RECOMMENDATIONS FOR MEETING THE TRANSPORTATION NEEDS OF MICHIGAN'S AGING POPULATION

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16. Abstract

Mobility, or the ability to get from place to place, is important for everyone. Mobility enables people to conduct activities of daily life, stay socially connected with their world, participate in activities that make life enjoyable, and increase their quality of life. In the United States, and indeed in Michigan, personal mobility is frequently equated with being able to drive a personal automobile. However, because of age-related medical conditions and the medications used to treat them, as people age into older adulthood they are more likely to experience declines in abilities needed for safe driving. Because of the preference for the personal automobile, and the lack of acceptable mobility alternatives, one focus of efforts to enhance safe mobility for older adults is to keep older adults driving for as long as they can safely do so. At the same time, society has a responsibility to help maintain mobility for those who are unable or choose not to drive. As the population of older adults in Michigan continues to grow, it is becoming more and more critical that the Michigan Department of Transportation (MDOT) understand the mobility needs of older adults and incorporate these needs into transportation facility design and planning. This project provided the background information needed to help MDOT identify where to concentrate resources to maximize the safe mobility of Michigan's aging population. The overall goal of the project was to help maintain the safety and well-being of Michigan's older adult residents by developing a set of low-cost, high-impact measures that could be implemented by MDOT. This goal was achieved through a literature review, an analysis of demographic data, and statewide surveys of older adults and family members/caregivers for Michigan older adults in order to gain a better understanding of the travel and residency patterns, gaps in transportation services, and the transportation needs and wants of Michigan older adult residents and the population of adults who provide care and/or transportation assistance to Michigan older adults. The complete results of these research activities, a list of measures for improving older adult mobility in Michigan, and an implementation plan are included in this report.

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Executive Summary

Background

Mobility, or the ability to get from place to place, is important for everyone. Mobility enables people to conduct activities of daily life, stay socially connected with their world, participate in activities that make life enjoyable, and increase their quality of life. In the United States (US), and indeed in Michigan, personal mobility is frequently equated with being able to drive a personal automobile. However, because of age-related medical conditions and the medications used to treat them, as people age into older adulthood they are more likely to experience declines in abilities needed for safe driving. Because of the preference for the personal automobile, and the lack of acceptable mobility alternatives, one focus of efforts to enhance safe mobility for older adults is to keep older adults driving for as long as they can safely do so. At the same time, society has a responsibility to help maintain mobility for those who are unable or choose not to drive. As the population of older adults in Michigan continues to grow, it is becoming more and more critical that the Michigan Department of Transportation (MDOT) understand the mobility needs of older adults and incorporate these needs into transportation facility design and planning. This project provides the background information needed to help MDOT identify where to concentrate resources to maximize the safe mobility of Michigan's aging population.

The overall goal of the project was to help maintain the safety and well-being of Michigan's older adult residents by developing a set of low-cost, high-impact measures that could be implemented by MDOT. This goal was achieved through the following objectives: determining population concentrations and travel needs/habits of Michigan's older adult population; determining current best practices and promising approaches for maintaining safe mobility for older adults that could be applied in Michigan; and providing a list of low-cost, high-impact measures that MDOT could make that would positively affect older transportation users.

This research entailed three main activities designed to support the development of recommendations to increase older adult safety and mobility in Michigan. The first was a literature review. The purpose of this activity was to better understand older adult

travel needs and to determine promising approaches and best practices for enhancing older adult mobility through a detailed search and review of the literature. The second was a demographic analysis. The purpose of this task was to better understand Michigan's current older adult residents and projected future older adult residents by conducting an analysis of Michigan-specific databases. This task entailed analysis of population data, driver license and travel patterns data, and motor vehicle crash and injury data. The final task entailed statewide surveys of older adults and family members/caregivers for Michigan older adults. The purpose of the surveys was to gain a better understanding of the travel and residency patterns, gaps in transportation services, and the transportation needs and wants of Michigan older adult residents and the population of adults who provide care and/or transportation assistance (family members/caregivers) to Michigan older adults.

Results

Literature review

The literature review covered four general topics: older adult travel patterns; promising approaches for maintaining safe mobility; Michigan transportation services and programs; and older adult caregiving. The review identified a number of individual, social, and environmental factors that impact transportation choices and patterns. The review made it clear that a complete understand of transportation choices require not only knowing about transportation choices, preferences, and need, but also understanding the motivations, resources, awareness, and other factors that may influence use of various community transportation options. In addition, it was clear that caregivers played a critical role in helping older adults maintain community mobility. At the same time, little is known about the factors that enable caregivers to provide sustained care to older adults, particularly in the context of providing transportation assistance.

The review covered several programs and practices that are considered promising approaches for maintaining older adult safety and mobility. Although many of these approaches are not under the direct purview of MDOT, they represent opportunities for partnerships with various state organizations. It is clear from the

literature review that promoting safe transportation for older adults will require a multidisciplinary effort and MDOT has the opportunity to take a leadership role in helping Michigan make significant progress on this pressing societal issue.

Demographic Analysis

The demographic analysis examined population projections and current trends in driver licensing, travel patterns, and transportation-related fatality and injury rates of Michigan adults age 70 years and older. By 2030, the population of Michigan adults age 70 years and older is expected to be about 1.5 million, and comprise about 14% of the state's population. Women will account for 60% of this group and there will be approximately two women for each man age 85 or older. Currently 80% of all adults age 70 and older and 63% of those 85 years and older are licensed to drive, and this trend is expected to continue. Analysis of recent statewide travel survey data showed that about one-third of adults age 70 and older lived alone and 12% did not have access to a car. Among adults age 85 and older, 43% lived alone and 16% did not have access to a car. Adults age 70 and older made on average 2.6 trips per day. The most frequent trip purposes were for personal business, everyday shopping, eating out, picking up or dropping off passengers, and accompanying another person. Most trips were made by car, either as a driver (73%) or passenger (23%). The portion of trips as a passenger increased with age. Walking accounted for about 4% of trips and public transportation accounted for about 1% of trips in this age group. Examination of Michigan crash records showed that each year about 575 adults age 70 and older were killed or severely injured in traffic crashes. The crash rate for drivers age 70 and older was 33 crashes per 1,000 licensed drivers per year, and the rate of fatal crashes was 0.2 per 1,000 licensed drivers per year.

Family member/caregiver survey

A total of 300 family member/caregiver respondents completed the caregiver survey. Respondents averaged about 60 years of age, were predominantly women, were licensed drivers, and about three-quarter of the respondents were currently married. Nearly all lived in their own home or apartment; a vast majority had lived at

their current residence for at least the past 5 years; and the average number of people in the household was about 2.4 people. More than 90% of respondents were White in each of the regions. Respondents varied greatly in household income and education. The percent of caregivers who worked outside the home for pay was about 50% statewide. Of those who worked outside the home, about two-thirds worked full-time and another 37% worked part-time. The percent of respondents who volunteered in the community was 54% statewide. Although there was great variability in the self-reported health of the caregivers, more than one-half reported to be in “excellent” or “very good” health. About 18% reported “fair” or “poor” health.

A large majority of respondents drove regularly, with nearly all droving very frequently (5-7 days per week). About 1 in 9 respondents were currently providing some level of unpaid care and, on average, respondents provided care to two people. Seventy percent of the care recipients were women and the average age of the recipient was 84 years. Slightly more than one-half of the recipients were a parent, with another 18% being a relative. Very few recipients were the spouse of the caregiver. Most caregivers lived close to the care recipient, with about three-fourths living within a 20 minute drive and nearly all within an hour drive.

The survey found a wide range in the frequency with which the caregiver provided assistance to the recipient, with about 38% providing assistance 1-2 times per week and 27% providing assistance 5-7 times per week. Only about 60% of the care recipients owned an automobile and about 70% rarely or never drove themselves. By far the most common help given by caregivers was related to transportation, with more than 90% of respondents statewide reporting to have provided this type of care. In nearly all cases transportation assistance entailed giving the recipient rides him/herself. Medical, shopping, and family or personal reasons were the most common reasons for the recipient needing transportation. Most caregivers who provided help with transportation only did so a few times per week. Fewer than 5% of recipients used a bus, transportation provided by a senior/retirement community, senior van or dial-a-ride service, or a taxi.

Statewide, caregivers indicated on average very little change in their lives or burden associated with providing care. Indeed, there was evidence that providing care

may have enhanced some caregivers' lives. About 43% of caregivers indicated that they sought information and services to help them with providing care. Of these respondents, a wide range of information and services were sought, with about 11% seeking information about transportation. The most commonly reported sources of information were doctors/health care professionals, senior centers, family/friends, and government agencies.

Analysis of caregiver responses by sex showed few differences in responses, except that women were more likely to be caring for women and men reporting slightly more positive effects of caregiving. Men also were less likely to seek information and/or services to help with providing assistance, in particular training and education. Analysis of caregiver responses by the age of the care recipient (70-84 years and 85 years or older) also showed few differences, except: that caregivers were slightly younger in the group caring for younger people; the care recipient was significantly more likely to be a spouse in the younger care recipient age group; younger care recipients were more likely to still own a vehicle; younger care recipients were more likely to drive regularly and less likely to have stopped driving; and caregivers less often provided help with using the telephone and transportation in the younger care recipient age group.

Older adult survey

A total of 300 Michigan residents aged 70 and older completed the older adult survey. Respondents averaged about 78 years of age, were about two-thirds women, about 60% were currently married; and nearly all were White. Nearly all lived in their own home or apartment and a vast majority had lived at their current residence for at least the past 5 years. Respondents varied greatly in household income and education. About 60% of respondents lived in two-person households. Statewide, about 15% of respondents lived outside of Michigan for two or more contiguous months in the past year. Nearly all households of respondents had an automobile, with a statewide average of 1.7 vehicles per household. About 92% of respondents were licensed to drive. Very few respondents worked outside of the home for pay and about 30% of respondents volunteered in their community. Overall, respondents reported to be in good health, with about 50% reporting to be very able to walk one-half mile and to climb

two flights of stairs. However, 20%-30% reported to be not very able or not at all able to do these activities. About 80% of respondents reported to be in *good* or *better* health. Statewide, 70% of respondents drove regularly, 16% were no longer driving, and another 9% drove only occasionally or rarely. Respondents' who drove, tended to drive frequently; however, they did not tend to drive many miles each year, with about 60% driving less than 5,000 miles per year.

Of those respondents who no longer drove, about one-half had stopped driving in the past 2 years. These respondents gave a variety of reasons for stopping driving, with health being reported by 44% of respondents. About three-quarters of non-driving respondents indicated that they were somewhat or very satisfied with their ability to get around. One in every five, however, reported that they were somewhat or very dissatisfied with their personal transportation.

The survey explored issues of isolation related to mobility. Statewide, Michigan older adults score relatively high on frequency of activities and low on subjective isolation. There was, however, a small group of respondents who reported feeling lonely and socially isolated.

The questionnaire also explored Michigan older adults' use of non-driving modes of transportation. Only about one-third of respondents indicated that they regularly used some form of public transportation. Regular bus service was reported to be available in only 28% of respondents' neighborhoods and most respondents became aware of this service by seeing the buses and bus stops. Only 28% of those with an available bus service reported having used it. The most common reason given for not using the bus was that it was not needed. Of those who used the bus, nearly 90% used it only occasionally or rarely. Users of the bus were mostly very or somewhat satisfied with the service.

About two-thirds of respondents reported that a senior van and/or dial-a-ride service was available in the neighborhood, with nearly 15% reporting that they did not know. Of those who knew about the service, 40% became aware of it through seeing the service in action, 17% heard about it from family or friends, and about 15% found out through some form of printed media. Only 11% overall had used this service. Those who had not used the service indicated that they did not need the service. Of

those who had used the service, about one-half used it rarely; 28% used it only occasionally; and about 90% of users were very or somewhat satisfied with the service.

About one-third of respondents did not know if there was a volunteer driver programs available in their neighborhood and 42% reported that it was not available. Of the few respondents who reported that the service was available, most found out about it through family or friends, senior-related organizations, or the respondent was a volunteer driver him or herself. Only 9% reported having used a volunteer driver program and two-thirds of these respondents used it only rarely. Nearly all of those who did not use the service indicated that they did not need the service. All users of the service were either very or somewhat satisfied with it, citing convenience, it goes where they want to go, pleasantness, and reliability as the top reasons.

The reported neighborhood availability of taxi services was about 40%. Most people became aware of the service in their neighborhood by seeing the taxis. About one-third of respondents reported that they had used the taxi service. Those that had not used the taxis reported that they did not need the service. Those that used taxis generally did so only rarely and only 5% usually paid a special senior discount or rate. A large majority of users reported being very or somewhat satisfied with the taxi service.

Nearly all respondents often or occasionally rode as a passenger in an automobile. Respondents did not often walk to destinations. Less than 10% of respondents ever rode a bicycle. Indeed, respondents reported overwhelmingly that they relied on driving themselves or riding as a passenger most often to get around. When respondents rode as a passenger, they reported that most often the driver was their spouse, child, or a friend.

The older adult survey responses were analyzed by sex. These analyses showed few differences between men and women respondents except: men were more likely to be married and have a higher educational level; women were significantly more likely to live in single person households; men were far more likely to be “snow birds” and have more vehicles in their household; men drove more frequently and greater distances; and women were more likely to have used public transportation. Responses were also analyzed by two age groups (age 70-79 and age 80 and older). Few differences were found by age group except: respondents in the younger age group were more likely to

be married; those in the older age group more often lost their license in the past 5 years and were less likely to have another driver in the household; those in the younger age group were more likely to work full-time and were healthier; and younger respondents drove more. Finally, responses were analyzed by self-reported use of public transportation (those had had used public transportation and those who had not). Although not generally statistically significant because of the low number of respondents, those older adults who had used some form of public transportation: tend to be male; non-White; have a slightly lower household income; have a higher level of education; are more likely to live in a multi-person household with fewer household vehicles and licensed drivers; are more likely to work full time; have poorer health; drive less regularly; and have a smaller range of social activities that they engage in.

Recommendations

Based on the results of the research activities the following recommendations were developed:

- Continued special focus on the older adult segment of the population is warranted.
- Differences among older adults themselves must be taken into account. The older adult population is the most heterogeneous of all age groups. In particular, the oldest-old can be quite different from youngest-old.
- Gender matters when it comes to understanding the travel patterns, preferences, and needs of older adults.
- Support development of vehicle design guidelines to make cars more “older driver friendly.”
- Be responsive to guidelines for roadway design that have been developed for older adults and find ways to implement them cost effectively.
- Support continuing research and demonstration projects on quantifying the actual safety benefits of implementing recommended road improvements and complete streets legislation.

- In implementing roadway design improvements (e.g., roundabouts), include an educational/training component for the public that is tailored to the special needs and learning styles of older adults.
- In developing and distributing educational and training materials for older drivers, take into the account the role that caregivers play in the providing transportation and mobility assistance to older adults.
- Consider medical and allied health professionals as viable partners for disseminating transportation safety information to older adults. Other "nontraditional partners" should also be considered such as senior centers and other community organizations frequented by older adults.
- Explicitly take into account needs, preferences, and unique behaviors of older adults in the development and implementation of ITS.
- Investment in pedestrian infrastructure should focus not only on making communities more walkable but on improving travel routes from home to transit stations to reduce physical barriers to the use of transit.
- Reduce other physical barriers to using public transit through measures such as improving vehicle entry through low floor vehicle design and increasing number of reserved seats for older adults.
- Support travel training geared toward both older adults and their caregivers.
- Improve training of transit operators.
- Maximize the potential for volunteer driver programs.
- Consider ways to expand voucher programs, especially for vulnerable populations.
- Support improvements in marketing and outreach efforts to older adults to make them aware of what community mobility options are available (especially paratransit) and how they can be accessed.
- Paratransit and specialized transportation services should explore cost effective ways to provide more than just trips for medical purposes. As part of this effort, trip-making flexibility should be expanded by increasing opportunities for multipurpose trips.

- Continue to take a leadership role in fostering coordination of transportation services at the state level.
- Support continued inter-agency and citizen collaboration in planning and implementing mobility options for older adults, at the state, regional, and local levels, including collaboration within departments of state, regional, and local government, and with private sector safety, insurance, senior advocacy and healthcare organizations.
- Support continuing research on caregivers who provide transportation assistance to older adults to better understand this population, as well the factors that enable them to sustain these efforts over time.

Introduction

Mobility, or the ability to get from place to place, is important for everyone. Indeed, there is increasing recognition that driving is considered a privilege but mobility is a basic human need (Molnar & Eby, 2008). Mobility enables people to conduct the activities of daily life, stay socially connected with their world, participate in activities that make life enjoyable, and increase their quality of life. In the United States (US), and indeed in Michigan, personal mobility is frequently equated with being able to drive a personal automobile. However, because of age-related medical conditions and the medications used to treat them, as people age into older adulthood (age 65 and older) they are more likely to experience declines in abilities needed for safe driving. Declines in perceptual, cognitive, or psychomotor skills can increase the risk of a crash as well as limit personal mobility as people self-restrict their driving to times and places in which they feel most safe (Eby, Molnar, & Kartje, 2009).

According to Census Bureau (2005) projections, Michigan's population is aging. In 2000, Michigan older adult residents aged 65 and older accounted for about 12% of the population. By 2030, Michigan older adults will represent about 20% of the population. These increases will be even greater for the oldest Michigan residents. Residents age 80 and older will account for slightly more than 5% of the population—up from 3% in 2000. Thus, Michigan is facing a coming wave of older adults who will: be driving more than the current cohort of older adults; be dependent on the motor vehicle for mobility; likely be experiencing declines in driving related skills; and want and expect to have their mobility needs met if driving is limited or no longer possible.

Because of the preference for the personal automobile, and the lack of acceptable mobility alternatives, one focus of efforts to enhance safe mobility for older adults is to keep older adults driving for as long as they can safely do so (see Dickerson et al., 2008; Eby, Molnar, & Kartje, 2009). As discussed by Eby, Molnar, and Kartje (2009) these efforts can focus on a variety of approaches including changes in vehicles (e.g., age friendly vehicle design; vehicle modifications; advanced technology); changes in roadways (e.g., signs; signals; markings; intersection redesign; roundabouts); and education/retraining to help drivers maintain safe driving or change the way they drive to

become safer. At the same time, society has a responsibility to help maintain mobility for those who are unable or choose not to drive. Current estimates show that men will live about 6 years longer, and women about 10 years longer than they will be able to drive (Foley, Heimovitz, Guralnik, & Brock, 2002). Thus, a second focus to maintaining safe mobility for older adults is to identify and provide mobility support options for those who no longer drive (Eby, Molnar, & Kartje, 2009; Molnar, Eby, & Dobbs, 2005).

The first Baby Boomers turned age 65 this year and by 2028 all living Baby Boomers will be older adults (Molnar & Eby, 2009). As described in several recent reviews of the aging and mobility literature, much research has been conducted in the past decade with a focus on maintaining safe mobility for older adults (Dickerson et al., 2007; Eby, Molnar, & Kartje, 2009; Eby, Molnar, & Vivoda, 2009; Molnar, Eby, St. Louis, & Neumeyer, 2007). As the population of older adults in Michigan continues to grow, it is becoming more and more critical that the Michigan Department of Transportation (MDOT) understand the mobility needs of older adults and incorporate these needs into transportation facility design and planning. This project provides the background information needed to help MDOT identify where to concentrate resources to maximize the safe mobility of Michigan's aging population.

Objectives

The overall goal of the project was to help maintain the safety and well-being of Michigan's older adult residents by developing a set of low-cost, high-impact measures that could be implemented by MDOT. This goal was achieved through the following objectives:

- Determine population concentrations and travel needs/habits of Michigan's older adult population;
- Determine current best practices and promising approaches for maintaining safe mobility for older adults that could be applied in Michigan;
- Provide a list of low-cost, high-impact changes MDOT can make that would positively affect older transportation users.

Scope

This project included nine tasks. Task 1 was an initial meeting in Lansing, MI with MDOT technical liaisons, sponsoring MDOT Office Administrator, staff from the MDOT ORBP, and staff from the Michigan Federal Highway Administration (FHWA). The second task was a literature review to better understand older adult travel needs and to determine promising approaches and best practices for enhancing older adult mobility through a detailed search and review of the literature. Task 3 was an analysis of Michigan-specific demographic data to better understand Michigan's current older adult residents and projected future older adult residents. The fourth task was developing and administering separate surveys to Michigan older adults and to family members/caregivers of Michigan older adults in order to gain a better understanding of the travel and residency patterns, gaps in transportation services, and the transportation needs and wants of Michigan older adult residents and the population of adults who provide care and/or transportation assistance (family members/caregivers) to Michigan older adults. Task 5 was to develop recommendations for low-cost, high-impact measures that could be implemented to increase older adult safety and mobility in Michigan. Tasks 6-9 were for wrap-up and dissemination activities including: writing a final report, executive summary, and implementation plan; participate in a wrap-up meeting; writing an article for the ORBP newsletter; and producing quarterly progress reports.

Methodology

This research entailed three main activities, designed to support the development of recommendations for low-cost, high-impact measures that could be implemented to increase older adult safety and mobility in Michigan: a literature review; a demographic analysis; and statewide surveys of older adults and family members/caregivers for Michigan older adults. This section describes the methodologies for each activity.

Literature Review

The purpose of this activity was to better understand older adult travel needs and to determine promising approaches and best practices for enhancing older adult mobility through a detailed search and review of the literature. This search was conducted by first developing a set of selection criteria. These selection criteria were derived from our knowledge of the aging and mobility literature, recent reviews of the literature conducted by members of the project team (Eby, Molnar & Kartje, 2009; Eby, Molnar, & St. Louis, 2008; Eby, Molnar, & Vivoda, 2009; Molnar, Eby, & St. Louis, 2008; Molnar, Eby, St. Louis, & Neumeyer, 2007), input from the Senior Mobility Work Group, and discussions with MDOT. The selection criteria were used to gather appropriate articles, reports, and other documents. Several document databases were searched, including: MEDLINE, PSYCINFO, TRID, ProQuest, ScienceDirect, UM-MIRLYN, and UMTRI's Library. We also searched relevant websites, such as the MDOT and Beverly Foundation websites, to compile lists of Michigan-specific transportation programs. Finally, the MDOT Bureau of Passenger Transportation provided us with information about MDOT administered transportation programs for older adults and people with disabilities. Collected articles and data were reviewed for appropriateness and those deemed appropriate were collected, organized, synthesized, and included in the literature review. Sections of the review were drafted by members of the project team and integrated by the first author. The first draft was submitted to MDOT for comments and a final document was written based on these comments. The complete literature review document can be found in Appendix A.

Demographic Analysis

The purpose of this task was to better understand Michigan's current older adult residents and projected future older adult residents by conducting an analysis of Michigan-specific databases. This task entailed analysis of population data, driver license and travel patterns data, and motor vehicle crash and injury data. Specific methodological details are as follows.

Population Projections

Population projections for the state of Michigan and for the 7 MDOT regions were based on available US Census data and county-level data from the Michigan Center for Geographic Information (CGI). The US Census Bureau conducts a census of the population every 10 years, and estimates future populations for each state by age and sex for 30 years into the future. The census projections are based on cohort analysis and demographic trends (i.e., birth and mortality rates, internal migration patterns) of that time period. Population data from the 2010 census as well as projections for future years were not available for this project. Thus, here Michigan population numbers and projections are based on US Census information from the 2000 census and from the US Census Population Division, Interim State Projections, 2005. Statewide population projections were tabulated by 5-year age groups and sex for 2010, 2020, and 2030. To obtain population estimates by 5-year age groups and sex for the MDOT regions for 2010, 2020, and 2030 we turned to the more detailed county level information available from the Michigan CGI. The latest available county level population information by age and sex were projections for 2010 and 2020 based on the 1990 census. Because the overall statewide 1990 population projections were different from those based on the 2000 census, we applied the distributions for age and sex for future years from the 1990 census to the total state age and sex projections from the 2000 census. County level population projections for the year 2030 were estimated by multiplying the statewide projection of each sex and age group by the ratio of the county population to state population. Aggregation of county projections yielded the population projections for each MDOT region.

Driver License and Travel Patterns

Driver license files that tabulate the number of licensed drivers by age, sex, and license type for each county are obtained annually by UMTRI from the Michigan Department of State. The license data files for 1992, 2000, and 2009 were used to develop the driver license holding trends for Michigan drivers. This 17-year span was chosen because the files from 1992 and 2009 were the earliest and most recent available to us at the time of analysis. Driver license holding trends by age, sex, and MDOT region were tabulated by sex, 5-year age group, and MDOT region for the years 1992, 2000, and 2009.

Travel patterns of Michigan residents age 70 and older were based on analysis of survey data from the MI Travel Counts program of 2004/2005 (MDOT, 2005) that were obtained from the MDOT. The survey contains information about the travel patterns of a representative statewide sample of households, and includes 48-hour travel diaries of all members of the sampled households. The database from the MI Travel Counts survey contains detailed travel and out-of-home activity information for 37,475 individuals from 14,996 households. SAS software was used to obtain travel pattern metrics such as average daily trips, trip purposes, and modes of transportation for respondents age 70 by 5-year age group, sex, MDOT region, household size, car ownership, and driver license holding.

Vehicle-Related Deaths and Injuries

Michigan Vehicle Crash Data files from 2007-2009 were used to examine the recent patterns of vehicle-related deaths and serious injuries of older persons. SAS software was used to obtain the numbers and distributions of adults age 70 and over killed or seriously injured in a vehicle crash by mode (driver, passenger, bicyclist, pedestrian and motorcyclist) for the years 2007, 2008, and 2009. The number of vehicle and fatal crashes involving drivers age 70 and over were examined by 5-year age group, sex, and MDOT region for the year 2009.

Surveys of Michigan Older Adults and Family Members/Caregivers

The purpose of the surveys was to gain a better understanding of the travel and residency patterns, gaps in transportation services, and the transportation needs and wants of Michigan older adult residents and the population of adults who provide care and/or transportation assistance (family members/caregivers) to Michigan older adults. The project team completed this task through two statewide telephone surveys—one administered to older adults (age 70 and older) and one to family members/caregivers (age 45-80) who provide care and assistance to older adults in Michigan. This task involved five activities: questionnaire design; pilot testing; sample design; data collection; and data analyses.

Questionnaire Design

Based on the results of the literature review, demographic analysis, discussion with MDOT, feedback from the Senior Mobility Work Group, and project team expertise, we developed and finalized a list of topics for each survey to address. The project team then developed the survey questions for each topic. The team consulted appropriate questionnaires we have developed in the past as well as published questionnaires from other researchers to find appropriate questions to include in the present surveys. A draft of each questionnaire was forwarded to MDOT for review and they were revised based on this feedback.

Pilot Testing

Once drafts of the surveys were completed, they were pilot-tested using a cognitive interviewing process. With this process, respondents complete the questionnaire with an investigator present and "think out loud" as they proceed through each question. The investigator asked probing questions as issues arose. This process allowed the project team to assess how questions were perceived and understood, appropriateness of language and wording, and overall impressions of the survey. This process also helped us to refine our screening criteria for selecting family member/caregiver respondents. Two older adult respondents and two family member/caregiver respondents completed the pilot testing. Revisions were made to the

questionnaires and the to telephone participant's recruitment script based on this feedback.

Sample Design

A sample design with 300 respondents stratified by the seven MDOT regions with approximately equal numbers of respondents in each stratum was selected for both surveys. Stratification can provide greater precision than a simple random sample of the same size, and given that the overall sample size was dictated by the resources available for the project, a stratified sample design was selected. The choice of MDOT regions as strata was driven by the sponsor's request that the survey results include some analysis by MDOT region. Because the population of the MDOT regions varies greatly, basing the sample in each stratum on its population would not yield enough respondents in some regions for any meaningful analyses. Consequently, a design with equal number of respondents in each stratum (known as a disproportionate sample) was selected. This design allowed us to identify statewide differences in proportions and means for responses to some survey items by age and sex, and also let us examine responses across MDOT regions.

The Michigan Driver History file, extracted in January 2011 served as the sampling frame for both surveys. Because the driver history file database contains records of people who are currently licensed, as well as those who have a license that is sanctioned (revoked, restricted, etc.), a license that has expired within the past 7 years, or a Michigan Department of State-issued identification card, this database included both drivers and non-drivers in approximately the same proportion as they are found in Michigan.

Samples were selected independently for each survey, using the following process. First UMTRI filtered the Driver History data file by eligibility criteria.

Eligibility criteria for the older adult survey respondents:

- Adults 70 years of age or older.
- Males and females.

- Residents of the seven MDOT regions in Michigan (Bay, Grand, Metro, North, Southwest, Superior, University).

Eligibility criteria for caregiver survey respondents:

- Adults 45-80 years of age.
- Males and females.
- Residents of the seven MDOT regions in Michigan (Bay, Grand, Metro, North, Southwest, Superior, University).
- Provided transportation assistance or other unpaid care to Michigan seniors age 70 or older in the past 12 months

In the next step random samples of 900 persons and 4,100 persons who met the eligibility criteria for the older adult or caregiver survey respectively were drawn for each of the seven MDOT regions. Two replicate samples (e.g., additional random samples) for each survey were also drawn at that time. Replicate samples are a precaution that assures the same probability of respondent selection in the final sample, in the event that the initial sample is exhausted (i.e., yields no more respondents). At this point the sample and replicates files were turned over to a professional survey administration company—Abt SRBI. Because the driver history records do not contain telephone numbers, Abt SRBI obtained telephone numbers from commercially available databases that matched names and home addresses to phone numbers.

Data Collection

The telephone interviews were conducted by professional interviewers from Abt SRBI using Computer Assisted Telephone Interviewing (CATI) technology. All Abt SRBI interviewers are trained in interviewing techniques and undergo project-specific training for every project. Interviews are monitored by field supervisors to ensure a high standard of quality in the data collection process.

A total of 600 interviews were completed across both surveys (300 for each survey respectively with equal number of respondents from each MDOT region) from June 7, 2011, through June 17, 2011. In all 1,062 and 5,548 contacts were made in the older adult and caregiver surveys respectively, before the target numbers of

interviews for each survey in each MDOT region were reached. The number of contacts by region is shown in Table 1.

	Table 1: Telephone Contacts by Survey and Region						
Survey	**Bay**	**Grand**	**Metro**	**North**	**Southwest**	**Superior**	**University**
Older Adult	165	131	222	135	132	134	143
Caregiver	722	1001	911	831	649	680	754

Table 2: Contacts and Incidence Summary				
	Older Adult Survey		**Caregiver Survey**	
Record of Contacts	**#**	**%**	**#**	**%**
Contacts	1062	100%	5548	100%
No Adult	14	1.3%	67	1.2%
Callback Appointment (qualification not determined yet)	446	42.0%	2483	44.8%
Spanish Language	4	0.4%	14	0.3%
Other Language	4	0.4%	13	0.2%
Other (hearing, health, etc.)	87	8.2%	76	1.4%
Refusal	89	8.4%	328	5.9%
Terminate	116	10.9%	2257	40.7%
Not mentally able to do interview	11	1.0%	11	0.2%
No such person/refused	13	1.2%	47	0.8%
Not a caregiver	N/A	N/A	1962	35.4%
Refused at Screener-2b	91	8.6%	194	3.5%
Refused at Screener-2c	N/A	N/A	20	0.4%
Not within accepted age range	0	0.0%	23	0.4%
Live in a nursing or long term care facility	1	0.1%	N/A	N/A
Qualified	302	28.4%	310	5.6%
Qualified refusals/break-offs/callbacks	2	0.2%	10	0.2%
Completes	300	28.2%	300	5.4%
(TARGET QUOTA)	(300)		(300)	
Incidence [Qualified/(Qualified Terminate)]	72%		12%	
Average Interview Length (minutes)	12		14	

Up to 2 calls were made for each non-contact (i.e., those who have not yet been reached) and up to 5 calls were made to those who have been reached initially and requested that they be called back at another time. There were no refusal conversion

attempts for this sample (i.e., regardless of whether a refusal was hard or soft, no follow ups were made). Once a person was reached and was available on the phone, the introductory material in the survey was read before commencing with survey questions. The average interview lengths were 12 minutes for the Older Adult survey and 14 minutes for the Caregiver survey. Abt SRBI prepared a data dictionary and SAS datafile for each survey. Table 2 shows the summary record of contacts and incidence for each survey.

Survey Weighting

Weighting survey responses compensates for unequal probabilities of selection of subjects and also for the failure of selected subjects to respond. Overall, weighting improves the accuracy and minimizes the bias of the sample estimates. The following equation shows how weights were determined:

$$Weight_{(stratum)} = (1/probability\ of\ selection) \times (1/\ probability\ of\ response).$$

The probability of selection was based on the population of eligible persons in each stratum. The probability of response is estimated from the ratio of respondents to the number of eligible contacts. For the older driver survey the population referred to the number of persons of eligible age in the Michigan Driver License database. However, the population of caregivers was not known. We estimated the proportion of caregivers in the population of persons age 45 to 80 in Michigan Driver license files from our knowledge of how many persons of the eligible age were contacted, the final number of caregiver respondents in each stratum, and with the assumption the same response rate obtained from the older driver survey applied to caregivers. By this process, we estimated that 20.7% of adults age 45 to 80 are caregivers as defined by this study. The percent ranged from 13% to 23% across the MDOT regions.

Analysis

Questionnaire data were analyzed using the Statistical Analysis Software (SAS) 9.2 package using tools for the analysis of complex samples. The survey responses

were tabulated for each question by each MDOT region and statewide. The older adult survey was further tabulated by sex, by age group (70-79, 80+), and by public transportation use. The questions on the caregiver survey were tabulated by MDOT region and statewide, by the sex of the caregiver, and by the age group of the care recipient.

The weighted proportions and means were calculated, along with the standard error of the proportion or mean. Note, that the proportions and means apply to the population as opposed to the sample. The standard error was used to calculate the confidence interval which provides the estimate of the reliability of the measure and was used to determine differences between groups. Table 3 shows final weights used for analyzing the two surveys.

Table 3: Weights for Survey Analysis

Stratum (MDOT Region)	Older driver survey	Caregiver survey
Bay	3212.72	2747.97
Grand	2755.81	1485.73
University	3230.42	2717.37
Southwest	2410.26	1920.10
Superior	1031.57	662.23
North	2072.19	1086.29
Metro	9639.81	9546.85

Results

The results of the main research activities are presented here.

Literature review

The completed literature review was a 69-page document (Appendix A). The review covered four general topics: older adult travel patterns; promising approaches for maintaining safe mobility; Michigan transportation services and programs; and older adult caregiving.

One purpose of the literature review was to help support the development of two questionnaires that were to be administered statewide in Michigan. The review identified a number of individual, social, and environmental factors that impact transportation choices and patterns. The review made it clear that for both questionnaires we need to not only ask about transportation choices, preferences, and need, but also to explore motivations, resources, awareness, and other factors that may influence use of various community transportation options. In addition, it was clear that caregivers played a critical role in helping older adults maintain community mobility. At the same time, little is known about the factors that enable caregivers to provide sustained care to older adults, particularly in the context of providing transportation assistance.

The second purpose of the literature review was to help MDOT determine measures and programs that might be useful to implement in Michigan. The review covered several programs and practices that are considered promising approaches for maintaining older adult safety and mobility. Although many of these approaches are not under the direct purview of MDOT, they represent opportunities for partnerships with various state organizations. It is clear from the literature review that promoting safe transportation for older adults will require a multidisciplinary effort and MDOT has the opportunity to take a leadership role in helping Michigan make significant progress on this pressing societal issue.

The review contains a detailed discussion of Michigan transportation services and programs. Findings from this section are useful for thinking about where there may be gaps and overlapping services throughout the state. As MDOT plans for the future,

this information will be important in decisions about funding and resources distribution, particularly for programs targeting older adults and people with disabilities.

Demographic Analysis

The complete demographic analysis results are available in a 32-page document (Appendix B). This report examined population projections and current trends in driver licensing, travel patterns, and transportation-related fatality and injury rates of Michigan adults age 70 years and older. The following is a summary of the findings.

By 2030, the population of Michigan adults age 70 years and older is expected to be about 1.5 million, and comprise about 14% of the state's population. Women will account for 60% of this group and there will be approximately two women for each man age 85 or older. Currently 80% of all adults age 70 and older and 63% of those 85 years and older are licensed to drive, and this trend is expected to continue. Analysis of a recent statewide travel survey data showed that about one-third of adults age 70 and older lived alone and 12% did not have access to a car. Among adults age 85 and older, 43% live alone and 16% did not have access to a car.

Adults age 70 and older make on average 2.6 trips per day. The most frequent trip purposes were for personal business, everyday shopping, eating out, and picking up or dropping off passengers, or accompanying another person. Most trips were made by car, either as a driver (73%) or passenger (23%). The portion of trips as a passenger increased with age. Walking accounted for about 4% of trips and public transportation accounted for about 1% of trips in this age group.

Examination of Michigan crash records showed that each year about 575 adults age 70 and older were killed or severely injured in traffic crashes. The crash rate for drivers age 70 and older was 33 crashes per 1,000 licensed drivers per year, and the rate of fatal crashes was 0.2 per 1,000 licensed drivers per year.

Family Member/Caregiver Survey

A total of 300 family member/caregiver respondents completed the survey, with 43 respondents in 6 of the 7 MDOT regions and 42 respondents in the Metro region. The demographics of this sample are shown in Table 4 by MDOT region and statewide.

Table 4: Caregiver Sample Demographics by MDOT Region and Statewide (Unweighted)								
	Bay	**Grand**	**Metro**	**North**	**Southwest**	**Superior**	**University**	**Statewide**
Number of respondents	43	43	42	43	43	43	43	300
Age								
Mean	59.7	60.1	58.3	62.7	62.3	61.3	62.6	61.0
SD	(8.4)	(8.7)	(7.7)	(8.3)	(9.9)	(9.0)	(7.8)	(8.6)
% Female	76.7	65.1	73.8	55.8	60.5	65.1	67.4	66.3
% Currently licensed to drive	97.7	100.0	100.0	100.0	97.7	100.0	100.0	99.3
% Licensed to drive in past 5 years	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
% Married	67.4	90.7	76.2	76.7	69.8	79.1	74.4	76.3
% Live in own home/apartment	97.7	97.7	97.6	95.4	90.7	95.4	90.7	95.0
% Lived 5+ yrs in same location	86.1	86.1	92.9	93.0	86.1	93.0	95.4	90.3
Avg. household size	2.4	2.5	2.7	2.5	2.3	2.2	2.3	2.4
Race								
Caucasian	90.7	93.0	92.9	97.7	95.4	100.0	93.0	94.7
African American	2.3	2.3	2.4	0.0	2.3	0.0	7.0	2.3
Other	4.7	4.7	0.0	2.3	2.3	0.0	0.0	2.0
Refused	2.3	0.0	4.8	0.0	0.0	0.0	0.0	1.0
Household income								
$25,000 or less	14.0	14.0	11.9	16.3	16.3	23.3	0.0	13.7
$25,000-$49,999	27.9	23.3	14.3	32.6	23.3	20.9	37.2	25.7
$50,000-$74,999	23.3	14.0	16.7	25.6	37.2	14.0	16.3	21.0
$75,000-$99,999	7.0	16.3	7.1	9.3	7.0	16.3	16.3	11.3
$100,000+	9.3	7.0	21.4	2.3	2.3	7.0	16.3	9.3
Don't know/Refused	18.6	25.6	28.6	14.0	14.0	18.6	14.0	19.0
Education								
< High school	4.7	7.0	9.5	4.7	4.7	0.0	2.3	4.7
High school	27.9	34.9	21.4	34.9	20.9	53.5	20.9	30.7
Some college	44.2	30.2	28.6	34.9	53.5	20.9	34.9	35.3
College graduate	4.7	9.3	9.5	7.0	11.6	9.3	9.3	8.7
Graduate school	14.0	18.6	31.0	16.3	9.3	16.3	32.6	17.7

As shown in this table, respondents averaged about 60 years of age, were predominantly women, were licensed drivers, and about three-quarter of the respondents were currently married. Nearly all lived in their own home or apartment; a vast majority had lived at their current residence for at least the past 5 years; and the average number of people in the household was about 2.4 people. More than 90

percent of respondents were White in each of the regions. Respondents varied greatly in household income and education.

Table 5 shows the employment and volunteer work status of the respondents by MDOT region and statewide. Note that all statewide data reported in this table and subsequent tables have been weighted to be representative of the State of Michigan. The values in the statewide column are either the weighted percentages or weighted means with the standard error (SE). Because the respondents within each MDOT region are from a simple random sample, data reported by region are representative of that region and do not need to be weighted. As shown in Table 5, the percent who worked outside the home for pay ranged from 37% to 57%, with a statewide average of about one-half. Of those who worked outside the home, about two-thirds worked full-time and another 37% worked part-time. The percent of respondents who volunteered in the community varied among the regions from 44% to 67%, with a statewide average of about 54%. Those who reported to engage in volunteer work also reported that they spent on average about 5 or 6 hours per week volunteering.

Table 5: Caregivers – Employment/Volunteer Work

	Bay n=43	Grand n=43	Metro n=42	North n=43	Southwest n=43	Superior n=43	University n=43	Statewide n=300
% Work outside home for pay	37.2	48.8	57.1	46.5	55.8	37.2	44.2	50.6 (4.04)
If work outside home								
Full-time	62.5	76.2	66.7	50.0	79.2	68.8	68.4	67.7 (5.65)
Part-time	37.5	14.3	29.2	35.0	12.5	25.0	26.3	27.0 (5.42)
Occasional	0.0	9.5	4.2	15.0	8.3	6.3	5.3	5.3 (2.45)
% Volunteer in community	60.5	44.2	54.8	67.4	51.2	60.5	48.8	54.5 (4.06)
Avg. hours of volunteer work per week	6.1	7.9	4.7	6.0	5.6	6.5	6.2	5.5 (0.62)

Table 6 shows the self-reported health of the respondent by MDOT region and statewide. Although there was great variability in the self-reported health of the caregivers, more than one-half reported to be in “excellent” or “very good” health. About 18% reported “fair” or “poor” health.

Table 6: Caregiver Health								
	Bay n=43	Grand n=43	Metro n=42	North n=43	Southwest n=43	Superior n=43	University n=43	Statewide n=300
Overall health								
Excellent	20.9	18.6	16.7	14.0	27.9	11.6	23.3	19.1 (3.11)
Very good	30.2	27.9	42.9	34.9	32.6	37.2	34.9	37.3 (4.00)
Good	23.3	37.2	21.4	32.6	27.9	27.9	30.2	25.5 (3.42)
Fair	25.6	11.6	11.9	9.3	9.3	20.9	11.6	13.6 (2.71)
Poor	0.0	4.7	7.1	9.3	2.3	2.3	0.0	4.5 (1.93)

Table 7 shows the driving status and frequency of driving of the caregiver respondents. As shown in this table, a large majority of respondents drove regularly in all regions. Of the three respondents who reported that they no longer drove, one had stopped driving in the past 3 months, while the other two had stopped between 1 and 2 years ago (not shown in table). Two of these three respondents reported that they stopped driving because of health reasons; while the other reported that he or she decided not to renew their license (not shown in table). Of the 297 who reported still driving, nearly all drove very frequently (5-7 days per week). A large majority of respondents also reported that they expected to still be driving in the next 5 years, but there was great regional variation with nearly one-quarter of respondents in the Superior region indicating that they may have problems with their driving in the next 5 years.

Table 8 provides a summary of the data on the recipient of care and the care provided by the caregiver. As shown in this table, about 88% of respondents were currently providing some level of unpaid care. (Note that in order to be eligible for the survey, the respondent had to be either currently providing care, or had provided care in the past year.) On average, respondents provided care to two people. Seventy percent of the care recipients were women and the average age of the recipient was 84 years, with little variation among regions. Slightly more than one-half of the recipients were a parent, with another 18% being a relative. Very few recipients were the spouse of the caregiver. Statewide, about 62% of recipients were widowed, although there was great variability across regions (range = 55% - 75%). About 20% of the recipients lived with the caregiver. Of those that did not live with the caregiver, 75.2% lived in their own home and 6.9% lived in an assisted living facility (not shown in table).

Table 7: Caregivers - Driving								
	Bay n=43	Grand n=43	Metro n=42	North n=43	Southwest n=43	Superior n=43	University n=43	Statewide n=300
Do you drive:								
Regularly	86.1	86.1	97.6	95.4	95.4	95.4	95.4	94.4 (1.51)
Occasionally	9.3	11.6	2.4	4.7	2.3	4.7	0.0	3.9 (1.36)
Rarely	2.3	2.3	0.0	0.0	0.0	0.0	2.3	0.8 (0.48)
Do not drive	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.2 (0.22)
Do not drive, but may in future	2.3	0.0	0.0	0.0	0.0	0.0	2.3	0.6 (0.45)
Frequency of driving								n = 297
5-7 days/week	85.7	86.1	92.9	72.1	85.7	76.7	81.0	87.4 (2.33)
3-4 days/week	4.8	4.7	7.1	16.3	11.9	18.6	16.7	9.2 (2.20)
1-2 days/week	7.1	9.3	0.0	9.3	2.4	2.3	2.4	2.8 (0.79)
Few days/ month	2.4	0.0	0.0	0.0	0.0	2.3	0.0	0.4 (0.33)
Don't know	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.1 (0.12)
Is there a chance your driving ability could become a problem within the next 5 years?								n = 297
Yes	7.1	4.7	7.1	14.0	19.1	23.3	16.7	10.3 (2.24)
No	92.9	86.1	92.9	76.7	78.6	69.8	83.3	88.1 (2.29)
Don't know	0.0	9.3	0.0	9.3	2.4	7.0	0.0	1.7 (0.49)

Most caregivers lived close to the care recipient, with about three-fourths living within a 20 minute drive and nearly all within an hour drive. The survey found a wide range in the frequency with which the caregiver provided assistance to the recipient, with about 38% providing assistance 1-2 times per week and 27% providing assistance 5-7 times per week. Only about 60% of the recipients owned an automobile and about 70% rarely or never drove themselves. The recipients had a wide range of medical conditions, with conditions related to mobility reported in about 65% of recipients. Vision problems were reported in about 43% of recipients. Only a small percentage of recipients needed assistance with Activities of Daily Living (ADLs), but there was great variability among regions (range = 11% - 46%). The two most commonly reported ADLs for which assistance was needed were getting into and out of a bed or chair and bathing.

