paid envelope.

Sincerely,

Prof. Kouros Mohammadian, Ph.D.
University of Illinois at Chicago