Table 8: Caregivers – Recipients and Caregiving								
	Bay n=43	Grand n=43	Metro n=42	North n=43	Southwest n=43	Superior n=43	University n=43	Statewide n=300
Providing unpaid help:								
Currently	83.7	81.4	92.9	93.0	76.7	90.7	83.7	87.9 (2.33)
Past 12 months	16.3	18.6	7.1	7.0	23.3	9.3	16.3	12.1 (2.33)
Number of people you have provided care for in the past 12 months	2.1	1.7	1.7	2.3	2.3	2.3	2.0	1.9 (0.09)
% Care recipient female	74.4	74.4	66.7	67.4	79.1	76.7	67.4	70.0 (3.81)
Avg. age of care recipient	83.4	83.4	84.7	82.4	85.2	83.4	83.7	84.1 (0.56)
Care recipient's relationship to you								
Spouse	14.0	9.3	2.4	7.0	4.7	7.0	11.6	6.4 (1.58)
Parent	41.9	69.8	64.3	41.9	41.9	37.2	58.1	56.5 (3.93)
Other relative	18.6	11.6	19.1	23.3	16.3	25.6	14.0	17.9 (3.17)
Friend	20.9	7.0	11.9	23.3	27.9	30.2	9.3	15.2 (2.72)
Other	4.7	2.3	2.4	4.7	9.3	0.0	7.0	4.0 (1.41)
Is this person								
Married	13.5	18.0	22.0	22.5	19.5	25.0	31.6	21.7 (3.53)
Divorced	5.4	5.1	4.9	10.0	4.9	0.0	2.6	4.8 (1.83)
Widowed	70.3	74.4	58.5	60.0	63.4	67.5	55.3	61.6 (4.19)
Single	5.1	2.6	7.3	7.5	9.8	7.5	5.3	6.7 (2.19)
DK/Refused	5.4	0.0	7.3	0.0	2.4	0.0	5.3	3.4 (1.76)
% Care recipient lives with caregiver	23.3	18.6	19.1	27.9	16.3	16.3	18.6	19.7 (3.22)
Travel time to home of care recipient								
<20 min	81.8	74.3	70.6	80.7	88.9	88.9	74.3	75.8 (4.07)
20-59 min	12.1	17.1	23.5	6.5	2.8	8.3	20.0	17.6 (3.74)
60-120 min	3.0	5.7	0.0	0.0	2.8	0.0	2.9	1.5 (0.69)
>120 min	3.0	2.9	2.9	12.9	5.6	2.8	0.0	3.3 (1.54)
Refused	0.0	0.0	2.9	0.0	0.0	0.0	2.9	1.8 (1.44)
Frequency of providing assistance to care recipient								
5-7 times/week	32.6	25.6	23.8	32.6	37.2	23.3	25.6	27.1 (3.53)
3-4 times/week	23.3	14.0	9.5	14.0	16.3	16.3	20.9	14.4 (2.59)
1-2 times/week	32.6	37.2	50.0	23.3	18.6	30.2	23.3	37.9 (3.99)
Few times/mnt	7.0	16.3	14.3	14.0	14.0	18.6	20.9	14.4 (2.85)
≤ 1 time/month	4.7	7.0	2.4	14.0	11.6	11.6	9.3	5.8 (1.50)
Don't know	0.0	0.0	0.0	2.3	2.3	0.0	0.0	0.4 (0.26)
% care recipients with a vehicle	55.8	60.5	61.9	58.1	48.8	62.8	55.8	59.7 (3.98)

% care recipients who drive themselves:								
Regularly	16.3	16.3	14.3	16.3	16.3	20.9	11.6	14.9 (2.87)
Occasionally	7.0	11.6	14.3	14.0	14.0	9.3	20.9	13.8 (2.84)
Rarely	4.7	9.3	11.9	11.6	2.3	7.0	2.3	8.3 (2.48)
No longer drive	67.4	58.1	50.0	53.5	53.5	46.5	55.8	54.2 (4.06)
Never drove	4.7	4.7	7.1	4.7	14.0	14.0	9.3	7.7 (2.12)
Don't know	0.0	0.0	2.4	0.0	0.0	2.3	0.0	1.2 (1.12)
% of care recipients with problems in:								
Vision	37.2	37.2	45.2	39.5	53.5	44.2	39.5	43.2 (4.05)
Mobility	76.7	74.4	64.3	65.1	53.5	58.1	62.8	65.4 (3.89)
Cognition	48.8	48.8	31.0	39.5	34.9	30.2	30.2	35.5 (3.81)
Other condition	55.8	37.2	23.8	55.8	41.9	37.2	30.2	34.0 (3.58)
DK/Refused	2.3	7.0	11.9	14.0	0.0	16.3	2.3	8.0 (2.45)
% of caregivers who help with Activities of Daily Living:								
Bathing	25.6	25.6	21.4	14.0	14.0	11.6	16.3	20.2 (3.33)
Dressing	20.9	14.0	16.7	9.3	11.6	7.0	16.3	15.8 (3.04)
Using bathroom	18.6	14.0	16.7	7.0	11.6	9.3	11.6	14.8 (3.00)
Bed/chair	37.2	9.3	26.2	14.0	18.6	18.6	14.0	23.1 (3.53)
Incontinence	23.3	16.3	16.7	7.0	16.3	9.3	7.0	15.4 (3.01)
Feeding	11.6	4.7	14.3	9.3	2.3	2.3	7.0	10.4 (2.73)
None	53.5	67.4	66.7	74.4	69.8	79.1	76.7	67.4 (3.83)

Table 9 presents the results on the transportation assistance provided by the caregiver. By far the most common help given by caregivers was related to transportation, with more than 90% of respondents statewide reporting to have provided this type of care. Although very few respondents indicated that they did not assist in transportation, those who did reported that the care recipient got around with the help of friends, family, volunteer drivers, drove themselves, or utilized some other means. For those caregivers who did provide transportation assistance, nearly all (97%) did so by giving the recipient rides him/herself. Medical, shopping, and family or personal reasons were the most common reasons for the recipient needing transportation. Most caregivers who provided help with transportation only did so a few times per week, but nearly 30% provided this assistance more frequently. In the more rural regions of Michigan (Bay, Grand, and North), there was a slight trend for more frequent transportation assistance. The survey explored among caregivers, how recipients got

around when the caregiver did not help out. Nearly 60% indicated that other family and friends provided transportation, with another 28% driving him or herself. Fewer than 5% of recipients used a bus, transportation provided by a senior/retirement community, senior van or dial-a-ride service, or a taxi. Of the few caregivers who provided transportation assistance by accompanying the recipient on trips, most reported riding with the recipient. Finally, for those caregivers who reported arranging transportation for the recipient, nearly 60% reported arranging with family or friends, while 17% reported arranging for van/dial-a-ride services.

Table 9: Caregivers—Transportation Assistance

	Bay n=43	Grand n=43	Metro n=42	North n=43	Southwest n=43	Superior n=43	University n=43	Statewide n=300
% of caregivers helping with:								
Telephone	23.3	37.2	28.6	20.9	18.6	20.9	20.9	25.8 (3.64)
Shopping	18.6	30.2	23.8	23.3	18.6	16.3	23.3	22.7 (3.45)
Food prep	51.2	41.9	38.1	32.6	39.5	23.3	30.2	38.4 (3.96)
Housekeeping	65.1	55.8	57.1	51.2	46.5	30.2	48.8	54.8 (4.04)
Laundry	39.5	44.2	33.3	39.5	30.2	25.6	25.6	33.7 (3.84)
Transportation	88.4	90.7	95.2	95.4	88.4	86.1	81.4	91.1 (2.00)
Medications	39.5	20.9	40.5	23.3	27.9	25.6	32.6	35.2 (3.97)
Finances	48.8	39.5	40.5	34.9	37.2	30.2	37.2	40.2 (4.01)
Other	4.7	11.6	4.8	11.6	9.3	9.3	9.3	6.8 (1.85)
Caregiver does not provide transportation	n=5	n=4	n=2	n=2	n=5	n=6	n=8	n=32
% of care recipients who get around using:								
Bus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 (--)
Sr/Retirement	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 (--)
Van/ dial-a-ride	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 (--)
Volunteer driver	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.3 (2.52)
Taxi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 (--)
Family/friends	20.0	20.0	0.0	0.0	20.0	0.0	0.0	8.1 (4.81)
Him/herself	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.6 (3.40)
Other	40.0	0.0	0.0	0.0	40.0	16.7	16.7	16.7 (6.51)
Caregiver provides transportation	n=38	n=39	n=40	n=41	n=38	n=37	n=35	n=268

% of caregivers providing the following type of transportation assistance:								
Ride in a car	100.0	97.4	95.0	97.6	97.4	100.0	100.0	97.0 (1.74)
Accompany	7.9	10.3	2.5	12.2	5.3	0.0	0.0	4.2 (1.48)
Arrange	21.1	30.8	37.5	17.1	18.4	10.8	14.3	28.2 (4.06)
Other	2.6	0.0	0.0	2.4	5.3	0.0	0.0	1.0 (0.51)
Caregivers who provide transport assist. % providing assistance for trips to:								
Medical	81.6	79.5	97.5	95.1	81.6	89.2	88.6	91.0 (1.82)
Shopping	60.5	59.0	75.0	68.3	60.5	54.1	62.9	68.0 (3.85)
Social/rec.	68.4	56.4	57.5	61.0	57.9	54.1	60.0	59.3(4.27)
Family/personal	60.5	56.4	67.5	65.9	60.5	54.1	60.0	63.7 (4.10)
School/religious	39.5	35.9	37.5	29.3	36.8	27.0	17.1	34.3 (4.15)
Other	21.1	7.7	10.0	4.9	13.2	2.7	2.9	10.2(2.62)
DK/refused	2.6	0.0	0.0	2.4	2.6	2.7	0.0	0.8 (0.46)
Caregivers who provide transport assist. Frequency of providing rides for care recipient								
5-7 times/week	13.5	13.2	7.9	15.0	10.8	5.4	5.7	9.4 (2.43)
3-4 times/week	10.8	23.7	21.1	25.0	16.2	16.2	20.0	19.4 (3.52)
1 -2 times/week	35.1	26.3	42.1	25.0	24.3	40.5	31.4	35.9 (4.28)
Few times/mn	24.3	21.1	15.8	22.5	37.8	21.6	22.9	20.9 (3.33)
$\leq$ 1 time/month	8.1	13.2	13.2	12.5	10.8	16.2	17.1	12.8 (2.95)
Don't know	8.1	2.6	0.0	0.0	0.0	0.0	2.9	1.6 (0.74)
Caregivers who provide transport assist. % care recipients who also get around by:								
Bus	0.0	2.6	2.5	0.0	2.6	5.4	5.7	2.5 (1.36)
Sr/Retirement	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 (--)
Van/ dial-a-ride	0.0	10.3	15.0	9.8	13.2	5.4	5.7	10.7 (2.92)
Volunteer driver	5.3	5.1	2.5	0.0	5.3	2.7	0.0	2.9 (1.39)
Taxi	2.6	0.0	0.0	0.0	0.0	0.0	5.7	1.0 (0.60)
Family/friends	63.2	69.2	57.5	48.8	65.8	64.9	57.1	59.6(4.27)
Him/herself	26.3	25.6	30.0	26.8	21.1	24.3	28.6	27.8 (3.95)
Other	7.9	7.7	7.5	4.9	5.3	8.1	8.6	7.4 (2.28)
Caregivers who provide transport assist. % who accompany care recipients on:								
	0.0	0.0	0.0	4.9	0.0	0.0	0.0	0.3 (0.19)
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 (--)
Bus	0.0	0.0	2.5	4.9	0.0	0.0	0.0	1.5 (1.24)
Sr/Retirement	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 (--)
Van/ dial-a-ride	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 (--)

Volunteer driver	2.6	7.7	2.5	0.0	2.6	0.0	0.0	2.4 (1.33)
Taxi	2.6	0.0	0.0	0.0	2.6	0.0	0.0	0.6 (0.43)
Family/friends								
Him/herself								
Other								
Caregiver arranges for transportation	n=4	n=4	n=1	n=3	n=3	n=0	n=0	n=15
Caregivers who arrange for transport % arrange transportation on:								
Van/ dial-a-ride	0.0	0.0	0.0	66.7	66.7	0.0	0.0	16.9 (6.21
Volunteer driver	25.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7 (7.74)
Family/friends	25.0	100.0	100.0	0.0	33.3	0.0	0.0	56.8 (8.90)
Don't know	50.0	0.0	0.0	33.3	0.0	0.0	0.0	15.5 (8.93)

Table 10 explores issues related to caregiver burden among respondents. As part of the questionnaire, respondents completed the Bakas Caregiving Outcomes Scale (BCOS; Bakas & Champion, 1999). This scale included 15 questions related to possible changes in life resulting from providing care to a recipient. On each item, the respondent answered on a 7-point scale (-3 to +3) with negative values indicating changes for the worst, positive values indicating changes for the better, and zero indicating no change. The answers for the 15 items are summed to get an overall score that could range from -45 to +45, with low scores indicating very little change and high scores indicating a lot of change for the better or worse depending on the direction of the change. Statewide, caregivers indicated on average very little change in their lives associated with providing care (BCOS=3.6). Indeed, this score was positive, with some variation among regions. Using the same 7-point scale, respondents also reported on how their life changed in general as a result of providing care. The average response was also close to zero overall and in each region. Statewide, about 43% of caregivers indicated that they sought information and services to help them with providing care. Of these respondents, a wide range of information and services were sought, with about 11% seeking information about transportation. The most commonly reported sources of information were doctors/health care professionals, senior centers, family/friends, and government agencies.

Table 10: Caregiver Burden								
	Bay n=43	Grand n=43	Metro n=42	North n=43	SW n=43	Superior n=43	Univ n=43	Statewide n=300
Average Overall BCOS Score	1.5	4.5	3.8	4.0	6.2	5.9	1.9	3.6 (1.39)
How has life changed?	0.5	0.5	0.1	0.1	0.4	0.3	0.2	0.2 (0.14)
% caregivers who sought information/services to help them provide assistance	34.9	46.5	47.6	32.6	37.2	30.2	44.2	42.9 (4.06)
% caregivers who sought information/services:								
Training/education	11.6	9.3	14.3	7.0	9.3	7.0	16.3	12.7 (2.82)
Counseling/support	2.3	2.3	7.1	4.7	4.7	7.0	7.0	5.7 (2.03)
Respite care	4.7	2.3	9.5	11.6	11.6	2.3	7.0	8.0 (2.33)
Trans. services	0.0	4.7	16.7	11.6	9.3	4.7	7.0	10.8 (2.83)
Financial support	11.6	7.0	9.5	4.7	16.3	11.6	4.7	9.4 (2.39)
Other	14.0	20.9	11.9	14.0	11.6	7.0	16.3	13.4 (2.70)
% caregivers who sought information from source:								
Doctor/health pro.	18.6	23.3	23.8	18.6	23.3	14.0	20.9	20.0(3.40)
Family/friends	4.7	11.6	11.9	4.7	11.6	11.6	11.6	10.4 (2.58)
Senior center	16.3	4.7	11.9	14.0	9.3	11.6	4.7	10.8 (2.60)
Other group/organiz	4.7	9.3	11.9	9.3	4.7	7.0	9.3	9.3(2.50)
Government agency	7.0	4.7	14.3	4.7	9.3	7.0	4.7	10.0 (2.70)
Paid caregiver service	7.0	2.3	7.1	7.0	9.3	4.7	7.0	6.8 (2.10))
TV or radio	2.3	2.3	2.4	0.0	0.0	0.0	2.3	1.9 (1.21)
Newspaper	7.0	2.3	2.4	2.3	2.3	2.3	4.7	3.3 (1.35)
Internet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 (-)
Other sources	4.7	4.7	4.8	4.7	4.7	2.3	9.3	5.3 (1.78)

Men versus Women Caregivers

We also calculated survey results as a function of the respondent's sex. Tables 11-15 show these results. Statistical differences between men and women were calculated by computing 95% confidence intervals for the means/averages and determining if they overlapped. Those that did not overlap were considered to be statistically different means/averages (shown in the tables with an asterisk). Table 11 shows respondent demographics by sex. As can be seen, about two-thirds of the respondents were women and both groups were reasonably similar in all other demographic categories.

Table 11: Caregiver Sample Demographics by Sex (Unweighted)			
	Men	**Women**	**Statewide**
Number of respondents	101	199	300
Age			
Mean	61.5	60.7	61.0
SD	(9.32)	(8.27)	(8.6)
% Currently licensed to drive	99.1	99.5	99.3
% Licensed to drive in past 5 years	100.0	100.0	100.0
% Married	82.2	73.4	76.3
% Live in own home/apartment	93.1	96.0	95.0
% Lived 5+ yrs in same location	87.1	92.0	90.3
Avg. household size	2.5	2.4	2.4
Race			
Caucasian	93.1	95.5	94.7
African American	4.0	1.5	2.3
Native American and Other	3.0	1.5	2.0
Refused	0.0	1.5	1.0
Household income			
Under $25,000	11.9	14.6	13.7
$25,000-$49,999	25.7	25.6	25.7
$50,000- $74,999	22.8	20.1	21.0
$75,000- $99,999	10.9	11.6	11.3
$100,000 and over	11.9	8.0	9.3
Don't know/Refused	16.8	20.1	19.0
Education			
Less than high school	5.0	4.5	4.7
High school	27.2	32.2	30.7
Vocational or some college	31.7	37.2	35.3
College graduate	9.9	8.0	8.7
Some graduate school	25.7	16.6	17.7

Table 12 shows caregiver self-reported health by sex and overall. There were no significant differences between sexes on overall health.

Table 12: Caregiver Health			
	Men	**Women**	**Statewide**
Overall health			
% Excellent	22.1 ± 11.0	17.8 ± 7.3	19.1 ± 6.1
% Very good	25.6 ± 11.7	42.3 ± 9.6	37.3 ± 7.8
% Good	30.2 ± 13.0	23.5 ± 7.9	25.5 ± 6.7
% Fair	9.8 ± 8.2	15.3 ± 6.8	13.6 ± 5.3
% Poor	12.3 ± 11.4	1.2 ± 1.0	4.5 ± 3.8

Table 13 shows average responses to questions related to the caregiver's own driving by sex and overall. There were no significant differences by sex on driving frequency and there were only three respondents (two were women) who no longer drove. Of those who were still driving, there were no significant differences between men and women for frequency of driving. There was no difference between sexes for answering either yes or no to the question: Is there a chance your driving ability could become a problem within the next 5 years? However, there were significantly more men who answered that they did not know.

Table 14 shows comparisons between men and women on responses to question about recipients and caregiving. As can be seen from this table, there were no significant differences between men and women on any of these questions, except that women were likely to be caring for women.

Table 13: Caregivers - Driving			
	Men	**Women**	**Statewide**
Do you drive			
Regularly	97.5 ± 2.7	93.1 ± 4.1	94.4 ± 3.0
Occasionally	1.4 ± 1.8	4.9 ± 3.7	3.9 ± 2.7
Rarely	0.0 ± 0	1.2 ± 1.4	0.8 ± 0.9
Do not drive anymore	0.0 ± 0	0.3 ± 0.6	0.2 ± 0.4
Do not drive now but expect to in the future	1.1 ± 2.1	0.5 ± 0.9	0.6 ± 0.9
Caregivers who drive	n=100	n=197	N=297
Frequency of driving			
Every day or almost every day	90.1 ± 8.2	86.3 ± 5.5	87.4 ± 4.6
3 or 4 days a week	8.4 ± 8.0	9.6 ± 5.2	9.2 ± 4.3
1 or 2 days a week	1.2 ± 1.7	3.5 ± 2.1	2.8 ± 1.5
A few days a month	0.3 ± 0.5	0.5 ± 0.9	0.4 ± 0.6
Is there a chance your driving ability could become a problem within the next 5 years?			
Yes	10.6 ± 8.3	10.1 ± 5.2	10.3 ± 4.4
No	85.4 ± 8.6	89.2 ± 5.3	88.1 ± 4.5
Don't know*	4.0 ± 2.5	0.7 ± 0.8	1.7 ± 1.0

Table 14: Caregivers – Questions About Recipients and Caregiving			
	Men	**Women**	**Statewide**
% Care recipient female*	55.6 ± 13.8	76.1 ± 8.2	70.0 ± 7.5
Avg. age of care recipient	85.4 ± 2.0	83.6 ± 1.3	84.1 ± 1.1
Care recipient's relationship to you			
Spouse	5.8 ± 4.2	6.6 ± 4.1	6.4 ± 3.1
Parent	57.1 ± 13.1	56.2 ± 9.5	56.5 ± 7.7
Other relative	20.1 ± 11.3	17.0 ± 7.6	17.9 ± 6.2
Friend	13.0 ± 8.9	16.1 ± 6.7	15.2 ± 5.3
Other	4.1 ± 3.7	4.0 ± 3.6	4.0 ± 2.8
Is this person			
Married	32.1 ± 14.4	17.3 ± 7.6	21.7 ± 3.6
Divorced	2.6 ± 3.0	5.8 ± 5.0	4.8 ± 3.6
Widowed	57.8 ± 15.0	63.2 ± 10.0	61.6 ± 8.2
Single, never been married	2.4 ± 2.5	8.6 ± 6.0	6.7 ± 4.3
Don't know	5.1± 8.1	2.7± 3.6	3.4 ± 3.4
% Care recipient lives with caregiver	18.5 ± 11.1	20.2 ± 7.8	19.7 ± 6.3
Distance the care recipient lives from caregiver			
Within 20 minutes	72.6 ± 14.8	77.2 ± 9.7	75.8 ± 8.0
More than 20 minutes	21.3 ± 14.3	16.0 ± 8.6	17.6 ± 7.3
Between 1 and 2 hours	1.6 ± 2.3	1.4 ± 1.7	1.5 ± 1.4
More than 2 hours	4.5 ± 3.8	2.8 ± 4.0	3.3 ± 3.0
Frequency of providing assistance to care recipient			
Every day or almost every day	27.4 ± 12.8	27.0 ± 8.3	27.1 ± 6.9
3 or 4 times a week	16.5 ± 11.1	13.5 ± 5.5	14.4 ± 5.1
1 or 2 times a week	27.9 ± 12.7	42.1 ± 9.5	37.9 ± 7.8
A few times a month	20.4 ± 12.3	11.9 ± 6.0	14.4 ± 5.6
Once a month or less	7.1 ± 4.5	5.3 ± 3.7	5.8 ± 2.9
Don't know	0.7 ± 1.5	0.2 ± 0.4	0.4 ± 0.5
% of caregivers help with:			
Using the telephone	24.5 ± 12.7	26.4 ± 8.7	25.8 ± 7.1
Shopping	19.0 ± 11.2	24.3 ± 8.5	22.7 ± 6.8
Food preparation	30.5 ± 13.0	41.8 ± 9.6	38.4 ± 7.8
Housekeeping	50.6 ± 14.2	56.5 ± 9.6	54.8 ± 7.9
Laundry	27.1 ± 12.8	36.5 ± 9.3	33.7 ± 7.5
Transportation	94.1 ± 3.8	89.8 ± 5.3	91.1 ± 3.9
Taking medications	31.4 ± 13.9	36.8 ± 9.5	35.2 ± 7.8
Managing finances	37.2 ± 13.2	41.4 ± 9.7	40.2 ± 7.9
Other	13.7 ± 10.6	3.9 ± 2.2	6.8 ± 3.6
Caregiver provides transportation assistance	n=90	n= 178	n=268

Caregivers who provide transportation assistance			
% who provide the following type of transportation assistance:			
Gives ride in a car	99.5 ± 0.9	95.8 ± 4.9	97.0 ± 3.4
Accompany him/her on other forms of trans.	6.1 ± 8.1	3.4 ± 2.1	4.2 ± 2.9
Arrange for someone else to drive	28.3 ± 14.3	28.2 ± 9.7	28.2 ± 8.0
Other transportation assistance	0.0 ± 0.0	1.4 ± 1.4	1.0 ± 1.0
Caregivers who provide transportation assistance			
% who provide transportation assistance for trips to:			
Medical or dental services	89.5 ± 5.3	91.8 ± 4.6	91.0 ± 3.6
Shopping or errands	57.9 ± 14.7	72.5 ± 8.7	68.0 ± 7.5
Social or recreational activities	54.0 ± 14.8	61.7 ± 10.2	59.3 ± 8.4
Family or personal business	60.8 ± 14.7	65.0 ± 9.8	63.7 ± 8.0
School or religious activities	27.6 ± 12.1	37.3 ± 10.2	34.3 ± 8.1
Other purpose	7.7 ± 12.1	11.3 ± 7.0	10.2 ± 5.1
Don't know/refused	1.5 ± 1.9	0.5 ± 1.0	0.8 ± 0.9
Caregivers who provide transportation assistance			
Frequency of providing rides for care recipient			
Every day or almost every day	11.8 ± 9.0	8.2 ± 5.7	9.4 ± 4.8
3 or 4 times a week	20.3 ± 12.0	18.9 ± 8.6	19.4 ± 6.9
1 or 2 times a week	34.4 ± 14.9	36.6 ± 10.4	35.9 ± 8.4
A few times a month	20.5 ± 12.0	21.0 ± 7.9	20.9 ± 6.5
Once a month or less	11.8 ± 9.1	13.3 ± 7.4	12.8 ± 5.8
Don't know	1.1 ± 2.3	1.9 ± 2.0	1.6 ± 1.5

Table 15 shows average responses to questions on issues related to caregiver burden among respondents, including the BCOS. Men had a higher BCOS score than women, but this difference was not significant. Men did, however, give higher, positive ratings for how life had changed as a result of caregiving than did women. Male caregivers were also significantly less likely overall to seek information and/or services to help with providing assistance, in particular training and education.

Table 15: Caregiver Burden			
	Men	**Women**	**Statewide**
Average Score on BCOS	7.3 ± 5.6	2.0 ± 3.0	3.6 ± 2.7
How has life changed?*	0.6 ± 0.4	0.04 ± 0.3	0.2 ± 0.3
% caregivers who sought information/services to help them provide assistance*	29.8 ± 12.9	48.5 ± 9.7	42.9 ± 8.0
% caregivers who sought			
Caregiver training or education*	4.3 ± 3.8	16.3 ± 7.5	12.7 ± 5.5
Caregiver counseling or support groups	2.2 ± 2.5	7.2 ± 5.5	5.7 ± 4.0
Respite care	8.6 ± 8.1	7.8 ± 5.6	8.0 ± 5.7
Transportation services	4.3 ± 3.6	13.5 ± 7.5	10.8 ± 5.5
General financial support	9.6 ± 8.4	9.3 ± 5.7	9.4 ± 4.7
Other information or services	9.7 ± 8.1	15.0 ± 6.7	13.4 ± 5.3
% caregivers who sought information from:			
Doctor or other health professional	14.4 ± 8.8	25.2 ± 8.7	20.0 ± 6.7
Other family and friends	5.0 ± 3.7	12.7 ± 6.9	10.4 ± 5.1
Senior center	4.8 ± 3.6	13.4 ± 7.0	10.8 ± 5.1
Other community group or organization	9.7 ± 8.5	9.2 ± 6.2	9.3 ± 4.9
Government agency	5.4 ± 7.5	12.0 ± 6.9	10.0 ± 5.3
Paid caregiver service	3.2 ± 3.1	8.4 ± 5.6	6.8 ± 4.1
TV or radio	0.0 ± 0.0	2.7 ± 3.4	1.9 ± 2.4
Newspaper	2.1 ± 2.6	3.8 ± 3.6	3.3 ± 2.6
Other sources	2.4 ± 3.0	6.5 ± 4.8	5.3 ± 3.5

Age of Care Recipient

As a way to further understand the transportation and other issues related to giving care to Michigan's older adults, we analyzed the caregiver survey results as a function of two age groups of care recipients: 70-84 years (n=161) and 85 years and older (n=136). Note that two respondents did not give the age of the care recipient and variables marked with an asterisk are statistically significant between groups. Tables 16-21 show these results.

Table 16 shows the demographic characteristics of the caregiver as a function of the age of the care recipient. There was little difference in the demographics of the caregivers for each care recipient age group, except that caregivers were slightly but significantly younger in the group caring for people aged 70-84 years.

Table 16: Weighted Proportions/Means and SE of Caregivers by Age of their Care Recipient		
Caregiver	**Age of care recipient, Years**	
	70-84	**85+**
Mean age*	58.4 ± 1.7	61.3 ± 1.6
% Female	70.7 ± 9.8	69.1 ± 10.7
% Currently licensed to drive	100.0 ± 0.0	99.3 ± 1.3
% Licensed to drive in past 5 years	100.0 ± 0.0	100.0 ± 0.0
% Married	74.5 ± 9.7	75.4 ± 10.1
% Live in own home/apartment	95.9 ± 2.7	95.6 ± 5.0
% Lived 5+ yrs in same location	89.0 ± 6.8	93.0 ± 5.4
Avg. household size	2.6 ± 0.3	2.4 ± 0.3
% of households with no vehicle	2.2 ± 4.4	0.4 ± 0.7
% of households with one vehicle	18.6 ± 7.5	23.3 ± 10.4
% of households with two vehicles	43.4 ± 11.0	47.6 ± 11.8
% of households with three^{+} vehicles	36.2 ± 11.0	27.1 ± 10.8
Avg. number of vehicles given a vehicle	2.3 ± 0.3	2.1 ± 0.2

Table 17 shows the employment/volunteer status of caregivers as a function of the two age groups of care recipients. Table 18 shows the self-reported health status of caregivers. There were no differences among caregiver responses about employment, volunteering activities, or health status between the two care recipient age groups.

Table 17: Caregivers – Work and Volunteer Activity by Age of Care Recipient		
	Age of care recipient	
Caregiver	**70-84**	**85+**
% Work outside home for pay	56.8 ± 10.5	45.4 ± 11.8
If work outside home		
Full-time	69.2 ± 14.5	65.4 ± 19.0
Part-time	26.9 ± 14.3	27.5 ± 16.8
Occasional	3.9 ± 3.1	7.1 ± 11.3
% Volunteer in community	60.0 ± 10.8	50.6 ± 11.9
Avg. hours of volunteer work per week	5.1 ± 1.1	6.0 ± 2.3

Table 18: Caregiver Health by Age of Care Recipient		
Caregiver	**Age of care recipient**	
	70-84	**85+**
Overall health		
% Excellent	15.0 ±7.3	23.9 ± 10.1
% Very good	45.6 ± 10.9	29.5 ± 11.0
% Good	24.9 ± 9.2	26.9 ± 10.2
% Fair	9.1 ± 3.9	16.5 ± 9.1
% Poor	5.5 ± 6.1	3.2 ± 4.6

Table 19 shows respondent answers to questions about giving care as a function of the age group of the care recipient. There were few differences in caregiver responses between the two groups. As expected, the average age of the care recipient was significantly older in the older age group. Other significant differences were that: the care recipient was significantly more likely to be a spouse in the younger care recipient age group; younger care recipients were more likely to still own a vehicle; younger care recipients were more likely to drive regularly and less likely to have stopped driving; and caregivers less often provided help with using the telephone and transportation in the younger care recipient age group.

Table 19: Caregivers – Recipients and Caregiving by Age of Care Recipient		
Caregiver	**Age of care recipient**	
	70-84	**85+**
Providing unpaid help		
Currently	92.0 ± 3.8	86.5 ± 7.3
Past 12 months but not currently	8.0 ± 3.8	13.5 ± 7.3
Number of people you have provided care for in the past 12 months	2.0 ± 0.3	1.8 ± 0.3
% Care recipient female	70.3 ± 10.5	68.7 ± 11.1
Avg. age of care recipient*	78.5 ± 0.7	90.0 ± 1.1
Care recipient's relationship to caregiver		
% Spouse*	10.2 ± 5.8	2.6 ± 2.4
% Parent	54.8 ± 10.4	59.2 ± 11.5
% Other relative	12.3 ± 6.9	24.3 ± 10.5
% Friend	17.4 ± 7.4	11.1 ± 7.0
% Other	5.4 ± 5.0	2.8 ± 2.3
Is this person		
% Married	26.8 ± 10.6	17.6 ± 9.3
% Divorced	7.0 ± 5.7	2.8 ± 4.7
% Widowed	56.3 ± 11.8	68.2 ± 11.5
% Single, never been married	6.7 ± 5.6	7.0 ± 6.7
% Care recipient lives with caregiver	17.4 ± 7.4	22.6 ± 10.3
Distance the care recipient lives from caregiver		
% Within 20 minutes	79.3 ± 10.4	74.0 ± 12.2
% More than 20 minutes	17.4 ± 10.2	18.6 ± 11.2
% Between 1 and 2 hours	2.0 ± 2.3	1.1 ± 1.5
% More than 2 hours	1.3 ± 1.3	5.6 ± 6.3

Frequency of providing assistance to care recipient		
% Every day or almost every day	23.6 ± 8.6	31.2 ± 11.1
% 3 or 4 times a week	15.2 ± 7.4	14.0 ± 7.4
% 1 or 2 times a week	39.1 ± 10.7	37.8 ± 11.7
% A few times a month	16.1 ± 8.0	10.4 ± 7.0
% Once a month or less	5.3 ± 3.0	6.5 ± 5.2
% care recipient that have a vehicle*	69.9 ± 9.4	48.0 ± 11.9
% care recipients who drive themselves:		
Regularly*	20.3 ± 8.9	9.3 ± 6.9
Occasionally	17.4 ± 8.8	10.0 ± 6.9
Rarely	10.7 ± 7.6	6.1 ± 6.4
Does not drive anymore*	42.8 ± 10.5	65.5 ± 11.4
Never drove	6.5 ± 5.0	9.1 ± 6.9
Don't know	2.4 ± 4.4	0.0 ± 0.0
% caregivers helping with:		
Using the telephone*	16.2 ± 8.1	36.6 ± 11.6
Shopping	18.0 ± 8.2	28.3 ± 11.0
Food preparation	36.4 ± 10.4	41.8 ± 11.8
Housekeeping	53.0 ± 11.0	58.3 ± 11.2
Laundry	30.3 ± 9.9	38.3 ± 11.6
Transportation*	88.7 ± 5.6	95.6 ± 2.8
Taking medications	32.2 ± 10.6	39.4 ± 11.8
Managing finances	36.0 ± 11.8	45.8 ± 11.7
Other	9.2 ± 6.6	4.7 ± 2.8
Caregiver provides transportation assistance	n=140	n= 126
Caregivers who provide transportation assistance		
% who provide following type of transportation assistance:		
Gives ride in a car	97.1 ± 5.0	96.8 ± 4.8
Accompany him/her while on other forms of trans.	3.3 ± 2.3	5.2 ± 5.3
Arrange for someone else to drive him/her	26.4 ± 11.1	29.7 ± 11.8
Other transportation assistance	0.5 ± 1.0	1.5 ± 1.7
Caregivers who provide transportation assistance		
% who provide transportation assistance for trips to:		
Medical or dental services	88.7 ± 6.4	93.3 ± 3.5
Shopping or errands	63.3 ± 11.0	72.7 ± 10.6
Social or recreational activities	54.0 ± 12.0	65.0 ± 11.8
Family or personal business	54.8 ± 12.0	72.8 ± 10.0
School or religious activities	27.7 ± 10.6	41.0 ± 12.3
Other purpose	5.3 ± 3.3	15.1 ± 9.3
Don't know/refused	0.3 ± 0.6	1.3 ± 1.7
Caregivers who provide transportation assistance		
Frequency of providing rides for care recipient		
% Every day or almost every day	7.4 ± 3.8	11.4 ± 8.4
% 3 or 4 times a week	18.1 ± 9.3	20.7 ± 10.4
% 1 or 2 times a week	35.8 ± 11.8	36.4 ± 12.1

% A few times a month	20.8 ± 9.4	20.2 ± 9.3
% Once a month or less	15.2 ± 9.1	10.6 ± 7.5
% Don't know	2.6 ± 2.5	0.7 ± 1.4

Tables 20-21 show the responses related to caregiver burden (Table 20) and assistance seeking (Table 21) as a function of the two care recipient age groups. There were no significant differences on any of the items in these tables.

Table 20: Caregiver Burden by Age of Care Recipient

Caregiver	Age of care recipient	
	70-84	**85+**
Average score on BCOS	3.2 ± 2.6	3.5 ± 4.8
How has life changed?	0.2 ± 0.3	0.2 ± 0.5

Table 21: Caregiver Seeking Information and Support by Age of Care Recipient

Caregiver	Age of care recipient	
	70-84	**85+**
% caregivers who sought information/services to help them provide assistance	41.9 ± 11.0	42.6 ± 11.7
% Caregivers who sought the following:		
Caregiver training or education	14.1 ± 8.0	11.6 ± 8.0
Caregiver counseling or support groups	7.3 ± 6.4	4.2 ± 4.9
Respite care	10.1 ± 7.5	6.2 ± 5.3
Transportation services	9.1 ± 7.3	10.5 ± 7.9
General financial support	9.7 ± 6.7	9.4 ± 6.9
Other information or services	9.4 ± 5.6	17.5 ± 9.2
% Caregivers who sought information from:		
Doctor or other health professional	18.8 ± 8.9	25.5 ± 10.6
Other family and friends	11.2 ± 7.6	9.9 ± 7.0
Senior center	9.8 ± 6.7	12.3 ± 8.0
Other community group or organization	7.1 ± 6.4	12.0 ± 8.0
Government agency	11.7 ± 8.3	8.6 ± 6.8
Paid caregiver service	4.2 ± 4.8	9.8 ± 7.0
TV or radio	0.6 ± 1.3	3.3 ± 4.7
Newspaper	0.6 ± 1.3	6.2 ± 5.3
Internet	0.0 ± 0.0	0.0 ± 0.0
Other sources	4.6 ± 4.9	3.8 ± 2.6

Michigan Older Adult Survey

A total of 300 Michigan residents aged 70 and older completed the survey, with 43 respondents in 6 of the 7 MDOT regions and 42 respondents in the Superior region. The demographics of this sample are shown in Table 22 by MDOT region and statewide. As shown in this table, respondents averaged about 78 years of age, were about two-thirds women, about 60% were currently married; and nearly all were White. Nearly all lived in their own home or apartment and a vast majority had lived at their current residence for at least the past 5 years. Respondents varied greatly in household income and education.

Table 22: Older Adult Sample Demographics

	Bay	Grand	Metro	North	SW	Superior	Univ	Statewide
Number of respondents	43	43	43	43	43	42	43	300
Mean Age	77.8	77.9	78.6	76.6	77.0	76.1	78.9	78.0 (0.44)
% Female	81.4	55.8	60.5	51.2	74.4	52.4	62.8	63.3 (3.50)
% Married	62.8	72.1	51.2	74.4	72.1	71.4	60.5	61.2 (3.58)
% Live in own home/apartment	95.4	95.4	93.0	100.0	95.4	95.3	97.7	95.1 (1.72)
% Lived 5^{+} years in same location	86.1	90.7	93.0	95.4	93.0	92.9	90.7	91.7 (1.95)
Race								
White	95.4	93.0	88.4	97.7	97.7	100.0	86.1	91.7 (2.20)
African Am.	0.0	4.7	9.3	2.3	2.3	0.0	4.7	5.3 (1.29)
Other	2.3	2.3	0.0	0.0	0.0	0.0	7.0	1.5 (0.66)
Don't know	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.9 (0.92)
Refused	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.6 (0.44)
Household income								
>$25,000	20.9	25.6	16.3	23.3	32.6	35.7	34.9	23.4 (2.87)
$25,000-$49999	16.3	30.2	32.6	32.6	18.6	31.0	23.3	27.4 (3.32)
$50,000-$74,999	9.3	4.7	2.3	11.6	20.9	11.9	6.98	7.2 (1.49)
$75,000 +	72.0	9.3	14.0	11.6	4.7	2.4	11.6	10.6 (2.40)
Don't Know	23.3	16.3	7.0	4.7	14.0	7.1	9.3	11.0 (2.08)
Refused	23.3	14.0	27.9	16.3	9.3	11.9	14.0	20.4 (3.10)

Education								
< High school	11.6	9.3	7.0	9.3	7.0	14.3	4.7	8.0 (1.91)
High school	48.8	32.6	41.9	32.6	48.8	50.0	48.8	42.9 (3.60)
Some college	18.6	30.2	27.9	25.6	30.2	19.0	20.9	25.7 (3.22)
College graduate	7.0	11.6	11.6	11.6	9.3	4.8	7.0	9.9 (2.26)
Some Grad	9.3	11.6	7.0	20.9	2.3	9.5	18.6	10.2 (2.03)
Don't Know	0.0	0.0	2.3	0.0	0.0	2.4	0.0	1.0 (0.92)
Refused	4.7	4.7	2.3	0.0	2.3	0.0	0.0	2.3 (1.11)

Table 23: Household Size and Vehicles

	Bay n=43	**Grand n=43**	**Metro n=43**	**North n=43**	**Southwest n=43**	**Superior n=43**	**University n=43**	**Statewide n=300**
% In one-person households	32.6	20.9	27.9	27.9	25.6	23.8	32.6	27.9 (3.28)
% In two-person households	60.5	69.8	51.2	65.1	69.8	69.1	55.8	58.9 (3.60)
% In three^{+} -person households	7.0	9.3	14.0	7.0	2.3	4.8	11.6	10.1 (2.37)
Average household size	1.7	1.9	1.9	1.8	1.8	1.8	1.8	1.8 (0.05)
% Lived out of MI for 2+ mos. in past year	16.3	20.9	14.0	27.9	4.6	14.3	14.0	15.3 (2.65)
% households with no vehicle	11.6	7.0	2.3	0.0	9.3	4.8	4.6	5.0 (1.37)
Avg. number of vehicles, given a vehicle in the household	1.5	1.9	1.7	1.6	2.0	1.7	1.6	1.7 (0.05)
% licensed to drive	81.4	90.7	97.7	93.0	86.1	95.2	88.4	91.8 (1.61)
Of those not currently licensed - % licenses in past 5 years	37.5	25.0	100.0	66.7	76.7	100.0	80.0	51.1 (0.31)
% of households with another person who drives	60.5	67.4	55.8	69.8	62.8	61.9	58.1	60.2 (3.59)

Table 23 shows questionnaire variables related to household sizes and vehicle ownership as a function of MDOT region and statewide. About one-quarter of older adults lived in single-person household, without much difference between regions. About 60% of respondents lived in two-person households, although this was about 10 percentage points lower in the Metro region. Statewide, about 15% of respondents

lived outside of Michigan for 2 or more contiguous months in the past year (the so-called snow birds). Nearly all households of respondents had an automobile, with a statewide average of 1.7 vehicles per household. About 92% of respondents were licensed to drive. One-half of those who were not licensed had lost their license within the past 5 years. About 60% of respondents' households had another individual who was licensed to drive.

Table 24 shows the work and volunteering activities of respondents. Very few respondents worked outside of the home for pay. Of those who did work, only 9% worked full-time. Statewide, about 30% of respondents volunteered in their community, with great variation among regions (the range was 20.9% in the Southwest region to 55.8% in the North region).

Table 24: Work and Volunteering

	Bay n=43	Grand n=43	Metro n=43	North n=43	Southwest n=43	Superior n=43	University n=43	Statewide n=300
% Work outside home for pay	4.7	11.6	4.7	2.3	11.6	9.5	4.7	6.1 (1.63)
Those who work % full time	0.0	20.0	0.0	100.0	0.0	25.0	0.0	9.1 (4.58)
% Volunteer in community	30.2	37.2	23.3	55.8	20.9	33.3	46.5	31.8 (3.20)

Table 25 shows the respondents' answers to a variety of health related questions. Overall, respondents reported to be in good health, with about 50% reporting to be very able to walk one-half mile and to climb two flights of stairs. However, 20%-30% reported to be not very able or not at all able to do these activities. About 80% of respondents reported to be in good or better health. Very few respondents reported that vision (7.1%) or memory (6.3%) problems were affecting their ability to drive safely.

Table 26 reports the driving status of the older adult respondents. As can be seen in this table, nearly 70% drove regularly, 16% were no longer driving, and another 9% drove only occasionally or rarely.

Table 25: Overall Health								
	Bay n=43	Grand n=43	Metro n=43	North n=43	Southwest n=43	Superior n=42	Univ n=43	Statewide n=300
Ability to walk half a mile								
% Very able	39.5	60.5	46.5	65.1	48.8	69.1	51.2	50.5 (3.62)
% Somewhat	18.6	16.3	16.3	14.0	18.6	14.3	25.6	17.8 (2.75)
% Not very able	11.6	11.6	20.9	9.3	4.7	2.4	4.7	13.1 (2.71)
% Not at all able	30.2	11.6	16.3	11.6	27.9	14.3	16.3	18.3 (2.75
Ability to climb 2 flights of stairs								
Very able	41.9	55.8	51.2	62.8	37.2	61.9	51.2	50.5 (3.63)
Somewhat able	20.9	25.6	20.9	11.6	32.6	23.8	30.2	23.2 (3.02)
Not very able	16.3	2.3	9.3	16.3	11.6	9.5	11.6	10.6 (2.18)
Not at all able	18.6	14.0	11.6	9.3	18.6	2.4	7.0	12.3 (2.37)
Overall health								
Excellent	4.7	23.3	14.0	30.2	18.6	11.9	18.6	16.2 (2.57)
Very good	30.2	30.2	37.2	30.2	20.9	50.0	20.9	31.7 (3.44)
Good	37.2	37.2	20.9	25.6	39.5	19.1	51.2	31.1 (3.14)
Fair	18.6	4.7	16.3	11.6	14.0	16.7	4.7	13.1 (2.56)
Poor	4.7	2.3	9.3	2.3	7.0	2.4	4.7	6.2 (1.95)
% With vision problems affecting driving	9.3	7.0	7.0	4.7	11.6	4.8	4.7	7.1 (1.87)
% With memory problems affecting driving	9.3	9.3	2.3	7.0	4.7	4.7	14.0	6.3(1.48)

Table 26: Driving Status								
	Bay n=43	Grand n=43	Metro n=43	North n=43	Southwest n=43	Superior n=42	Univ n=43	Statewide n= 300
% who drive								
Regularly	53.5	74.4	67.4	86.1	62.8	81.0	74.4	69.0 (3.38)
Occasionally	7.0	11.6	20.9	4.7	14.0	9.5	7.0	13.6 (2.73)
Rarely	11.6	0.0	0.0	2.3	2.3	2.4	2.3	2.4 (0.79)
Do not drive anymore	25.6	11.6	7.0	2.3	11.6	7.1	16.3	11.3 (2.10)
Expect to in future	2.3	0.0	2.3	2.3	4.7	0.0	0.0	1.9 (1.04)
Never drove	0.0	2.3	0.0	2.3	4.7	0.0	0.0	0.9 (0.92)

Table 27 shows the driving habits of those who reported that they still drove at least some. Respondents who drove, tended to drive frequently: two-thirds of those who drove did so at least 5-7 days per week, 15% drove 3-4 days per week, and 11% drove 1-2 days per week. Respondents, however, did not tend to drive many miles each year, with about 60% driving less than 5,000 miles per year. Questions from the

Driving Space Questionnaire (Owsley et al., 1999) showed that the large majority of drivers tended to drive no further than distant towns, with only 22% reporting to have driven out-of-state in the past 3 months. Responses to these questions have also been combined to obtain an overall Driving Space Score, which can vary from 0-6, with higher scores indicating larger driving spaces. The statewide average Driving Space Score was 3.5, indicating a moderate-sized driving space. Nearly all respondents were very or somewhat satisfied with their ability to get to places where they wanted to go. About 20% of respondents thought there was a chance that their driving ability could become a problem in the next 5 years.

Table 27: Driving Related Questions

	Bay n=31	Grand n=37	Metro n=38	North n=40	Southwest n=34	Superior n=39	Univ n=36	Statewide n=255
How often do you drive?								
5-7 day/week	54.8	73.0	65.8	87.5	52.9	61.5	69.4	66.5 (3.76)
3- 4 days/week	16.1	18.9	13.2	7.5	26.5	20.5	13.9	15.3 (2.77)
1-2 days/week	9.7	5.4	13.2	2.5	11.8	12.8	13.9	10.8 (2.60)
Few days/month	6.5	0.0	2.6	2.5	5.9	2.6	0.0	2.7 (1.28)
≤ 1 day a month	9.7	2.7	2.6	0.0	2.9	2.6	2.8	3.2 (1.14)
Don't know	3.2	0.0	0.0	2.6	0.0	0.0	0.0	1.4 (1.14)
Average miles per year								
0-2,000	6.9	34.3	25.0	15.4	23.8	38.9	17.2	32.0 (3.68)
2,000-4,999	14.3	25.7	37.5	15.4	10.0	13.9	31.0	27.1 (3.89)
5,000-9,999	17.9	14.3	18.8	38.5	3.9	25.0	34.5	21.1 (3.32)
10,000-14,999	7.1	11.4	15.6	18.0	15.2	16.7	13.8	14.2 (2.98)
15,000-19,999	3.6	5.7	0.0	5.1	12.5	2.8	3.5	2.5 (0.91)
20,000-24,999	0.0	5.7	3.1	5.1	0.0	2.8	0.0	2.6 (1.38)
25,000 or more	0.0	2.9	0.0	2.6	0.0	0.0	0.0	0.6 (0.44)
% who have you driven in immediate neighborhood in the past 3 months	84.4	100.0	100.0	100.0	94.3	97.4	97.2	97.2 (0.92)
% who have you driven beyond immediate neighborhood in the past 3 months	78.1	100.0	89.5	95.1	91.4	89.7	91.7	90.4 (2.39)
% who have you driven to neighboring towns in the past 3 months	68.8	91.9	86.8	97.6	82.9	86.8	88.6	86.2 (2.71)
% who have you driven to more distant towns in the past 3 months	53.1	59.5	37.8	80.5	54.3	52.6	57.1	50.9 (3.87)
% who have you driven outside the state in the past 3 months	21.9	32.4	13.5	31.7	28.6	28.2	27.8	22.4 (2.99)
% who have you driven outside USA in past 3 mnts	3.1	2.7	5.3	7.3	0.0	10.5	2.8	4.3 (1.68)

% who have someone depending on them to drive	16.1	24.3	26.3	12.5	14.7	12.8	16.7	20.7 (3.38)
Driving Space Score	3.1	3.9	3.3	4.1	3.6	3.7	3.7	3.5 ± 0.2
% Overall satisfaction with ability to get to places you want to go to								
Very satisfied	45.2	70.3	57.9	57.5	55.9	59.0	58.3	57.8 (3.93)
Somewhat satisfied	54.8	29.7	39.5	40.0	44.1	38.5	41.7	40.8 (3.90)
Dissatisfied	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 (-)
Very Dissatisfied	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.1 (-)
Don't know	0.0	0.0	2.6	2.5	0.0	0.0	0.0	1.37 (1.10)
Is there a chance your driving ability could become a problem within the next 5 years?								
Yes	29.0	27.0	13.2	25.0	29.4	25.6	25.0	21.2 (2.97)
No	51.6	56.8	71.1	60.0	61.8	66.7	55.6	63.1 (3.72)
Don't know	19.4	16.2	15.8	15.0	8.8	7.7	19.4	15.6 (2.92)

Table 28 explores several issues for the 45 respondents who indicated that they no longer or never drove. About one-half had stopped driving in the past two years. Respondents gave a variety of reasons for stopping driving, with health being reported by 44% of respondents. Another 22% indicated that they were no longer comfortable with driving and 15% said that they were not safe drivers. Interestingly, less than 3% reported stopping driving based on advice from family, friends, or a doctor. About three-quarters of non-driving respondents indicated that they were somewhat or very satisfied with their ability to get around. One in every five, however, reported that they were somewhat or very dissatisfied with their personal transportation.

The questionnaire explored among respondents issues of isolation. To do this, the questionnaire utilized two sets of questions, both sets of which could be combined to generate an overall isolation scale. The first set of questions came from work looking at isolation among people who have ceased driving (Marottoli et al., 2000). This work indirectly assessed social isolation by asking respondents 11 questions about how frequently they engaged in certain activities. An overall activities scale score can be calculated by combining the responses to these questions. The Overall Activities Score ranges from 0-33, with lower scores indicating greater social isolation. The results for these questions can be found in Table 29.

Table 28: Questions for Non Drivers								
	Bay n=12	Grand n=6	Metro n=5	North n=3	SW n=9	Superior n=3	Univ n=7	Statewide n=45
When was the last time you drove?								
< 1 year ago	33.3	0.0	25.0	50.0	28.6	0.0	0.0	21.4 (8.50)
1-2 years ago	25.0	20.00	50.0	0.0	14.3	33.3	14.3	27.9(9.59)
2-5 years ago	25.0	0.0	0.0	50.0	14.3	33.3	42.9	18.1(5.50)
> 5 years ago	16.7	80.0	25.0	0.0	42.9	0.0	28.6	29.6 (8.85)
Reasons for stopping driving-- % who indicated:¶								
Health	41.7	16.7	60.0	66.7	44.4	33.3	28.6	44.0 (9.39)
Not comfortable	16.7	33.3	20.0	0.0	11.1	33.3	42.9	22.1 (7.85)
Crash /near crash	8.3	0.0	20.0	0.0	0.0	0.0	0.0	8.2 (6.48)
License not renewed	0.0	0.0	20.0	0.0	0.0	0.0	14.3	8.2 (6.48)
Costs	8.3	16.7	0.0	0.0	11.1	0.0	0.0	5.3 (3.10)
Not safe driver	41.7	16.7	0.0	0.0	22.2	0.0	0.0	15.1 (4.53)
Family and friends	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.7 (0.66)
Advice from doctor	0.0	0.0	0.0	0.0	0.0	0.0	14.3	2.1 (2.06)
% Overall satisfaction with ability to get to places you want to go to								
Very satisfied	25.0	33.3	0.0	33.3	44.4	66.7	28.6	22.6 (5.51)
Somewhat	33.3	50.0	60.0	66.7	55.6	33.3	71.4	53.2 (9.46)
Dissatisfied	16.7	0.0	20.0	0.0	0.0	0.0	0.0	10.2 (6.74)
Very Dissatisfied	16.7	0.0	20.0	0.0	0.0	0.0	0.0	10.2 (6.75)
Don't know	8.3	16.7	0.0	0.0	0.0	0.0	0.0	3.8 (2.70)

¶More than one reason could be given

The second set of questions addressed subjective social isolation with an established scale (Hughes, et al., 2004). This scale consisted of three questions related to isolation in which a respondent answered never, sometimes, or often. An overall score for subjective isolation was derived from combining the answers from these questions, with scores ranging from 3-9. Higher scores indicate higher subjective isolation. The results of these questions are presented in Table 30.

As can be seen in Tables 29-30, Michigan older adults score relatively high on frequency of activities and low on subjective isolation. There is, however, a small group of respondents who reported feeling lonely and socially isolated.

Table 29: Activities Scale								
	Bay n=43	Grand n=43	Metro n=43	North n=43	SW n=43	Superior n=42	Univ n=43	Statewide n=300
How often do you go shopping outside the home?								
Never	2.3	7.0	4.7	4.7	4.7	0.0	0.0	3.8 (1.46)
Sometimes	37.2	30.2	32.6	29.9	27.9	38.1	23.3	31.0 (3.39)
Often	60.5	62.8	58.1	67.4	67.4	59.5	74.4	62.9 (3.55)
How often do you go to movie, restaurant or sporting event?								
Never	16.3	2.3	9.3	16.3	11.6	23.8	14.0	11.5 (2.20)
Sometimes	58.1	48.8	58.1	53.5	46.5	35.7	44.2	52.8 (3.61)
Often	25.6	48.8	30.2	30.2	41.9	40.5	41.9	34.9 (3.39)
How often do you go on day trips?								
Never	34.9	7.0	37.2	11.6	37.2	21.4	20.9	28.5 (3.37)
Sometimes	41.9	67.4	44.2	58.1	44.2	57.1	51.2	49.2 (3.61)
Often	20.9	25.6	16.3	27.9	18.6	19.1	23.3	20.2(2.81)
How often do you go on overnight trips?								
Never	48.8	37.2	55.8	34.9	51.2	45.2	41.9	48.3 (3.62)
Sometimes	41.8	53.3	39.5	58.1	41.9	50.0	51.2	45.2 (3.58)
Often	7.0	9.3	4.7	7.0	7.0	2.4	7.0	6.1 (1.65)
How often do you participate in unpaid volunteer work?								
Never	60.5	48.8	67.4	32.6	65.1	52.4	41.9	58.7 (3.47)
Sometimes	18.6	34.9	16.3	25.6	23.3	33.3	51.2	21.5 (2.82)
Often	20.9	16.3	11.6	41.9	11.6	14.3	7.0	17.9 (2.54)
How often do you participate in exercise activities (including walking) or in other recreational sports/athletic events?								
Never	60.5	48.8	67.4	32.6	65.1	52.4	53.5	19.6 (3.04)
Sometimes	18.6	34.9	16.3	25.6	23.3	33.3	20.9	35.5 (3.50)
Often	20.9	16.3	11.6	41.9	11.6	14.3	25.6	43.4 (3.51)
How often do you participate in activities such as playing cards, games or bingo?								
Never	25.6	7.0	25.6	7.0	20.9	11.9	16.3	46.5 (3.60)
Sometimes	37.2	34.9	37.2	34.9	37.2	45.2	25.6	31.8 (3.27)
Often	37.2	37.2	34.9	58.1	39.5	42.9	58.1	20.5 (2.80)
How often do you participate in religious services?	32.6	41.9	55.8	43.9	37.2	45.2	51.2	24.0 (3.19)
Never	46.5	39.5	25.6	41.9	30.2	26.2	25.6	22.2 (3.14)

Sometimes	20.9	16.8	10.9	23.3	32.6	28.6	20.9	53.7 (3.60)
Often								
How often do you participate in social activities?								
Never	20.9	4.7	14.0	9.3	9.3	16.7	18.6	15.5 (2.57)
Sometimes	51.2	44.2	62.8	51.2	51.2	47.6	44.2	52.7 (3.56)
Often	25.6	51.2	23.3	39.5	39.5	33.3	37.2	31.3 (3.20)
How often do you participate in paid employment?								
Never	90.7	83.7	95.4	86.1	83.7	85.7	90.7	90.5 (1.83)
Sometimes	7.0	9.3	2.3	7.0	7.0	4.8	7.0	5.3 (1.39)
Often	0.0	7.0	2.3	7.0	9.3	7.1	0.0	3.5 (1.18)
How often do you visit with friends or family?								
Never	0.0	0.0	4.7	2.3	2.3	2.4	7.0	3.3 (1.42)
Sometimes	46.5	20.9	41.9	44.2	16.3	33.3	30.2	35.9 (3.52)
Often	53.5	79.1	51.2	53.5	81.4	64.3	62.8	60.0 (3.57)
Average Activity Scale Score	21.5	23.6	20.5	23.7	22.3	22.1	22.7	21.8 (0.30) 95% CL [21.22-22.27]

Table 30: Subjective Isolation Scale								
	Bay n=43	**Grand n=43**	**Metro n=43**	**North n=43**	**SW n=43**	**Superior n=42**	**Univ n=43**	**Statewide n=300**
How often do you feel that you lack companionship?								
Never	65.1	74.4	69.8	67.4	67.4	83.3	51.2	67.3(3.37)
Sometimes	23.3	20.9	20.9	23.3	20.9	11.9	30.2	22.3 (3.01)
Often	9.3	4.7	13.9	9.3	13.9	4.8	11.6	8.2 (1.94)
How often do you feel left out?								
Never	74.4	81.4	83.7	88.4	81.4	78.6	76.7	81.3 (2.77)
Sometimes	11.6	18.6	9.3	9.3	16.3	16.7	18.6	12.9 (2.28)
Often	14.0	0.0	9.3	2.3	2.3	0.0	4.7	4.7 (1.56)
How often do you feel isolated?								
Never	79.1	88.4	79.1	88.4	83.7	85.7	86.1	82.6 (2.87)
Sometimes	11.6	11.6	18.6	9.3	14.0	11.9	9.3	14.1 (2.69)
Often	9.3	0.0	2.3	2.3	2.3	2.4	4.7	3.3 (1.22)
Subjective Isolation Scale Score (3-9)	4.1	3.6	3.8	3.7	3.8	3.5	4.1	3.8 (0.10) 95% CL [3.63- 4.03]

The questionnaire also explored Michigan older adults' use of non-driving modes of transportation. Tables 31-36 show these results. As shown in Table 31, about one-third of respondents indicated that they regularly used some form of public transportation, with 44% indicting regular public transportation use in the Metro region and only 23% in the Southwest region. Most respondents (82%), however, had not recently used public transportation.

Table 32 shows that regular bus service was only available in 28% of respondents' neighborhoods. Of those who had available regular bus service, 72% became aware of the service by seeing the buses and bus stops. Only 28% of those with an available bus service reported having used it. The most common reason given for not using the bus was that it was not needed. Of those who used the bus, nearly 90% used it only occasionally or rarely. Users of the bus were mostly very or somewhat satisfied with the service. The two top reasons given for the high satisfaction ratings were that the bus went to where respondents wanted to go and it was convenient. The most frequently reported trip purposes by bus were for medical/dental and social/recreational reasons.

Table 31: Public Transportation Use Experience

	Bay n=43	Grand n=43	Metro n=43	North n=43	SW n=43	Superior n=42	Univ n=43	Statewide n=300
% have used public transportation on regular basis	41.9	37.2	44.2	27.9	23.3	26.2	32.6	37.3 (3.57)
Used public transportation regularly								
Currently	5.6	18.8	5.3	0.0	10.0	18.2	14.3	8.2 (3.14)
In the recent past	11.1	12.5	5.3	8.3	40.0	0.0	14.3	10.2 (3.29)
Long ago	83.3	68.8	89.5	91.7	50.0	81.8	71.4	81.6 (4.32)

Table 32: Regular Bus Service Use Experience

	Bay	Grand	Metro	North	SW	Superior	Univ	Statewide
Is there regular bus service in your neighborhood?	n=43	n=43	n=43	n=43	n=43	n=42	n=43	n=300
Yes	44.2	20.9	27.9	25.6	27.9	19.1	20.9	27.8 (3.26)
No	53.5	79.1	53.5	69.8	67.4	78.6	72.1	62.7 (3.55)
Don't know	2.3	0.0	18.6	4.7	4.7	2.4	7.0	9.6 (2.49)
How did you become aware of bus service?¶	n=19	n=9	n=12	n=11	n=12	n=8	n=9	n=80

Saw buses/stops	89.5	77.8	75.0	54.6	50.0	100.0	55.6	72.9 (6.15)
Friends or family	10.5	0.0	8.3	18.2	8.3	0.0	22.2	10.0 (4.13)
Print media	0.0	0.0	8.3	36.4	8.3	0.0	0.0	7.0 (3.62)
TV/radio	0.0	0.0	0.0	9.1	8.3	0.0	0.0	1.5 (1.09)
organization	0.0	22.2	0.0	0.0	8.3	0.0	0.0	2.7 (1.50)
Other	5.3	11.1	0.0	18.2	16.7	0.0	11.1	6.3 (2.35)
Have you used this service? % Yes	21.1	44.4	33.3	9.1	16.7	25.0	33.3	27.9 (6.56)
Why haven't you used this regular bus service?¶	n=15	n=5	n=8	n=10	n=10	n=6	n=6	n=60
Don't need to	80.0	60.0	100.0	90.0	70.0	100.0	100.0	88.3 (3.57)
Don't know enough	0.0	0.0	0.0	0.0	10.0	0.0	0.0	1.2 (1.15)
Don't feel safe	6.7	0.0	0.0	0.0	0.0	0.0	0.0	1.5 (1.53)
Costs too much	0.0	0.0	0.0	10.0	10.0	0.0	0.0	2.1 (1.52)
Unpleasant	0.0	20.0	0.0	10.0	0.0	0.0	0.0	2.3 (1.65)
Too long wait/ride	13.3	0.0	0.0	0.0	0.0	0.0	0.0	3.1 (2.09)
Other reason	13.3	20.0	0.0	10.0	10.0	0.0	0.0	6.5 (2.90)
Frequency of regular bus use	n=4	n=4	n=4	n=1	n=2	n=2	n=3	. n=20
Often	0.0	50.0	0.0	0.0	0.0	50.0	33.3	12.1 (5.74)
Occasionally	75.0	25.0	25.0	100.0	100.0	0.0	66.7	43.6 (13.58)
Rarely	25.0	25.0	75.0	0.0	0.0	50.0	0.0	44.3 (13.05)
How satisfied are you with bus service?	n=4	n=4	n=4	n=1	n=2	n=2	n=3	n=20
Very satisfied	75.0	100.0	25.0	100.0	0.0	50.0	66.7	49.2 (13.21)
S/W satisfied	0.0	0.0	50.0	0.0	100.0	0.0	0.0	29.7 (13.73)
S/W dissatisfied	0.0	0.0	25.0	0.0	0.0	0.0	0.0	11.9 (11.89)
Very dissatisfied	0.0	0.0	0.0	0.0	0.0	50.0	33.3	5.3 (4.18)
Why are you satisfied with regular bus service?¶	n=3	n=4	n=3	n=1	n=2	n=1	n=2	n=16
Goes where I want	33.3	50.0	33.3	100.0	50.0	0.0	100.0	45.8 (17.07)
Convenient	66.7	50.0	0.0	100.0	50.0	0.0	100.0	35.8 (8.01)
Reliable/punctual	0.0	50.0	0.0	100.0	0.0	100.0	50.0	18.5 (7.09)
Inexpensive	0.0	25.0	0.0	100.0	0.0	0.0	50.0	12.6 (6.64)
Pleasant	66.7	25.0	0.0	100.0	0.0	0.0	50.0	22.6 (8.32)
Safe	0.0	25.0	0.0	100.0	0.0	0.0	50.0	12.6 (6.64)
No asking for rides	0.0	0.0	0.0	100.0	0.0	0.0	50.0	8.3 (5.05)
Other	33.3	0.0	66.7	0.0	0.0	0.0	50.0	40.2 (16.67)
Trip purpose when using bus*	n=4	n=4	n=4	n=1	n=2	n=2	n=3	n=20
Medical/dental	25.0	25.0	25.0	100.0	50.0	50.0	33.3	30.0 (13.96)
Social/recreational	25.0	25.0	25.0	0.0	50.0	50.0	33.3	27.5 (13.96)
Family/personal	25.0	50.0	0.0	0.0	0.0	50.0	33.3	16.0 (6.97)
School/religious	25.0	25.0	0.0	0.0	0.0	50.0	100.0	20.6 (5.37)
Other	25.0	25.0	0.0	0.0	0.0	50.0	0.0	8.6 (5.37)

¶More than one response possible

Table 33 shows the use of and experiences with senior van and/or dial-a-ride service. As shown in this table, about two-thirds of respondents reported that this service was available in the neighborhood, with nearly 15% reporting that they did not know. Of those who knew about the service, 40% became aware of it through seeing the service in action, 17% heard about it from family or friends, and about 15% found out through some form of printed media. Only 11% overall had used this service, although there was a large difference in use of this service among the MDOT regions. Those who had not used the service indicated that they did not need the service. Of those who had used the service, about one-half used it rarely; 28% used it only occasionally; and about 90% of users were very or somewhat satisfied with the service. Users that were at least somewhat satisfied indicated that their satisfaction derived from the reliability, convenience, and pleasantness of the service. The service was also used for a variety of purposes, with the top thee being: medical/dental; shopping/errands; and social/recreational.

Table 33: Senior Van or Dial-a-Ride Use Experience

	Bay	Grand	Metro	North	SW	Super.	Univ	Statewide
Is there a senior van or dial-a-ride service in your neighborhood?	n=43	n=43	n=43	n=43	n=43	n=42	n=43	n=300
Yes	69.8	46.5	79.1	79.1	65.1	47.6	44.2	66.8 (3.13)
No	14.0	32.6	7.0	11.6	25.6	38.1	39.5	18.6 (2.31)
Don't know	16.3	20.9	14.0	9.3	9.3	14.3	16.3	14.5 (2.55)
How did you become aware of senior van or dial-a-ride services?*	n=30	n=20	n=34	n=34	n=28	n=20	n=19	n=185
Saw vans/stops	46.7	45.0	44.1	32.4	39.3	35.0	15.8	40.1 (4.59)
Friends or family	20.0	25.0	14.7	14.7	14.3	20.0	15.8	16.5 (3.39)
Telephone book	0.0	0.0	0.0	0.0	0.0	0.0	10.5	0.9 (0.64)
Print media	6.7	15.0	14.7	26.5	14.3	10.0	21.1	15.2 (3.31)
TV/radio	3.3	0.0	0.0	0.0	0.0	5.0	0.0	0.6 (0.48)
Organization	10.0	5.0	8.8	5.9	14.3	10.0	15.8	9.6 (2.70)
Other	10.0	0.0	17.7	20.6	17.9	20.0	21.1	15.9 (3.47)
Don't know	3.3	10.0	0.0	0.0	0.0	0.0	0.0	1.2 (0.71)
% have used senior van or dial-a-ride services	13.3	5.0	5.9	17.7	21.4	25.0	15.8	11.0 (2.51)
Why haven't you used senior van or dial-a-ride	n=26	n=19	n=32	n=28	n=22	n=15	n=16	n=158

services?*								
Don't need to	84.6	89.5	96.9	96.4	100.0	100.0	87.5	94.1 (2.08)
Don't know enough	3.9	0.0	3.1	0.0	0.0	0.0	0.0	2.1 (1.63)
Not go where I want	3.9	0.0	0.0	3.6	0.0	0.0	0.0	0.8 (0.61)
Cost too much	0.0	0.0	3.1	0.0	0.0	0.0	0.0	1.5 (1.55)
Too long wait/ride	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.5 (0.52)
N/A when needed	3.9	0.0	3.1	0.0	0.0	0.0	6.3	2.6 (1.71)
Other	3.9	5.3	0.0	3.6	0.0	0.0	6.3	1.8 (0.92)
Frequency of senior van or dial-a-ride service use	n=4	n=1	n=2	n=6	n=6	n=5	n=3	n=27
Often	0.0	100.0	50.0	16.7	16.7	20.0	0.0	23.4 (13.31)
Occasionally	0.0	0.0	50.0	0.0	50.0	20.0	33.3	27.6 (13.99)
Rarely	100.0	0.0	0.0	83.3	33.3	80.0	66.7	49.1 (6.61)
How satisfied are you with senior van and dial-a-ride services?								
Very satisfied	75.0	100.0	50.0	50.0	50.0	40.0	33.3	53.2 (15.08)
S/W satisfied	25.0	0.0	50.0	16.7	50.0	40.0	33.3	35.8 (14.88)
S/W dissatisfied	0.0	0.0	0.0	33.3	0.0	0.0	33.3	9.6 (5.43)
Very dissatisfied	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 (-)
Why are you satisfied with senior van and dial-a-ride services? ¶	n=4	n=1	n=2	n=4	n=6	n=4	n=2	n=23
Goes where I want	50.0	100.0	0.0	0.0	0.0	0.0	0.0	13.5 (5.44)
Convenient	50.0	100.0	0.0	25.0	33.3	50.0	0.0	26.6 (7.86)
Reliable/punctual	25.0	100.0	50.0	25.0	16.7	50.0	100.0	41.9 (15.70)
Inexpensive	25.0	100.0	0.0	0.0	0.0	0.0	50.0	13.5 (6.68)
Pleasant	25.0	100.0	50.0	25.0	0.0	0.0	0.0	25.9 (15.20)
Safe	0.0	100.0	0.0	0.0	0.0	0.0	0.0	4.0 (0.00)
Other	0.0	0.0	50.0	50.0	50.0	0.0	0.0	30.8 (15.31)
Trip purpose when using senior van and dial-a-ride services¶	n=4	n=1	n=2	n=6	n=6	n=5	n=3	n=27
Medical/dental	75.0	100.0	100.0	50.0	50.0	60.0	33.3	67.1 (8.31)
Shopping/errands	50.0	100.0	50.0	50.0	33.3	20.0	0.0	40.3 (14.58)
Social/recreational	50.0	100.0	0.0	0.0	50.0	60.0	33.3	29.7 (7.86)
Family/personal	25.0	100.0	0.0	0.0	0.0	40.0	0.0	10.5 (4.51)
School/religious	25.0	0.0	0.0	16.7	0.0	20.0	0.0	8.2 (5.17)
Other	25.0	0.0	50.0	0.0	0.0	20.0	33.3	22.3 (13.98)

¶More than one response possible

Table 34 shows the use of and experiences with volunteer driver programs where volunteers (often older adults themselves) drive people to destinations. As shown in this table, one-third of respondents did not know if the service was available in their neighborhood and 42% indicated that it was not available. Of the few respondents

who reported that the service was available, most found out about it through family or friends, senior-related organizations, or the respondent was a volunteer driver him or herself. Only 9% reporting having used a volunteer driver program and two-thirds of these respondents used it only rarely. Nearly all of those who did not use the service indicated that they did not need the service. All users of the service were either very or somewhat satisfied with it, citing convenience, it goes where they want to go, pleasantness, and reliability as the top reasons. When this service was used, it was used for a variety of trip purposes.

Table 34: Volunteer Drivers Experience								
	Bay	**Grand**	**Metro**	**North**	**SW**	**Super**	**Univ**	**Statewide**
Are there volunteer drivers in your neighborhood?	n=43	n=43	n=43	n=43	n=43	n=42	n=43	n=300
Yes	25.6	32.6	14.0	44.2	20.9	23.8	16.3	21.6 (2.72)
No	37.2	41.9	44.2	23.3	41.9	40.5	51.2	41.8 (3.60)
Don't know	37.2	25.6	41.9	32.6	37.2	35.7	32.6	36.7 (3.55)
How did you become aware of these volunteer drivers?¶	n=11	n=14	n=6	n=19	n=9	n=10	n=7	n=76
Am a vol. driver	18.2	0.0	16.7	15.8	11.1	30.0	0.0	12.3 (5.07)
Friends or family	36.4	28.6	33.3	26.3	11.1	50.0	42.9	31.4 (6.97)
Print media	0.0	14.3	0.0	15.8	0.0	10.0	0.0	5.7 (2.28)
TV/radio	0.0	0.0	16.7	0.0	0.0	0.0	0.0	4.3 (4.27)
Organization	27.3	28.6	16.7	31.6	55.6	0.0	42.9	28.6 (6.19)
Other	18.2	21.4	16.7	10.5	11.1	10.0	14.3	15.6 (5.54)
Don't know	0.0	7.1	0.0	0.0	11.1	0.0	0.0	2.3 (1.62)
% have used volunteer driver services	18.2	0.0	0.0	5.3	33.3	20.0	14.3	9.3 (3.08)
Why haven't you used volunteer driver services?¶	n=9	n=14	n=6	n=18	n=6	n=8	n=6	n=67
Don't need to	88.9	92.9	100.0	94.4	83.3	100.0	100.0	94.9 (2.59)
Other	11.1	7.1	0.0	5.6	16.7	0.0	0.0	5.1 (2.59)
Frequency of volunteer driver service use	n=2	n=0	n=0	n=1	n=3	n=2	n=1	n=9
Often	0.0	0.0	0.0	100.0	66.7	50.0	0.0	37.7 (12.47)
Rarely	100.0	0.0	0.0	0.0	33.3	50.0	100.0	62.3 (12.47)
How satisfied are you with volunteer driver services? Very /somewhat satisfied	100.0	0.0	0.0	100.0	100.0	100.0	100.0	100 (0.00)

Why are you satisfied with volunteer driver services?¶								
Goes where I want	0.0	0.0	0.0	0.0	33.3	0.0	100.0	26.8 (11.47)
Convenient	50.0	0.0	0.0	0.0	100.0	0.0	0.0	49.7 (15.28)
Reliable/punctual	50.0	0.0	0.0	0.0	0.0	50.0	0.0	20.2 (16.05)
Inexpensive	0.0	0.0	0.0	0.0	33.3	0.0	0.0	11.5 (11.47)
Pleasant	50.0	0.0	0.0	0.0	33.3	0.0	0.0	26.7 (19.12)
Safe	0.0	0.0	0.0	0.0	33.3	0.0	0.0	11.5 (-)
No asking for rides	0.0	0.0	0.0	0.0	33.3	0.0	0.0	11.5 (-)
Other	0.0	0.0	0.0	100.0	0.0	50.0	0.0	14.8 (-)
Trip purpose when using volunteer driver services¶								
Medical/dental	100.0	0.0	0.0	100.0	66.7	100.0	0.0	73.2 (11.47)
Social/recreational	50.0	0.0	0.0	0.0	66.7	100.0	100.0	63.4 (19.12)
Family/personal	50.0	0.0	0.0	0.0	33.3	50.0	0.0	31.7 (19.73)
School/religious	50.0	0.0	0.0	0.0	66.7	100.0	0.0	48.0 (19.12)

¶More than one response possible

Table 35 shows the use of and experiences with taxi services. As shown in this table, reported neighborhood availability was about evenly split at 40%. Most people became aware of the service in their neighborhood by seeing the taxis. About one-third of respondents reported that they had used the taxi service. Those that had not used the taxis reported that they did not need the service. Those that used taxis generally did so only rarely and only 5% usually paid a special senior discount or rate. A large majority of users reported being very or somewhat satisfied with the taxi service, with a wide range of reason given for this satisfaction. Taxis were also rarely used for social or recreational purposes, but were often used for medical and family/personal purposes.

Table 35: Taxi Service Use Experience

	Bay	Grand	Metro	North	SW	Super	Univ	Statewide
Is taxi service available in your neighborhood?	n=43	n=43	n=43	n=43	n=43	n=42	n=43	n=300
Yes	32.6	51.2	44.2	27.9	30.2	45.2	41.9	40.4 (3.59)
No	44.2	37.2	30.2	62.8	60.5	50.0	44.2	41.3 (3.42)
Don't know	23.3	11.6	25.6	9.3	9.3	4.8	14.0	18.3 (3.01)
How did you become aware of the taxi service?	n=14	n=22	n=19	n=12	n=13	n=19	n=18	n=117

Saw taxis	64.3	68.2	68.4	41.7	23.1	79.0	38.9	59.4 (5.58)
Friends/family	0.0	9.1	0.0	16.7	7.7	0.0	5.6	3.6 (1.47)
Telephone book	7.1	0.0	5.3	0.0	23.1	10.5	5.6	6.0 (2.70)
Print media	21.4	4.6	0.0	25.0	15.4	5.3	11.1	7.3 (2.06)
TV/radio	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.8 (0.76)
Other	7.1	9.1	21.1	16.7	30.8	0.0	22.2	17.5 (4.70)
Don't know	0.0	9.1	5.3	0.0	0.0	5.3	11.1	5.4 (2.68)
% have used taxi services	14.3	13.6	52.6	16.7	0.0	42.1	27.8	33.0 (5.58)
Why haven't you used taxi services?¶	n=12	n=19	n=9	n=10	n=13	n=11	n=13	n=87
Don't need to	91.7	94.7	88.9	80.0	92.3	81.8	84.6	89.2 (4.26)
Costs too much	8.3	15.8	0.0	10.0	0.0	9.1	7.7	6.3 (2.41)
Other	0.0	0.0	0.0	10.0	7.7	0.0	7.7	2.7 (1.60)
Frequency of taxi service use	n=2	n=3	n=10	n=2	n=0	n=8	n=5	n=30
Occasionally	0.0	33.3	10.0	0.0	0.0	12.5	20.0	11.9 (7.58)
Rarely	100.0	33.3	90.0	100.0	0.0	87.5	80.0	86.1 (7.58)
Don't know	0.0	33.3	0.0	0.0	0.0	0.0	0.0	2.0 (1.97)
How do you usually pay for taxi service use?								
The regular rate	100.0	0.0	90.0	50.0	0.0	50.0	60.0	78.1 (7.69)
A special/senior rate	0.0	0.0	0.0	0.0	0.0	37.5	20.0	4.5 (2.55)
Don't know	0.0	100.0	10.0	50.0	0.0	12.5	20.0	17.4 (7.47)
How satisfied are you with taxi services?								
Very satisfied	100	33.3	50.0	0.0	0.0	75.0	20.0	47.8 (11.94)
S/W satisfied	0.0	0.0	20.0	50.0	0.0	25.0	60.0	23.7 (9.79)
S/W dissatisfied	0.0	0.0	10.0	50.0	0.0	0.0	0.0	8.4 (7.06)
Very dissatisfied	0.0	0.0	10.0	0.0	0.0	0.0	0.0	6.9 (6.90)
Don't know	0.0	66.7	10.0	0.0	0.0	0.0	20.0	13.2 (7.54)
Why are you satisfied with taxi services?	n=2	n=1	n=7	n=1	n=0	n=8	n=4	n=23
Goes where I want	50.0	0.0	28.6	0.0	0.0	37.5	0.0	25.6 (12.95)
Convenient	0.0	0.0	28.6	0.0	0.0	25.0	0.0	21.4 (12.53)
Reliable/punctual	50.0	100.0	28.6	0.0	0.0	25.0	0.0	27.3 (12.94)
Inexpensive	0.0	0.0	14.3	0.0	0.0	0.0	50.0	16.1 (10.35)
Pleasant	0.0	100.0	42.9	0.0	0.0	12.5	0.0	32.7 (13.68)
Safe	0.0	0.0	28.6	0.0	0.0	12.5	0.0	20.3 (12.50)
No asking for rides	0.0	0.0	14.3	0.0	0.0	0.0	0.0	9.6 (9.65)
Other	0.0	0.0	14.3	100.0	0.0	0.0	25.0	15.0 (10.18)
Trip purpose when using taxi services¶	n=2	n=3	n=10	n=2	n=0	n=8	n=5	n=30
Medical/dental	0.0	0.0	30.0	0.0	0.0	12.5	0.0	21.4 (10.57)
Social/recreational	0.0	0.0	0.0	0.0	0.0	37.5	0.0	2.2 (1.08)
Family/personal	50.0	0.0	20.0	50.0	0.0	37.5	20.0	22.1 (9.94)
School/religious	0.0	0.0	0.0	0.0	0.0	12.5	20.0	3.1 (2.43)

¶More than one response possible

Table 36 shows that use of and experiences with riding as a passenger, walking, and bicycling. Nearly all respondents often or occasionally rode as a passenger in an automobile. Respondents did not often walk to destinations, with more than 60% rarely or never walked to a destination at least three blocks away. Less than 10% of respondents ever rode a bicycle. Indeed, respondents reported overwhelmingly that they relied on driving themselves or riding as a passenger most often to get around. When respondents rode as a passenger, they reported that most often the driver was their spouse, child, or a friend.

Table 36: Riding as a Passenger, Walking, and Biking Use and Experience								
	Bay n=43	**Grand n=43**	**Metro n=43**	**North n=43**	**SW n=43**	**Super n=42**	**Univ n=43**	**Statewide n=300**
How often do you ride as a passenger?								
Often	51.2	39.5	32.6	37.2	62.8	40.5	44.2	41.1 (3.47)
Occasionally	37.2	39.5	46.5	41.9	25.6	33.3	34.9	39.9 (3.59)
Rarely	9.3	18.6	16.3	18.6	7.0	23.8	18.6	15.5 (2.65)
Never	2.3	2.3	2.3	2.3	4.7	2.4	2.3	2.6 (1.12)
Don't know	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.9 (0.92)
How often do you walk to your destination at least 3 blocks away?								
Often	11.6	27.9	9.3	20.9	18.6	21.4	11.6	14.4 (2.31)
Occasionally	20.9	18.6	25.6	14.0	18.6	21.4	20.9	21.7 (3.10)
Rarely	23.3	14.0	30.2	23.3	14.0	16.7	39.5	25.9 (3.26)
Never	44.2	39.5	34.9	41.9	48.8	40.5	27.9	37.9 (3.49)
How often do you bike to your destination?								
Often	4.7	4.7	4.7	7.0	2.3	9.5	4.7	4.8 (1.54)
Occasionally	4.7	7.0	2.3	11.6	11.6	11.9	2.3	5.3 (1.34)
Rarely	0.0	14.0	9.3	7.0	2.3	4.8	7.0	7.2 (1.99)
Never	90.7	74.4	83.7	74.4	83.7	73.8	86.1	82.7 (2.69)
Which do you rely on most often?								
Driving your own car	55.8	79.1	79.1	83.7	58.1	73.8	76.7	73.8 (3.06)
Riding as a passenger	41.9	18.6	20.9	11.6	34.9	23.8	23.3	24.4 (3.03)
Van/dial-a-ride	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.2 (0.23)
Regular bus	0.0	2.3	0.0	0.0	0.0	2.4	0.0	0.4 (0.28)
Volunteer drivers	0.0	0.0	0.0	0.0	4.7	0.0	0.0	0.5 (0.32)
Walking	2.3	0.0	0.0	2.3	0.0	0.0	0.0	0.5 (0.37)
Other	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.2 (0.20)

Which do you rely on second-most often?								
Driving your own car	11.6	4.7	7.0	9.3	18.6	19.1	7.0	9.2 (1.96)
Riding as a passenger	46.5	67.4	55.8	60.5	58.1	52.4	53.5	56.1 (3.61)
Van/dial-a-ride	0.0	0.0	4.7	0.0	2.3	0.0	2.3	2.4 (1.34)
Regular bus	2.3	2.3	2.3	0.0	0.0	0.0	0.0	1.5 (1.01)
Volunteer drivers	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.2 (0.23)
Walking	9.3	9.3	4.7	9.3	4.7	9.5	18.6	8.2 (1.79)
Bicycle	4.7	7.0	2.3	4.7	0.0	2.4	0.0	2.8 (1.15)
Other	4.7	0.0	4.7	7.0	2.3	4.8	4.7	4.1 (1.48)
No other	18.6	9.3	16.3	9.3	11.6	9.5	14.0	14.2 (0.98)
When you are a passenger, who most likely drives?								
Spouse	38.1	50.0	34.2	47.6	61.0	48.8	50.0	43.0 (3.56)
Child	42.9	26.2	26.8	14.3	17.1	19.5	28.6	26.8 (3.28)
Grandchild	0.0	2.4	0.0	0.0	0.0	0.0	2.4	0.6 (0.42)
Other relative	7.1	7.1	7.3	7.1	2.4	7.3	4.8	6.4 (1.87)
Friend	9.5	11.9	19.5	26.2	17.1	17.1	9.5	16.2 (2.80)
Caretaker/Hired help	2.4	0.0	2.4	0.0	0.0	2.4	0.0	1.4 (1.01)
Volunteer	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.3 (0.31)
Other	0.0	2.4	7.3	2.4	14.3	2.4	2.4	3.7 (1.68)
Besides the first person, when you are a passenger, who else is likely to drive you?¶								
Spouse	7.8	5.0	0.0	10.3	2.6	5.0	2.4	3.3 (0.95)
Child	34.2	32.5	25.0	23.1	28.2	17.5	11.9	25.0 (3.28)
Grandchild	5.3	2.5	5.6	2.6	2.6	7.5	0.0	3.9 (1.60)
Other relative	15.8	12.5	16.7	7.7	15.4	2.5	9.5	13.5 (2.73)
Friend	10.5	40.0	16.7	25.6	25.6	20.0	26.2	21.8 (2.96)
Caretaker/Hired help	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.3 (0.34)
Volunteer	0.0	0.0	0.0	2.6	0.0	2.5	0.0	0.3 (0.25)
No one else	23.7	7.5	15.3	28.2	25.6	45.0	50.0	31.8 (3.55)

¶More than one response possible

The questionnaire also explored whether the respondent had received any transportation assistance from an unpaid person in the past year and, if so, what this assistance entailed. Table 37 shows these results. Only 12% of respondents had received transportation assistance. Of those who had received help, the caregiver was primarily a child (60%), other relative (10%), or a friend (8%). About 60% of these caregivers were women and nearly all were age 69 or younger. All of these caregivers lived outside of the respondents' homes; had their own vehicle; and provided rides to the respondent.

Table 37: Care Recipients								
	Bay n=43	Grand n=43	Metro n=43	North n=43	SW n=43	Super n=42	Univ n=43	Statewide n=300
Has anyone provided transportation assistance or unpaid care to you in the last 12 months?								
Yes	20.9	4.7	14.0	7.0	9.3	7.1	9.3	11.9 (2.45)
No	79.1	93.0	86.1	93.0	90.7	92.9	90.7	87.9 (2.46)
DK/Refuse	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.3 (0.26)
Care recipients	n=9	n=2	n=6	n=3	n=4	n=3	n=4	n=31
Relationship of caregiver to care recipient								
Child	44.4	50.0	66.7	100.0	50.0	0.0	75.0	60.3 (11.40)
Grandchild	0.0	0.0	16.7	0.0	0.0	0.0	0.0	7.8 (7.77)
Other relative	11.1	0.0	16.7	0.0	0.0	0.0	0.0	10.4 (8.19)
Friend	11.1	50.0	0.0	0.0	25.0	66.7	0.0	8.4 (4.01)
Volunteer	11.1	0.0	0.0	0.0	0.0	0.0	25.0	5.2 (3.67)
Other	22.2	0.0	0.0	0.0	25.0	33.3	0.0	7.9 (4.02)
% Female caregivers	77.8	50.0	50.0	66.7	75.0	66.7	75.0	62.3 (11.80)
Caregivers age								
<50	44.4	50.0	66.7	66.7	0.0	0.0	50.0	52.2 (11.40)
50-69	55.4	0.0	33.3	33.3	75.0	66.7	25.0	37.6 (11.28)
70+	0.0	50.0	0.0	0.0	0.0	33.3	25.0	5.7 (3.52)
Don't know	11.1	0.0	0.0	0.0	25.0	0.0	0.0	4.5 (3.24)
% Caregiver lives outside of home	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0 (0.00)
Distance caregiver lives from care recipient								
20 min or less	77.8	100.0	50.0	33.3	25.0	33.3	25.0	52.9 (11.59)
20 min or more	0.0	0.0	50.0	66.7	50.0	66.7	75.0	40.0 (11.13)
Don't know	22.2	0.0	0.0	0.0	25.0	0.0	0.0	7.1 (3.94)
% Caregiver has own vehicle	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0 (0.00)
Caregiver helps with transportation by:								
Gives rides in a car	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100. (0.00)

In order to better understand responses on the Michigan Older Adult Survey, we analyzed results based on factors believed to likely impact responses and to provide insight into recommendations: respondent sex and age.

Men versus Women

This following set of tables show the results of the survey of Michigan adults age 70 years and older by sex. The survey results reflect the statewide population of community dwelling adults age 70 and older whose files appear in the Michigan driver license database, and are well enough to respond to a 12-14 minute telephone survey. Significantly different means and averages are shown by an asterisk. As shown in Table 38, men and women respondents were similar on most variables except that men were more likely to be married and have a higher educational level.

Table 38: Demographics by Sex		
	Men n= 112	**Women n= 188**
Average age	77.2 ± 1.5	78.5 ± 1.0
% Married*	78.0 ± 10.8	51.5 ± 8.9
% Live in own home/apartment	98.0 ± 2.2	93.5 ± 5.1
% Lived 5+ yrs in same location	95.3 ± 3.5	89.6 ± 5.6
Race		
Caucasian	85.5 ± 9.5	95.3 ± 3.7
African American	9.6 ± 8.3	2.7 ± 3.2
Other	2.4 ± 2.6	1.0 ± 1.4
Don't Know	2.5 ± 4.9	0.0 ± 0.0
Refused	0.0 ± 0.0	1.0 ± 1.4
Household income		
<$25,000	21.5 ± 10.2	24.5 ± 6.6
$25,0000-$49,999	35.0 ± 11.6	23.1 ± 7.8
$50,000-$74,999	8.4 ± 4.4	6.5 ± 3.9
≥ $75,000	17.4 ± 9.3	6.7 ± 5.1
Don't know	1.1 ± 1.7	16.7 ± 6.2
Refused	16.6 ± 9.7	22.6 ± 7.9
Education		
Less than high school	5.4 ± 5.4	9.6 ± 5.1
High school*	28.0 ± 9.8	51.5 ± 8.9
Vocational or some college	36.2 ± 11.8	19.6 ± 6.8
College graduate	13.9 ± 9.0	7.6 ± 4.7
Some graduate school	12.5 ± 67	8.9 ± 5.0

Table 39 shows the results for household size, vehicles, and respondents' sex. Men and women respondents were significantly different on several factors. Women were significantly more likely to live in single person households, whereas men were more likely to live in two-person households. Men were far more likely to be snow birds and have more vehicles in their household.

Table 39: Household Size and Vehicles by Sex		
	Men n=112	**Women n=188**
% In one-person households*	16.6 ± 9.7	34.5 ± 8.4
% In two-person households*	71.8 ± 11.4	51.4 ± 8.9
% In three+ person households	11.1 ± 8.4	9.3 ± 5.5
Average household size	2.0 ± 0.2	1.7 ± 1.2
% Lived out of MI for 2+ months in past year*	25.1 ± 10.3	9.7 ± 5.0
% households with no vehicles	1.7 ± 2.1	6.9 ± 4.1
Average number of vehicles in household*	1.9 ± 0.2	1.5 ± 0.1
% licensed to drive	94.1 ± 5.8	90.6 ± 3.9
Of those not currently licensed - % licenses in past 5 years	75.2 ± 27.8	42.2 ± 18.5
% of households with another person who drives	72.2 ± 11.3	53.2 ± 9.0

Table 40 shows the responses related to work and volunteering by sex. Table 41 shows respondent health by sex. There were no significant differences by sex on the factors shown in these tables.

Table 42 shows the results of the driving-related questions by sex. The results showed that men drove more regularly and more annual miles than did women. Men also tended to have a larger driving space than women. Men and women were similar on the other factors.

Table 43 shows the overall activities scale and overall subjective social isolation scale results by sex. Note that there were no significant differences between sexes on the individual questions that comprise each scale. Nor were any differences found between sexes for the overall scale scores.

Table 40: Work and Volunteering by Sex		
	Men n=112	**Women n=188**
% Work outside home for pay	7.5 ± 6.0	5.4 ± 3.7
Those who work, % full time	20.4 ± 20.1	0.0 ± 0.0
% Volunteer in community	32.0 ± 10.0	31.7 ± 8.1

Table 41: Overall Health by Sex		
	Men n=112	**Women n=188**
Ability to walk half a mile		
% Very able	55.8 ± 12.1	47.5 ± 8.9
% Somewhat able	20.3 ± 9.5	16.3 ± 6.6
% Not very able	11.0 ± 8.5	14.4 ± 6.9
% Not at all able	12.1 ± 7.8	21.8 ± 7.3
Ability to climb 2 flights of stairs		
Very able	64.2 ± 11.6	42.6 ± 8.8
Somewhat able	19.1 ± 9.4	25.6 ± 7.7
Not very able	7.9 ± 6.0	12.1 ± 5.8
Not at all able	5.5 ± 5.6	16.3 ± 6.6
Overall health		
Excellent	16.5 ± 8.3	16.0 ± 6.4
Very good	26.3 ± 10.8	34.8 ± 8.6
Good	31.4 ± 10.0	30.9 ± 7.9
Fair	17.9 ± 10.0	10.4 ± 5.1
Poor	4.6 ± 5.3	7.1 ± 5.2
% With vision problems affecting driving	8.2 ± 7.4	6.5 ± 3.9
% With memory problems affecting driving	7.0 ± 5.9	5.9 ± 3.0

Table 42: Drivers and Driving by Sex		
	Men n=112	**Women n=188**
% who drive		
Regularly*	83.3 ± 9.2	60.7 ± 8.8
Occasionally	10.5 ± 7.6	15.5 ± 7.2
Rarely	3.1 ± 2.9	3.7 ± 2.4
Do not drive anymore	2.5 ± 4.9	16.0 ± 6.2
Do not drive but expect to drive in the future	1.0 ± 1.2	1.5 ± 1.5
Never drove	0.0 ± 0.0	1.1 ± 1.3
Those who drive	**Men n=105**	**Women n=150**
Frequency of driving		
5-7 days a week	79.1 ± 9.2	57.9 ± 10.0
3-4 days a week	16.3 ± 8.8	14.6 ± 7.0
1-2 days a week*	4.3 ± 3.5	15.3 ± 8.0
A few days a month	0.3 ± 0.5	4.3 ± 4.2
Once a month or less	0.0 ± 0.0	5.4 ± 4.5
Don't know	0.0 ± 0.0	2.4 ± 3.8

Average miles per year		
0-2,000*	11.5 ± 4.7	48.1 ± 10.9
2,001-4,000	29.3 ± 12.0	25.3 ± 9.8
5,001-10,000	25.2 ± 10.4	17.8 ± 8.4
10,001-15,000	22.0 ± 10.8	8.1 ± 5.7
15,001-20,000	4.8 ± 3.8	1.0 ± 1.0
20,001-25,000	5.9 ± 6.1	0.0 ± 0.0
Over 25,000	1.4 ± 2.0	0.0 ± 0.0
% who have driven in immediate neighborhood in the past 3 months	99.7 ± 0.5	95.5 ± 2.9
% who have driven beyond immediate neighborhood in the past 3 months	93.5 ± 6.2	88.3 ± 6.7
% who have driven to neighboring towns in the past 3 months	89.5 ± 8.2	84.0 ± 7.1
% who have driven to more distant towns in the past 3 months*	63.8 ± 12.3	42.1 ± 9.1
% who have outside the state in the past 3 months*	35.5 ± 11.3	13.4 ± 5.6
% who have driven outside the USA in the past 3 months	8.8 ± 7.7	1.4 ± 1.5
Mean Driving Space Score*	3.9 ± 0.3	3.2 ± 0.2
% who have someone depending on them to drive	28.7 ± 11.9	15.3 ± 7.1
Satisfaction with ability to get to places you want to go to	58.6 ± 12.3	57.2 ± 10.0
% very satisfied	41.4 ± 12.3	40.4 ± 9.9
% satisfied	0.0 ± 0.0	0.0 ± 0.0
% dissatisfied	0.0 ± 0.0	0.2 ± 0.4
% very dissatisfied	0.0 ± 0.0	2.2 ± 3.6
% Don't Know		
Is there a chance your driving ability could become a problem within the next 5 years?		
Yes	24.3 ± 8.2	19.2 ± 7.9
No	58.4 ±11.3	66.3 ± 9.6
Don't know	17.3 ± 9.7	14.4 ± 7.1

Table 43: Activities Scale and Subjective Social Isolation Scale by Sex		
	Men n=112	**Women n=188**
Mean Activity Scale Score	21.6 ± 0.9	21.9 ± 0.7
	Men n=110	**Women n=183**
Mean Subjective Isolation Scale Score	3.6 ± 0.3	4.0 ± 0.3

Table 44 shows overall public transportation use by sex. Women were significantly more likely to be currently using public transportation than men, even though few men or women reported using public transportation.

Table 44: Public Transportation Use by Sex		
	Men n=112	**Women n=188**
% have used public transportation (bus, taxi, subway or train) on regular basis anytime in their life	34.0 ± 11.7	39.2 ± 8.8
Of those that used public transportation at some time in their life, they used it		
Currently*	0.8 ± 1.5	11.9 ± 9.1
In the recent past	20.2 ± 16.6	5.1 ± 4.4
Long ago	79.0 ± 16.7	82.9 ± 9.9

Older Adult Respondents by Age Group

This next set of tables show the results of the survey of Michigan adults age 70 and older by two age groups, those age 70 to 79, and those age 80 and older. Table 45 shows respondent demographics by age group. Respondents in the younger age group were more likely to be married. There were no other demographic differences between the age groups.

Table 46 shows the respondent household sizes and vehicle ownership by age group. The household and vehicle characteristics were very similar between age groups except that among those who were not currently licensed to drive, those in the older age group more often lost their license in the past 5 years and were less likely to have another driver in the household.

Tables 47-48 show work and volunteering activity and overall heath by age group. These tables show that the younger age group was significantly more likely to work full-time even though very few respondents overall did this. As expected, the younger age group was also significantly healthier.

Table 45: Demographics of Michigan Older Adults by Age Group		
	Age 70-79 years n=164	**Age 80+ Years n=136**
Average age*	73.0 ± 7.1	83.0 ± 0.8
% Female	57.2 ± 9.3	69.2 ± 9.3
% Married*	72.2 ± 9.0	50.4 ± 10.4
% Live in own home/apartment	99.6 ± 0.9	90.8 ± 6.5
% Lived 5+ yrs in same location	94.9 ± 3.2	88.5 ± 6.8
Race		
Caucasian	89.6 ± 7.1	93.7 ± 4.6
African American	6.0 ± 6.0	4.5 ± 4.3
Other	1.2 ± 1.7	1.8 ± 2.0
Don't Know	1.9 ± 3.6	0.0 ± 0.0
Refused	1.2 ± 1.7	0.0 ± 0.0
Household income		
<$25,000	22.3 ± 8.2	24.5 ± 7.7
$25,000 -$49,999	28.2 ± 9.0	26.8 ± 9.6
$50,000 -$74,999	8.4 ± 3.6	6.0 ± 4.6
$75,000 and over	15.3 ± 7.8	6.0 ± 4.6
Education		
Less than high school	5.7 ± 4.5	10.4 ± 6.0
High school	37.0 ± 9.3	48.7 ± 10.5
Vocational or some college	32.6 ± 9.4	18.9 ± 8.2
College graduate	11.6 ± 6.7	8.2 ± 5.8
Some graduate school	11.8 ± 5.4	8.6 ± 5.8

Table 46: Household Size and Vehicles by Age Group		
	Age 70-79 n=164	**Age 80+ n=136**
% In one-person households	23.5 ± 8.3	32.4 ± 9.9
% In two-person households	62.9 ± 9.6	54.9 ± 7.6
% In three^{+} -person households	13.5 ± 7.5	6.7 ± 4.7
Average household size	1.9 ± 0.1	1.7 ± 0.1
% Lived out of MI for 2+ mos. in past year	18.0 ± 7.4	12.7 ± 6.9
% hh with no vehicles	1.9 ± 1.8	8.0 ± 4.9
Average number of vehicles in hh	1.9 ± 0.1	1.7 ± 0.1
% licensed to drive	94.3 ± 4.5	89.4 ± 4.3
Of those not currently licensed - % licenses in past 5 years*	36.0 ± 0.0	59.1 ± 22.1
% of households with another person who drives *	73.2 ± 8.7	47.3 ± 10.5

Table 47: Work and Volunteering by Age Group		
	Age 70-79 n=164	**Age 80+ n=136**
% Work outside home for pay	8.6 ± 5.0	3.7 ± 4.0
Of those who work, % full time*	13.1 ± 12.9	0.0 ± 0.0
% Volunteer in community	38.1 ± 9.0	25.6 ± 8.8

Table 48: Overall Health by Age Group		
	Age 70-79 n=164	**Age 80+ n=136**
Ability to walk half a mile		
% Very able*	63.1 ± 9.5	38.2 ± 10.2
% Somewhat able	17.9 ± 7.9	17.6 ± 7.4
% Not very able	8.1 ± 5.8	18.1 ± 8.8
% Not at all able*	10.9 ± 5.4	25.5 ± 9.1
Ability to climb 2 flights of stairs		
Very able	61.2 ± 9.5	40.0 ± 10.4
Somewhat able	20.5 ± 8.0	25.8 ± 8.8
Not very able	8.7 ± 5.1	12.4 ± 6.9
Not at all able*	5.7 ± 3.1	18.8 ± 8.5
Overall health		
Excellent*	24.5 ± 8.2	7.9 ± 5.6
Very good	31.5 ± 9.1	31.9 ± 10.1
Good	26.6 ± 8.0	35.5 ± 9.3
Fair	12.6 ± 6.8	13.7 ± 7.5
Poor	2.9 ± 3.9	9.4 ± 6.5

Table 49 shows results related to driving by age group. In general, respondents in the younger age group drove more often and had a larger driving space. They were also less likely to think that their driving would become a problem in the next five years. All other comparisons were not significant.

Table 50 shows the two overall scales related to isolation and loneliness. The survey found that people in the older age group had significantly more restricted social activity when compared to the younger age group. There was no significant difference found on the subjective isolation scale.

Table 51 shows overall public transportation use by age group. As shown in this table both age groups were similar in their use of public transportation overall.

Table 49: Driving by Age Group		
	Age 70-79 n=164	**Age 80+ n=136**
% who drive		
Regularly*	82.6 ± 6.1	55.6 ± 10.4
Occasionally*	7.2 ± 3.7	20.0 ± 9.1
Rarely	1.8 ± 1.9	2.9 ± 2.5
Do not drive anymore*	4.3 ± 2.8	18.1 ± 7.5
Do not drive but expect to drive in the future	2.7 ± 3.8	1.1 ± 1.5
Never drove	1.3 ± 1.5	1.8 ± 3.6
	Age 70-79 n=149	**Age 80+ n=106**
Frequency of driving		
Every day or almost every day	69.9 ± 9.1	65.7 ± 11.8
3 or 4 days a week	20.6 ± 8.4	9.2 ± 6.1
1 or 2 days a week	5.8 ± 3.5	16.7 ± 9.7
A few days a month	1.6 ± 1.9	3.9 ± 6.9
Once a month or less	1.5 ± 1.8	5.3 ± 5.4
Don't know	0.6 ± 1.3	2.3 ± 4.6
Average miles per year		
0-2,000	27.1 ± 8.6	38.6 ± 12.5
1,999-5,000	29.3 ± 10.0	24.0 ± 12.0
4,999-10,000	20.9 ± 8.3	21.3 ± 10.6
9,999-15,000	15.1 ± 7.8	12.9 ± 9.0
14,999-20,000	3.1 ± 2.6	1.7 ± 2.2
19,999-25,000	3.8 ± 4.4	1.5 ± 2.0
Over 25,000	1.1 ± 1.5	0.0 ± 0.0
Mean Driving Space Score*	3.8 ± 0.3	3.2 ± 0.3
% who have someone depending on them to drive	19.1 ± 8.7	22.6 ± 10.3
Satisfaction with ability to get to places you want to go to		
% very satisfied	66.5 ± 9.7	47.4 ± 12.2
% satisfied	33.3 ± 9.5	49.5 ± 12.2
% dissatisfied	0.0 ± 0.0	0.0 ± 0.0
% very dissatisfied	0.2 ± 0.4	0.0 ± 0.0
Is there a chance your driving ability could become a problem within the next 5 years?		
Yes*	12.7 ± 4.8	31.1 ± 10.7
No	71.5 ± 9.1	53.4 ± 11.6
Don't know	15.8 ± 8.1	15.5 ± 7.8

Table 50: Activity Scale and Subjective Social Isolation Scores by Age Group		
	Age 70-79 n=164	**Age 80+ n=136**
Mean Activity Scale Score*	22.9 ± 0.7	20.7 ± 0.8
	Age 70-79 n=161	**Age 80+ n=132**
Mean Subjective Isolation Scale Score	3.7 ± 0.3	4.0 ± 0.3

Table 51: Overall Public Transportation Use by Age Group		
	Age 70-79 n=164	**Age 80+ n=136**
% have used public transportation (bus, taxi, subway or train) on regular basis anytime in their life	38.6 ± 9.6	36.1 ± 10.3
Of those that have used public transportation at some time in their life, they used it		
Currently	3.5 ± 4.3	13.2 ± 11.9
In the recent past	15.4 ± 11.6	4.7 ± 4.9
Long ago	81.1 ± 12.2	82.2 ± 12.3

Older Adult Respondents: Public Transportation Users versus Non Users

This section compares Michigan adults 70 years of age and older who report using some form of public transportation (n=44) with those who report not using any form of public transportation (n=256). Users of public transportation were defined as those who reported using regular bus, dial-a-ride or senior van, volunteer drivers, or a taxi with a special or senior fare with any frequency (often, occasionally, or rarely). Note that because of the low number of respondents in the public transportation user group, the means and proportions for this group have large variances. As such, most comparisons are not statistically different. We provide these comparisons, on a limited set of questions, to help provide some insight into these groups and to help with developing recommendations.

Tables 52-57 show these comparisons by demographics, household size and vehicles, work and volunteering activities, general health, driving behaviors, and social isolation. Although not generally statistically significant, those older adults who use some form of public transportation: tend to be male; non-White; have a slightly lower household income; have a higher level of education; are more likely to live in a multi-

person household with fewer household vehicles and licensed drivers; are more likely to work full time; have poorer health; drive less regularly; and have a smaller range of social activities that they engage in.

Table 52: Demographics of Older Adults by Use of Public Transportation		
	Use Public Transportation n= 44	**Do Not Use Public Transportation n= 256**
Average age	78.5 ± 2.3	78.0 ± 0.9
% Female	51.0 ± 19.2	65.3 ± 7.3
% Married	47.6 ± 19.5	63.4 ± 7.5
% Live in own home/apartment	91.4 ± 7.4	95.7 ± 3.7
% Lived 5+ yrs in same location	95.2 ± 5.8	91.1 ± 4.3
Race		
White	74.3 ± 18.3	94.5 ± 3.5
African American	14.7 ± 16.5	3.7 ± 3.2
Other	2.2 ± 4.3	1.4 ± 1.4
Don't Know	6.6 ± 12.8	0.0 ± 0.0
Refused	2.2 ± 4.3	0.4 ± 0.7
Household income		
<$25,000	30.4 ± 15.4	22.3 ± 6.0
$25,000-$49,999	36.3 ± 18.0	26.0 ± 6.8
$50,000-$74,999	4.8 ± 5.8	7.6 ± 3.3
$75,000 and over	5.5 ± 6.3	11.4 ± 5.3
Don't know	4.1 ± 5.6	12.1 ± 4.6
Refused	19.1 ± 15.6	20.6 ± 6.6
Education		
Less than high school	5.9 ± 6.2	8.4 ± 4.2
High school	37.8 ± 18.7	43.7 ± 7.6
Vocational or some college	25.4 ± 18.1	25.7 ± 6.7
College graduate	6.0 ± 6.7	10.5 ± 5.0
Some graduate school	22.5 ± 15.3	8.2 ± 3.9

Table 53: Household Size and Vehicles by Use of Public Transportation		
	Use Public Transportation n= 44	**Do Not Use Public Transportation n= 256**
% In one-person households	31.9 ± 16.8	27.3 ± 7.0
% In two-person households	39.8 ± 16.8	62.0 ± 7.6
% In three -person households	21.8 ± 17.4	8.3 ± 4.2
Average household size	1.7 ± 0.2	1.8 ± 0.1
% Lived out of MI for 2+ mos. in past year	7.9 ± 7.2	16.5 ± 5.7
% hh with no vehicles	12.2 ± 7.8	3.8 ± 2.8
Average number of vehicles in hh	1.3 ± 0.3	1.8 ± 0.1
% older adult licensed to drive*	75.7 ± 16.1	95.5 ± 2.5
Of those not currently licensed - % licenses in past 5 years	57.3 ± 13.1	46.6 ± 16.8
% of households with another person who drives	45.9 ± 20.2	62.5 ± 7.6

Table 54: Work and Volunteering by Use of Public Transportation		
	Use Public Transportation n= 44	**Do Not Use Public Transportation n= 256**
% Work outside home for pay	2.6 ± 3.9	6.7 ± 3.7
Those who work, % full time	27.2 ± 0.0	8.0 ± 8.9
% Volunteer in community	35.3 ± 16.1	31.2 ± 6.8

Table 55: Overall Health by Use of Public Transportation		
	Use Public Transportation n= 44	**Do Not Use Public Transportation n= 256**
Ability to walk half a mile		
% Very able	33.7 ± 16.7	53.3 ± 7.7
% Somewhat able	18.7 ± 15.7	17.6 ± 5.8
% Not very able	28.7 ± 19.0	10.6 ± 5.2
% Not at all able	18.8 ± 14.7	18.2 ± 5.8
Ability to climb 2 flights of stairs		
Very able	32.7 ± 19.0	53.2 ± 7.7
Somewhat able	25.1 ± 16.2	22.8 ± 6.4
Not very able	24.6 ± 18.1	8.3 ± 3.9
Not at all able	11.0 ± 6.4	12.5 ± 5.2
Overall health		
Excellent	9.5 ± 7.2	17.3 ± 5.7
Very good	26.1 ± 16.5	32.6 ± 7.4
Good	26.2 ± 16.5	31.9 ± 6.7
Fair*	34.5 ± 17.6	9.6 ± 4.4
Poor	3.8 ± 5.4	6.6 ± 4.3
% With vision problems affecting driving	12.7 ± 15.3	6.3 ± 3.6
% With memory problems affecting driving	3.6 ± 5.2	6.8 ± 3.3

Table 56: Driving by Use of Public Transportation		
	Use Public Transportation n= 44	**Do Not Use Public Transportation n= 256**
% who drive		
Regularly	62.7 ± 19.0	70.3 ± 7.1
Occasionally	9.4 ± 13.6	14.3 ± 5.9
Rarely*	0.0 ± 0.0	2.8 ± 1.8
Do not drive anymore	15.0 ± 9.3	10.7 ± 4.5
Do not drive but expect to drive in the future	8.2 ± 13.2	0.9 ± 1.0
Never drove	4.7 ± 5.0	1.1 ± 2.1

Table 57: Activity Scale and Subjective Social Isolation Scale Scores by Use of Public Transportation		
	Use Public Transportation n= 44	**Do Not Use Public Transportation n= 256**
Mean Activity Scale Score*	20.5 ± 1.0	22.0 ± 0.6
Mean Subjective Isolation Scale Score	4.0 ± 0.8	3.8 ± 0.2

Conclusions

This study represents the most comprehensive investigation into the transportation patterns and needs of Michigan's older adult population and of those who give care to Michigan older adults. Based on the results of the literature review, demographic analysis, statewide survey of caregivers, and statewide survey of older adults a number of general conclusions can be made.

The challenges for safe mobility among older adults are going to become a more pressing societal issue in the coming two decades. Projections show that Michigan's population is growing older and a greater proportion will be licensed to drive. Tomorrow's next generation of older adults is expected to be driving more and will prefer the personal automobile over other ways to get around. If these older adults are not driving themselves, they will most likely be transported in a personal automobile. Unless effective countermeasures are implemented, the crash rates for older adults will continue to be high, particularly among those who drive very little.

Providing safe mobility for older adults who live in rural areas will be more challenging than solutions for those who live in suburban and urban areas. Older people frequently live in rural areas, which are not well served by many public transportation programs. Rural roads are less safe to drive and family and friends are less likely to live close by in order to provide transportation assistance. These challenges will need to be overcome to ensure safe mobility for all older adults, regardless of where they live.

The issues of safe mobility in an aging society can be framed by four complementary and interdependent goals: (1) understand and better manage the effects of medical conditions and medications on skills needed for safe driving; (2) develop and identify procedures and tools for determining fitness to drive; (3) to help those who are able to drive safely continue to do so; and (4) to identify and provide community mobility support to those who are no longer able or choose not to drive. Effective countermeasures and solutions are needed in each of these areas in order to significantly impact the safe mobility of quality-of-life for older adults.

Integrated solutions for maintaining safe mobility must recognize that older adults not only have travel needs related to satisfying basic needs (medical appointments,

grocery shopping, etc.), but must also satisfy the needs related to maintaining a high quality of life (visiting with family/friends, religious activities, volunteering, etc.). Solutions must also be responsive to when and how older adults travel.

Many solutions for maintaining safe mobility among older adults have not been formally evaluated. In order for people and jurisdictions to make cost-effective decisions related to the older adult population, programs and countermeasures need to be evaluated in terms of reducing crashes/injuries or improving quality-of-life.

Caregivers/family members play a critical role in maintaining safe mobility for older adults, and will continue to play an important role in the coming decades. The role that the caregiver plays and the burden it causes is just starting to be studied. A comprehensive understanding of caregiver characteristics, how they assist older adults, and how this impacts caregiver health and finances is needed in order to improve the effectiveness of this integral part of older adult safe mobility. The findings from the caregiver survey component of the present research are an important first step in this direction. The survey found that caregivers for Michigan's older adults: are generally college educated; have full- or part-time jobs; are relatively healthy; are generally providing care to a parent or other family member; live close to the care recipient; provide care 1-4 times per week; and nearly all help with transportation, most often by giving rides themselves. Caregivers in general do not report undue burden and very few seek help or information to assist with giving care. There were few differences between men and women caregivers, with the exception that men less frequently sought out information to help with caregiving. We also found few differences among caregivers who cared for people age 70-84 and those who cared for people age 80 and older, except that older recipients need more help with transportation.

A comprehensive understanding of the transportation needs and patterns of older adults is also important for effectively developing and implementing solutions for maintaining safe mobility in an aging society. The survey of Michigan older adults in the present study adds to this understanding. The survey found that among Michigan older adults: nearly all lived in 1-2 person households; most lived in households with 1 or 2 motor vehicles available; hardly any worked outside the home for pay, but a third volunteered; 20%-30% were in fair to poor health; and about 20% did not currently drive

or rarely drove. Those who did drive, did not drive very much, but were satisfied with their current mobility. Those who did not drive stopped driving for a variety of reasons and about one-quarter were not satisfied with their current mobility. Older adults, regardless of driving status engaged in a wide variety of mobility-related activities and reported low social isolation.

Older adults do not currently use most forms of public transportation and are relatively unaware of the following types of transportation: volunteer driver programs; dial-a-ride/senior van programs; and voucher/senior discount programs. Those who do use public transportation are generally happy with it. There were few differences between men and women, except that men drove more and were more likely to use public transportation, although the number of public transportation users overall was small. There were several differences between older adults age 70-79 and those who were age 80 or older. Younger respondents were more likely to: be married; work full-time; be healthier; drive more; engage in a wider variety of mobility-related activities; and have greater satisfaction with their personal mobility. Our analysis of responses by whether or not the older adult had used public transportation was hampered by the low number of older adults who reported using public transportation. Although not generally statistically significant, our analyses showed that those older adults who had used some form of public transportation tended to: be female; more likely be non-White; have a slightly lower household income; have a higher level of education; be more likely to live in a multi-person household; have fewer household vehicles and fewer licensed drivers; be more likely to work full time; have poorer health; drive less regularly; and have a smaller range of social activities.

Recommendations

General

1: Continued special focus on the older adult segment of the population is warranted.

Background and rationale: Older drivers deserve special attention in terms of research and practice for a number of reasons. Consistent with national trends, the Michigan population is aging, with the oldest old (those 85 and older) experiencing especially high levels of growth. By 2030, it is estimated that 14% of the Michigan population will be comprised of adults age 70 and older. Older drivers, as a group, are at increased risk of a crash per mile driven, especially fatal crashes due primarily to increased frailty that comes with aging. At the same time, having to stop driving can have serious consequences for community mobility, which in turn can adversely affect individual freedom and well being. There is evidence that older drivers as a group often differ from younger age groups, not only in terms of their travel patterns and needs, but also in how they respond to various countermeasures to keep them safe and/or mobile. It is important to take into account these age-related differences in developing and implementing measures to improve transportation safety and mobility.

2: Differences among older adults themselves must be taken into account. The older adult population is the most heterogeneous of all age groups. In particular, the oldest-old can be quite different from youngest-old.

Background and rationale: The heterogeneity of the older adult population is well recognized. At the most basic level, differences between the oldest-old and the youngest-old need to be considered in developing measures to meet the needs of Michigan's older population. For example, the demographic analysis found that while 88% of Michigan residents age 70 and older reported having a car, that percentage dropped to 72% among the oldest-old (those age 85 and older). The survey of Michigan older adults found that respondents age 80 and older (compared to respondents age 70-79) reported lower levels of health and functioning, drove less and closer to home, and were more likely to think there was a chance their driving ability

could become a problem within the next 5 years. In addition, their participation in a number of activities outside the home, regardless of transportation mode, was more limited, consistent with their higher level of perceived social isolation. While similar proportions of each age group reported ever having used public transit, the oldest old were more likely to be current users.

3: Gender matters when it comes to understanding the travel patterns, preferences, and needs of older adults.

Background and rationale: Older men and older women differ in important ways with regard to population and travel trends. Women age 70 and older outnumber men and will continue to do so (by a factor of 1.4 to 1 for those 70 and older and by a factor of 2 to 1 for those age 85 and older). However, men are more likely to continue driving into old age. As noted in the literature review, it has been estimated that older women will outlive their ability to drive safely by 10 years, compared to 6 years for older men (Foley et al., 2002). Results from the survey of older adults indicated that women were less likely than men to report driving regularly as well as driving every day or almost every day. Women also reported driving fewer miles per year and driving closer to home. They were more likely to report riding as a passenger in someone else's vehicle and having had someone provide transportation assistance or unpaid care to them within the past 12 months. Consistent with this, they were less likely to report that someone in their life was dependent on them to drive. These and other differences between women and men suggest that measures to meet the needs of the older population will need to be gender-specific to some degree or at least take relevant differences into account in the development and implementation stages.

Extending Safe Driving

Older drivers, like people of all ages, prefer getting around by personal auto. In Michigan for example, the use of public transit, while traditionally low, has experienced further declines in recent years (MDOT, 2006). Although some older drivers exhibit compromised driving safety due to declines in driving-related abilities, it is not age per

se that leads to problems with driving. Rather it is the medical conditions and/or the medicines used to treat them that can make driving more dangerous. While many of these conditions become more prevalent with age, there is great variability among individuals in terms of whether and how their skills may be affected. Because of this, there is widespread agreement that efforts should focus on helping older drivers extend the time over which they can safely drive, rather than restricting all older drivers simply because of their age (Molnar et al., 2007). Results from the survey of older adults underscore the importance of this effort. While most respondents rated their health as good, very good, or excellent, fully one in five reported that there was chance that their driving ability could become a problem within the next 5 years. A number of measures appear promising that are targeted to drivers, their vehicles, or the roadway.

4. Support development of vehicle design guidelines to make cars more "older driver friendly."

Background and rationale**:** The aging of the population and older adult preferences for travel by personal automobile have led, in part, to increasing attention of how vehicle design can be improved to enhance safety, accessibility, and comfort of older drivers. In addition, vehicle design features have been identified as making an important contribution to crashworthiness (beyond individual occupant protection and other technologies) by diverting crash energies away from occupants (Langford, Bohensky, Koppel, & Taranto, 2009). Improving vehicle design features to address specific problems faced by older adults (e.g., getting in and out of the vehicle, turning around to look out of the rear window, crashworthiness for increasing frailty), will likely result in improvements for the larger population of drivers as well (Herriotts, 2005). In the survey of older adults, over a third of respondents reported being not very or not at all able to walk half a mile and almost a quarter reported being not very or not at all able to climb 2 flights of stairs, suggesting that mobility was a problem. Yet most respondents reported still driving – two-thirds everyday or almost every day and about 14% each 3-4 days and 1-2 days per week. This suggests an opportunity to better meet the needs of the large numbers of older adults who continue to drive by supporting efforts to identify and implement vehicle design improvements.

5. Be responsive to guidelines for roadway design that have been developed for older adults and find ways to implement them cost effectively.

Background and rationale: A great deal of effort has been expended at the national and state levels to identify roadway improvements to better accommodate the common functional impairments associated with aging. As noted in the literature review, the US Federal Highway's *Older Driver Highway Design Handbook* is being updated and implementation training workshops for state traffic engineers are available for the current version. One study of the handbook found that, among its strengths, it presented low-cost solutions backed by empirical data, provided a process for prioritization of efforts, and that most recommendations are supportive of the "complete streets" initiative recently enacted in Michigan (Lynott & Taylor, 2009). Michigan should continue to take advantage of the work being done, while at the same time continue to extend research on the most cost effective strategies for drivers of all ages, as well as support the continued training of traffic engineers to identify and implement beneficial countermeasures.

6. Support continuing research and demonstration projects on quantifying the actual safety benefits of implementing recommended road improvements and complete streets legislation.

Background and rationale: As recommended roadway and infrastructure improvements are implemented, it is important to assess the actual safety benefits afforded by these design changes. This process has been ongoing with recommendations from the current *Older Driver Highway Design Handbook* and should continue once the updated handbook is available. Similarly, as communities begin to implement the complete streets model, there needs to be support for demonstration projects to determine whether these changes are contributing and not detracting from safety outcomes. For example, as communities plan for pedestrians and bicyclists when renovating streets by adding bicycle lanes and pedestrian crossings, it will be important to assess, using analytical studies with representative samples, whether automobile drivers, pedestrians,

and bicyclists of all ages are using these roadway features as intended and what the impacts are on safety in the areas where these changes have been made.

7. In implementing roadway design improvements (e.g., roundabouts), include an educational/training component for the public that is tailored to the special needs and learning styles of older adults.

Background and rationale: While it is critical to provide training for state traffic engineers to implement roadway improvements, it is equally important to accompany such infrastructure changes with educational materials for the public to ensure that the projected safety benefits are realized. Older drivers are overrepresented in certain types of crashes, especially intersection crashes. Research has identified various roadway improvements to help older drivers reduce their crash rates. However, many of these improvements, such as adding roundabouts to reduce the need for turns across oncoming traffic, require older drivers to drive in very different ways than they are used to. For example, although studies show that roundabouts have safety benefits for drivers of all ages, older drivers may have a higher learning curve when it comes to learning to use roundabouts. A recent study in Michigan found some evidence that older drivers have a greater potential for incorrect roundabout negotiation than younger drivers and that certain design features might increase older driver understanding and comfort (Savolainen et al., 2011). It is important that the implementation of roadway improvements such as roundabouts be accompanied by educational and training materials that explicitly take into account the unique problems that older adults may be having and that are communicated in a way that resonate with both older drivers and the more general population. To this end, materials should not be written in a way that labels the older adult population as a special population.

8. In developing and distributing educational and training materials for older drivers, take into the account the role that caregivers play in the providing transportation and mobility assistance to older adults.

Background and rationale: The role of caregivers providing assistance to older adults has received increasing attention over the past several years although much remains to be learned about both the caregiver and care recipient populations, especially with

regard to the provision of transportation and mobility assistance. Results from the survey of caregivers indicated that transportation assistance is an important component of the care provided to older adults, with such assistance including not only giving rides in a car, but also arranging for someone else to drive the older adult or accompanying the older adult on other forms of transportation. Sizable numbers of caregivers reported seeking information or services to help them provide assistance, including more general caregiver training or education materials, as well as more specific information on transportation services. Information was sought from a variety of sources including community groups and government agencies, among others. There appears to be an interest on the part of caregivers for education and training materials on transportation and mobility that they can use to support or manage their care recipients' needs. As importantly, given the important relationship that caregivers often have in older adults' lives, with most providing care at least once per week up to everyday, there is an opportunity to make sure that materials are available that can assist caregivers in providing assistance and can be easily accessed by them.

9. Consider medical and allied health professionals as viable partners for disseminating transportation safety information to older adults. Other "nontraditional partners" should also be considered such as senior centers and other community organizations frequented by older adults.

Background and rationale: Older adults and their caregivers seek out transportation information from a variety of sources. In the survey of caregivers, one in five sought information from doctors or other health professionals. One in ten sought information from each of the following: senior centers, other community organizations, or family/friends. For older adults, it is often the medical conditions that become more prevalent with age that can compromise the ability to drive safely. In fact, among the older adults in our survey who had stopped driving, over 45% cited health reasons or advice from a doctor for stopping. An additional 35% reported not feeling comfortable driving anymore or realizing they were not a safe driver. Given older adults' increased interaction with the medical community as they age, it makes sense that medical and allied health professionals become more involved in helping educate older adults about how functional declines resulting from medical conditions and the medications used to

treat them may affect safe driving, what might be done to compensate for such declines, and when driving cessation is necessary. Similarly, senior centers and other community organizations can play an important role in pointing older adults to resources for assessing their driving safety so that they do not continue to drive beyond the time they are safe to do so, as well as stop driving before they actually need to.

10. Explicitly take into account needs, preferences, and unique behaviors of older adults in the development and implementation of ITS.

Background and rationale: As noted in the literature review, there has been great progress in the development of advanced technology systems for vehicles with the potential to increase driving safety and mobility (e.g., route guidance, crash warning systems). The challenge with regard to older drivers is to make sure that such systems actually enhance safety rather than detract from it. There is increasing evidence that older drivers differ from younger drivers in their use of and response to such systems in some ways. For example, older drivers may take longer to learn how to use the technology and may be more distracted by it, although such distraction was still minimal in at least one study. At the same time, several studies have shown that older drivers can benefit from and be pleased with such technology just as much as younger drivers. As development of ITS continues, it is important to make sure that testing includes sufficient numbers of older drivers and goes hand in hand with training materials that are responsive to older adult needs.

Community Mobility Options for Older Adults

For older adults who are unable or choose not to drive, support for community mobility options will become increasingly important. A number of community mobility options have been developed to meet the mobility needs of older adults who no longer drive. Among these are traditional public transit (e.g., buses, light rail, trains, and subways); paratransit (demand response services including Americans with Disabilities Act transit services, supplemental transportation programs, and other specialized transit services); private transit; and other alternatives such as walking, bicycling, or using

small motorized vehicles such as golf carts (Kerschner & Hardin, 2006; Suen & Sen, 2004). The extent to which these services are available varies from community to community. There is also considerable variation in how aware people are of them, how difficult they are to use, and how much they cost. The barriers preventing older adults and others from using public and paratransit have been categorized as physical, service, perceptual, and information (Peck, 2010). The recommendations in this section, for the most part, have to do with overcoming these barriers. The lessening of such barriers to public transit use by older adults can potentially increase transit ridership for all customers, not just older adults (Peck, 2010).

In thinking about how to improve public transit services for older adults, it is important to understand who is most likely to use such services currently. Studies suggest that public transit use is higher among women, minorities, the oldest old, those with low-income, or those in urban areas (Babka et al., 2008; Rosenbloom, 2004). Thus in many ways, the current ridership for public transit can be characterized as being made up of some of the more vulnerable populations in our communities. At the same time, there are opportunities to improve all community mobility options in Michigan so they are better able to meet the needs of individuals of all levels of impairment and vulnerability and to appeal to larger segments of society before these individuals actually have a need to use them.

11. Investment in pedestrian infrastructure should focus not only on making communities more walkable but on improving travel routes from home to transit stations to reduce physical barriers to the use of transit.

Background and rationale**:** Many of the functional declines experienced by older adults that lead to their driving cessation also impede their ability to use other forms of transit, especially public transit. For example, in a survey of adults age 75 and older, 50% reported being unable to walk to a bus stop if they wanted to; however, 32% reported that they might have been able to do so if a resting place had been available (Burkhardt, 2003). Features of pedestrian infrastructure that may be especially beneficial to older adults include sidewalks, curb ramps, street lighting, street crossings, and rest areas (Peck, 2010). Improving pedestrian infrastructure in communities to facilitate transit use

will also help make communities more livable in general, a goal that has received increasing attention over the past few years and is one of the goals laid out in the most recent US DOT strategic plan.

12. Reduce other physical barriers to using public transit through measures such as improving vehicle entry through low floor vehicle design and increasing number of reserved seats for older adults.

Background and rationale**:** Older adults may be more likely to consider using public transportation options as improvements are made to better meet their needs. A number of recommendations for improving public transportation for older adults have emerged over the past several years (e.g., see Burkhardt, 2003; Burkhardt, McGavock, & Nelson, 2002; Kerschner & Hardin, 2006). Many focus specifically on overcoming physical barriers to use of public transit, specifically getting on and off buses more easily.

13. Support travel training geared toward both older adults and their caregivers.

Background and rationale: Efforts to overcome service barriers must be balanced by what is economically feasible. That is, one approach would be to try to make public transit more like travel by personal automobile which most people clearly prefer largely because of the convenience it affords. However, as Peck (p. 32, 2010) points out, "it would be prohibitively expensive to design a public transit system that offers the same convenience – door-to-door service, route flexibility, and scheduling independence – as the personal automobile." In the absence of such extreme changes to the transit system, there are still improvements that can be made to reduce barriers to using public transit. However, even minor improvements will not have the desired effects on ridership if people are unfamiliar or uncomfortable with using the system. One reason reported by individuals for not using public transportation is lack of knowledge regarding use (e.g., Burkhardt et al., 2002). One potentially promising approach to overcoming this barrier is to provide travel training. Travel training has been found to be useful in increasing ridership by providing clear and accessible information on public transit riding, fares, routes, and schedules (e.g., Shaheen, Allen, & Liu, 2009). Travel training

needs to be targeted not only at older adults themselves but also the caregivers who provide transportation assistance to older adults. Support for caregivers who provide transportation assistance to older adults will become increasingly important as the older adult segment of the population increases.

14. Improve training of transit operators.

Background and rationale: Older adults, like people of all ages, want transit providers to be responsive to their needs as customers. Many of the recommendations that have come out for improving transit services focus on how such services can be more customer-focused. An essential component of this approach is the training of transit operators to improve assistance to passengers rather than just operate vehicles, as well as encourage friendly and responsive service. In addition, training can be useful in helping transit operators understand the unique issues that older and disabled adults may be facing and how their needs can be best accommodated during transit travel.

15. Maximize the potential for volunteer driver programs.

Background and rationale: A recurring finding from this project is that older adults, like people of all ages, prefer to get around by personal automobile. Volunteer driver programs benefit older adults by allowing them to maintain their mobility in this way without sacrificing their autonomy. Programs that use both volunteer and paid drivers in private automobiles have the added benefit of leveraging the resources that individuals hold and would have spent on their personal vehicle if they had not stopped or reduced their driving. An important barrier to the widespread adoption of such programs is the availability and affordability of liability insurance for drivers. Among the strategies for maximizing the potential of volunteer driver programs identified by the White House Council on Aging (2005) were: developing and funding policies that cover volunteer drivers for door-to-door and door-through-door transportation services, by local and state governments; promoting community-based volunteer transportation options and protecting volunteer drivers from unreasonable insurance premiums; and fund

development of volunteer-based transportation for older adults including liability protection for volunteers.

16. Consider ways to expand voucher programs, especially for vulnerable populations.

Background and rationale: As noted in the literature review, a transportation voucher program is one in which vouchers are given out to people for one or more formal or informal transportation options. Currently most voucher programs are in rural areas. As noted in the literature review, such programs show promise for improving community mobility among older adults, especially because they help address some of the barriers faced by vulnerable users who make up a large part of transit users. For example, vouchers programs are especially important for economically vulnerable populations who may not be able to afford regular fee rates associated with many community mobility options. Similarly, voucher programs may be especially promising for older adults living alone or far from relatives or friends and unable to rely on them for rides. These types of programs may become increasingly important, especially given trends related to shrinking household size and geographic dispersion of families.

17. Support improvements in marketing and outreach efforts to older adults to make them aware of what community mobility options are available (especially paratransit) and how they can be accessed.

Background and rationale: While many communities already have public and paratransit services in place, older adults do not always know about them, especially if they have not had a need to use them in the past. In the survey of older adults, about one third reported regularly using some form of public transit. Even though most respondents who were not regular users of these services reported not needing them, there may come a time when they will have a need for them. There is an opportunity to educate them now about what services are available so that in the future they are better positioned to take advantage of these services. Considerably fewer respondents were aware of volunteer driver or voucher programs in their communities. While it is likely that fewer such programs are available relative to public and paratransit, it may also be

that greater educational outreach is necessary. This is especially true, because unlike public and paratransit, such services are not as easily identifiable out on the road and therefore older adults cannot simply rely on seeing them to know they are available.

18. Paratransit and specialized transportation services should explore cost effective ways to provide more than just trips for medical purposes. As part of this effort trip-making flexibility should be expanded by increasing opportunities for multipurpose trips.

Background and rationale: The literature review revealed that older adults travel for a variety of reasons. Even though they are more likely to have medical conditions that can affect travel than younger people, less than 5% of their trips are for medical purposes according to one study (Rosenbloom, 2009). Many specialized transportation services limit their trips to medical appointments. While these types of trips are clearly important, other types of trips such as shopping, social/recreational, personal business, and family reasons make a major contribution to the quality of life of older adults. The survey of older adults found that two-thirds of respondents' trips by bus or van/dial-a-ride were for reasons other than medical or dental. There is an opportunity for transportation service providers to be more responsive to older adult travel needs by expanding the range of trips that are covered by integrating multi-purpose trip coverage.

19. Continue to take a leadership role in fostering coordination of transportation services at the state level.

Background and rationale: Increasing coordination and cooperation among transportation providers is one of three critical action areas outlined in the Transit Technical Report of the MDOT Long Range Transportation Plan (MDOT, 2006). Such coordination leads to better resource management strategies to improve the performance of various individual transportation services, as well as the overall mobility within a community (Burkhardt, Nelson, Murry, & Koffman, 2004). Research has identified several state level strategies found to be effective in improving cooperation including: offering significant financial, technical, and political support for planning and operations; establishing guiding principles, quality control standards, and oversight and monitoring practices early in the process; creating a comprehensive process and

perspective, including all major human service and transportation programs; streamlining administrative procedures; and innovating with demonstration programs and grass-roots initiatives (Burkhard et al., 2004). MDOT has had a long standing role in promoting transportation coordination in Michigan and should continue to build on its successes. As noted in the literature review, while Michigan has an extensive transportation network for older adults (with every county having some form of such service), gaps and barriers to services remain, largely due to lack of funding as well as lack of coordination among transportation providers. MDOT is well positioned to identify where these gaps in service exist in the state and where there are opportunities for improved coordination.

20. Support continued inter-agency and citizen collaboration in planning and implementing mobility options for older adults, at the state, regional, and local levels, including collaboration within departments of state, regional, and local government, and with private sector safety, insurance, senior advocacy and healthcare organizations.

Background and rationale: As discussed earlier in this report, older adults represent a very heterogeneous group in terms of levels of socio-economic status, employment, health status, mobility habits and preferences, and so forth. Comprehensive support for a safe and reliable spectrum of transportation options for older adults requires coordination of knowledge and effort across many professional disciplines (e.g., healthcare, gerontology, social services) and across areas of governmental responsibility (e.g., transportation infrastructure, regional planning agencies, driver licensure/driver education, law enforcement, public health) Successful interdisciplinary and intergovernmental effort will benefit from the guidance of both local and state level governmental organizations, and cooperative effort with the local and state healthcare community, automobile insurance industry, and the network of local, regional, and state level senior support and advocacy organizations.

21. Support continuing research on caregivers who provide transportation assistance to older adults to better understand this population, as well the factors that enable them to sustain these efforts over time.

Background and rationale: As discussed in the literature review, demand for family caregiving to the older adult population is likely to increase for a variety of reasons. Given people's preference to "age in place," and the subsequent need for caregiving in the home, it is not surprising that federal and state programs to support caregivers have expanded (e.g., respite care, education and training, tax relief, cash assistance). However, as programs are developed to help family caregivers specifically with providing transportation and mobility assistance to older adults, it is important to have a better understanding of both the caregiver and care recipient populations so that efforts to support them can be more effectively targeted. Results from our caregiver survey suggests that differences among caregivers may be more important than differences among care recipients in terms of what kinds of and the level of assistance provided. However, it is important that further research be done on the population of adults who provide transportation assistance to older adults to replicate these preliminary results, with sufficient sample sizes to yield meaningful conclusions. In addition, future research should focus on quantifying the size of the caregiver population with regard to providing transportation assistance. In the survey of older adults, even though only about 12% of respondents said that someone had provided transportation assistance or unpaid care to them in the past 12 months, about 41% reported they often rode as a passenger and about 23% reported that they relied most often on riding as a passenger in a car (not a taxi), suggesting that sizable numbers of older adults are relying on others for transportation assistance but not formally calling it that.

Recommendations for Implementation: Implementation Plan

For the purposes of the implementation plan, each recommendation from the project has been translated into a measure for increasing safe mobility of Michigan's older adults. For each measure, a description is provided of: 1) the target audience; 2) the activities necessary for successful implementation; 3) the potential barriers to implementation; 4) the criteria for judging the success of implementation; and 5) the estimated costs for implementation.

Given that considerable work has already been done at the state and federal levels on developing and implementing effective strategies for meeting the safe mobility needs of older adults, we have tried to integrate key findings from these efforts into the implementation plan when and where appropriate. In particular, we have considered findings from the NCHRP Report 500 Guidance for Implementation of the AASHTO Strategic Highway Safety Plan, Volume 9: A Guide for Reducing Collisions Involving Older Adults (Potts, Stutts, Pfefer, Neuman, Slack, & Hardy, 2004); Economic Benefits of Coordinating Human Service Transportation and Transit Services (Burkhardt, Koffman, & Murray, 2003); Improving Public Transit Options for Older Persons: Volume 2 (Burkhardt, McGavock, Nelson, & Mitchell, 2002); Transportation Innovations for Seniors: A Report from Rural America (Kerschner & Hardin, 2006); and Policy Options to Improve Specialized Transportation (Ellis, Lynott, & Fox-Grage, 2010).

Measure 1: Continue special focus on the older adult segment of the population.

Implementation Component	Description
Target audience	The target audiences for this measure are MDOT, the GTSAC, OHSP, and other state/local transportation and planning offices. Other agencies and organizations should be active participants but transportation agencies should take leadership roles in undertaking the activities identified here.
Activities	1. Maintain dedicated position at MDOT focusing on older drivers. 2. Continue to maintain the older driver emphasis area as part of Michigan's Strategic Highway Safety Plan (i.e., Senior Mobility Workgroup). 3. Support conference workshops and sessions on older driver safety and mobility issues. 4. Support research projects focusing on older driver issues.
Barriers to implementation	No barriers are anticipated as this measure simply calls for a continuation of what is currently the status quo. The measure reinforces that there is compelling evidence for maintaining the current focus on older adults as a population with unique needs and preferences.
Criteria for success	Among the criteria for judging the success of implementation are having: a high level of support from top management and key stakeholders; a knowledgeable and committed person at MDOT who can provide enthusiastic leadership to mobilize key stakeholders; an active coalition comprised of a broad cross section of individuals from other agencies including state offices on aging, areas agencies on aging, law enforcement, state and local planners, transportation service providers, social service agencies, the medical and public health communities, advocacy groups (e.g., AARP), and older adults themselves; a comprehensive and up-to-date plan of action for addressing older adult safe mobility for the state.
Estimated costs	There are minimal costs associated with this measure beyond what is already being budgeted and spent.

Measure 2: Take into account differences among older adults themselves, particularly between the youngest-old and the oldest-old (85+).

Implementation Component	Description
Target audience	The target audiences for this measure are MDOT, the GTSAC, OHSP, and other state/local transportation and planning offices. Other agencies and organizations should be active participants but transportation agencies should take leadership roles in undertaking the activities identified here.
Activities	1. In conducting problem identification and other planning activities, disaggregate the older adult population to better understand differences between the oldest old and younger old instead of treating the population of adults age 70 and older as one entity. 2. In funding research projects on older adults, require such breakouts as appropriate and feasible within the scope of the project. 3. Educate key stakeholders about the heterogeneity of the older adult population and help disseminate findings relative to important group differences that could impact policy and practice. 4. Consider including separate strategies for the two segments of the older adult population, as appropriate, in planning efforts (e.g., the Senior Mobility Workgroup Action Plan). In cases where a given strategy focuses predominantly on a particular segment of the older adult population, this should also be made clear.
Barriers to implementation	Among the barriers to implementation are: budget limitations for research and analysis; research results that are not in a form for easy and practical dissemination to non-research audiences; limitations in data availability (e.g., insufficient sample sizes to make meaningful inferences).
Criteria for success	The criteria for judging the success of this measure include having interventions to help older adults that are empirically based and tailored to take into account important age differences among older adults.
Estimated costs	To the extent that this measure has to do with how we think about and frame the issue of older adult mobility, there are minimal costs associated with it. However, there will be added costs associated with ensuring that research samples and analyses have sufficient sample sizes so that age differences can be explored and implications for countermeasures can be identified.

Measure 3: Gender matters when it comes to understanding the travel patterns, preferences, and needs of older adults.

Implementation Component	Description
Target audience	The target audiences for this measure are MDOT, the GTSAC, OHSP, and other state/local transportation and planning offices. Other agencies and organizations should be active participants but transportation agencies should take leadership roles in undertaking the activities identified here.
Activities	1. In conducting problem identification and other planning activities, examine differences by gender and identify implications for countermeasure development. 2. In funding research projects on older adults, require such breakouts as appropriate and feasible within the scope of the project. 3. Educate key stakeholders about the key gender differences that could impact policy and practice. 4. Consider including separate strategies for the two segments of the older adult population, as appropriate, in planning efforts (e.g., the Senior Mobility Workgroup Action Plan). In cases where a given strategy focuses predominantly on men or women, this should also be made clear. Examples of tailored interventions include: a) When developing programs and educational material for older adults, be aware that men are less likely to seek out information. b) When marketing transportation services, actively seek out ways of reaching older men, such as working with senior centers, VFWs, and fraternal organizations. c) Making non-driving transportation options more attractive to men to overcome their reluctance to give up driving when driving skills decline to unsafe levels.
Barriers to implementation	Among the barriers to implementation are: budget limitations for research and analysis; research results that are not in a form for easy and practical dissemination to non-research audiences; limitations in data availability (e.g., insufficient sample sizes to make meaningful inferences).
Criteria for success	The criteria for judging the success of this measure include having interventions to help older adults that are empirically based and tailored to take into account important gender differences among older adults.
Estimated costs	The costs should be relatively minimal apart from ensuring adequate numbers of men and women in research samples.

Measure 4: Support development of vehicle design guidelines to make cars more "older driver friendly."

Implementation Component	Description
Target audience	The target audiences for this measure are MDOT, the automakers, universities, and other organizations involved in the design of vehicles. Michigan is fortunate to have a large number of automakers headquartered in the state.
Activities	1. Develop a partnership with the automakers to both advise and stay abreast of efforts to make older driver friendly vehicles. This partnership should include the Alliance of Automobile Manufacturers. Because of the advances in connected vehicles, older driver friendly vehicle designs may be influenced by the infrastructure and vice versa. 2. Encourage the automakers and/or universities to develop a set of empirically-based guidelines for vehicle design that are based on what is known about common age-related declines in abilities. 3. Encourage the automakers and/or universities to conduct research on how to effectively market an older-driver-friendly vehicle to older adults.
Barriers to implementation	The main barrier for this measure is that other measures may have greater priority for MDOT.
Criteria for success	The primary measure for success is an empirically-based set of guidelines for designing older-driver-friendly vehicles. A secondary measure is that automakers are utilizing the guidelines when designing new vehicles.
Estimated costs	The cost for implementing this measure is the salary time for one or more people to make contacts and to prepare for and attend meetings. The cost is minimal.

Measure 5: Be responsive to guidelines for roadway design that have been developed for older adults and find ways to implement them cost effectively.

Implementation Component	Description
Target audience	The target audiences for this measure are traffic engineers and other professionals who develop and implement roadway improvements. It should be noted that the ultimate audience for such improvements is all drivers but with a particular focus on older drivers who may not be able to anticipate or easily recognize certain roadway features because of reduced or impaired vision, cognition, or psychomotor skills.
Activities	1. Conduct a spatial analysis of crash data for Michigan crashes (using police-reported crash data linked to Geographic Information System databases) in which older drivers are over-represented to identify specific roadway features of each location that may be amenable to improvement. 2. Try to match these needed improvements with specific recommended older driver roadway design guidelines (as identified in AASHTO implementation plan guidance). Recommended guidelines include: a) provide advance warning signs to inform drivers of hazardous conditions; b) provide advance guide signs and street name signs; c) increase size and letter height of roadway signs; d) provide all-red clearance interval at signalized intersections; e) provide more protected left-turn signal phases at high-volume intersections; f) provide offset left-turn lanes at intersections; g) improve lighting at intersections, horizontal curves, and railroad grade crossings; h) improve roadway delineation; i) replace painted channelization with raised channelization; j) reduce intersection skew angle; k) improve traffic control at work zones. 3. Expand list of potential older driver design guidelines as necessary, based on update of Highway Design Handbook due out by the end of 2011. 4. Expand roadway design improvements to other high-crash locations (not just older driver) as funds are available, as well as locations characterized by hazardous driving actions or high traffic volumes (with traffic volume being taken into account in any case). 5. Schedule and hold trainings for those responsible for implementing this measure. Included in the training should be information about the special needs of older drivers and the

	implications with regard to the specific roadway features of interest.
Barriers to implementation	Missing or incomplete data on police reports may make it difficult to accurately identify high crash locations for older drivers at a detailed enough level to determine what and where roadway features should be improved. Agencies may not have trained personnel in the use of GIS with knowledge of appropriate GIS databases, although this approach is becoming much more common and databases are generally available. Other potential barriers are: once design improvements are made, they must be maintained – these costs should be factored in at the implementation stage; there is often a lag between identified best practices or guidelines actually being incorporated into the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) and the AASHTO Green Book.
Criteria for Success	Indicators of success for this measure will include the number of roadway improvements implemented and the numbers of professionals trained.
Estimated costs	The costs for this measure are relatively small, particularly for the changes in signage, and given that these measures will only be implemented initially in locations where older drivers are over-represented in crashes. Some improvements such as intersections improvements may be more costly.

Measure 6: Support continuing research and demonstration projects on quantifying the actual safety benefits of implementing recommended road improvements and complete streets legislation.

Implementation Component	Description
Target audience	The target audiences for this measure are MDOT, GTSAC, OHSP, and other state agencies that have resources that can be committed to supporting research projects.
Activities	1. Support the development and updating of a literature review on road improvements and complete-streets-related improvements that have been formally assessed and shown to increase safety. 2. Seek out opportunities for Federal sponsorship of demonstration programs. 3. Encourage the formal assessment of road improvements and complete-streets-related activities.
Barriers to implementation	The barriers include limited funding and competing priorities for this measure.
Criteria for success	The criteria for success are: an updated literature review; the existence of at least one Federally sponsored project in Michigan in a 5-year period; and increases in the implementation of road improvements and complete-streets-related activities.
Estimated costs	The costs for this measure are minimal, if Federal sponsorship can be utilized for demonstration projects.

Measure 7: In implementing roadway design improvements (e.g., roundabouts), include an educational/training component for the public that is tailored to the special needs and learning styles of older adults.

Implementation Component	Description
Target audience	The target audiences for this measure are traffic engineers and other professionals who develop and implement roadway improvements. It should be noted that the ultimate audience for such improvements is all drivers but with a particular focus on older drivers who may not be able to anticipate or easily recognize certain roadway features because of reduced or impaired vision, cognition, or psychomotor skills.
Activities	1. Conduct an analysis of each roadway design improvement to determine the possible difficulties an older adult with declining abilities may have with the design change. 2. Hold public forums with older adults about new design features to determine their concerns about the improvements. 3. Develop educational and training materials (brochures, pamphlets, PowerPoints, etc.) on the reasons for, and how to negotiate, new roadway design elements with the input of experts on aging and driving. 4. Pilot-test educational and training materials with older adults. 5. Develop an easily searchable website for disseminating the education information. 6. Offer training sessions at senior centers, fraternal organizations, and other places where older adults congregate.
Barriers to implementation	The barriers to implementation are cost and competing priorities for this measure. It is also critical that this measure be implemented with a high level of input from experts in transportation and aging and older adult education.
Criteria for success	The criteria for success are: older adults are attending public forums; educational literature has been developed; training sessions have been developed; a new website has been developed and older adults are using it; and training sessions are being held around the state.
Estimated costs	The costs for this measure depend greatly on the amount of training and educational materials that are developed and the level of involvement of expertise. If this measure were to be implemented as a solicited project, the estimated costs would be about $350,000.

Measure 8: In developing and distributing educational and training materials for older drivers, take into the account the role that caregivers play in providing transportation and mobility assistance to older adults.

Implementation Component	Description
Target audience	The target audiences for this measure are MDOT, Michigan older adults, and people who provide transportation assistance to older adults.
Activities	1. Continue to periodically (e.g., every 5 years) assess the level and nature of involvement of caregivers who provide transportation assistance to older adults. 2. In developing materials for improving older adult mobility, include information for caregivers about the transportation services that are available and how to use them. 3. When marketing and distributing transportation-related materials, work with the professions/agencies where caregivers seek this information: health professionals; senior centers; and state government agencies (such as Area Agencies on Aging).
Barriers to implementation	There are no barriers to implementation.
Criteria for success	The criterion for success is that fewer caregivers are providing rides to care recipients themselves and are more often utilizing public transportation or other community mobility options.
Estimated costs	The estimated costs are minimal, except for the periodic monitoring of the level and nature of involvement of caregivers who provide transportation assistance. The cost to assess this statewide would be about $200,000.

Measure 9: Consider medical and allied health professionals as viable partners for disseminating transportation safety information to older adults. Other "nontraditional partners" should also be considered such as senior centers and other community organizations frequented by older adults.

Implementation Component	Description
Target audience	The target audiences for this measure are MDOT, other organizations that focus on transportation and/or aging, and agencies and institutions that provide medical and health care services to older adults.
Activities	1. Seek out appropriate representatives from the medical and allied health professions to participate in planning efforts so that they are aware of issues related to older safety and mobility and their perspective can be integrated into identified goals and strategies. 2. Identify key partners from the medical and allied health professions who are well positioned to help disseminate information for older adults (e.g., the Turner Geriatric Centers at the University of Michigan which include specialty clinics for vision, cognition, and psychomotor skill loss; the University of Michigan Drive-Ability Program, comprehensive driving evaluation programs). 3. Develop a systematic process for providing partners with traffic safety materials produced by the state as well as by state and national organizations, particularly those who serve as clearing houses for disseminating information such as the National Center for Senior Transportation (NCST).
Barriers to implementation	Potential barriers to implementation include: limited funding and competing priorities; lack of time or interest from health professionals to take on responsibilities they might consider outside their scope.
Criteria for success	Criteria for judging success include the establishment of a network of medical and allied health professionals and institutions who are involved in helping disseminate materials to older adults.
Estimated costs	There are moderate costs associated with implementation of this measure that are largely related to salary costs for someone to establish contacts with health professionals and serve as a liaison between them and the appropriate state departments and other organizations whose role it is to produce, manage, and/or disseminate informational materials.

Measure 10: Explicitly take into account needs, preferences, and unique behaviors of older adults in the development and implementation of ITS.

Implementation Component	Description
Target audience	The target audiences for this measure are MDOT and organizations that develop ITS technologies (universities and private sector).
Activities	1. Support the development and updating of a literature review on research and programs on ITS use by older adults. 2. Require developers of ITS to evaluate new technologies specifically with older adult populations. 3. Ensure that ITS development and implementation activities take into account the potential for distracting older adults.
Barriers to implementation	The barriers include limited funding and competing priorities for this measure.
Criteria for success	Criteria for success are: an updated literature review on appropriate topics and a reduction in older driver-involved crashes.
Estimated costs	The costs for this measure are minimal.

Measure 11: Investment in pedestrian infrastructure should focus not only on making communities more walkable but on improving travel routes from home to transit stations to reduce physical barriers to the use of transit.

Implementation Component	Description
Target audience	The target audiences for this measure are traffic engineers and other professionals who develop and implement roadway improvements. It should be noted that the ultimate audience for improvements in infrastructure includes pedestrians as well as users of transit, particularly older adults who may have difficulty using the transit system because of reduced or impaired vision, cognition, or psychomotor skills.
Activities	1. Based on review of published federal/state guidelines and expertise within MDOT, identify a set of infrastructure improvements that integrate walkability with access to public transit. Such improvements may include design changes to increase safety at pedestrian crossings and on sidewalks, as well as changes to increase accessibility such as pedestrian walkways and covered rest stops. 2. Identify key stakeholders who should be involved in planning for these improvements. 3. Develop a plan for prioritizing and implementing these improvements across the state. 4. Seek funding for demonstration projects for infrastructure improvements that, if successful, could be replicated around the state.
Barriers to implementation	Barriers to implementation include limited resources and competing priorities for funding.
Criteria for success	Among the criteria for success are: an increase in the number of communities in Michigan designated as “walkable;” public transit services that meet the service quality assessment measure of accessibility (i.e., proximity, physically able to use); and increased use of public transit among older adults.
Estimated costs	The costs for this measure depend on the specific improvements made and the number of communities in which they are made.

Measure 12: Reduce other physical barriers to using public transit through measures such as improving vehicle entry through low floor vehicle design and increasing number of reserved seats for older adults.

Implementation Component	Description
Target audience	The audiences for this measure include public transit operators themselves, as well as MDOT and other state/local transportation offices that provide guidance, funding, and other support to them.
Activities	1. Be aware of and build on recommendations from the Federal Transit Administration (FTA) in planning at the state level. 2. Participate in training offered by the FTA and other appropriate agencies. 3. Develop a plan for implementing and funding vehicle improvements in the fleet, including strategies for maximizing cost effectiveness. 4. Develop a fleet-wide policy for increasing reserved seating for older adults.
Barriers to implementation	Barriers to implementation include lack of funding and competing priorities.
Criteria for success	Among the criteria for success are: public transit services that meet the service quality assessment measure of accessibility (i.e., proximity, physically able to use); and increased ridership of public transit by older adults.
Estimated costs	As new vehicles are brought on, improvements in vehicle entry and egress will be built into standard design guidelines and therefore should not be substantial. There should be no additional costs associated with policies to increased reserved seating for older adults. To the extent that improvements in accessibility increase ridership, overall system costs will be reduced.

Measure 13: Support travel training geared toward both older adults and their caregivers.

Implementation Component	Description
Target audience	The audiences for this measure include public transit operators themselves, as well as MDOT and other state/local transportation offices that provide guidance, funding, and other support to them.
Activities	1. Compile information on travel training programs from around the country. 2. Be aware of current work being done on developing effective travel training programs such as work that is being sponsored by the National Cooperative Highway Research Program of the Transportation Research Board. 3. Work with providers of public transportation to develop travel training programs that are specific to older adults and caregivers of older adults. 4. Formally assess the effectiveness of these programs and make adjustments to the programs based on the assessment to make them more effective.
Barriers to implementation	The barriers to success are that public transportation providers may lack the funds or will to develop these materials.
Criteria for success	The criteria for success are that travel training materials designed specifically for older adults have been developed and that more older adults are using public transportation.
Estimated costs	The estimated costs are minimal.

Measure 14: Improve training of transit operators.

Implementation Component	Description
Target audience	The audiences for this measure include public transit operators themselves, as well as MDOT and other state/local transportation offices that provide guidance, funding, and other support to them.
Activities	1. Compile information on transit operator programs from around the country. 2. Be aware of current work being done on developing transit operator training programs such as work that is being sponsored by the National Cooperative Highway Research Program of the Transportation Research Board. 3. Work with providers of public transportation to develop transit operator training programs that have a special focus on understanding the needs and preferences of older adults. 4. Formally assess the effectiveness of these programs and make adjustments to the programs based on the assessment to make them more effective.
Barriers to implementation	The barriers to implementation are that : public transportation providers make lack the funds or will to develop and implement these training programs; transit operators may be resistant to changing the way they interact with older adult customers.
Criteria for success	The criteria for success are that: transit operator training materials designed specifically for older adults have been developed; older adult customers are rating public transit services highly; and more older adults are using public transportation.
Estimated costs	The estimated costs for developing training materials and training all transit operators are moderate.

Measure 15: Maximize the potential for volunteer driver programs.

Implementation Component	Description
Target audience	The audiences for this measure include paratransit operators themselves and other providers of specialized transit services, as well as MDOT and other state/local transportation offices that provide guidance, funding, and other support to them.
Activities	1. Identify successful volunteer driver programs, demonstration projects, and/or toolkits, particularly those that have been evaluated, that can serve as models for program development in Michigan. 2. Develop a plan for leveraging FTA specialized transportation program funds to support demonstration projects designed to lead to wide-spread adoption on a regional and statewide basis (e.g., projects that result in a "toolkit" for other communities or larger areas). 3. Identify other potential sources of funding. 4. Help identify community champions to lead grass-roots initiatives for establishing volunteer driver programs. 5. Support efforts to address barriers related to liability insurance for volunteer drivers.
Barriers to implementation	Potential barriers to implementation of this measure include: a lack of available funds; competing priorities for scarce funds; lack of a champion and/or support from key stakeholders; lack of availability and affordability of liability insurance for volunteer drivers.
Criteria for success	Among the criteria for success are: paratransit services that meet the service quality assessment measure of availability (i.e., frequency, hours/days available), acceptability (i.e., reliable, comfortable), adaptability (i.e., flexible and responsive to specific requests), accessibility (i.e., proximity, physically able to use), and affordability (i.e., not excessive money, time, or effort).
Estimated costs	The costs associated with this measure include the start up costs which range from minimal to substantial for a formalized model such as ITN America that requires an upfront community investment for access to its software. However, using volunteer drivers to provide transportation for long-distance medical trips are often the most cost effective option (given the difficulty in providing group rides for this purpose) and may lead to cost savings.

Measure 16: Consider ways to expand voucher programs, especially for vulnerable populations.

Implementation Component	Description
Target audience	The audiences for this measure include public transit operators themselves, as well as MDOT and other state/local transportation offices that provide guidance, funding, and other support to them.
Activities	1. Identify successful voucher programs, demonstration projects, and/or toolkits, particularly those that have been evaluated, that can serve as models for program development in Michigan. 2. Develop a plan for leveraging FTA specialized transportation program funds to support demonstration projects designed to lead to wide-spread adoption on a regional and statewide basis (e.g., projects that result in a "toolkit" for other communities or larger areas). 3. Identify other potential sources of funding. 4. Bring together human service agencies, Medicaid transportation contractors, and paratransit providers to explore creative ways of moving clients from expensive paratransit services to less costly fixed transit (e.g., by providing bus vouchers or transit passes).
Barriers to implementation	Potential barriers to implementation include: lack of available funds to support the programs; competing priorities for scarce funds; lack of coordination between agencies; lack of outreach and marketing to inform/educate potential users about the program and its availability.
Criteria for success	Among the criteria for success are: paratransit services that meet the service quality assessment measure of affordability (i.e., not excessive money, time, or effort).
Estimated costs	Programs that provide Medicaid transit passes actually result in considerable cost savings. Other voucher programs can also lead to savings by reducing administration costs given that the transactions are between the driver and rider, and reducing capital costs for vehicles in the case of taxi voucher programs for example.

Measure 17: Support improvements in marketing and outreach efforts to older adults to make them aware of what community mobility options are available (especially paratransit) and how they can be accessed.

Implementation Component	Description
Target audience	The target audiences for this measure are MDOT and older Michigan residents.
Activities	1. Develop educational materials designed specifically for older adults that review all community mobility options and how they can be assessed. These materials should be developed in conjunction with experts on transportation and aging and older adult education. 2. Reach out to senior centers, fraternal organizations, churches, and other places where older adults congregate in order to market educational materials. 3. Develop and market an easily accessed website where older adults, caregivers, and other people who have a stake in older adult transportation can find information on community mobility options all in one place.
Barriers to implementation	The barriers to implementation are that outreach efforts will require sustained effort and the initial design of a website can be expensive.
Criteria for success	The criteria for success are that materials on all community mobility options have been developed; senior centers and other organizations statewide are disseminating information; and a website is developed and being used.
Estimated costs	Some costs would be required for the development of and dissemination of materials. However, it might be possible to reduce costs by working through various community agencies. The initial costs for the website would be moderate.

Measure 18: Paratransit and specialized transportation services should explore cost effective ways to provide more than just trips for medical purposes. As part of this effort, trip-making flexibility should be expanded by increasing opportunities for multipurpose trips.

Implementation Component	Description
Target audience	The audiences for this measure include paratransit operators themselves, as well as MDOT and other state/local transportation offices that provide guidance, funding, and other support to them.
Activities	1. Restructure trip purpose outcome categories for MI Travel Counts so that trips for medical purposes can be separated out, allowing for a better understanding of trip taking by Michigan older adults. 2. Support efforts for coordinated transportation services to make multipurpose trips more economically feasible (see measure 19).
Barriers to implementation	Barriers to implementation include limited resources and competing priorities; restrictions or inflexibility in programs; and challenges associated with creating a more coordinated system.
Criteria for success	Among the criteria for success are: increased availability of multipurpose trip options among paratransit programs; paratransit services that meet the service quality assessment measure of adaptability (i.e., flexible and responsive to specific requests).
Estimated costs	To the extent that the availability of multipurpose trips result from more coordinated transportation services, there may actually be cost savings. Costs associated with changes to MI Travel Counts are minimal.

Measure 19: Continue to take a leadership role in fostering coordinated transportation services.

Implementation Component	Description
Target audience	The target audience for this measure is MDOT.
Activities	1. Support continued inter-agency and citizen collaboration in planning and implementing mobility options for older adults, at the state, regional, and local levels, including collaboration within departments of state, regional, and local government, and with private sector safety, insurance, senior advocacy and healthcare organizations. 2. Explicitly include strategies to improve coordination in various planning efforts (e.g., Senior Mobility Work Group Action Plan, the Coordinated Public Transit-Human Services Transportation Plan), based on analysis of existing conditions, identified problems, and established goals. 3. Strengthen coordinated planning through: information sharing (e.g., posting sample plans on the MDOT website to provide models for other planning agencies); providing strong technical assistance to others engaged in planning; encouraging representatives from outside MDOT to participated in coordinated planning process (e.g., representatives from agencies identified in Activity 1 and older adults themselves, including underrepresented groups such as low income). 4. Take advantage of guidelines and strategies for fostering coordination being developed and supported at the federal level (e.g., Transit Cooperative Research Program). 5. Support “mobility management,” a systems approach to managing transportation resources intended to optimize transportation resources within a community. One way to do this is to fund mobility management activities through the three FTA specialized transportation programs (Section 5310, 5316, and 5317). 6. Focus funding support on demonstration projects that are designed to lead to wide-spread adoption on a regional and statewide basis (e.g., projects that result in a “toolkit” for other communities or larger areas). 7. Conduct scientific evaluations of coordination-related programs to improve overall program effectiveness as well as

	highlight program elements that are working well and should be replicated.
Barriers to implementation	Potential barriers to implementation of this measure include: staffing constraints; lack of sufficient information, resources, or technology needed to facilitate the planning process; the inherent difficulties of establishing collaborations particularly among agencies not used to working with one another (especially when the missions/visions of individual agencies may differ or agencies are reluctant to give up control); unrealistic expectations by participants with regard to benefits; "silo funding" (i.e., when federal funds flowing down to state and local levels are encumbered with each program's specific rules and regulations).
Criteria for success	Success on this measure will require support at the highest levels of MDOT for the agency to continue to take on this role. Other measures for a successful coordinated system include: minimization of duplication of services and expenditures among transportation providers; full utilization of vehicles and related resources; consistent service quality and safety from program to program; adequate information about available services; reduction in overall system unit costs; improved cost effectiveness.
Estimated costs	The costs associated with this measure may be substantial to begin with, but successful coordination will result in tremendous cost savings to the system down the line.

Measure 20: Support continuing research on caregivers who provide transportation assistance to older adults to better understand this population, as well the factors that enable them to sustain these efforts over time.

Implementation Component	Description
Target audience	The target audiences for this measure are MDOT, GTSAC, OHSP, and other state agencies that have resources that can be committed to supporting research projects.
Activities	1. Support and publicize literature reviews on caregiving and transportation so that the most current research and practices can be accessible to state agencies. 2. Continue to solicit advice from the Senior Mobility Work Group and other stakeholders about research needs related to caregiving and transportation in Michigan. 3. Develop a 5-year research plan that is specific to issues related to caregiving and transportation in Michigan. 4. Continue sponsoring Michigan-based research projects with adequate support to be able to generalize results either statewide or to specific regions or populations in Michigan. 5. Present research results to the Senior Mobility Workgroup and other stakeholders.
Barriers to implementation	The barriers include limited funding and competing priorities for this measure.
Criteria for success	Criteria for success are: A 5-year research plan has been developed; stakeholders and the Senior Mobility Work Group are engaged in advising MDOT; appropriate research projects are being awarded and completed; and research results are being utilized by MDOT and stakeholders.
Estimated costs	The costs for implementing this measure are dictated mainly by the number of research projects awarded. An average project would cost about $250,000.

List of Acronyms, Abbreviations, and Symbols

AASHTO	American Association of State Highway and Transportation Officials
ADLs	Activities of Daily Living
BCOS	Bakas Caregiving Outcomes Scale
CATI	Computer Assisted Telephone Interviewing
CGI	Center for Geographic Information
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GTSAC	Governor's Traffic Safety Advisory Commission
ITS	Intelligent Transportation Systems
M-CASTL	Michigan Center for Advancing Safe Transportation throughout the Lifespan
MDOS	Michigan Department of State
MDOT	Michigan Department of Transportation
MI	Michigan
MUTCD	Manual on Uniform Traffic Control Devices for Streets and Highways
NCHRP	National Cooperative Highway Research Program
NCST	National Center for Senior Transportation
ORBP	Office of Research and Best Practices
SAS	Statistical Analysis Software
UMTRI	University of Michigan Transportation Research Institute
US	United States

References

Burkhardt, J. (2003). Critical measures for transit service quality in the eyes of older travelers. *Transportation Research Record*, 1835, 84-92.

Burkhardt, J.E., Koffman, D., & Murray, G. (2003). *Economic Benefits of Coordinating Human Service Transportation and Transit Services*. TCRP Report 91. Washington DC: Transportation Research Board.

Burkhardt, J. E., McGavock, A. T., Nelson, C. A., & Mitchell, C. G. B. (2002). *Improving Public Transit Options for Older Persons: Volume 2. Final Report* (Report No. 82). Washington, DC: Transportation Research Board.

Burkhardt, J.E., Nelson, C.A., Murry, G., & Koffman, D. (2004). *Toolkit for Rural Community Coordinated Transportation Services. TCRP Report 101*. Washington DC: Transportation Research Board.

Bakas, T. & Champion, V. (1999). Development and psychometric testing of the Bakas Caregiving Outcomes Scale. *Nursing Research*, **48**, 250-259.

Dickerson, A.E., Molnar, L.J., Eby, D.W., Adler, G., Bédard, M., Berg-Weger, M., Classen, S., Foley, D., Horowitz, A., Kerschner, H., Page, O., Silverstein, N.M., Staplin, L., & Trujillo, L. (2007). Transportation and aging: A research agenda for advancing safe mobility. *The Gerontologist*, **47**, 578 - 590.

Eby, D.W., Molnar, L.J., & Kartje, P.S. (2009). *Maintaining Safe Mobility in an Aging Society*. New York, NY: CRC Press.

Eby, D.W., Molnar, L.J., & St. Louis, R.M. (2008). *M-CASTL 2008 Synthesis Report: Volume 1, Older Adult Mobility*. Report No. M-CASTL-2008-01. Ann Arbor, MI: Michigan Center for Advancing Safe Transportation throughout the Lifespan.

Eby, D.W., Molnar, L.J., & Vivoda, J.M. (2009). *M-CASTL 2009 Synthesis Report: Older Adult Safety and Mobility*. Report No. M-CASTL-2009-01. Ann Arbor, MI: Michigan Center for Advancing Safe Transportation throughout the Lifespan.

Ellis, E., Lynott, J., & Fox-Grage, W. (2010). Policy options to improve specialized transportation. *Insight on the Issues*, 39. Washington DC: AARP Public Policy Institute.

Foley, D.J., Heimovitz, H.K., Guralnik, J.M., & Brock, D.B. (2002). Driving life expectancy of persons aged 70 years and older in the United States. *American Journal of Public Health,* **92**, 1284-1289.

Herriotts, P. (2005). Identification of vehicle design requirements for older drivers. *Applied Ergonomics*, 36, 255-262.

Hughes, M. E., Waite, L.J., Hawkley, L.C., & Cacciopo, J.T. (2004). A short scale for measuring loneliness in large surveys: Results from two population-based studies. *Research on Aging*, **26**, 655-672.

Kerschner, H., & Hardin, J. (2006). *Transportation Innovations for Seniors: A Report from Rural America*. Pasadena, CA: Beverly Foundation and the Community Transportation Association of America.

Langford, J., Bohensky, M., Koppel, S., and Taranto, D. (2009). *Safer Vehicles for Older Drivers*. Melbourne, AU: Monash University Accident Research Centre.

Lynott, J. & Taylor, A. (2009). Complete streets for older adults. *TRB 2009 Annual Meeting CD-ROM*. Washington DC: Transportation Research Board.

Marottoli, R.A., de Leon, C.F.M., Glass, T.A., Williams, C.S., Cooney, L.M., & Berkman, L.F. (2000). Consequences of driving cessation: Decreased out-of-home activity levels. *Journal of Gerontology: Social Sciences*, **6**, S334-S340.

Michigan Department of Transportation. (2005). *2004-2005 Comprehensive Household Travel Data Collection Program MI Travel Counts Final Report*. Prepared by Morpace International, Farmington Hills, Michigan.

Michigan Department of Transportation. (2006). *Michigan Department of Transportation State Long Range Transportation Plan 2005-2030: Transit Technical Report.* Lansing, MI: Michigan Department of Transportation.

Molnar, L.J. & Eby, D.W. (2008)**.** *Consensus-Based Recommendations from the North American License Policies Workshop*. Washington, DC: AAA Foundation for Traffic Safety.

Molnar, L.J. & Eby, D.W. (2009). Getting around: Meeting the boomers' mobility needs. In *Boomer Bust? Economic and Political Issues of the Graying Society*. R. Houston (Ed). Praeger Publishing.

Molnar, L.J., Eby, D.W., & Dobbs, B.M. (2005). Policy Recommendations to the White House Conference on Aging Solutions Forum. *Public Policy & Aging Report*, **15(2)**, 24-27.

Molnar, L.J., Eby, D.W., St. Louis, R.M., & Neumeyer, A.L. (2007). *Promising Approaches for Promoting Lifelong Community Mobility*. Washington, DC: AARP.

Peck, M.D. (2010). *Barriers to Using Fixed-Route Public Transit for Older Adults*. San Jose, CA: Mineta Transportation Institute, San Jose State University.

Potts, I., Stutts, J., Pfefer, R., Neuman, T.R., Slack, K.L., & Hardy, K.K. (2004). *NCHRP Report 500. Guidance for Implementation of the AASHTO Strategic Highway Safety Plan. Volume 9: A Guide for Reducing Collisions Involving Older Adults*. Washington DC: Transportation Research Board.

Rosenbloom, S. (2004). Mobility of the elderly: Good news and bad news. In *Transportation in an Aging Society: A Decade of Experience.* Washington, DC: Transportation Research Board.

Rosenbloom, S. (2009). Meeting transportation needs in an aging-friendly community. *Generations*, 33(2), 33-43.

Savolainen, P.T., Gates, T.J., Datta, T.K., Kawa, J., Flannery, A., and Retting, R. (2011). Improving Driver's Ability to Safely and Effectively Use Roundabouts: Educating the Public to Negotiate Roundabouts. Detroit, MI: Wayne State University.

Shaheen, S.A,, Allen, D., & Liu, J. (2009). Public transit training: A mechanism to increase ridership among older adults. Paper presented at the 2009 Transportation Research Board Annual Meeting.

Suen, S. L., & Sen, L. (2004). Mobility options for seniors. In *Transportation in an Ageing Society Conference Proceedings, 27*. Washington, DC: Transportation Research Board.

United States Census Bureau (2005). *Interim State Population Projections*. URL: http://www.census.gov/population/www/projections/statepyramid.html. Accessed: April 23, 2009.

White House Conference on Aging. (2005). *Booming Dynamics of Aging: From Awareness to Action: Final Report*. Washington, DC: White Conference on Aging.

Appendix A: Literature Review

TRANSPORTATION IN MICHIGAN: OLDER ADULTS AND CAREGIVERS

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Introduction

Most countries around the globe are experiencing an aging of the population, due to decreased fertility, increased longevity, and the aging of the baby boomers (Global Action on Aging, 2010). Although global aging results, in part, from improved public health, medical care, and technology, it also creates new societal challenges. One challenge is how to maintain older adult safety and mobility in an aging society.

Mobility enables people to engage in the activities needed to not only survive, but also to enjoy life. In most Western Nations and in the United States (US) in particular, mobility is closely linked with the ability to drive a personal automobile. However, as people age, they begin to experience age-related health conditions that can make it difficult to safely operate an automobile (Eby, Molnar, & Kartje, 2009). At the same time, if driving is limited or stopped completely, an individual's need to get around still remains. Further, having to stop driving has been linked with a number of negative consequences including depression and a drop in overall well-being (e.g., Fonda, Wallace, & Herzog, 2001; Marottoli et al., 1997; Ragland, Satariano, & MacLeod, 2005). Thus, the challenge of maintaining safe mobility in an aging society has been characterized by four complementary and interdependent goals (Eby & Molnar, 2010): (1) to understand and better manage the effects of medical conditions and medications on skills needed for safe driving; (2) to develop and identify procedures and tools for determining fitness to drive; (3) to help those who are able to drive safely continue to do so; and (4) to identify and provide community mobility support to those who are no longer able or choose not to drive.

Like the rest of the world and the US, Michigan's population is aging. Currently, Michigan is ranked 31st in the nation in terms of residents age 65 and older with 12.3% of the population in this age group, and is ranked 23rd in terms of the population of residents over 85 years (Friss-Feinberg, Newman, Gray, Kolb, & Fox-Grage, 2004). The subgroup age 85 and older is one of the fastest growing segments of the population. The oldest-old population is projected to grow rapidly after 2030, when the baby boomers begin to move into this age group (He, Sengupta, Velkoff, & DeBarros, 2005).

Thus, Michigan is facing the challenge of how to maintain safe mobility for its older adult residents. One purpose of this literature review is to support the development of two statewide surveys related to older adult transportation: one administered to older adults (age 70 and older) in Michigan; and one administered to caregivers who provide transportation assistance or other support to an older adult in Michigan. The second purpose of this review is help the Michigan Department of Transportation (MDOT) determine measures and programs that might be useful to implement in Michigan. This review covers several topics developed in collaboration between the University of Michigan Transportation Research Institute (UMTRI), MDOT, and the Michigan Senior Mobility Workgroup (comprised of representatives of state and local organizations interested in promoting safe mobility for older adults). These topics are: older adult travel patterns; promising approaches to maintaining older adult mobility; a review of Michigan-specific older driver transportation services and programs; and caregiver issues.

Older Adult Travel Patterns

Older adults travel patterns have been changing over the past few decades. Today, older adults drive later into life and take more daily trips than they did in the past (Hu & Reuscher, 2004). Although older adult men and women take fewer daily trips than their younger counterparts and are more likely to try to avoid certain driving situations such as driving in bad weather, at night, or in rush hour (e.g., see Bauer, Adler, Kuskowski, & Rottunda, 2003), this does not imply that they no longer want to travel

(Rosenbloom, 2004). Efforts to help older drivers maintain their community mobility should build on an understanding of where, when, how, and why older adults travel. The following sections examine the characteristics of older adults' trips, including frequency, length, time-of-day, purpose, and travel mode. Unless otherwise specified, "trips" refers to trips by any mode of transportation, not just automobile trips.

Frequency of Trips

Surveys in the US report that older adults take an average of 3 to 4 trips per day. For example, in 2001, older adults across the US took 3.4 trips per day compared to 4.4 trips per day by younger adults (Collia, Sharp, & Giesbrecht, 2003). The reduced trip taking of older adults relative to younger adults is due in part to the greater likelihood that older adults are retired and free from having to provide transportation to their children, as well the general lack of transportation alternatives in many communities for those who are unable or choose not to drive themselves. Older men took more daily trips than women, averaging 3.9 person trips in 2001 versus 3.2 average person trips for women (Collia et al., 2003). A smaller survey of older adults by the AARP found similar results , with respondents 50-74 years of age reporting that they took an average of 3.5 trips the previous day (Ritter, Straight, & Evans, 2002).

The frequency of trip taking appears to be associated with several factors. Adults age 75 and older in urban areas take more trips during the course of the week, along with males, those in better health, those with higher education and/or a driver's license (Lynott, 2009). Even urban non-drivers make more trips than both suburban drivers and non-drivers due in part to greater access to public transportation and destinations (Coughlin, 2001), as older adults in urban areas walk or use transit more than rural seniors (Rosenbloom, 2004). In one study, almost 79% of urban older adults took daily trips outside their home 5 or more days a week, and 52% went out 7 days a week (Babka, Zheng, Cooper, & Ragland, 2008). In contrast, rural older adults in another study who took trips took an average of 3.0 trips per day, and the total study sample took an average of 2.0 trips per day (Foster, 1995).

Older adults experiencing serious health issues are likely to have reduced weekly travel outside the home (Lyman, McGwin, & Sims, 2001). Older, disabled adults leave home about 4 days a week, translating to 6 million disabled older adults in the US taking trips outside the home almost every day (Sweeney, 2004). Increased age (often associated with increased prevalence of medical conditions) is also related to a decline in trip-making. A study of adults age 75 and older found they took between 1 to 6 trips per week (Coughlin, 2001) and an AARP survey reported those age 75 and older took an average of 2.5 trips per day (Ritter et al., 2002), a full trip less than those age 50-74. However, even at an advanced age, older drivers take more trips than non-drivers. One study showed drivers over age 70 took about 6 trips a week, while non-drivers took about 2 trips a week (Burkhardt, 1999). In addition, older adults with a driver's license take more trips than older non-drivers, even after age 85 (Rosenbloom, 2004).

Adults age 65 and older in Michigan make fewer daily trips than younger adults. According to the 2005 Michigan Travel Counts, women made more daily trips than men until age 65 and older, when women made an average of 2.6 trips a day and men 3.1 trips per day (Michigan Department of Transportation, MDOT, 2006). The 2009 Travel Counts Comparison Report showed that adults age 65 and older accounted for more trips in the SEMCOG and Northern Lower Peninsula regions than adults age 55-64, and were found to take the least amount of trips in the southern lower peninsula (2.5 trips/day)(MDOT, 2010). Consistent with other surveys, those in urban areas took more trips than those in rural areas

(MDOT, 2006) as adults age 55 and older living in the rural areas of Michigan took the fewest number of trips (MDOT, 2005).

Trip Length

Older men and women take shorter trips than younger drivers both in terms of time and distance traveled, although older adult trip lengths have increased from prior decades. In 1983, older men and women traveled an average of 12.0 person miles per day; in 2001 older men and women traveled 27.5 person miles per day (Hu & Reuscher, 2004), with men traveling farther and for longer periods of time than women (Collia et al., 2003). Although the increase in older adults' daily trips and distance within their own age group could mean better overall mobility, it could also be due to decreased access to the destinations of interest to older adults (Rosenbloom, 2003). A survey in rural and small urban areas found that 44% of older adults traveled between 1 and 5 miles to their most "frequent destination", 32% traveled 6 miles or more, and 13% traveled more than 20 miles (Mattson, in press). Indeed, the 2001 National Household Travel Survey found rural older adults over age 80 traveled more miles than their urban counterparts (Pucher & Renne, 2005).

Michigan's older adults also travel fewer minutes and miles compared to younger adults. Men and women between ages 36-64 spent an average of 79.9 and 70.5 minutes per day traveling, respectively, whereas men and women age 65 and older spent an average of 57.8 and 46.5 minutes per day traveling, respectively. Average weekday trip duration for older men was about 19 minutes, down from 22 for men in the 21-35 and 36-64 age groups. Women age 65 and older took weekday trips that averaged about 18 minutes in length, higher than the women in the 21-35 and 36-64 age groups who averaged about 17 minutes (MDOT, 2006).

Time of Day

Older adults also travel most frequently at nonpeak hours (Benekohal, Michaels, Shim, & Resende, 1994; Hanson, 2004; Hildebrand, Myrick, & Creed, 2000). For this reason, the usual operational hours of traditional public transit may not be responsive to the older adults' preference to travel on weekends and between 9 AM and 3 PM on weekdays (Coughlin, 2001). Sixty percent of older adults' trips in 2001 were taken between the hours of 9 AM and 4 PM (Collia et al., 2003) and older drivers were found to make the most trips between 9 AM and 1 PM (Rosenbloom, 2003).

Trip Purpose

It has been estimated that in the US, 50% of non-drivers age 65 and older cannot travel due to lack of transportation options, especially in rural areas and sprawling suburbs (Bailey, 2004). Not surprisingly, one study found that older non-drivers take 15% fewer trips to the doctor, 59% fewer trips shopping and to restaurants, and 65% fewer social/family/religious trips than older drivers (Bailey, 2004). Understanding the reasons that people take trips is important to ensure that alternative transportation options are responsive to where older adults need and want to go.

Although older adults may be more likely to have medical conditions that can affect their ability to travel than younger people, less than 5% of their trips are for medical purposes (Rosenbloom, 2009). Most often, both rural and urban older adults travel for shopping, social/recreation and personal business purposes (Hanson, 2004; Hough, Cao, & Handy, 2008). The 2001 National Household Travel Survey revealed older adults took the most daily trips for social and recreation (19.4%), shopping (18.3%) and family/personal business (17.5%) purposes (Collia et al., 2003). A survey of older drivers' trip purposes

showed similar results: the respondents' most recent trips were for shopping (49%), personal business (15%), social/recreational (12%), work (8%) and medical/dental (7%) (Benekohal et al., 1994). Older men take 23% more non-work trips than younger men; women take fewer non-work trips than younger women; and minorities take fewer trips than Whites (Rosenbloom, 2003). However, as age increases, trips made for recreational purposes decline (Bauer et al., 2003) and suburban older adults who do not drive make more trips for medical reasons and less trips for shopping purposes than suburban drivers (Coughlin, 2001).

As found in the US in general, Michigan older adults are more likely to take trips for shopping, social/recreation purposes, and personal business. Michigan's 2005 Travel Counts found that men age 65 and older report the most frequent daily trips for personal business (average .83 person trips per day), shopping (.74), social/recreational purposes (.73), picking up, dropping off or accompanying another (.35), work (.33) and religion (.11). Women over 65 took the most daily trips for shopping (.73), followed by personal business (.67), social/recreational (.62), picking up, dropping off or accompanying (.30), work and religion (.15). Neither men nor women traveled for school/childcare purposes. Both men and women age 65 and older took fewer trips for work purposes than younger adults and more trips for religious/ community reasons (MDOT, 2006).

Travel Mode

The personal automobile is by far the most preferred method of transportation for younger and older adults alike, as either drivers or passengers. In fact, in 2001 older adults took 89% of their trips in the personal vehicle in the US overall (Collia et al., 2003). Even most disabled older adults get from place to place via the private automobile. One survey found nearly 56% of disabled older adults drove a private vehicle in the last month, 70% rode as a passenger, and 38% walked (Sweeney, 2004). Only small percentages of disabled older adults used the taxicab (8%), paratransit (7%), public bus (6%) or private/chartered bus (5%) in the previous month (Sweeney, 2004). Trends in Michigan are similar to the national picture. For example, a statewide Michigan survey found that the majority of urban and suburban older adults rely on the private automobile, primarily as the driver (Zhou & Lyles, 1997). Transit use made up only a small percentage of total travel and only applied to those living in urban areas. As a result, older adults in suburban and rural areas, and small cities tended to take fewer trips than older adults in urban areas and traveled more miles in a day, thus reducing their driving less. In another study of Michigan older adults, 60% of those surveyed reported that they did not use public transportation (Kostyniuk & Shope, 2003).

Once older adults have stopped driving, many rely on family and friends to drive them. In fact, it has been estimated that 75% of older adults who no longer drive rely on friends and family to drive them (Rosenbloom, 2001). One survey found that 13% of older adults ride-share as their usual mode of transportation, especially those age 75 and older and/or in poor health, and 43% ride-share more than once per month (Ritter et al., 2002). Another survey found that 70% of disabled older adults traveled as passengers in the private automobile (Sweeney, 2004). However, getting rides from others can be associated with feelings of dependence, guilt, and embarrassment for older adults (Glasgow & Blakely, 2000; Ritter et al., 2002).

Although public transit use among both urban and rural older adults has declined since the eighties (Glasgow, 2000), there are segments of the population that are more likely to use public transit. Studies suggest that among these groups are women, minorities, and those of advancing age, low-income, or living in urban areas (Babka et al., 2008; Mattson, in press; Rosenbloom, 2004). One possible

explanation for this finding is that women, low-income, and minorities are more likely to cease driving (Rosenbloom, 2001) and public transit is less available in rural areas, potentially inhibiting rural older adults from making all of their desired trips (Mattson, in press). Public transit and other alternatives to driving including paratransit, private transit, walking, and biking are discussed in more detail in the section on Michigan transportation services and programs later in this review.

Promising Approaches to Maintaining Safe Mobility

Maintaining safe mobility for older adults is a multifaceted problem. On one hand, there are great benefits to society, as well as older drivers themselves, to keep them driving for as long as they can safely do so. On the other hand, it is inevitable that for most older adults there will come a time when they can no longer safely drive to the locations that are important for both daily living and quality of life. Indeed, researchers have estimated that on average women will outlive their ability to drive safely by 10 years, and men will outlive their ability to drive safely by 6 years (Foley et al., 2002). Thus, solutions for safe mobility for older adults must address a number of issues: formulating approaches to keep people driving safely even after they begin to experience health related declines in critical driving skills; developing valid and reliable tools to evaluate when skills have declined to a level that driving is no longer safe; and determining how best to provide transportation alternatives to older adults once they cannot or choose not to drive.

This section covers promising approaches related to older adult safety and mobility. Some of these approaches are actual programs, while others are resources and technologies. There are also research studies that point to how promising approaches should be formulated. Because most approaches have not been formally evaluated, we consider a promising approach to be one that shows special promise for enhancing the safety and mobility of older adults using criteria developed by Molnar et al. (2007). The promising approaches are organized by general topic: screening and assessment; education and training; exercise and rehabilitation; advanced vehicle technology; and roadway design. Because alternative transportation options are discussed later in this review (under Michigan transportation services and programs), they are not included in this section to avoid redundancy.

Screening and Assessment

An important topic for older adult safety and mobility is the evaluation of an older person's fitness to drive. In the past, many people used the terms screening and assessment interchangeably when they applied them to driver evaluation. Current researchers and practitioners, however, distinguish between the two concepts while recognizing that both are important for evaluating driver fitness. A recent consensus-based workshop, the *North American Driver License Policies Workshop* (Molnar & Eby, 2008), defined screening and assessment in the following way:

> "Screening and assessment represent different and distinct domains of driver evaluation. Screening is the first step in a multi-tiered process and should not be used to make licensing decisions. Assessment provides the basis for identifying reasons for functional deficits, determining the extent of driving impairment, recommending license actions, and identifying options for driving compensation or remediation" (pg. 2).

Driver screening tools are generally inexpensive and relatively quick and easy to administer. Driver assessment, on the other hand, requires professional administration, can be expensive, and is most

often quite detailed and time consuming. Failing a screen does not necessarily mean that a driver is unsafe to drive. Rather, the screening result means that driver assessment should be completed. Ideally, screening and assessment procedures should be used together to ensure that all but the unsafe drivers can continue driving while minimizing the financial burden on drivers, health care professionals, and licensing agencies.

There are three settings in which screening and assessment can take place (Eby, Molnar, & Kartje, 2009). The first is the home and larger community. Police, family, friends, and the drivers themselves can all engage in driver screening. The second is clinical locations where physicians, occupational therapists, and other health care professionals can participate in screening and in many cases conduct in depth driver assessments. The final setting is the licensing agency. As drivers renew their licenses and conduct other business, licensing agency personnel can perform screening activities. Because these agencies are solely responsible for making decisions about driving privileges, they also are closely involved in the driver assessment process.

Research continues to develop best practices for facilitating the older adult driver screening and assessment process. Here we discuss some of the more promising programs and tools for driver screening and assessment.

Self-Screening

Self-screening is the process by which an older driver can gain awareness of driving related issues by administering a screening tool to themselves. Among the potential benefits of self-screening are that: it is a relatively nonthreatening form of screening so more people may be willing to be screened; because it is nonthreatening, people may engage in screening at an earlier point in their driving careers; and because self-screening tools are easily administered they can be widely and cheaply disseminated, providing the opportunity for nearly any driver to screen themselves (Eby, et al., 2003). A number of self-screening tools are available for the older driver, most of which are simple paper and pencil booklets (see Eby, Molnar, & Kartje, 2009 for a list). Three tools have received recent attention as promising approaches: *Driving Decisions Workbook* (Eby et al., 2003); *Roadwise Review* (Staplin & Dinh-Zarr, 2006); and *SAFER Driving: The Enhanced Driving Decisions Workbook* (Molnar et al., 2010).

The *Driving Decisions Workbook* is a paper and pencil questionnaire that is completed by the older driver only. The workbook is divided into five topic areas that are related to safe driving behaviors—on-the-road, seeing, thinking, getting around, and health. Readers circle the answers that best describes their situation. Feedback (information and suggestions on dealing with a specific problem) is provided based on how people answer questions. The workbook also contains a general question and answer section with additional information and resources. In preliminary evaluation, the workbook was found to correlate positively with driving ability as measured by an on-road driving test, as well as several functional tests (Eby et al., 2003). The evaluation also found that people liked the workbook, thought it would be useful for family discussions, and it took about 30 minutes to complete. In addition, results showed that the workbook reinforced what older drivers already knew about age-related declines, helped them discover changes in themselves they had not been aware of before, and encouraged them to make changes in driving and to seek further evaluation. The workbook is available free of charge at: http://deepblue.lib.umich.edu/handle/2027.42/1321.

The *Roadwise Review* is a computer-based self-screening instrument that presents several tests for users to complete. While most tests can be done alone, some require the help of another person to

administer. The *Roadwise Review* was developed by AAA and transportation safety researchers (Staplin & Dinh-Zarr, 2006). The tests assess the following abilities: leg strength, head and neck flexibility, high-contrast visual acuity, low-contrast visual acuity, working memory, visualization of missing information, visual search, and visual information processing speed. The program identifies potential problem areas and suggests ways to correct them. Myers et al. (2008) conducted a process evaluation of the *Roadwise Review* and found that people liked the program but some had difficulties using the software and working with the second person to administer some tests. Bédard, Riendeau, Weaver, and Porter (2009) compared scores on the *Roadwise Review* to scores from an on-road driving evaluation in 30 older drivers. The study found that scores on the *Roadwise Review* (number of mild or serious problems identified) did not correlate significantly with scores on the on-road test, Useful Field of View, or trail making test. The authors concluded that the study indicates a lack of congruence between the findings of the *Roadwise Review* and actual performance using standardized approaches. The program can be downloaded from the AAA Foundation for Traffic Safety free of charge at: http://www.seniordrivers.org/driving/driving.cfm?button=roadwiseonline.

The *Self-Awareness and Feedback for Responsible Driving (SAFER Driving)* tool is a web-based self-screening program for older drivers. *SAFER Driving* was developed to improve upon previous self-screening tools by focusing entirely on symptoms of declining health that affect driving, rather than the medical conditions or medications that produce these symptoms. Older adults answer questions on the website and receive individualized feedback that is intended to increase awareness of declines in functioning that affect driving, as well as recommendations for ways to change driving given certain problems, further evaluation by a health care professional, and ways the vehicle can be modified to enhance safe driving (Eby et al., 2008a). Molnar et al. (2010) evaluated *SAFER Driving* with 68 participants aged 65 and older. The researchers reported that participants overwhelmingly found the tool to be useful, thought it was easy to use in the web-based format, would recommend it others, and thought it would help older adults talk about driving concerns with their families. *SAFER Driving* outcomes also correlated with driving problems as measured by an on-the-road driving evaluation with a certified driving rehabilitation specialist. The tool is available for free at: http://www.um-saferdriving.org.

Family Screening

Family members and friends are frequently the first to notice problems with an older adult's driving abilities. Family and friends may directly observe problems with driving; they may notice new scrapes or dents in the older driver's vehicle and/or older drivers themselves may share information that may indicate there are problems. When a family member or friend notices a potential problem, he or she is, in effect, screening the older driver and is often placed in the position of deciding what to do about his or her concerns. A study of drivers age 50 and older found that about two-thirds identified a friend or family member as the person they would most likely listen to about driving concerns (Coughlin et al., 2004; D'Ambrosio et al., 2007). In a different study, focus groups with older drivers and the adult children of older drivers found that both of these groups agreed that the families should have the responsibility of talking to the older driver about driving reduction and cessation (Eby, Molnar, Kostyniuk, & Shope, 1999). However, these conversations rarely took place and were generally ineffective when they did. Family members also reported that they did not know where to find information on aging and driving.

Fortunately, a number of good resources have been developed (AAA Foundation for Traffic Safety, 2006; American Occupational Therapy Association, AOTA, 2002; Hartford Financial Services Group, 2007; Land

Transport NZ, 2006; New York State Office for the Aging, 2000; Pennsylvania Department of Transportation, 2006; Spreitzer-Berent, 1999). As described in a recent book (Eby, Molnar, & Kartje, 2009), each of the guides provides a wealth of information and, collectively, they provide several general recommendations:

- **Recognize**: Mobility is important for the driver; the driver has unique needs and resources; and talking about driving problems is uncomfortable for everyone.
- **Observe**: Look for clues or "warning signs" that indicate potential driving problems. Consult an expert, such as a driving rehabilitation specialist, if unsure if something is a warning sign.
- **Communicate**: Open, honest, and direct communication is paramount, while remembering that communication involves good listening as well as talking.
- **Encourage**: A formal clinical assessment with a medical professional is the first step in maintaining safe mobility for older adults experiencing driving problems. Follow up advice should be carefully considered.
- **Assist**: If assessment shows that the older adult needs to limit or stop driving, family members and friends can assist them in transitioning to non-driving mobility options.

Police Screening

Law enforcement officers often have contact with older drivers in situations where they can directly observe driving difficulties. Thus, police officers have a unique opportunity to screen older drivers for potentially unsafe driving. Indeed, in a large majority of jurisdictions, police officers refer a greater number of older adults for reassessment than any other stakeholder group (Meuser, Carr, & Ulfarsson, 2009). There are some resources available to help law enforcement officers interact with older drivers. The National Highway Traffic Safety Administration (NHTSA, 2004) has developed a law enforcement educational module on this topic called the Older Driver Law Enforcement Course. This course is taught by an instructor and has three key messages: b**e sensitive** to the special needs of older adults and declines that occur from age-related medical conditions; **write the citation where appropriate as** citations help the licensing agencies identify potential problem drivers; and **make a referral** to the licensing agency where appropriate so that the drivers can receive appropriate intervention. This course has not been evaluated, and NHTSA is currently developing it into an interactive website so that it can receive wider distribution.

NHTSA (2005) has also collaborated with a number of organizations involved with aging drivers, including the National Sheriff's Association Traffic Safety Committee, to develop and publish a review of law enforcement programs focused on older driver safety. This publication, called *Turning the Corner…and Still Driving*, addresses older adult driving issues, promising approaches and keys to successful programs, and resources/contacts.

Recently, the Older Driver Education & Research Team (2007) at the Washington University School of Medicine, developed *Health, Functional Status, & Older Driver Safety: A Curriculum for State Highway Patrol Driver Examiners & Troopers*. This publication presents a complete curriculum for training police officers about the special issues related to older drivers including: red flags of concern; the process of reporting drivers to the licensing agency; how to fill out the required forms; crash statistics; problem maneuvers for older drivers; medical conditions and driving; and a wealth of other information. An evaluation of the curriculum is planned.

Physician Screening and Assessment

As the number of older drivers increases, older adults and their families will increasingly rely on physicians for guidance on safe driving. Physicians will have the challenge of balancing their patients' safety against their needs for mobility and independence, as well as the confidentiality and quality of the physician-patient relationship. According to the American Medical Association (AMA), physicians have an ethical responsibility to recognize and address impairments in patients' driving abilities (Wang et al., 2003). For many physicians, however, driving issues are often overlooked or not discussed for a number of reasons: driver screening and assessment is viewed as being beyond the scope of medical care (Bogner et al., 2004; Marottoli, 2008); there is concern that if they address driving issues, their patients will not disclose medical problems for fear of losing their driving privileges (Redepenning, 2006; Taylor, Chadwick, & Johnson, 1995); physicians are aware that screening and assessment tools have not been found to be strongly linked with crash risk and are, therefore, reluctant to use them (Marottoli, 2008); some physicians are unaware of these tools (Marottili, 2008); and physicians are concerned that if they evaluate for driving fitness, they will jeopardize their relationships with patients (Molnar et al., 2005). A number of tools exist for helping physicians and other medical personnel evaluate older drivers. The *Physician's Guide to Assessing and Counseling Older Drivers* was developed by the AMA and NHTSA (Carr et al., 2010) to provide physicians with information to address the issue of safe mobility in the older patient population. This guide presents a flow-chart for physician screening, assessment, and remediation titled, "Physician's Plan for Older Drivers' Safety" (PPODS). In this model, screening is the first step in identifying at-risk drivers and involves careful observation of the patient. Physicians are also advised to be alert to "red flags" such as any medical condition, medication, or symptom that can impair driving skills either temporarily or permanently. If this screening is positive, indicating that the patient may be an unsafe driver, the guide recommends that the physician perform a formal assessment called the "Assessment of Driving-Related Skills" (ADReS).

ADReS is an assessment battery that includes several tests of functional abilities. The individual tests have been validated as measures for the specific ability they measure and some have been shown to be related to driving performance. Work has shown that inter-rater reliability among various practitioners administering ADReS is high (Posse, McCarthy, & Mann, 2006). Other work addressed the specificity and sensitivity of ADReS administered by a sample of physicians (McCarthy & Mann, 2006). This study compared results of ADReS to the outcomes of a behind-the-wheel road test with a driver rehabilitation specialist. The study found that ADReS successfully identified all participants who failed the road test but also identified 70% of the total sample as being in need of an intervention. Thus, ADReS classified many people as being problem drivers when they were not. This result is supported by a cross-sectional study that evaluated the proportion of older drivers admitted to an emergency department who had potential driving problems as defined by ADReS (Fender et al., 2007). Until further research on ADReS is conducted, its value as an assessment battery is unclear.

Several efforts in Canada have resulted in guides and instruments to aid physicians in evaluating patients for fitness to drive. One such effort is the guide developed by the Canadian Medical Association (CMA, 2006) called *Determining Medical Fitness to Operate Motor Vehicles: CMA Driver's Guide*. The guide provides detailed information about medical conditions, medications, alcohol, and driving as well as advice to physicians on screening and assessment. Despite this detail, the CMA guide has been criticized for providing overly broad recommendations (Hogan, 2005) and for not being evidence-based; that is, based on empirical research linking recommendations to decreased crash risk (Molnar et al., 2005).

Another effort in Canada by the Dementia Network of Ottawa resulted in the development of the Driving and Dementia Toolkit for primary care physicians (Byszewski et al., 2003). This toolkit consists of background information regarding the older driver and dementia, as well as a list of local resources and how to access them. The toolkit also includes two sets of screening questions, one for the driver and another for the driver's family member. An evaluation by the developers of the toolkit (Byszewski et al., 2003) showed that after using the toolkit, physicians' knowledge and confidence regarding dementia and driving significantly increased; physicians were likely to report that they would start following the strategies presented in the toolkit, and physicians were quite satisfied with the toolkit. However, as with other physician tools, the toolkit has been criticized for providing overly broad recommendations (Hogan, 2005) and not being evidence based (Molnar et al., 2005). The screening questions are based on clinical experience and consensus and need to be validated to determine the relationship to driving and traffic safety measures. The toolkit can be found at: http://63.151.41.176/rgap/dementia/task_force_en.asp.

Licensing Agency Screening and Assessment

Licensing agencies play an important role in the driver evaluation process, including both screening and assessment. Because all drivers must eventually renew their license in person in most jurisdictions, licensing agencies have the opportunity to screen, and if necessary assess, older drivers. Recent studies have investigated several aspects of the licensing agencies' role in maintaining safe mobility among older people.

The California Department of Motor Vehicles (DMV) recently published a report on the development of the California Three-Tier Driving-Centered Assessment System (Hennessy & Janke, 2009). The authors reported that the three-tier system takes a "driving-centered" approach to assessment (taking into account when, where, why, and how an individual drives), as opposed to the current "driver-centered" approach (identification of high-risk drivers) used by most licensing agencies. The proposed system includes three tiers. The first tier is a brief completion of four screening tools: Snellen test of visual acuity, test of contrast sensitivity, recalling social security number (cognitive screen), and DMV counter-person observations of physical limitations. Those who pass these screens can renew their license after successful completion of a rules-of-the-road test. Those who fail the screen proceed to the second tier where they take a computer-administered assessment of perceptual-response time (processing speed). Those who fail this assessment must participant in an on-road evaluation (Tier 3). This evaluation not only considers a driver's abilities, but also the level of risk for making a driving error in that driver's normal driving. For example, a driver with poor contrast sensitivity may be deemed "driving well" if he or she appropriately avoids low contrast driving conditions. The three-tier system is currently being evaluated.

Licensing agencies are responsible for assessing drivers who have been referred to them as potentially unsafe, known as driver referrals. Meuser, Carr, and Ulfarsson (2009) examined the crash history and licensing outcomes for older drivers who were referred in Missouri as medically impaired. The study focused on 4,100 drivers age 50 and older reported in the years 2001-2005. In Missouri, reported drivers, in most cases, must submit a physician's evaluation within 30 days of being reported (or 60 days if an extension is requested). Depending upon what this evaluation indicates, the reported driver may be given a licensing action (full/restricted/revoked license) or required to be further evaluated. The authors found that of reported drivers, most reports came from police officers (30%), followed by license office staff (27%), physicians (20%), family members (16%), and others (7%). The average age of reported drivers was 80 years. When compared to control drivers, the crash involvement of reported

drivers was four times higher. About one-half of reported drivers did not submit a physician evaluation after being reported and subsequently had their license revoked. Most of the remaining reported drivers either failed to schedule further testing or failed the testing. Of the reported drivers in this study, 96.5% retired from driving at some point during the process.

Education and Training

Education and training play an integral role in older driver safety and mobility. Although related, education refers to the transfer of knowledge, while training refers to the acquisition of skills through hands-on instruction and practice. Education programs related to older drivers have been around for nearly two decades. For example, AARP (1992) released its *Older Driver Skill Assessment and Resource Guide: Creating Mobility Choices* in 1992 and the AAA Foundation for Traffic Safety (1994) published *Driver 55 Plus: Check your Own Performance* in 1994. Today there are hundreds of education/training programs and resources related to older driver safety and mobility.

Information about many of these programs has been organized into searchable databases that are accessible through the Internet. Three websites are the most comprehensive to date. San Diego State University's Center for Injury Prevention Policy and Practice and the California Office of Traffic Safety developed *ElderSafety.org: Facilitating Safe Mobility for Seniors*. This website includes information targeted at several players in the driver evaluation process including families and health care providers as well as a searchable database of statewide programs (http://www.eldersafety.org/Resources/Programs_State-Wide.html). Programs can be searched under the following headings: aging services, alternative transportation, collaboration, community education, consumer awareness, driver education programs, drive function research, driving safety evaluations, health care provider resources, law enforcement, occupational therapy, pedestrian safety, policy reports, public information, self-screening tools, traffic engineering, and walkable/livable communities.

The AAA Foundation for Traffic Safety developed a comprehensive website for older drivers, their families, researchers, and alternative transportation providers called *SeniorDrivers.Org*. This site contains a variety of resources and educational materials organized into the following topics: general safe driving information, measuring your driving skills/needs, education and training, planning for continued mobility, other useful resources. This latter section contains two searchable databases of programs and practices related to older drivers—one titled *Licensing Policies and Practice* and the other titled *Noteworthy Initiatives*. These databases can be accessed at: http://lpp.seniordrivers.org/lpp/.

The Michigan Center for Advancing Safe Transportation throughout the Lifespan (M-CASTL) has developed a website called *Promising Approaches for Promoting Lifelong Community Mobility* based on two publications that were developed in collaboration with AARP and the Michigan Office of Highway Safety Planning, respectively (Molnar et al. 2003; 2007). This website discusses in detail several areas that hold promise for promoting safe mobility for older adults: driver screening and assessment, education and training, vehicle design and advanced technology, roadway design, transitioning from driving to other transportation options, transportation coordination, and alternative transportation options. For each of these sections, the authors discuss why the topic is important and the criteria for qualifying as a promising approach in that area. More than 200 programs can be searched using keywords. The website can be found at: http://www.m-castl.org/promising-approaches/.

As may be clear from the descriptions of these websites, educational and training programs have been developed for a wide range of stakeholders including: the older driver, the older driver's

family/caregiver, the general public, physicians, licensing agencies, traffic engineers, urban/city planners, occupational therapists, law enforcement, alternative transportation providers, and practitioners who work with older adults. It is beyond the scope of this review to discuss promising approaches in each of these areas. Here we focus on two areas that we think are most relevant to this literature review: the older driver and the older driver's family member or caregiver.

For the Older Driver

Two recent publications have reviewed several programs available for older drivers (Eby et al., 2009; Molnar et al., 2007). These programs span a wide range of content, formats, and organizations. Table 1 contains information on some example programs from the US identified as promising approaches by Molnar et al. (2007). Note that a wide variety of topics and approaches is contained in this list. For all of these programs, it would be useful to know if they reduce the risk of a motor vehicle crash or improve the mobility of older adults. Although many of these programs and resources have been found to improve knowledge (see e.g., Eby et al., 2003; Marottoli, 2007; Owsley et al. 2004), improve self-reported driving behaviors (McCoy et al., 1993; Owsley et al., 2004) and improve on-road driving scores (Bédard et al., 2004; Marottoli, 2007), they have not been found to reduce roadway injuries or crashes (Berube et al., 1995; Korner-Bitensky, Kua, von Zweck, & van Benthem, 2009; Ker et al., 2005; Kua et al., 2007; Nasvadi & Vavrik, 2007; Owsley et al., 2004). Note that most programs have not been formally evaluated to determine traffic safety or mobility outcomes. Further research is needed.

Table 1: Example Promising Approaches for Educational Programs/Resources for Older Adults

Name	Organization	Web Site	Description
Driver Safety Program	AARP	*http://www.aarp.org/family/housing/driver_safety_program/*	Information, articles, and news.
Mature Driver Improvement Program	National Driver Safety Services, LLC	*http://www.maturedrivercourseonline.com/*	Online paid course that covers driving environment, risk awareness, impaired driving, driving emergencies, physical conditioning and defensive driving.
Safe Driving for Mature Operators	AAA Exchange	*http://www.aaaexchange.com/Main/Default.asp?CategoryID=14&SubCategoryID=72&ContentID=325*	Hands-on course addressing specific needs of drivers age 55 and older and designed to improve everyday driving skills and knowledge.
Super Seniors	Illinois Secretary of State	*http://www.cyberdriveillinois.com/services/services_for_seniors/superseniors.html*	Hands-on training for driver license renewal for older adults.
CarFit	AAA; AARP; and Amer. Occupational Therapy Association	*http://www.car-fit.org/*	A hands-on educational program that uses a 12-point checklist to help older drivers determine how well they fit into their vehicles.

Coaching the Mature Driver	National Safety Council	*http://www.nsc.org*	An interactive course that reviews driving techniques and skills that can offset the effects of declining driving abilities.
DriveWell	American Society on Aging	*http://www.asaging.org/asav2/drivewell/*	Informational course to promote older driver safety and community mobility.
GrandDriver	AAMVA	*www.granddriver.info/*	Information and links to several courses, tools, and other resources.
Project Safe R.O.A.D.s	Onondaga County Department for Aging and Youth	*http://www.ongov.net/Aging_and_Youth/SafeRoads/older/home.html*	Informational website covering several aspects of aging and mobility.
Adapting Motor Vehicles for People with Disabilities	NHTSA	*http://ntsa.dot.gov*	A brochure that provides information about the process that individuals should go through when they are in need of adaptive vehicle equipment.

For the Family and Caregivers

Many of the family and caregiver older driver screening tools discussed previously also serve as educational resources. Several recent studies provide information that is useful for developing programs to help family members and caregivers address driving and the transition to non-driving with older adults.

A study from Canada (Friedland & Rudman, 2009) explored the role of the family and physician advice in getting older adults to self-regulate driving more effectively. The study utilized data from focus groups with adults age 55-64, older adult drivers (age 66-92), older adult former drivers (age 65-94), and family physicians. The study found that: older drivers expected to hear driving advice from others (either family or physician); older drivers were open to constructive advice to reevaluate driving practices; older drivers wanted to hear the advice gradually rather than simply being told to stop driving; all participants reported a reluctance to discuss driving at all; and older adults expected to hear about their driving problems from their family, but families tended to not have these conversations.

Kostyniuk, Molnar, and Eby (2009) explored the conditions under which family members did or did not talk with older adults regarding driving problems. The researchers analyzed data from a statewide telephone survey of older adults in Michigan. The study found that family members were more likely to express concerns if the older adult: had been involved in a recent crash, was uncomfortable merging onto freeways in heavy traffic, was uncomfortable driving 200 miles in a familiar area, avoided driving in inclement weather, showed declines in physical functioning, or was male. The authors concluded that further research was needed to better understand the interactions and dynamics of adult children and their aging parents with respect to driving.

A study from Massachusetts (D'Ambrosio, et al. 2009) examined the issue of communication about driving problems among caregivers and drivers with dementia. The authors analyzed data from a

questionnaire administered to a random sample of caregivers attending a session to educate caregivers on how to cope with drivers with dementia. The study found: about two-thirds of caregivers had spoken to the driver with dementia about driving; about one-third thought that the dementia patients would know when to stop driving; one-half thought the family member would decide when the driver should stop driving; and about 10% had either taken away keys or disabled a vehicle to prevent the driver from driving. When asked about reasons why the caregiver had not talked with the driver with dementia, fear about family conflict was commonly reported. Finally, when asked about plans to address the driving issue with the driver with dementia, about 20% of caregivers indicated that they would eventually talk with the driver; 9% said they would sell the car; and small percentages of others said they would use other strategies. The authors concluded that there was a need to educate and support caregivers to provide them with the information they need to be better informed about driving and dementia.

Exercise and Rehabilitation

As discussed previously, declining physical and cognitive abilities can result in declines in skills that are critical for safe driving. It is well known that exercise and other forms of rehabilitation can help restore, or slow the decline of, functional abilities. Researchers have recently begun to explore whether exercise and rehabilitation programs can help improve driving skills and, ultimately, improve traffic safety. The two areas that have received the most research attention are physical fitness and cognitive rehabilitation programs.

Fitness

Fitness programs help older people drive more safely by improving range of motion, strength, and stamina. Research has shown that fitness programs that are specific and intense can help older drivers extend their driving lifetime (Marottoli et al., 2007; Ostrow, Shaffron, & McPherson, 1992). For example, Marottoli et al. (2007) investigated the effects of an exercise program on on-road driving performance. The program involved an occupational therapist visiting older drivers (age 70 and older) weekly for 3 months and guiding them through a graduated exercise program targeting stamina, flexibility, coordination, and speed of movement. Results showed that participants found the program acceptable and maintained their driving performance (as measured through an on-road driving test), while a control group declined in performance.

Another study investigated the effects of an 8 week stretching and exercise program on driving performance (Ostrow, Shaffron, & McPherson, 1992). Subjects in the program group (age 60-85) performed prescribed exercises at home and self-reported their exercise activity. The study found that when compared to a control group who did not exercise, participants in the exercise program increased shoulder and trunk flexibility, while flexibility decreased in the control group. The driving performance analysis showed that drivers in the program were significantly better than controls on “observing” (checking mirror, turning to check blind spots) and “vehicle handling” (parallel parking) than control subjects. There was no difference in performance on the other seven driving measures investigated.

Recent work investigated the effects of an exercise program on improving abilities related to safe driving in older adults (Marmeleira, Godinho, & Fernandes, 2009), as compared to a control group who did not receive the program. The program lasted 12 weeks with 3 hours of exercise per week. The exercise activities primarily involved participants walking in an open gymnasium while doing certain visuospatial tasks (e.g., maintaining several balloons in the air). All participants were tested on a series of functional

abilities before and after the program. When compared to the control group, participants in the exercise program showed significant improvement in most of the functional areas that were measured. Inasmuch as the functional abilities are related to safe driving, the authors concluded that exercise can help improve the driving safety of older adults.

Given these promising results and the fact that exercise programs have many other benefits other than improving driving performance, much more research should be conducted in this area. In addition, these results suggest that older drivers who are concerned about declining abilities should consider starting an exercise program that is appropriate for their level of fitness and functioning, and approved by their physician if appropriate.

Cognitive Rehabilitation

Recent research has established that some cognitive functioning can be improved through cognitive training (see e.g., Ball et al., 1988, 2002; Delahunt et al., 2008). Whether these improvements can also improve driving performance is less clear. For example, Roenker, Cissell, Ball, Wadley, and Edwards (2003) studied the effects of speed-of-processing training and simulator training on driving performance on an open-road test. The experimental group all had decreased perceptual/attention functioning while the control group did not. The program used a driving simulator to train older drivers on simple and choice reaction time. Simple reaction time was trained by having the subject brake as quickly as possible in response to simulated brake lights. Choice reaction time was measured by having the subjects react to simulated traffic signs. Based on what the sign contained, the subject braked, turned the steering wheel, or did nothing. Results indicated that the experimental group showed improved reaction time after training. As compared to a group of subjects who did not receive training, simulator-trained drivers improved driving performance (measured by on-road evaluation) on only two of the driving measures (turning and signal use) investigated. These improvements, however, had dissipated in an 18 month follow-up. Although the selection of subjects in this study makes it difficult to interpret the results, it seems that more work in this area is warranted.

Other studies have examined the effects of cognitive speed of processing training on driving outcomes. One of these studies combined data from two longitudinal studies of older drivers. Participants in the project who showed reduced speed of processing ability based on a cutoff were randomly assigned to speed of processing training or a control condition (Edwards, Delahunt, & Mahncke, 2009). The study found that when compared to the control group, those who completed 80% or more of the training program were 40% less likely to stop driving over the subsequent 3 years. The other study examined the impact of cognitive speed of processing training on driving exposure and difficulty (Edwards, Myers, Ross, Roenker, Cissel, McLaughlin, & Ball, 2009). As with the previous research, the 134 drivers who showed poor cognitive processing speed were randomly assigned to either receive cognitive processing speed training or to a control group. The study found that control group participants reported greater declines in driving exposure, geographic space, and driving difficulty over the subsequent 3 years when compared to those who received cognitive processing training.

Seidler et al. (2010) conducted a study to assess the effects of a cognitive training program on several factors including driving performance. The study had two aims: 1) determine whether a 5-week working memory training program improved working memory performance for young and older adults, and 2) determine whether benefits associated with the program transferred to other tasks including driving. The study involved recruiting both young (mean age = 21 years) and older adults (mean age = 68 years) and randomly assigning them to the training program or to a knowledge training control condition. The

cognitive training program used a dual *n*-back task, which involved remembering simultaneously presented visual and auditory sets of information. The participant's task was to remember *n* stimuli back in the set and respond if the current stimulus matched. A different response was given if the match was auditory or visual. The *n* was changed depending on how well the participant was performing this very difficult memory task. A session lasted about 20-25 minutes and participants participated in 17 to 25 sessions. Performance was measured by the final *n* for each session. Participants in the control group trained on trivia and vocabulary for 23-minute sessions. The study found that both age groups improved on the *n*-back task over the course of the training program, although older adults performed less well overall. This training transferred to other measures of working memory. The training also seemed to show transfer to complex motor tasks including driving performance as measured on a driving simulator. The authors caution that these results are preliminary.

Advanced Vehicle Technology

There has been great progress in electronic, satellite, and communication technologies in the past few decades. This progress has allowed for the development of advanced technology systems for vehicles that have the potential to increase the safety and mobility of older drivers (see e.g., Caird, 2004). Advanced vehicle technology systems have been developed to help drivers navigate (e.g., global-positioning-system-based route guidance), avoid crashes (e.g., collision avoidance systems), and summon emergency help in the event of a crash (e.g., automatic crash notification). The usefulness of these technologies for older adults has recently begun to be empirically investigated. Designers are aware that poorly designed technological systems could increase distraction and crash risk for older drivers. To be beneficial to older drivers, vehicle technology will need to be carefully designed to ensure that safety is enhanced rather than reduced (Henderson & Suen, 1999; Stamatiadis, 2001).

One challenge to designing safe advanced technologies for older drivers is that research shows older adults sometimes use vehicle technology differently than younger people (Caird, 2004; Dingus et al., 1997; Eby & Kostyniuk, 1998; Kostyniuk, Streff, & Eby, 1997; Stamatiadis, 1998; Wochinger & Boehm-Davis, 1995). For example, in an evaluation of navigation assistance applications, Kostyniuk, Streff, and Eby (1997) found that older drivers used the system more frequently than young people, entered a greater number of destinations into the system, and utilized the technology with a "co-pilot." Research has also found that older drivers take much longer to learn how to use technology (Caird, 2004; Kostyniuk, Streff, & Eby, 1997). Understanding these patterns of use for the various advanced technologies being developed is crucial for optimizing the benefits of advanced technology for all users (Vrkljan & Polgar, 2007).

Route Guidance

Route guidance systems combine global positioning system (GPS) vehicle location information with electronic mapping software to provide drivers with real-time instructions to a location as they drive. Route guidance systems have been well-researched and several are available as an aftermarket addition to vehicles. Route guidance systems have the potential to help older drivers in several ways including helping them travel to unfamiliar places; reducing the cognitive workload of reading maps, instructions, and street signs while driving; and increasing feelings of safety while driving. Several studies have examined older drivers' use or potential use of route guidance systems (Dingus et al., 1997; Eby & Kostyniuk, 1998; Eby & Molnar, 1998; Kostyniuk, Eby, Christoff, & Hopp, 1997a, 1997b; Oxley, Barham, & Ayala, 1995; Vrkljan & Polgar, 2007). Collectively, these studies show that older adult drivers: use the

route guidance systems frequently; report minimal distraction, but more than reported by younger drivers; travel to places they would not have without the system; report increased feelings of safety, confidence, attentiveness, and relaxation when using the system; take much longer to learn how to use the system than younger people; have more difficulty than younger drivers reading the displays; more frequently use the system with a co-navigator than reported by younger drivers; and would not buy a system that was marketed to "old" people. Given the fairly low cost of commercially available systems, the positive regard drivers have for them, and the fact that they seem to be safe, route guidance systems are a very promising advanced technology for helping to maintain safe mobility for older adults.

Crash Warning Systems

The US Department of Transportation and private industry have had a strong focus on the development of systems that warn drivers of potentially dangerous situations so that they can take appropriate evasive actions or, if appropriate, not perform a maneuver. These crash-warning-system technologies use vehicle-based sensors to determine when potentially hazardous traffic situations are arising and then warn the driver in some way. Some systems also take over partial control of the vehicle such as applying the brake. There are three main crash warning systems available for automobiles: forward collision warning, intelligent cruise control, and lane departure warning systems.

Forward collision warning systems use radar at the front of the vehicle to determine the changing distance to the vehicle ahead. When this distance gets dangerously small, the system will warn the driver using some signal and, with some systems, begin braking the vehicle. Studies investigating the safety benefits of forward collision warning systems have found: driver acceptance was high when the system did not give too many false alarms, older drivers were more forgiving of false alarms, older drivers benefited as much as or more than younger drivers, and older participants drove more slowly than younger drivers and maintained longer headways from the next vehicle (Cotté, Meyer, & Coughlin, 2001; Dingus, et al., 1997; Ervin et al. 2005; Kramer et al., 2007; Maltz & Shinar, 2004). Forward collision warning systems have the potential for extending an older adult's safe driving period.

Intelligent cruise control (ICC) is a system that has a forward sensor that can detect traffic in front of the vehicle, a headway-control algorithm, and an interface with a throttle that can change the vehicle speed to maintain certain headways (Fancher et al., 1998; Hoedemaeker & Brookhuis, 1998). With these systems, the driver selects a headway length and the vehicle will stay that time/distance from the vehicle in front without the driver having to use the brake or throttle. Studies of ICC in simulators, test-tracks, and in naturalistic driving have found: safety-related outcomes such as driving speed did not differ when using ICC; the vehicle lane position, however, was more variable when using ICC; driver workload and stress were reduced when using ICC; drivers trusted that the system would work properly; and older drivers were overwhelmingly pleased with the system (Fancher et al. 1998; Rudin-Brown & Parker, 2004; Stanton & Young, 2005). Thus, ICC has the potential for reducing the driving workload for older drivers.

Lane departure warning (LDW) systems can help drivers avoid drifting off the road crashes by warning drivers when the vehicle moves out of a lane without the use of a lane-change signal (LeBlanc et al., 2006). LDW systems use cameras pointed at the roadway on each side of the vehicle and video-analysis software to determine the vehicle's lane position. Warnings are usually linked so that, for example, a drift to the right is accompanied by a warning presented on the right portion of the vehicle. Studies of LDW systems have found: the LDW system significantly reduced the number, time, length, and area of lane departure events among drowsy drivers; the system encouraged drivers to stay closer to the center

of the lane, use their turn signals more often when changing lanes, and reduced the frequency of lane excursions; and all drivers, including older adults, liked the system (LeBlanc et al., 2006; Rimini-Doering, Altmueller, Ladstaetter, & Rossmeier, 2005). We conclude that a LDW system could have great benefit for older drivers, particularly those who are taking medications that can produce drowsiness.

Automatic Crash Notification

Automatic crash notification (ACN) systems employ wireless telephones that automatically contact emergency medical services personnel in the event of a crash and transmit the vehicle location (Williams, 2002). Some systems can also transmit details about crash type or severity, giving emergency personnel a general idea of the type of injuries they will encounter (Champion et al., 2003). Although these systems are not intended to facilitate mobility, they can aid in saving lives by getting emergency personnel to crash scenes more quickly. Several studies have demonstrated the safety benefits and efficacy of ACN systems (Berryman, 2004; Clark & Cushing, 2002; Kanianthra, Carter, & Preziotti, 2000; Ram, Talmor, & Brasel, 2005). No research has directly considered the safety benefits of ACN systems for older drivers, but these systems would undoubtedly be useful for this age group. One concern, however, is that the crash severity and potential injury severity information sent to emergency personnel may not take into account the increased frailty of older adults.

Roadway and Infrastructure Design

It has long been recognized that our roadways have not been designed, in general, with the older road user in mind. Many organizations have recognized that improvements to the roadway and infrastructure that better accommodate the common functional declines associated with aging are needed. A strong proponent of this view is the US Federal Highway Administration (FHWA). FHWA began an initiative about 15 years ago that resulted in the publication of the *Older Driver Highway Design Handbook* (Staplin, Lococo, & Byington, 1998). Included in the handbook are recommendations for geometrics, signing, and pavement markings in four major areas of roadway design – intersections, interchanges, roadway curvature and passing zones, and construction/work zones. A revised version of this booklet called the *Highway Design Handbook for Older Drivers and Pedestrians* was published a few years later (Staplin, Lococo, Byington, & Harkey, 2001). The FHWA website (http://safety.fhwa.dot.gov/older_users/) states that another revised version of the handbook will be available sometime in 2011.

The FHWA has developed a 1-day classroom training workshop to review the numerous guidelines and recommendations contained in the *Highway Design Handbook for Older Drivers and Pedestrians*. According to the FHWA (2010), the workshop interactively discusses functional declines associated with aging and how modifications to the roadway system can make it easier for both older adults, and all people, to drive. The training program has not been formally evaluated.

Along these same lines, AARP has been addressing the FHWA handbook from the perspective of city/urban planning. Recently, Lynott and Taylor (2009) discussed research on AARP's ongoing efforts to encourage states to implement the FHWA's roadway engineering guidelines for older drivers and pedestrians. The paper reported on a series of activities to consider the FHWA guidelines from the perspective of the planning concept known as "complete streets." According to the paper, complete streets are those that are designed for the safety and comfort of all road users, regardless of age or ability. Thus, pedal cyclists, pedestrians, wheelchair users and motor vehicle occupants are all considered users of the roadway. The project sought to determine whether the FHWA guidelines for

older drivers work and whether they hinder other roadway users. The study involved a literature review, a telephone questionnaire, an on-line questionnaire, a summit of national leaders, and a webinar. Among other results, the study found the following strengths of the FHWA handbook guidelines: the handbook presents low-cost solutions backed by empirical data, it provides a process for prioritization of efforts, and most of the handbook recommendations satisfy the complete streets paradigm. The study also reported the following weaknesses: although the recommendations are based on empirical data, these data are for older drivers and not for other road users; the handbook does not challenge current highway design practice of designing roadways for drivers of personal vehicles at the expense of other roadway users; there are few recommendations based on different land uses; the effects of speed on various proposed roadway treatments are not addressed; and the handbook contains contradictory statements. Michigan enacted complete streets legislation August 1, 2010 and became the 14th state to do so. This legislation will help the state and local communities build roads and pathways that are safer and more accessible for all types of road users.

A number of other recent studies have addressed the effectiveness and feasibility of roadway infrastructure and design changes in relation to older adult safety and mobility. Eby et al. (2008b) has reviewed many of these studies and provided the following general conclusions:

- Collectively, improvements in roadway design can serve to make the roadway more forgiving not only to older drivers, but also to the general population of drivers on the road. In addition, design improvements at intersections can benefit older pedestrians who are considerably more likely than younger pedestrians to be killed by automobiles.
- Even with good legibility, drivers of all ages sometimes do not understand what the words used on signs mean. Educational efforts are needed to improve sign comprehension among older drivers.
- Even when pavement markings are conspicuous and legible, research has found that pavement markings are difficult for many people to understand. Public information and education programs need to be developed to improve pavement marking comprehension.
- Comprehension of signals other than the familiar three-light traffic control device is often poor. Signal comprehension should be addressed in educational programs for older drivers.
- The intersections of roadways are more dangerous for older drivers than for drivers younger than age 65.
- Research needs to be done on countermeasures intended to help reduce the risk of intersection crashes including: advanced vehicle technology (such as collision avoidance systems); education and training programs; and intersection modifications, such as the more frequent use of roundabouts.
- Roundabouts can reduce the total number of injury crashes by up to 50% and fatal crashes by up to 70%. These safety benefits were found for drivers of all ages.
- Research should address the lack of familiarity of US drivers with roundabout design and signage.
- Educational and training programs should be developed to help traffic engineers better understand how roadways and infrastructure can be modified to help older drivers use the roadway system.

Michigan Transportation Services and Programs

This section provides an overview of various types of transportation services and programs in Michigan that serve older adults, including information on specific services and programs in the state. To the extent possible, program information is presented by MDOT region. There are six MDOT regions in Michigan. Region 1 – Bay contains Arenac, Bay, Clare, Genesee, Gladwin, Gratiot, Huron, Isabella,

Lapeer, Midland, Saginaw, Sanilac, and Tuscola Counties. Region 2 – Grand contains Ionia, Kent, Mecosta, Montcalm, Muskegon, Newaygo, Oceana, and Ottawa Counties. Region 3 – Metro contains Macomb, Oakland, St. Clair, and Wayne Counties. Region 4 – North contains Alcona, Alpena, Antrim, Benzie, Charlevoix, Cheboygan, Crawford, Emmet, Grand Traverse, Iosco, Lake, Leelanau, Manistee, Mason, Missaukee, Montmorency, Ogemaw, Osceola, Oscoda, Otsego, Presque Isle, and Wexford Counties. Region 5 – Southwest contains Allegan, Barry, Berrien, Branch, Calhoun, Cass, Kalamazoo, St. Joseph, and Van Buren Counties. Region 6 – Superior contains Alger, Baraga, Chippewa, Delta, Dickenson, Gogebic, Houghton, Iron, Keweenau, Luce, Mackinac, Marquette, Menominee, Ontonagon, and Schoolcraft Counties. Region 7 – University contains Clinton, Eaton, Hillsdale, Ingham, Jackson, Lenawee, Livingston, Monroe, Shiawassee, and Washtenaw Counties.

A recent analysis of transportation services for older adults in Michigan (Michigan Office of Services to the Aging, 2005) concluded that Michigan has an extensive transportation network for older adults, with every county having form of older adult transportation service. At the same time, the report concluded that gaps in and barriers to services remain, largely due to lack of funding, particularly in some rural areas, as well as lack of coordination among transportation providers. Included in the analysis were over 465 agencies providing transportation to Michigan residents, with many serving primarily older adults. Several agency types were represented including public transit and paratransit providers. These are discussed more fully below. Because the focus of this literature review is on older adults, transportation services that primarily serve younger populations, such as vanpool or transportation to work programs, are not included in this section. Information about these types of services can be found on the MDOT website (e.g., see http://www.michigan.gov/mdot/0,1607,7-151-11056_11266---,00.html).

Public Transit

Public transit falls under the umbrella of public transportation which refers to any transportation service provided using public funds. Traditional public transit typically operates on a schedule with predetermined stops along a specified route, and can include buses, subways, light-rail, or commuter rail (Suen & Sen, 2004). Fixed route bus service is characterized by printed schedules or timetables, designated bus stops where passengers board and alight, and the use of larger vehicles (Alan M. Voorhees Transportation Center, 2005). As described by the Michigan Office of Services to the Aging (2005), strengths of public transit include its use for various kinds of trips, relative low cost, and required linking to complementary paratransit, thereby increasing access. Barriers to use include lack of convenience (e.g., waiting time, longer travel time than car), limited to curb to curb, lack of familiarity, fear of public transit, and lack of availability in all areas, especially rural areas.

While use of public transit has traditionally been low, numerous efforts have been undertaken at the federal, state, and local levels to identify barriers to use and make public transit more “senior friendly” – that is, available, affordable, accessible, acceptable, and adaptable (Beverly Foundation, 2010). Older adults are more likely to use public transit if a bus stop exists within 5 blocks of where they live (Kim & Ulfarsson, 2004). The farther the bus stop is, the more difficult it becomes for older adults to reach it, not only because of difficulty walking, but also inadequate sidewalks, poor lighting, and lack of rest areas (Ritter, Straight, & Evans, 2002). More bus stops, with adequate lighting and rest areas along the way, or using shuttle vans in areas with many older adults, could lead to increased use (Peck, 2010). However, even if numerous bus stops exist within reasonable distances, older adults are often unfamiliar with how to use public transit and therefore do not ride. Clear, accessible information on

public transit riding, fares, routes, and schedules appears to be an important part of attracting riders. Providing older adults with information about transit before they stop driving and offering travel training are two approaches that may help increase use of public transit (Cevallos, Skinner, Joslin, & Ivy, 2010). In fact, some studies have found that public transit use did increase among older adults after they had received such training (Shaheen, Allen, & Liu, 2009; Stepaniuk, Tuokko, McGee, Garrett, & Benner, 2008).

Michigan has a total of 79 Public Transit agencies operating throughout the state. Of these, 20 are considered urbanized public transit agencies and the remaining 59 are non-urbanized public transit agencies. These public transit agencies represent the "backbone" of the transportation network for older adults, accounting for almost three-quarters of the trips taken by this segment of the population (Michigan Office of Services to the Aging, 2005). Information about each of the 79 agencies is contained in Appendix A. For each agency, a brief overview of the system is provided, along with system characteristics (population served, number of employees, number of total vehicles and lift-equipped vehicles, days and hours of operation), and a summary of fiscal year 2009 system data (miles, vehicle hours, passengers, total eligible expenses). All data are from the Michigan Department of Transportation (see **http://www.michigan.gov/mdot/0,1607,7-151-9625_21607-31837--,00.html**). For further descriptions of Michigan's public transit agencies, as well as discussion of transportation coordination in the state, see MDOT's State Long Range Transportation Plan 2005-2030 (MDOT, 2006).

Paratransit

Paratransit means "alongside transit" and includes all public and private mass transportation between private auto and conventional transit (Suen & Sen, 2004). Paratransit typically refers to demand response transportation services (i.e., modes of transportation that pick up at the door and delivery to the destination, usually upon request), but also includes subscription bus services, shared-ride taxis, and car pooling and van pooling (Alan M. Voorhees Transportation Center, 2005). Paratransit is characterized by flexible routing and the use of relatively small vehicles that provide door-through-door, door-to-door, curb-to-curb or point-to-point transportation (Bruff & Evans, 1999). It is more flexible than conventional fixed-route services but more structured than the use of personal automobiles, with individuals requesting services between certain locations at a certain time, usually requiring a reservation.

Paratransit includes two general categories of services: Americans with Disabilities Act (ADA) complementary paratransit and all other demand responsive services. With regard to the first category, public transportation agencies are required by the ADA to provide paratransit services for individuals of all ages who cannot reach or use fixed-route buses because of a functional impairment (Bailey, 2004). Public transportation agencies can also contract with taxis to provide complementary paratransit to accommodate people with disabilities and in some cases, specialized transit services are available to provide door-to-door transportation in the form of vans operated by human service and nonprofit agencies.

The second group of paratransit services encompasses a variety of demand response services, including what are often referred to as supplemental transportation services (STPs; a term coined by the Beverly Foundation, 2001), as well as specialized transit. STPs are community-based transportation programs organized to meet the specialized mobility needs of older adults through trip chaining, transportation escorts, door-through-door service, and other means of personal support. They are intended to complement or supplement existing transportation services, by reaching out to older adults with special

community mobility needs. Information has been collected on over 1,300 such programs since 2000 through an annual survey conducted by the Beverly Foundation (2010). These programs vary considerably in terms of where they are located, how they are organized, ridership, trip purpose, use of escorts, type of vehicle, rider fees, drivers, and funding. However, survey findings indicate that the majority operate in either rural areas or a mix of rural/urban, are non-profit, operate door-to-door service for older adults or individuals with disabilities, are used for medical purposes, operate during the daytime, employ paid and volunteer drivers, require either same day or 24 hour notice, and are funded through grants or fees/donations from riders. Common among STPs are volunteer ride programs that use private cars and other vehicles and are operated by private resources or volunteer drivers (Winter Park Health Foundation, 2006). Such programs may also be more affordable than public transportation, although they tend to have restricted hours and requirements for advanced scheduling. Specialized transit programs are those operated by health and human services providers such as hospitals, senior centers, nursing homes, and adult day services for clients, patients, or customers.

One limitation of many STPs and specialized transportation programs is that trips are limited to medical appointments. One study found that 45% of STPs in the US only provide rides for medical appointments (The Beverly Foundation, 2001). Trips for medical reasons are clearly important and older adults are more likely than younger adults to take such trips. At the same time, older adults actually take more trips for shopping, social/recreation, personal business, and family reasons (Benekohal, Michaels, Shim, & Resende, 1994; Collia et al., 2003; Foster, 1995). While many transportation programs recognize that longer hours, a larger service area, more and better-accessible vehicles, better compensation for drivers, and more staff members (e.g. marketing specialists) could increase the effectiveness of their programs (The Beverly Foundation, 2001), funding is always a challenge. One promising program that has been replicated in several communities around the US is the Independent Transportation Network (ITN), which provides door-to-door transportation by employing both paid and volunteer drivers using their own vehicles to transport older adults 24 hours a day, 7 days a week (Eby, Molnar, & Kartje, 2009).

Paratransit in Michigan is funded, in part, through several federal initiatives under the Safe, Accountable, Flexible Transportation Equity Act: A Legacy for Users (SAFETEA-LU) of 2005. Two federal programs are of note with regard to older adults: Elderly and Persons with Disabilities Program (Section 5310) and the New Freedom Program (Section 5317). As described by MDOT, Section 5310 provides funds to meet the special transportation needs of older adults and people with disabilities. Funds are apportioned to the states annually by a formula based on the number of elderly persons and persons with disabilities in each state. Projects are funded at up to 80% of net project costs. Eligible recipients include private nonprofit agencies, public bodies approved by the state to coordinate services for older adults and people with disabilities, or public bodies that certify to the state that no nonprofit agencies are available in an area to provide the service. Section 5317 funds are intended to encourage services and facility improvements to address the transportation needs of individuals with disabilities that go beyond those required by ADA. This program provides a new formula grant program for associated capital and operating costs. A list of FY 2011 Section 5317 recipient agencies is contained in Appendix B.

Among the state programs funding passenger transportation, a few have a special focus on older adults and the disabled. MDOT funds the Specialized Services Program which provides operating assistance to private, nonprofit agencies, and public agencies providing transportation services primarily to older adults and people with disabilities. Guidelines for operating assistance stipulate that funds are to be used for operating assistance, including purchase of service and vehicle leases (see http://www.michigan.gov/documents/special_18094_7.pdf). As described by MDOT, the amount of operating assistance is subject to the level of need, the level of local coordination and commitment,

funding availability, and legislative appropriation for specialized services. Capital assistance is funded with state and federal funds through the Federal Transit Administration (FTA) Section 5310 program. For applications to be considered for the FTA 5310 program, coordination/consolidation of existing transportation services must be thoroughly addressed. Any vehicle being requested under this program must also be included in the coordination plan for the county or multi-county region. Agencies within an urbanized Metropolitan Planning Organization's (MPO) geographic area must include these requests in the MPO's Transportation Improvement Program (TIP). Nonurban projects must be placed in the statewide TIP by MDOT. Specialized service providers in the state include not only local transit agencies (whose primary mission is transportation) but also social service agencies who offer a broad array of services such as rehabilitation, vocational training, and housing services (MDOT, 2006). Although 40 specialized transportation providers currently receive funding directly from MDOT, up to 100 additional agencies receive funding as subcontractors to one of these directly funded agencies. A list of FY 2010 Section 5310 recipient agencies is contained in Appendix B.

Information about paratransit services available through public transit agencies is contained in Appendix A, referenced in the above section. Information on selected supplemental transportation programs and specialized transit is presented in Appendix C. For each program or service, a brief description is provided, as well as the source or sources from which the information was compiled. The programs/services in Appendix C are not intended to be an exhaustive list of all such programs in the state. There are estimated to be close to 400 such programs in Michigan (not including the public transit agencies) and it is beyond the scope of this literature review to catalog each one. Many of the programs highlighted in the table are those that have been recognized by the Beverly Foundation or that have responded to one of their surveys of supplemental transportation programs (see e.g., Beverly Foundation, 2010). Only those programs that are still in operation and for which information on transportation services is available have been included. As a complement to Appendix C, the reader is referred to the document Michigan's Senior Transportation Network: An Analysis of Transportation Services for Older Adults in Michigan (Michigan Offices of Services to the Aging, 2005), a more comprehensive inventory of transportation programs in the state. Finally, a list of those specialized transportation services funded specifically through MDOT for FY 2011 is contained in Appendix B.

Voucher Programs

One type of program that can cut across public and paratransit services is a transportation voucher program in which vouchers are given out for one or more transportation options (ranging from formal to informal services). Most voucher programs in the US can be found in rural areas. Pilot transportation voucher programs have been undertaken in several areas of Michigan. A transportation voucher program was piloted in eight counties in Michigan (Antrim, Baraga, Jackson, Kalkaska, Muskegon, Newaygo, Shiawassee, and Wayne) between 2005 and 2008, with support from the Michigan Developmental Disabilities Council. An important outcome of the pilot was an implementation guide, including a toolkit for other communities (for links to these documents, see http://www.ucpmichigan.org/our-programs/public-transportation-advocacy/other-transportation-projects/creating-a-transportation-voucher-system). The biggest challenge for each participating county has been finding financial support to sustain their program. A voucher program was also piloted in Washtenaw County through the Robert Wood Johnson Foundation, with a 2008 evaluation calling for further expansion of the program to rural parts of the county.

Private Transit

Private transit services such as taxis are also available in many communities (Beverly Foundation, 2001). When used as private transit, taxis can either be booked by telephone or hailed on the street, with the capacity to carry multiple passengers (Suen & Sen, 2004). Taxi and limousine companies offer rides directly to the public. Companies often contract with public transit-paratransit operators and other community organizations to offer regularly scheduled rides.

The private transportation of passengers for compensation of any type is a regulated industry in Michigan and a license is required. As described by MDOT, the department regulates the commercial business activities of private motor common carriers of passengers for compensation pursuant to *Act 432 of 1982 (the Motor Bus Transportation Act)*, and *Act 271 of 1990, (the Limousine Transportation Act).* The division issues Certificates of Authority (a business license) to carriers who meet legal safety and insurance requirements. Registered vehicles are issued a decal designating compliance with the law when they pass an annual safety inspection. Complaints of illegal operations/non-compliance are investigated and enforcement action taken as necessary. Certain fees, forms and reports are required. A list of currently authorized limousine carriers with vehicles that seat 9 or less can be found at: http://mdotwas1.mdot.state.mi.us/public/licensedcarriers/carriers.cfm?type=L. A limousine is defined by the state as any private vehicle, regardless of body style, that is used to transport 15 or fewer passengers, including the driver, in exchange for compensation of any kind. A list of currently authorized commercial bus carriers can be found at: http://mdotwas1.mdot.state.mi.us/public/licensedcarriers/carriers.cfm?type=B.

Walking and Bicycling

For older adults who are relatively physically fit, walking or bicycling may be viable means of getting around for local neighborhood travel, as well as a means of maintaining physical and functional health. However, the frequency of walking among older adults in the US is quite low – in one study, only 6% of adults age 65 and older made trips by foot, compared to about half of adults age 75 and older in Holland and Germany (Pucher & Dijstra, 2003). Bicycling is even more limited among older Americans and little has been done in the US to address the need for a safe infrastructure for either walking or bicycling, including sidewalks, road crossings, and traffic signals for pedestrians, and bicycle lanes and road crossings for bicyclists. Without attention to these infrastructure issues, walking and bicycling will continue to hold risk for the older adult population, given their growing numbers in the population and their susceptibility to injury. Making communities bicycle friendly – that is, providing safe accommodation for cyclists and encouraging residents to bike for transportation and recreation – involves concerted efforts in a number of areas including engineering, education, encouragement, enforcement, and evaluation and planning (League of American Bicyclists, 2010).

One initiative intended to promote biking in communities is the designation of communities as bicycle friendly by the League of American Bicyclists. A bicycle friendly community is considered to be one that welcomes cyclists by providing safe accommodation for cyclists and encourages people to bike for transportation and recreation (League of American Bicyclists, 2010). Current bicycle friendly communities in Michigan (and their designation as platinum, gold, silver, or bronze award winners) include Ann Arbor (silver), and Houghton, Lansing, Marquette, Portage, and Traverse City (all bronze).

Another major initiative with implications for making communities more pedestrian and bike friendly is Complete Streets (see http://www.completestreets.org/). Complete Streets legislation (Public Acts 134 and 135) was signed into law in Michigan on August 1, 2010, with complete streets defined as roadways planned, designed, and constructed to provide appropriate access to all legal users in a manner that

promotes safe and efficient movement of people and goods whether by car, truck, transit, assistive device, foot, or bicycle (http://www.michigan.gov/mdot/0,1607,7-151-9623_31969_57564---,00.html). According to supporters, the legislation will encourage communities to include a plan for pedestrians and bicyclists when renovating streets. As required by the legislation, a Complete Streets Advisory Council has been set up, comprised of representatives from 18 statewide government and non-government stakeholder agencies, overseen by MDOT, to provide guidance on the development, implementation, and coordination of Complete Streets policies throughout the state. Prior to passage of the statewide legislation, several Michigan communities, including Lansing, Flint, Jackson, and Midland, had adopted local resolutions/ordinances or non-motorized transportation plans.

Powered Wheelchairs, Scooters, Golf Carts, and Neighborhood Electric Vehicles (NEVs)

One option that has gained in popularity among individuals who find walking or bicycling difficult or undesirable is the use of small motorized vehicles such as powered wheelchairs, scooters, and golf carts. Powered wheel chairs are about the size of manual wheelchairs, they operate at 2-3 mph and have a range of a few miles. Scooters are small three or four wheeled vehicles somewhat larger than power wheelchairs and normally operate up to 4 mph, with range of 10-20 miles. Golf carts are generally restricted to bike paths or dedicated lanes on sidewalk because they are not compatible with traffic on normal roads. Unfortunately, the safety of these forms of transportation is a concern (Whelan et al., 2006).

Transportation Coordination

Central to successful efforts to provide older adults with a broad array of transportation options is the coordination of transportation services and programs among federal, state, and local agencies. To that end, it is vital that individual transportation services and programs within communities and regions be viewed as part of a system (Eby, Molnar, & Kartje, 2009). In addition, it is important to understand where there might be gaps and where there might be opportunities for improved coordination and collaboration. Communities, working in concert with state and federal agencies, can then work toward ensuring that a "family of services" is available to members of the community, with particular attention to meeting the transportation needs of more vulnerable members such as older adults and people with disabilities. Strategies that have been found to be effective in promoting and facilitating transportation coordination include: establishing broad-based coalitions and partnerships; coordinating planning through ongoing relationships with planning and development agencies; leveraging funding from a variety of sources; paying careful attention to the specific objectives and regulations of federal transportation programs, given that much of the funding originates with federal programs aimed at unique needs of individual populations; and integrating new technologies into operations to improve efficiency and responsiveness to users (US Department of Health and Human Services, 2005).

Caregiving

About 35 million Americans were age 65 and older in 2000 (12% of the total population). Over the next 40 years, there will be a dramatic increase in the average age of the older population. For example, 4.2 million persons were age 85 and older in 2000, and further declines in mortality could lead to a five-fold increase in the number by 2040. This could have a significant impact on health and long-term care because the use of formal and informal services is strongly correlated with age (White House Conference on Aging, 2005).

In the US, it is estimated that 43.5 million adults provide unpaid care to someone age 50 or older, with 36 million providing care for those age 65 and older (National Alliance for Caregiving (NAC) and AARP, 2009a). While this care is unpaid, its value has been estimated at $350 billion annually (Houser & Gibson, 2007). Caregivers[1] provide daily or episodic support, and assist with activities of daily living (ADLs) such as bathing, dressing, and eating. Caregivers also assist with instrumental activities of daily living (IADLs) such as banking, shopping, and managing medications. A study performed by the NAC and AARP (2009a) found on average caregivers assist with two ADLs and four IADLs. There has been a slight increase in the proportion of caregivers of those age 50 and older who provide assistance with any IADL (98% in 1997 to 100% in 2009). The most frequently reported IADL performed is providing transportation, such as driving or coordinating transportation for a care receiver (84%). The proportion of caregivers assisting with transportation has increased from 79% in 1997 to the current rate of 84% (NAC & AARP, 2009a).

Research suggests that society is not equipped to provide good community mobility options for those who need them (Dickerson, et al., 2007). Accessible public transportation does not exist in all areas of the country, and is often not geared toward the needs of older adults. Where these systems are available, they are not designed to carry people to residential areas, places of worship, or medical facilities, essentially, places commonly visited by older adults. More than half of all non-drivers age 65 and over stay at home on a given day because of limited or complete lack of transportation options (Bailey, 2004). Older adults living in rural areas face special transportation challenges because of the limited public and paratransit services available, and the long distances they must often travel to reach health and social services or participate in social and other enrichment activities. Greater geographic dispersion of rural areas creates greater transportation needs. Due to the lack of access to transportation in rural areas, caregivers tend to be the primary driver for many older people living in such areas. In addition, older adults living in rural areas may be more vulnerable than their urban or suburban counterparts – they are more likely to be older (age 85 and older), poorer, and in worse heath than in those in urban and suburban areas (Molnar, Eby, St. Louis, & Neumeyer, 2007).

In the absence of other options, providing transportation to older adults often becomes the responsibility of a caregiver. Indeed, one third of older adults who do not drive rely on family and friends for their transportation while others rely on public and volunteer transportation options to maintain mobility and independence (Administration on Aging, 2004). Caregivers provide transportation to a variety of places, including medical appointments, shopping, social activities, and religious services. For many caregivers, providing transportation works out to be the most trustworthy and cost-effective solution to meeting the transportation needs of their care receiver. For others, providing adequate transportation to the care receiver is a very challenging task. Problems with transportation are among the most troublesome issues for caregivers, and challenges are even greater when the care receiver has mobility problems. The difficulties encountered with providing transportation to someone with limited mobility, such as handling a wheelchair or other assistive device and physically helping the care receiver into and out of the vehicle, may cause some family caregivers to stop transporting their care receiver or only transport them for the most essential appointments which can have an negative effect on the general well-being of the care receiver.

[1] In this report, *caregiving* denotes care that is provided by a family member or friend rather than by a professional who is reimbursed for services.

The NAC and AARP (2009a) report that caregivers have increased their use of outside transportation services for the person they help, from 17% in 2004 to 30% in 2009. The use of outside transportation services helps to provide the care receiver with more options and flexibility when scheduling a trip, as well as to ease the burden of primary transportation responsibility for the caregiver. This help may come in many forms including: paratransit (demand response services including ADA transit services); specialized transit services (e.g., those operated by health and human service providers); and supplemental transportation programs (e.g., operated by private sector transit services, community groups, and volunteer groups).

Caregiver and Care Receiver Demographics

Michigan has an estimated 1.3 million caregivers (Friss-Feinberg, Newman, Gray, Kolb, & Fox-Grage, 2004). Caregivers in Michigan provide approximately 1.4 billion hours of their time to meet the needs of relatives or friends who are unable to meet these needs themselves. This commitment results in $13.4 billion in economic value. While caregivers are a diverse and ever-changing group, the following discussion provides an overview of the demographics of caregivers that give assistance to someone over age 50, as well as demographic information regarding care receivers. The following statistics are based on the most recent survey of caregivers conducted by the National Alliance for Caregiving and AARP (2009a). In addition to the overall statistics, there have been several differences found within various racial subgroups and these findings will also be mentioned. For a closer look at the differences in caregiving by race and ethnicity, see NAC and AARP (2009b).

Gender and Race

In the US, caregivers who provide assistance to someone over age 50 are predominately White (76%), while 1 in 10 is African-American, 1 in 10 is Hispanic, and 2% are Asian-American. The majority of both caregivers and care receivers are female (67% and 68%, respectively), however, Asian-American caregivers are almost equally likely to be men or women.

Marital Status and Living Arrangements

Fifty-nine percent of caregivers and 30% of care receivers are married, and nearly half of all care receivers are widowed. Care receivers most often live in their own household (58%) and nearly half live alone. One in 5 reports living in the caregiver's household and approximately one-half of caregivers live within 20 minutes of the care receiver's home. As caregiver age increases, it is more likely that the caregiver and care receiver live in the same household.

Education and Income

An overwhelming 95% of caregivers in this study have attained at least a high school diploma. Furthermore, over a quarter of caregivers have graduated from college (26%), and 20% have attended graduate school. Asian-Americans are more likely to be college graduates than other caregiving subgroups. Just over half of all caregivers providing care to someone age 50 or older have an annual household income above $50,000 (55%). However, African-American and Hispanic caregivers are more likely to have an annual household income less than $50,000 (59% and 56%, respectively), while Asian-American caregivers have a relatively high annual income. Approximately three-fourths of caregivers continue to work at a paying job while also caregiving. Younger caregivers (between ages 18 and 49) are more likely to have worked while caregiving compared to caregivers over the age of 50. Also, caregivers

with an annual income above $50,000 are more likely to have worked while caregiving than those with an annual income below $50,000.

Caregiver/Care Receiver Relationship

Caregiving is primarily a family issue, with nearly 90% of caregivers providing care to a relative. Overall, 70% of caregivers provide care to one person over the age of 50, and most often provide care to their mother (36%). The relative that provides care is most often one that has the closest relationship to the care receiver, and those who are more closely related to the care receiver provide greater amounts of care, as measured by the types of assistance provided, the time spent performing care tasks, and the length of time they are willing to persist in the caregiving role. Therefore, spouses tend to provide the most care to their partner (Montgomery, Rowe, & Kosloski, 2007). In the absence of a spouse, a daughter is most likely to assume the role. In fact, daughters are twice as likely as sons to become the primary caregiver (Campbell & Martin-Matthews, 2003). It has also been found that daughters are much more likely than sons to care for a parent when the parent's functional level declines to a level that requires assistance with ADLs (Brody, Litvin, Hoffman, & Kleban, 1995). Therefore, female caregivers provide more hours of care and provide a higher level of care than males.

Age

The average age of caregivers and care receivers has increased throughout the last 7 years. The current average ages of caregivers and care receivers are 50 and 77 years old, respectively, compared to 48 and 75 years in 2004. Furthermore, the proportion of caregivers between the ages of 50 and 64 has increased by 12% since 2004, while the proportion of caregivers between the ages of 18 and 49 has decreased. Given the increase in age for care receivers, it naturally follows that the proportion of respondents listing Alzheimer's disease or dementia as the main reason their care receiver needs care is rising (22% in 1997 vs. 30% in 2009). In fact, the general processes of aging and Alzheimer's disease/dementia are the two main reasons caregivers assist their care receivers.

Caregiver Health

Caregivers tend to describe their health as excellent or very good (59%), and three-fourths believe their caregiving role has not affected their health. However, 16% of caregivers describe their health as fair or poor, and the same proportion believes that fulfilling their caregiving role has made their health worse. While it is encouraging to note that the majority of caregivers in this study reported positively on their health, studies have shown that caregiving has the potential to negatively affect not only the health of a caregiver, but also several other domains of the caregiver's life (see e.g., Montgomery, Rowe, & Kosloski, 2007).

Caregiver Level of Burden

Caregiver burden has been defined as ''a multidimensional response to physical, psychological, emotional, social, and financial stressors associated with the caregiving experience'' (Kasuya, Polgar-Bailey, & Takeuchi, 2000). Caregiving has the potential to impact the health, work, family relationships, and finances of the caregiver. There is a wide variety and level of intensity of care given which results in a differential impact on each individual. Both societal and individual differences can have an effect on caregiver burden. For example, the effects on the caregiver's health are moderated by individual

differences in resources and vulnerabilities, such as socioeconomic status, prior health status, and level of social support. Older caregivers, people of low socioeconomic status (SES), and those with limited support networks report poorer psychological and physical health than caregivers who are younger and have more economic and interpersonal resources (Schulz & Sherwood, 2008). It has also been found that caregivers with higher SES face fewer stressors not specific to caregiving and have better access to the health care system (Brodaty, Thomson, Thompson, & Fine, 2005); therefore they have better overall health.

The NAC and AARP (2009a) found that more than half of caregivers have a medium to high level of burden. This is correlated with the age of the caregiver as well as their health status. This study also found over 50% of caregivers rated their emotional stress level as moderate to high. Those more likely to rate their emotional stress level as high are: females, those in poorer health, those that live with their care receiver, and those who care for someone with Alzheimer's disease (NAC & AARP, 2009). In addition to a higher stress level for those caring for an individual with dementia, evidence suggests that higher levels of depression are also associated with caregivers assisting individuals with dementia. Studies have shown that about 30% of dementia caregivers suffer from depression, and more than 40% report high levels of emotional stress as a result of caregiving (Covinsky et al., 2003). The Alzheimer's Association (2006) reports that more than 80% of Alzheimer's disease caregivers frequently experience high levels of stress and almost half report that they suffer from depression.

Existing research suggests that the physical health of the caregiver is compromised when caregivers are psychologically distressed (Pinquart & Sörensen, 2007). Caregivers with increased caregiving responsibilities face greater levels of caregiver stress, which may place their physical health at risk. Researchers have documented several adverse health outcomes related to caregiving, including elevated blood pressure, impaired immune systems, and potential increased risk for cardiovascular disease (Lee, Colditz, Berkman, & Kawachi, 2003). Given these findings, it is not surprising that older spouse caregivers who experienced caregiver-related stress have higher mortality rates than non-caregivers of the same age (Schulz & Beach, 1999). Caregiver burden is also associated with illness and decreased quality of life (Schulz, Boerner, Shear, Zhang, & Gitlin, 2006). Differences in health outcomes between ethnic subgroups have also been identified. Pinquart and Sörensen (2005) found that ethnic minority caregivers have poorer physical health than do White caregivers.

Caregiving can be especially burdensome if the caregiver feels that he or she had no choice in taking on the caregiving role (NAC & AARP, 2009a,b). Caregiving is often a shared responsibility, but is rarely shared equally. Among caregivers who say another unpaid caregiver provided help in the last 12 months, only one in 10 say they split care equally (NAC & AARP, 2009a). Because of this, caregiving can be an especially time consuming activity for the primary caregiver. The burden of caregiving responsibilities has been shown to influence the quality of the relationship between caregivers and care receivers, caregiver health, and the decision to institutionalize the care receiver (Pinquart & Sörensen, 2007). About half of all caregivers say that as a result of caregiving, they have less time for friends or other family members (NAC & AARP, 2009a). The amount of time devoted to caregiving activities varies greatly. The NAC and AARP (2009a) found that 48% of caregivers provide 8 hours or less of care per week, but 10% provide more than 40 hours of care per week. On average, caregivers provide 19 hours of care per week, however, older caregivers (65 and older) report spending an average of 31 hours per week caregiving, increasing to 43 hours per week if the care receiver lives with the caregiver. Further research indicates that the amount of time spent providing care increases substantially for older adults with varying degrees of cognitive impairment. Individuals age 70 and older with no dementia received 4.6 hours of care per week, compared with 13.1 hours per week for those with mild dementia, 22.0

hours per week for those with moderate dementia, and 46.1 hours per week for those with severe dementia (Langa et al., 2001). While caregiving is a very fluid role in which people move into and out of over time, the average length of caregiving is approximately 4 years.

Financial Impact

Although the majority of caregivers report low financial hardship resulting from caregiving, 43% report at least some hardship and 10% report high levels of hardship (NAC and AARP, 2009a). Caregivers more likely to experience financial hardship from caregiving are similar to those who experience physical strain and emotional stress. These subgroups are based on caregivers' health, income, perceived choice of caregiving, level of burden, and living with the care recipient (NAC & AARP, 2009a).

As previously discussed, approximately three-fourths of caregivers have worked while caregiving. Although there has not been an increase in the proportion of those who say they have worked while caregiving, there has been an increase in the proportion who say they have had to make a workplace accommodation due to caregiving. According to NAC and AARP (2009a), 64% of caregivers report going into work late, leaving early, or taking time off to meet the needs of their care receiver. MetLife Mature Market Institute (2006) has estimated that the costs of lost productivity in the US due to caregiver accommodations are $17.1 billion annually. Additionally, caregivers that have to take time out of the work force to care for a family member may lose wages and fail to accrue savings and benefits, which may place them at economic risk over their lifetimes. The MetLife Mature Market Institute (1999) found that as a result of caregiving, caregivers lost a lifetime estimated average of $566,433 in pre-taxable wage wealth, $25,494 in Social Security wealth and $67,202 in pension wealth. Combined, the result is a loss in total pre-taxable wealth of approximately $659,000 per person over a lifetime.

A recent case study of a large corporate US employer (Albert, Schulz, & Colombi, 2010) found that employees providing care for others reported poorer physical and mental health than employees not providing care. The study estimated that health care costs for those employees providing care was about 8% higher than for those not providing care. The researchers extrapolated these data to the general US business sector and estimated that unpaid caregiving costs employers about $13 billion annually.

Programs to Assist Caregivers

As a result of increases in life expectancy, as well as the aging of the baby boomer generation, demand for family caregiving to the older population is likely to increase. Most older individuals prefer to remain in their own homes and live in the community for as long as possible. This can be a benefit in terms of the costs saved by delaying institutionalization of an older adult. The growing demand for care provided in the home has focused the attention of federal and state governments on efforts to expand programs that provide services and supports to family caregivers.

The federal government has established programs and initiatives that provide direct supports to caregivers, such as respite care, education and training, tax relief, and cash assistance. These benefits are targeted at family caregivers to reduce stress and financial hardship, and to improve caregiving skills. Other federal programs and initiatives provide home- and community-based long-term care services and supports to the care receiver. These programs can indirectly benefit caregivers in relieving caregiver burden by either supplementing the informal care they are providing or substituting with paid support (Administration on Aging, 2010). A national survey found that caregivers tend to support the following

caregiving-related policies: a tax credit of $3,000, respite services, a voucher program which pays them a minimum wage to be a caregiver, and transportation services (NAC & AARP, 2009a).

The Michigan Office of Services to the Aging (OSA) is the state agency with primary responsibility for administering federal and state programs for Michigan's 1.8 million older adults. Along with the Michigan Commission on Services to the Aging, OSA oversees a network of 16 Area Agencies on Aging (AAAs) that partner with 1,150 service providers across the state (Michigan Office of Services to the Aging, 2010). In 2009, $96.4 million was spent providing services to older adults and caregivers in Michigan. About 41% came from the federal government, 30% from state government, and 29% from local sources. Caregivers were supported with 832,471 hours of respite care, adult day care, counseling, training, and support groups, and 61,373 home-delivered meals as a form of respite care (Michigan Office of Services to the Aging, 2010).

Studies have shown that programs that assist caregivers can reduce caregiver depression, anxiety, and stress and enable them to provide care longer, thereby avoiding or delaying the need for costly institutional care (Bookwala et al., 2004; Schulz et al., 2002). The following are examples of different types of programs, resources, and assistance available to caregivers and care receivers.

Older Americans Act

Congress passed the Older Americans Act (OAA) in 1965 in response to concern by policymakers about a lack of community social services for older adults. The OAA funds a number of programs and activities to support family caregivers of older individuals (age 60 and older) directly through information and referral services, respite, and caregiver training and support. The OAA also provides indirect services that can assist caregivers through the delivery of other home- and community-based services and supports (Administration on Aging, 2010).

National Family Caregiver Support Program

In 2000, the Administration on Aging established the National Family Caregiver Support Program (NFCSP). This program provides grants to states and territories, based on the proportion of population age 70 and over, to fund a variety of programs that assist informal caregivers in providing care to their care receivers (Administration on Aging, 2011). Types of services the NFCSP provides include: information to caregivers about available services, assistance to caregivers in gaining access to the services, individual counseling, organization of support groups, caregiver training, respite care, and supplemental services (Administration on Aging, 2011). These services work in conjunction with other state and community-based services to provide a coordinated set of supports.

Home and Community-based Care

Home and community-based care encompasses a range of preventive and supportive health and social services that are provided to older individuals so that they may remain independent in their own homes and communities. Some home and community-based services are funded by federal and state tax dollars. Many organizations also offer services on a private pay basis. Examples of home and community-based care are: transportation, homemaker services, adult day centers and senior center activities. Some of these services are detailed below. These services can assist caregivers indirectly by allowing them to continue working, and directly by providing brief respite from caregiver responsibilities or helping to alleviate caregiver burden. When compared to other states, Michigan spends much less on

home-based care. Michigan currently spends 80% of its Medicaid long term care dollars on institutional care, and only 20% on home-based care, even though most people prefer services at home (Alban, 2011).

Area Agencies on Aging

Area Agencies on Aging (AAAs) were established under the Older Americans Act in 1973 to respond to the needs of Americans 60 and over in every local community (National Association of Area Agencies on Aging, 2011). Funding for AAAs in Michigan comes from the Older Americans Act, the state Older Michiganians Act, and the Medicaid program. AAAs also receive $1 million from local governments (Alban, 2010). AAAs provide assistance to older adults and caregivers in need of information and resources and provide a range of home and community-based care services that allow older adults to maintain their lifestyle outside of institutionalized care. While AAAs do not provide direct services, they are a link between service providers and older adults and caregivers. Examples of services include: home delivered meals, chore services, respite care for caregivers, legal assistance, transportation and much more. There are 16 AAAs in Michigan that serve Michigan's 83 counties. Most are private nonprofit organizations created by county and local governments, and most cover multi-county regions (Alban, 2010). See http://www.mi-seniors.net/regionmap/ to identify local AAAs by county.

MI Choice

MI Choice is a statewide Medicaid program that enables eligible adults who meet income and asset criteria to receive Medicaid-covered services like those provided by nursing homes, and allows the individual to stay in their own home or another residential setting, thereby avoiding or postponing costly institutional placement. This program partners with family caregivers to offer assistance and decrease caregiver burden. MI Choice costs an average of $48/day compared with an average nursing home cost of $185/day (Alban, 2011). The reduction in cost can be very beneficial for the older adult and caregiver, as well as the state. In 2010, 11,000 adults in Michigan were able to remain in their own homes with assistance from MI Choice. MI Choice also specializes in transitioning individuals out of nursing homes and back into their homes and the community. Michigan is a national leader in nursing home transitions with more than 1,500 people transitioned out of a nursing home in 2010 (Alban, 2011). Approximately 70% of the residents that transition from the nursing home get services through MI Choice. Currently, 14 AAAs administer MI Choice.

Internet Resources

The internet provides a wealth of information about caregiving and allows access to resources that are available near the caregiver. There are also several websites (see e.g., www.caregiver.org, www.nfcacares.org, www.michigan.gov/miseniors) that help to educate and assist caregivers.

Eldercare Locator

The Eldercare Locator, a public service of the Administration on Aging, provides users with the information and resources that will help older adults live independently and safely in their homes and communities. This service links those who need assistance with state and local area agencies on aging and community-based organizations that serve older adults and their caregivers. The Eldercare Locator began telephone operation in 1991 and the website was launched in 2001 (Administration on Aging, 2010).

Respite Care

Respite care programs provide companionship, supervision, and/or assistance with ADLs for older adults in the absence of the primary caregiver. Respite care can be regularly scheduled or used as needed by the caregiver, and can take place within the home or within the community. Respite care programs are often offered through community agencies, home health companies and residential care facilities. Some facilities also offer overnight respite care. In-home respite care can include: homemaker services, home delivered meals, home health aides, and personal care services.

Adult Day Centers

Adult day centers are a form of respite care that takes place in the community. Adult day centers have planned programs of activities designed to promote well-being though social and health related services. Adult day centers can be public or private, non-profit or for-profit. Program participants in Michigan must: require regular supervision in order to live in their own home or the home of a relative, require a substitute caregiver while their regular caregiver is unavailable, and have difficulty, or be unable to perform without assistance, ADLs (Michigan Office of Services to the Aging, 2011). This service is for people who do not need full-time care but cannot be left alone for long periods of time. It also provides caregivers temporary relief from their caregiving role.

Support Groups

Structured and informal groups allow caregivers to meet others in similar situations. These groups are available in many communities to allow individuals facing similar problems to cope through the sharing of experiences, practical suggestions, and emotional support. Support groups are available in person, but if the caregiver has difficulty leaving the care receiver for extended periods of time, online communities, message boards and forums can also provide support. Many support groups also provide the option of placing the participants' care receiver in respite programs during the meeting time. Support groups can be general (family members or children of aging parents) or disease specific (e.g., Alzheimer's disease, diabetes).

Caregiver Training

Caregiver training programs are intended to provide assistance to caregivers in understanding and coping with a range of issues associated with caregiving. Training programs include educational programs pertaining to techniques for providing personal care services to care receiver. These programs help to ensure that the caregiver is properly trained to provide adequate care to their care receiver.

Other programs are available to educate caregivers on specific diseases affecting their care receiver and strategies to manage caregiving. One example is the Creating Confident Caregivers (CCC) Program, which is supported in part, by the Administration on Aging through its Alzheimer's Disease Demonstration Grants to states and is available in select counties throughout Michigan. This is an educational training program for family members who are caring for a person with a dementia related illness. The CCC training program helps to reduce caregiver stress by providing caregivers with tools and information to make the task of caregiving less burdensome and more rewarding. In this program, caregivers learn about the disease of dementia, how it impacts their care receiver, strategies to manage difficult behaviors, and how to manage their own well-being.

Transportation Assistance

Transportation services exist throughout Michigan but services and availability are dependent upon the community in which the care receiver lives. Transportation services allow older adults who can no longer or choose not to drive access to community services, health care providers, and shopping. Services are offered through any or all of the following modes of transport: demand-response, volunteer drivers, or public transit systems (Michigan Office of Services to the Aging, 2011).

Conclusions

One purpose of the literature review was to help support the development of two questionnaires that will be administered statewide in Michigan. One of these questionnaires will explore transportation and mobility issues of older Michigan residents and one will explore the issues of providing care and transportation assistance to older Michigan residents from the perspective of the caregiver. The review identified a number of individual, social, and environmental factors that impact transportation choices and patterns. The review made it clear that for both questionnaires we need to not only ask about transportation choices, preferences, and need, but also to explore motivations, resources, awareness, and other factors that may influence use of various community transportation options.

In addition, it is clear that caregivers play a critical role in helping older adults maintain community mobility. At the same time, little is known about the factors that enable caregivers to provide sustained care to older adults, particularly in the context of providing transportation assistance. The caregiving questionnaire provides an opportunity to explore more fully not only the barriers to providing transportation assistance, but also the resources and strategies available for reducing caregiver burden. Also of interest is the extent to which caregivers are aware of transportation options and resources in Michigan. The questionnaire will also allow us to develop a Michigan-specific profile of caregivers who provide transportation assistance to older residents in the state. Additionally, the questionnaire will help us gain a better understanding of the level and type of transportation assistance that is provided in Michigan.

The second purpose of the literature review was to help MDOT determine measures and programs that might be useful to implement in Michigan. The review covered several programs and practices that are considered promising approaches for maintaining older adult safety and mobility. Although many of these approaches are not under the direct purview of MDOT, they represent opportunities for partnerships with various state organizations. It is clear from the literature review that promoting safe transportation for older adults will require a multidisciplinary effort and MDOT has the opportunity to take a leadership in helping Michigan make significant progress on this pressing societal issue.

The review contains a detailed discussion of Michigan transportation services and programs. Findings from this section are useful for thinking about where there may be gaps and overlapping services throughout the state. As MDOT plans for the future, this information will be important in decisions about funding and resources distribution, particularly for programs targeting older adults and people with disabilities.

References

AAA Foundation for Traffic Safety. (1994). *Drivers 55 plus: Check Your Own Performance*. Washington, DC: AAA Foundation for Traffic Safety.

AAA Foundation for Traffic Safety. (2006). *How to Help an Older Driver: A Guide for Planning Safe Transportation*. Washington, DC: AAA Foundation for Traffic Safety.

AARP. (1992). *Older Driver Skill Assessment and Resource Guide*. Washington, DC: AARP.

Administration on Aging (2004). Aging Well Living Well Fact Sheet – Transportation. Washington, DC: Health and Human Services, Administration on Aging.

Administration on Aging (2010). Older Americans Act. Accessed from http://www.aoa.gov/aoaroot/aoa_programs/oaa/index.aspx on Jan. 12, 2011.

Administration on Aging (2011). National Family Caregiver Support Program. Accessed from http://www.aoa.gov/aoaroot/aoa_programs/hcltc/caregiver/index.aspx on Feb. 17, 2011.

Alan M. Voorhees Transportation Center. (2005). *Safe Mobility at Any Age: Policy Forum Series* (Final Report). New Brunswick, NJ: Author and New Jersey Foundation for Aging.

Alban, M. (2010). Fact sheet on Area Agencies on Aging (AAAs). Area Agencies on Aging Association of Michigan. Lansing, MI: Area Agencies on Aging Association of Michigan.

Alban, M. (2011). Fact sheet on MI Choice. Area Agencies on Aging Association of Michigan. Lansing, MI: Area Agencies on Aging Association of Michigan.

Albert, S., Schulz, R. & Colombi, A. (2010). The MetLife study of working caregivers and employer health care costs: New insights and innovations for reducing health costs for employers. Westport, CT: Mature Market Institute.

Alzheimer's Association. (2006). National website. Accessed from http://www.alz.org/ on Jan. 12, 2011.

American Occupational Therapy Association. (2002). *Keeping Older Drivers Safe*. Washington, DC: American Occupational Therapy Association.

Babka, R. J., Zheng, J., Cooper, J., & Ragland, D. R. (2008). Removing Barriers for Seniors at Transit Stops and Stations and the Potential for Transit Ridership Growth. UC Berkeley: Safe Transportation Research & Education Center.

Bailey, L. (2004). Aging Americans: Stranded Without Options. Washington, DC: Surface Transportation Policy Project.

Ball, K.K., Beard, B.L., Roenker, D.L., Miller, R.L., & Griggs, D.S. (1988). Age and visual search: Expanding the useful field of view. *Journal of the Optical Society of America*, **5**, 2210-2219.

Ball, K.K., Berch, D.B., Helmers, K.F., Jobe, J.B., Leveck, M.D., Marsiske, M., Morris, J.N., Rebok, G.W., Smith, D.M., Tennstedt, S.L., Unverzagt, F.W., & Willis, S.L. (2002). Effects of cognitive training interventions with older adults: A randomized control trial. *Journal of the American Medical Association, 288*, 2271-2281.

Bauer, M. J., Adler, G., Kuskowski, M. A., & Rottunda, S. (2003). The influence of age and gender on the driving patterns of older adults. *Journal of Women & Aging, 15*(4), 3.

Bédard, M., Isherwood, I., Moore, E., Gibbons, C., & Lindstrom, W. (2004). Evaluation of a re-training program for older drivers. *Canadian Journal of Public Health*, **95**, 295-298.

Bédard, M., Riendeau, J., Weaver, B., & Porter, M. (2009). Limited congruence between the Roadwise Review determination of safety to drive and on-road evaluations. Program No. 105-4. *2009 Abstract Viewer*. Atlanta, GA: The Gerontological Society of America.

Benekohal, R. F., Michaels, R. M., Shim, E., & Resende, P. T. V. (1994). Effects of Aging on Older Drivers' Travel Characteristics. *Transportation Research Record, 1438*, 91-98.

Berryman, M.E. (2004). Automatic crash notification and 9-1-1: A success story. In *Proceedings 2004 ESRI Users Conference*. Redlands, CA: ESRI International.

Berube, E. (1995). Evaluation of Mature Driver Improvement Program Home-Study Courses. (Report No. RSS-95-157). Sacramento, CA: California Department of Motor Vehicles.

The Beverly Foundation. (2001). Supplemental transportation programs for seniors. Albuquerque, NM: The Beverly Foundation.

The Beverly Foundation. (2010). *The Beverly Foundation's STAR Search and STAR Awards Program*. Albuquerque, NM. Available at: http://www.beverlyfoundation.org/library/documents/star/2010%20STAR%20Search-Awards%20Report.pdf. Accessed February 15, 2011.

Bogner, H.R., Straton, J.B., Gallo, J.J., Rebok, G.W., & Keyl, P.M. (2004). The role of physicians in assessing older drivers: Barriers, opportunities, and strategies. *Journal of the American Board of Family Practice*, *17*, 38-43.

Bookwala, J., Zdaniuk, B., Burton, L., Lind, B., Jackson, S., & Schulz, R. (2004). Concurrent and Long-Term Predictors of Older Adults' Use of Community-Based Long-Term Care Services. *Journal of Aging and Health, 16*(1), 88-115.

Brodaty, H., Thomson, C., Thompson, C., & Fine, M. (2005). Why caregivers of people with dementia and memory loss don't use services. *International Journal of Geriatric Psychiatry, 20*(6), 537-546.

Brody, E. M., Litvin, S. J., Hoffman, C., & Kleban, M. H. (1995). Marital status of caregiving daughters and co-residence with dependent parents. *Gerontologist, 35*, 75 – 85.

Bruff, J.T., & Evans, J. (1999). *Elderly Mobility and Safety-The Michigan Approach Final Plan of Action*. Retrieved March 24, 2003, from http://www.semcog.org/Products/pdfs/eldmob_final.pdf.

Burkhardt, J. E. (1999). Mobility changes: their nature, effects, and meaning for elders who reduce or cease driving. *Transportation Research Record: Journal of the Transportation Research Board, 1671*, 11-18.

Byszewski, A.M., Graham, I.D., Amos, S., Man-Son-Hing, M., Dalziel, W.B., Marshall, S., Hunt, L., Bush, C., & Guzman, D. (2003). A continuing medical education initiative for Canadian primary care physicians: The Driving and Dementia Toolkit: A pre-and post-evaluation of knowledge, confidence gained, and satisfaction. *Journal of American Geriatric Society*, *51*, 1484-1489.

Caird, J.K. (2004). In-vehicle intelligent transportation systems: Safety and mobility of older drivers. In *Transportation in an Aging Society: A Decade of Experience*. Washington, DC: Transportation Research Board.

Campbell, L. D., & Martin-Matthews, A. (2003). The Gendered Nature of Men's Filial Care. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 58*(6), S350-S358.

Canadian Medical Association. (2006). *Determining Medical Fitness to Operate Motor Vehicles, 7th Edition*. Ottawa, Canada: Canadian Medical Association.

Carr, D.B., Schwartzberg, J.G., Manning, L., & Sempek, J. (2010). *Physician's Guide to Assessing and Counseling Older Drivers*. Washington DC: National Highway Traffic Safety Administration.

Cevallos, F., Skinner, J., Joslin, A., & Ivy, T. (2010). Attracting Senior Drivers to Public Transportation: Issues and Concerns. Miami, FL: Florida International University.

Champion, H.R., Augenstein, J.S., Blatt, A.J., Cushing, B. Digges, K.H., Hunt, R.C., Lombardo, L.V., & Siegel, J.H. (2003). Reducing highway deaths and disabilities with automatic wireless transmission of serious injury probability ratings from vehicles in crashes to EMS. In *Proceedings of the 18th International Technical Conference on the Enhanced Safety of Vehicles*. Washington, DC: US Department of Transportation.

Clark, D.E. & Cushing, B.M. (2002). Predicted effect of automatic crash notification on traffic mortality. *Accident Analysis & Prevention*, *34*, 507-513.

Collia, D. V., Sharp, J., & Giesbrecht, L. (2003). The 2001 National Household Travel Survey: A look into the travel patterns of older Americans. *Journal of Safety Research, 34*(4), 461-470.

Cotté, N., Meyer, J., & Coughlin, J.F. (2001). Older and younger drivers' reliance on collision warning systems. In *Proceedings of the Human Factors and Ergonomics Society 45th Annual Meeting*. Santa Monica, CA: Human Factors and Ergonomics Society.

Coughlin, J. (2001). Transportation and older persons: perceptions and preferences. Washington, D.C.: AARP Public Policy Institute.

Coughlin, J.F., Mohyde, M., D'Ambrosio, L.A., & Gilbert, J. (2004). *Who Drives Older Driver Decisions?* Cambridge, MA: MIT AgeLab.

Covinsky, K. E., Newcomer, R., Fox, P., Wood, J., Sands, L., Dane, K., & Yaffe, K. (2003). Patient and Caregiver Characteristics Associated with Depression in Caregivers of Patients with Dementia. *Journal of General Internal Medicine, 18*(12), 1006-1014.

D'Ambrosio, L.A., Coughlin, J.E., Mohyde, M., Carruth, A., Hunter, J.C., & Stern, R.A. (2009). Caregiver communications and the transition from driver to passenger among people with dementia. *Topics in Geriatric Rehabilitation*, **25**, 33-42.

D'Ambrosio, L.A., Coughlin, J.F., Mohyde, M., & Reimer, B. (2007). Family matter: Older drivers and the driving decision. *Transportation Research Board*, *2009*, 23-29.

Delahunt, P.B., Hardy, J.L., Brenner, D.F., Chan, S.C., Dewey, J.A., Mahncke, H.W., Wade, T.W., & Merzenich, M.M. (2008). *InSight: Scientific Principles of a Brain-Plasticity-Based Visual Training Program*. San Francisco, CA: Posit Science Corporation.

Dickerson, A. E., Molnar, L. J., Eby, D. W., Adler, G., Bedard, M., Berg-Weger, M., et al. (2007). Transportation and aging: a research agenda for advancing safe mobility. *Gerontologist, 47*(5), 578-590.

Dingus, T., Hulse, M.C., Mollnehauer, M.A., Fleischman, R.N., McGehee, D.V., & Manakkal, N. (1997). Effects of age, system experience, and navigation technique on driving with an advanced traveler information system. *Human Factors*, *39*, 177–179.

Eby, D.W. & Kostyniuk, L.P. (1998). Maintaining older driver mobility and well-being with traveler information systems. *Transportation Quarterly*, *52*, 45-53.

Eby, D.W. & Molnar, L.J. (1998). Preliminary guidelines for development of advanced traveler information systems for the driving tourist: Information content. In D. Roller (Ed.)*, Special Innovative Conference on Intelligent Transportation Systems and Telemetrics Proceedings*. (pp. 359-366). Croydon, UK: ISATA.

Eby, D.W. & Molnar, L.J. (2010). *M-CASTL 2010 Synthesis Report—Volume 1: Older Adult Safety and Mobility*. Report No. M-CASTL-2010-02. Ann Arbor, MI: Michigan Center for Advancing Safe Transportation throughout the Lifespan.

Eby, D.W., Molnar, L.J., & Kartje, P.S. (2009). *Maintaining Safe Mobility in an Aging Society*. New York, NY: CRC Press.

Eby, D.W., Molnar, L.J., Kartje, P., St. Louis, R., Parow, J.E., Vivoda, J.M., & Neumeyer, A. (2008a). *Older Driver Self Screening Based on Health Concerns. Volume I: Technical Report*. Report No. DOT HS 811 046A. Washington, DC: NHTSA.

Eby, D.W., Molnar, J.L., Kostyniuk, L.P., & Shope, J.T. (1999). The perceived role of the family in older driver reduction and cessation of driving. In *43rd Annual Proceedings: Association for the Advancement of Automotive Medicine*. (pp 458-460). Des Plaines, IL: AAAM.

Eby, D.W., Molnar, L.J., Shope, J.T., Vivoda, J.M., & Fordyce, T.A. (2003). Improving older driver knowledge and awareness through self-assessment: The *Driving Decisions Workbook. Journal of Safety Research*, *34*, 371-381.

Eby, D.W., Molnar, L.J., & St. Louis, R.M. (2008b). *M-CASTL 2008 Synthesis Report: Volume 1, Older Adult Mobility*. Report No. M-CASTL-2008-01. Ann Arbor, MI: Michigan Center for Advancing Safe Transportation throughout the Lifespan.

Edwards, J.D., Delahunt, P.B., & Mahncke, H.W. (2009). Cognitive speed of processing Training delays driving cessation. *Journal of Gerontology A: Biological and Medical Sciences*, *64*, 1262-1267.

Edwards, J.D., Myers, C., Ross, L.A., Roenker, D.L., Cissell, G.M., McLaughlin, A.M., & Ball, K.K. (2009). The longitudinal impact of cognitive speed of processing training on driving mobility. *The Gerontologist*, *49*, 485-494.

Ervin, R.D., Sayer, J., LeBlanc, D., Bogard, S., Mefford, M., Hagan, M., Bareket, Z., & Winkler, C. (2005). *Automotive Collision Avoidance System Field Operational Test Report: Methodology and Results*. (Report No. DOT HS 809 900). Washington, DC: US Department of Transportation.

Fancher, P., Ervin, R., Sayer, J., Hagan, M., Bogard, S., Bareket, Z., Mefford, M., & Haugen, J. (1998). *Intelligent Cruise Control Field Operational Test*. (Report No. UMTRI-98-17). Ann Arbor, MI: University of Michigan Transportation Research Institute.

Federal Highway Administration (2010). *Older Road Users—FHWA Safety Program*. URL: http://safety.fhwa.dot.gov/older_users/. Accessed February 22, 2011.

Fender, T., Wilber, S.T., Stiffler, K.A., & Blanda, M. (2007). Use of ADReS screening tool in an ED population of older drivers. *Annals of Emergency Medicine*, *50*, S94.

Foley, D.J., Heimovitz, H.K., Guralnik, J.M., & Brock, D.B. (2002). Driving expectancy of persons aged 70 years and older in the United States. *Research and Practice*, 92(8), 1284-1289.

Fonda, S. J., Wallace, R. B., & Herzog, A. R. (2001). Changes in driving patterns and worsening depressive symptoms among older adults. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 56*(6), S343-S351.

Foster, N.S.J. (1995). Travel patterns of rural elders. *Transportation Quarterly, 49*(3), 51-65.

Friedland, J. & Rudman, D.L. (2009). From confrontation to collaboration: Making a place for dialogue on seniors' driving. *Topics in Geriatric Rehabilitation*, *25*, 12-23.

Friss-Feinberg L, Newman, S, Gray, L, Kolb, K, Fox-Grage, W (2004). *The State of the States in Family Caregiver Support: a 50-State Study.* Washington, DC: National Center on Caregiving, Family Caregiver Alliance.

Glasgow, N. (2000). Older Americans' patterns of driving and using other transportation. *Rural America, 15*(3), 26-31.

Glasgow, N., & Blakely, R. M. (2000). Older nonmetropolitan residents' evaluations of their transportation arrangements. *Journal of Applied Gerontology, 19*(1), 95-116.

Global Action on Aging (2010). Strengthening Older People's Rights: Towards a UN Convention. Report No. ID9382. Global Action on Aging.

Hanson, T. R. (2004). *Using GPS and GIS to study the travel habits of elderly drivers.* M.Sc.Eng. Dissertation, University of New Brunswick (Canada), Canada. Retrieved from http://proquest.umi.com.proxy.lib.umich.edu/pqdweb?did=997885811&sid=1&Fmt=2&clientId=17822&RQT=309&VName=PQD (AAT MR06902)

Hartford Financial Services Group. (2007). *We Need to Talk…Family Conversations with Older Driver*. Southington, CT: The Hartford.

He, W., Sengupta, M., Velkoff, V. A., & DeBarros, K. A. (2005). *65+ in the United States: 2005*. US Census Bureau Current Population Reports, No. P23-209. Washington, DC: U.S. Government Printing Office.

Henderson, S. & Suen, S.L. (1999). Intelligent transportation systems: A two-edged sword for older drivers? *Transportation Research Record*, *1679*, 58-63.

Hennessy, D.F. & Janke, M.K. (2009). *Clearing a Road to Being Driving Fit by Better Assessing Driving Wellness: Development of California's Prospective Three-Tier Driving-Centered Assessment System*. Report No. Cal-DMV-RSS-05-216. Sacramento, CA: California Department of Motor Vehicles.

Hildebrand, E. D., Myrick, B., & Creed, T. (2000). *The rural elderly: driving patterns and accident involvement.* Paper presented at the Bridging the Gaps. Canadian Transportation Research Forum, Proceedings of the 35th Annual Conference, Charlottetown, Prince Edward Island, Canada.

Hoedemaeker, M & Brookhuis, K.A. (1998). Behavioural adaptation to driving with an adaptive cruise control (ACC). *Transportation Research Part F*, *1*, 95-106.

Hogan, D.B. (2005). Which older patients are competent to drive? Approaches to office-based assessment. *Canadian Family Physician, 51*, 362-368.

Hough, J. A., Cao, X., & Handy, S. L. (2008). Exploring travel behavior of elderly women in rural and small urban North Dakota: An ecological modeling approach. *Transportation Research Record: Journal of the Transportation Research Board, 2082*, 125-131.

Houser, A.N. and Gibson, M.J. (2007). Valuing the Invaluable: A New Look at State Estimates of the Economic Value of Family Caregiving. Washington, DC: AARP Public Policy Institute.

Hu, P. S., & Reuscher, T. R. (2004). Summary of Travel Trends: 2001 National Household Travel Survey. Washington, DC: US Department of Transportation.

Kanianthra, J., Carter, A., & Preziotti, G. (2000). *Field Operational Test Results of an Automated Collision Notification System.* (Report No. 2000-01-C041). Warendale, PA: SAE International.

Kasuya, R.T., Polgar-Bailey, P. & Takeuchi, R. (2000). Caregiver burden and burnout. A guide for primary care physicians. *Postgraduate Medicine*, 108(7), 119-123.

Kim, S., & Ulfarsson, G. F. (2004). Travel mode choice of the elderly: Effects of personal, household, neighborhood, and trip characteristics. *Transportation Research Record: Journal of the Transportation Research Board, 1894*, 117-126.

Ker, K., Roberts, I., Collier, T., Beyer, F., Bunn, F., & Frost, C. (2005). Post-license driver education for the prevention of road traffic crashes: A systematic review of randomized controlled trials. *Accident Analysis & Prevention*, *37*, 305-313.

Korner-Bitensky, N., Kua, A., von Zweck, C., and van Benthem, K. (2009). Older driver retraining: An updated systematic review of evidence of effectiveness. *Journal of Safety Research*, *40*, 105-111.

Kostyniuk, L.P., Eby, D.W., Christoff, C., & Hopp, M.L. (1997a). *An Evaluation of Driver Response to the TetraStar Navigation Assistance System by Age and Sex*. (Report No. UMTRI-97-33). Ann Arbor, MI: University of Michigan Transportation Research Institute.

Kostyniuk, L.P., Eby, D.W., Christoff, C., & Hopp, M.L. (1997b). *The FAST-TRAC Natural Use Leased-Car Study: An Evaluation of User Perceptions and Behaviors of Ali-Scout by Age and Gender*. (Report No. UMTRI-97-09). Ann Arbor, MI: University of Michigan Transportation Research Institute.

Kostyniuk, L.P., Molnar, L.J., & Eby, D.W. (2009). Safe mobility of older drivers: Concerns expressed by adult children. *Topics in Geriatric Rehabilitation, 25*, 24-32.

Kostyniuk, L. P., & Shope, J. T. (2003). Driving and alternatives: Older drivers in Michigan. *Journal of Safety Research, 34*, 407-414.

Kostyniuk, L.P., Streff, F.M., & Eby, D.W. (1997). *The Older Driver and Navigation Assistance Technologies*. (Report No. UMTRI-97-47). Ann Arbor, MI: University of Michigan Transportation Research Institute.

Kramer, A.F., Cassavaugh, N., Horrey, W.J., & Mayhugh, J.L. (2007). Influence of age and proximity warning devices on collision avoidance in simulated driving. *Human Factors*, *49*, 935-949.

Kua, A., Korner-Bitensky, N., Desrosiers, J., Man-Hong-Sing, M., & Marshall, S. (2007). Older driver retraining: A systematic review of effectiveness*. Journal of Safety Research*, *38*, 81-90.

Land Transport NZ. (2006). *Supporting Older Drivers: Help Your Older Friend or Relative Stay Mobile—Safely*. Wellington, New Zealand: Land Transport NZ.

Langa, K., Chernew, M., Kabeto, M., Herzog, A., Ofstedal, M., Willis, R., Wallace, R., Mucha, L., Straus, W., Fendrick, A. (2001). National estimates of the quantity and cost of informal caregiving for the elderly with dementia. *Journal of General Internal Medicine, 16*(11), 770-778.

League of American Bicyclists. (2010). Current Bicycle Friendly Communities - September 2010. Available at: http://www.bikeleague.org/programs/bicyclefriendlyamerica/communities/pdfs/bfc_masterlist_09_10.pdf. Accessed March 3, 2011.

LeBlanc, D., Sayer, J., Winkler, C., Ervin, R., Bogard, S., Devonshire, J., Mefford, M., Hagan, M., Bareket, Z., Goodsell, R., & Gordon, T. (2006). *Road Departure Crash Warning System Field Operational Test: Methodology and Results.* (Report No. UMTRI-2006-9-1). Ann Arbor, MI: University of Michigan Transportation Research Institute.

Lee, S., Colditz, G. A., Berkman, L. F., & Kawachi, I. (2003). Caregiving and risk of coronary heart disease in U.S. women: A prospective study. *American journal of preventive medicine, 24*(2), 113-119.

Lyman, J. M., McGwin, G., & Sims, R. V. (2001). Factors related to driving difficulty and habits in older drivers. *Accident Analysis & Prevention, 33*(3), 413-421.

Lynott, J. (2009). Getting out and about: The relationship between urban form and senior travel patterns. *Journal of Housing for the Elderly, 23*, 390-402.

Lynott, J. & Taylor, A. (2009). Complete streets for older adults. TRB 2009 Annual Meeting CD-ROM. Washington, DC: Transportation Research Board.

Maltz, M. & Shinar, D. (2004). Imperfect in-vehicle collision avoidance warning systems can aid drivers. *Human Factors*, *46*, 357-366.

Marmeleira, J., Godinho, M., & Vogelaere, P. (2009). The potential role of physical activity on driving performance and safety among older adults. *European Review of Aging and Physical Activity*, *6*, 29-38.

Marottoli, R.A. (2007). *Enhancement of Driving Performance Among Older Drivers*. Washington, DC: AAA Foundation for Traffic Safety.

Marottoli, R.A. (2008). Remediation from the physician's perspective. In D.W. Eby & L.J. Molnar (Eds.). *Proceedings of the North American License Policies Workshop*. Washington, DC: AAA Foundation for Traffic Safety.

Marottoli, R.A., Allore, H., Araujo, K.L., Iannone, L.P., Acampora, D., Gottschalk, M., Charpentier, P., Kasl, S., & Peduzzi, P. (2007). A randomized trial of a physical conditioning program to enhance the driving performance of older persons. *Journal of General Internal Medicine, 22*, 590-597.

Marottoli, R. A., Mendes de Leon, C. F., Glass, T. A., Williams, C. S., Cooney, L. M., Jr., Berkman, L. F., & Tinetti, M. E. (1997). Driving cessation and increased depressive symptoms: prospective evidence from the New Haven EPESE. Established Populations for Epidemiologic Studies of the Elderly. *Journal of the American Geriatrics Society, 45*(2), 202-206.

Mattson, J. W. (in press). Aging and mobility in rural and small urban areas: A survey of North Dakota. *Journal of Applied Gerontology*.

McCarthy, D. & Mann, W. (2006). Sensitivity and specificity of the assessment of driving-related skills older driver screening tool. *Topics in Geriatric Rehabilitation, 22*, 138-152.

McCoy, P.T., Tarawneh, M.S., Bishu, R.R., Ashman, R.D., & Foster, B.G. (1993). Evaluation of countermeasures for improving driving performance of older drivers. *Transportation Research Record, 1405*, 72-80.

MetLife Mature Market Institute. (1999). *The MetLife Juggling Act Study: Balancing Caregiving with Work and the Costs Involved.* Westport, CT: Mature Market Institute.

MetLife Mature Market Institute. (2006). *The MetLife Caregiving Cost Study: Productivity Losses to U.S. Business.* Westport, CT: Mature Market Institute.

Meuser, T.M., Carr, D.B., & Ulfarsson, G.F. (2009). Motor-vehicle crash history and licensing outcomes for older drivers reported as medically impaired in Missouri. *Accident Analysis & Prevention*, *41*, 246-252.

Michigan Department of Transportation. (2005). 2004-2005 Comprehensive Household Travel Data Collection Program: MI Travel Counts. Lansing, MI: Michigan Department of Transportation.

Michigan Department of Transportation. (2006). State Long Range Transportation Plan 2005-2030:Travel Characteristics Technical Report. Lansing, MI: Michigan Department of Transportation.

Michigan Department of Transportation. (2010). 2009 Comprehensive Household Travel Data Collection Program: MI Travel Counts II. Lansing, MI: Michigan Department of Transportation.

Michigan Office of Services to the Aging. (2005). *An Analysis of Transportation Services for Older Adults in Michigan*. Lansing, MI: Office of Services to the Aging.

Michigan Office of Services to the Aging (2010). 2009 Michigan Aging Information System NAPIS Participant and Service Report. Lansing, MI: Michigan Office of Services to the Aging.

Michigan Office of Services to the Aging (2011). Search for Services. Accessed from http://www.michigan.gov/miseniors/0,1607,7-234-45069_46585---,00.html on Feb. 16, 2011.

Molnar, F.J., Byszewski, A.M., Marshall, S.C., & Man-Son-Hing, M. (2005). In-office evaluation of medical fitness to drive: Practical approaches for assessing older people. *Canadian Family Physician*, *51*, 372-379.

Molnar, L.J. & Eby, D.W. (2008). *Consensus-Based Recommendations from the North American License Policies Workshop*. Washington, DC: AAA Foundation for Traffic Safety.

Molnar, L.J., Eby, D.W., Kartje, P.S. & St. Louis, R. (2010). Increasing self awareness among older drivers: The role of self-screening. *Journal of Safety Research*, *41*, 367-373.

Molnar, L.J., Eby, D.W., & Miller, L.L. (2003). *Promising Approaches to Enhancing Elderly Mobility*. Report No. UMTRI-2003-14. Ann Arbor, MI: University of Michigan Transportation Research Institute.

Molnar, L.J., Eby, D.W., St. Louis, R.M., & Neumeyer, A.L. (2007). *Promising Approaches for Promoting Lifelong Community Mobility*. Washington, DC: AARP.

Montgomery, R.J.V., Rowe, J.M., & Kosloski, K. (2007). Family Caregiving. In C.C. Dulkis, & J.A. Blackburn (Eds.), *Handbook of Gerontology: Evidence-Based Approaches to Theory, Practice, and Policy* (pp.426-454). Indianapolis, IN: John Wiley & Sons.

Myers, A.M., Blanchard, R.A., Maconald, L., & Porter, M. (2008). Process evaluation of the American Automobile Association (sic) Roadwise Review CD-ROM: Observed and reported experiences of older drivers. *Topics in Geriatric Rehabilitation*, *24*(3), 224-238.

Nasvadi, G.E. & Vavrik, J. (2007). Crash risk of older drivers after attending a mature driver education program. *Accident Analysis & Prevention*, *39*, 1073-1079.

National Alliance for Caregiving and AARP (2009a). Caregiving in the U.S. - A Focused Look at Those Caring for Someone Age 50 or Older Executive Summary. Bethesda, MD and Washington, DC: National Alliance for Caregiving and AARP.

National Alliance for Caregiving and AARP (2009b). Caregiving in the U.S. A Focused Look at the Ethnicity of Those Caring for Someone Age 50 or Older. Bethesda, MD and Washington, DC: National Alliance for Caregiving and AARP.

National Association of Area Agencies on Aging (2011). About Area Agencies on Aging. Accessed from http://www.n4a.org/about-n4a/ on Feb. 9, 2011.

National Highway Traffic Safety Administration (2004). *A Compendium of Older Driver Law Enforcement Programs*. URL: http://www.nhtsa.dot.gov/people/injury/olddrive/LawEnforcementOlderDriver03/introduction.htm. Accessed, February, 2010.

National Highway Traffic Safety Administration (2005). *Turning the Corner…and Still Driving: A Review of Law Enforcement Programs Involving Older Driver Safety*. Report No. DOT HS 809 889. Washington, DC: US Department of Transportation.

New York State Office of the Aging. (2000). *When You Are Concerned: A Guide For Family, Friends, and Caregivers Concerned About the Safety of an Older Driver*. New York, NY: New York State Office of the Aging.

Older Driver Education & Research Team (2007). *Health, Functional Status, & Older Driver Safety: A Curriculum for State Highway Patrol Driver Examiners & Troopers.* St. Louis, MO: Washington University School of Medicine.

Ostrow, A.C., Shaffron, P., & McPherson, K. (1992). The effects of a joint range-of-motion physical fitness training program on the automobile driving skills of older adults. *Journal of Safety Research*, *23*, 207-219.

Owsley, C., McGwin, G.Jr., Phillips, J.M., McNeal, S.F., & Stalvey, B.T. (2004). Impact of an educational program on the safety of high-risk, visually impaired, older drivers. *American Journal of Preventive Medicine*, *26*, 222-229.

Oxley, P.R., Barham, P.A., & Ayala, B.E. (1995). The use of route guidance systems by elderly drivers. In *Proceedings of the 1994 World Congress on Applications of Transport Telemetrics and Intelligent Vehicle-Highway Systems*. Boston, MA: Artech House.

Peck, M. D. (2010). Barriers to using fixed-route public transit for older adults. San Jose, CA: Mineta Transportation Institute.

Pennsylvania Department of Transportation (2006). *Talking with Older Drivers: A Guide for Family and Friends.* (Report No. 345-1-06). Harrisburg, PA: Pennsylvania Department of Transportation.

Pinquart, M., & Sörensen, S. (2005). Ethnic Differences in Stressors, Resources, and Psychological Outcomes of Family Caregiving: A Meta-Analysis. *The Gerontologist, 45*(1), 90-106.

Pinquart, M., & Sörensen, S. (2007). Correlates of Physical Health of Informal Caregivers: A Meta-Analysis. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 62*(2), P126-P137.

Posse, C., McCarthy, D. P., & Mann, W.C. (2006). A pilot study of interrater reliability of the Assessment of Driving-Related Skills: Older driver screening tool. *Topics in Geriatric Rehabilitation*, *22*, 113-120.

Pucher, J., & Dijkstra, L. (2003). Promoting safe walking and cycling to improve public health: Lessons from the Netherlands and Germany. *American Journal of Public Health, 93*(9), 1509-1516.

Pucher, J., & Renne, J. L. (2005). Rural mobility and mode choice: Evidence from the 2001 National Household Travel Survey. *Transportation 32*(2), 165-186.

Ragland, D. R., Satariano, W. A., & MacLeod, K. E. (2005). Driving cessation and increased depressive symptoms. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences, 60*(3), 399-403.

Ram, N., Talmor, D., & Brasel, K. (2005). Predicting significant torso trauma. *The Journal of Trauma*, *59*, 132-135.

Redepenning, S. (2006). *Driver Rehabilitation Across Age and Disability: An Occupational Therapy Guide.* Bethesda, MD: American Occupational Therapy Association.

Rimini-Doering, M., Altmueller, T., Ladstaetter, U., & Rossmeier, M. (2005). Effects of lane departure warning on drowsy drivers' performance and state in a simulator. In *Proceedings of the Third International Driving Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design*. Ames, IA: The University of Iowa.

Ritter, A. S., Straight, A., & Evans, E. (2002). Understanding Senior Transportation: Report and Analysis of a Survey of Consumers Age 50+. Washington, DC: AARP Public Policy Institute.

Roenker, D.L., Cissell,G.M., Ball, K.K., Wadley, V.G. & Edwards, J.D. (2003). Speed-of processing and driving simulator training result in improved driving performance. *Human Factors*, *45*, 218-233.

Rosenbloom, S. (2001). Driving cessation among older people: When does it happen and what impact does it have? *Transportation Research Record: Journal of the Transportation Research Board, 1779*, 93-99.

Rosenbloom, S. (2003). The mobility needs of older americans: Implications for transportation reauthorization. Washington, DC: Center on Urban and Metropolitan Policy.

Rosenbloom, S. (2004). *Mobility of the elderly: Good news and bad news*. Paper presented at the Conference Proceedings 27: Transportation in an Aging Society: A Decade of Experience, Washington, DC.

Rosenbloom, S. (2009). Meeting transportation needs in an aging-friendly community. *Generations, 33*(2), 33-43.

Rudin-Brown, C. & Parker, H.A. (2004). Behavioural adaptation to adaptive cruise control (ACC): Implications for preventive strategies. *Transportation Research Part F*, *7*, 59-76.

Seidler, R.D., Bernard, J.A., Buschkuehl, M., Jaeggi, S., Jonides, J., & Humfleet, J. (2010). *Cognitive Training as an Intervention to Improve Driving Ability in the Older Adult.* Report No. M-CASTL 2010-01. Ann Arbor, MI: Michigan Center for Advancing Safe Transportation throughout the Lifespan.

Schulz, R., & Beach, S. R. (1999). Caregiving as a Risk Factor for Mortality. *JAMA: The Journal of the American Medical Association, 282*(23), 2215-2219.

Schulz, R., Boerner, K., Shear, K., Zhang, S., & Gitlin, L. (2006). Predictors of Complicated Grief Among Dementia Caregivers: A Prospective Study of Bereavement. *American Journal of Geriatric Psychiatry, 14*(8), 650-658.

Schulz, R., O'Brien, A., Czaja, S., Ory, M., Norris, R., Martire, L. M., Belle, S.H., Burgio, L., Gitlin, L., Coon, D., Burns, R., Gallagher-Thompson, D., & Stevens, A. (2002). Dementia Caregiver Intervention Research. *The Gerontologist, 42*(5), 589-602.

Schulz, R., & Sherwood, P. R. (2008). Physical and mental health effects of family caregiving. *The American journal of nursing, 108*(9 Suppl), 23-27.

Shaheen, S. A., Allen, D., & Liu, J. (2009). *Public Transit Training: A Mechanism to Increase Ridership Among Older Adults*. Paper presented at the 2009 Transportation Research Board Annual Meeting.

Spreitzer-Berent, B. (1999). *Supporting the Mature Driver: A Handbook for Friends, Family Members, and Advisors*. Royal Oak, MI: AgeQuest.

Stamatiadis, N. (1998). ITS and human factors and the older driver: The U.S. experience. *Transportation Quarterly, 52*, 91–101.

Stamatiadis, N. (2001). Is ITS ready for the older driver? *In 2001 IEEE Intelligent Transportation Systems Conference Proceedings*. New Brunswick, NJ: IEEE.

Stanton, N.A. & Young, M.S. (2005). Driver behaviour with adaptive cruise control. *Ergonomics*, *48*, 1294-131.

Staplin, L. & Dinh-Zarr, T.B. (2006). Promoting rehabilitation of safe driving abilities through computer-based clinical and personal screening techniques. *Topics in Geriatric Rehabilitation, 22*,129-138.

Staplin, L., Lococo, K., & Byington, S. (1998). *Older Driver Highway Design Handbook*. Report No. FHWA-RD-97-135. Washington, DC: FHWA.

Staplin, L., Lococo, K., Byington, S., & Harkey, D. (2001). *Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians*. (Report No. FHWA-RD-01-051). Washington, DC: Federal Highway Administration.

Stepaniuk, J. A., Tuokko, H., McGee, P., Garrett, D. D., & Benner, E. L. (2008). Impact of transit training and free bus pass on public transportation use by older drivers. *Preventive Medicine, 47*(3), 335-337.

Suen, S. L., & Sen, L. (2004). Mobility options for seniors. In *Transportation in an Ageing Society Conference Proceedings, 27*. Washington, DC: Transportation Research Board.

Sweeney, M. (2004). Travel Patterns of Older Americans with Disabilities. Washington, DC: US Bureau of Transportation Statistics.

Taylor, J., Chadwick, D.W., & Johnson, T. (1995). Accident experience and notification rates in people with recent seizures, epilepsy or undiagnosed episodes of loss of consciousness. *Quarterly Journal of Medicine*, *88*, 733-40.

US Department of Health and Human Services. (2005). Seniors Benefit from Transportation Coordination Partnerships – A Toolbox. Washington DC: US Department of Health and Human Services.

Vrkljan, B.H. & Polgar, J.M. (2007). Driving, navigation, and vehicular technology: Experiences of older drivers and their co-pilots. *Traffic Injury Prevention*, *8*, 403-410.

Wang, C.C., Kosinski, C.J., Schwartzberg, J.G., & Shanklin, A.V. (2003). *Physician's Guide to Assessing and Counseling Older Drivers*. Chicago, IL: American Medical Association.

Whelan, M., Langford, J., Oxley, J., Koppel, S. & Charlton, J. (2006). *The Elderly and Mobility: A Review of the Literature* (Report No. 255). Victoria, Australia: Monash University Accident Research Centre.

White House Conference on Aging. (2005). *Booming Dynamics of Aging: From Awareness to Action: Final Report*. Washington, DC: White Conference on Aging.

Williams, L.E. (2002). *Emergency Vehicle Automatic Crash Notification & Event Reporting Technology*. Aliso Viejo, CA: Roadside Telematics Corporation.

Winter Park Health Foundation (2006). *Florida's Volunteers: The Driving Force for Senior Mobility.* Winter Park, FL: Winter Park Health Foundation.

Wochinger, K. & Boehm-Davis, D. (1995). *The Effects of Age, Spatial Ability, and Navigation Information on Navigational Performance*. Report No. FHWA-RD-95-166). Washington, DC: Federal Highway Administration.

Zhou, M., & Lyles, R. W. (1997). Mobility patterns of the next generation of older persons. *Transportation Research Record: Journal of the Transportation Research Board, 1573*, 99-104.

Appendix A: Michigan Public Transit Systems by MDOT Region

MICHIGAN PUBLIC TRANSIT SYSTEMS BY MDOT REGION*					
		System Characteristics			
Region/Public Transit Agency	**System Profile**	**Population Served/ Employees**	**Total Vehicles/ Lift Equipped**	**Days/Hours of Operations**	**FY 2009 System Data**
Region 1-Bay					
Bay Metropolitan Transportation Authority	Bay Metro was started in 1974 to provide public transportation to Bay City's urbanized area. During FY 1992, the agency changed to an Act 196 transportation authority. In addition, the system also provides countywide service and service to Arenac. The basic service is a combination of line-haul and demand-response utilizing 62 vehicles.	112,932/ 103	61/ 60	M-F 6:00 AM - 6:30 PM	Miles: 1,380,435 Vehicle Hours: 76,572 Passengers: 545,673 Total Eligible Expenses: $6,947,764
Flint Mass Transportation Authority	The Mass Transportation Authority (MTA) service area is Genesee County. The majority of transportation services are still provided in the Flint urbanized area, however service has expanded to include regional routes. MTA currently operates 13 primary fixed-routes and 8 suburban service centers which provide curb to curb service to the community. The primary routes provide regular service throughout the City of Flint and adjacent areas. The suburban service centers in addition to providing commuter service to and from the City of Flint, also provide demand/response service within the communities.	425, 028/ 450	287/ 152	M-SAT 6:30 AM - 11:30 PM SUN 9:30 AM - 7:00 PM	Miles: 8,837,568 Vehicle Hours: 488,818 Passengers: 5,675,019 Total Eligible Expenses: $20,437,162
Saginaw Transit Authority Regional Services	The Saginaw Transit System operates ten fixed routes from the Rosa Parks Transfer Plaza in Saginaw. Lift service providing curb to curb transportation to Saginaw's physically challenged, senior citizens and general public. One of the routes provides Saginaw college students with transportation to Saginaw Valley State University, with transfers to Delta.	127,000/ 80	45/ 45	M-F 5:00 AM - 8:00 PM Sat 8:00a.m - 6:00 PM	Miles: 938,799 Vehicle Hours: 56,539 Passengers: 1,054,559 Total Eligible Expenses: $6,717,544
Alma Dial-A-Ride	Alma Dial-A-Ride has provided demand response service to the residents of the Alma area since 1975. The present demand response service area includes Alma, St. Louis, Gratiot Community Airport, and portions of Pine River Township. The Alma Transit Center is also a sales agency for intercity tickets and information.	13,600/ 9	10/ 6	M-F 7:30 AM - 8:00 PM	Miles: 87,842 Vehicle Hours: 6,450 Passengers: 53,552 Total Eligible Expenses: $582,315
Caro Transit Authority	In May 1988, the Almer and Indianfields Townships Board and the Caro Village Council created the Caro Transit Authority (CTA). CTA assumed responsibility for transportation service on October 1, 1988. Known locally as "Thumbody Express,"	9,358/ 14	12/ 9	M-F 6:00 AM - 6:00 PM SAT 9:00 AM - 1:00 PM	Miles: 216,486 Vehicle Hours: 7,990 Passengers: 60,686 Total Eligible Expenses:

	the demand/response service is operated by the Human Development Commission. "Thumbody Express" enjoys a very high level of local support.				$821,934
Clare County Transit Corporation	Clare County Transit Corporation (CCTC) began its dial-a-ride service in 1981. The purpose of the transit corporation is to provide transportation service for the people of Clare County, particularly the elderly and handicapped, coordinated through a central dispatch center using a combination of demand-response and reserved trips. We cover 570 square miles. Wheelchair lifts are available as well as prescription/package delivery.	31,252/ 40	32/ 20	M-F 6:00 AM - 10:00 PM By 24 Hour Reservation SAT 8:00 AM - 5:00 PM SUN 8:00 AM - 3:00 PM By 24 Hour Reservation	Miles: 675,537 Vehicle Hours: 36,707 Passengers: 156,460 Total Eligible Expenses: $1,428,857
Gladwin City/County Transit	Gladwin City/County Transit (GCCT) began providing service to the City of Gladwin in 1975. In 1981, Gladwin County joined the city to provide countywide service. GCCT provides demand-response service to the city's of Beaverton and Gladwin as well as the immediate surrounding areas. Flexible route and fixed schedule service is provided five times daily to out-county areas.	23,879/ 40	19/ 15	M-F 7:00 AM - 6:00 PM	Miles: 491,947 Vehicle Hours: 31,034 Passengers: 102,041 Total Eligible Expenses: $1,385,938
Greater Lapeer Transportation Authority	The Greater Lapeer Transportation Authority (GLTA) commenced operation in March 1987 as a nonurban demand-response transit system. GLTA is a political subdivision of its incorporators, and serves the same geographic area: the City of Lapeer and the townships of Elba, Lapeer, Mayfield, Deerfield Township area, and Oregon (Lapeer County, MI). Additionally, GLTA has the authority, by statute, to provide service throughout the county. GLTA is governed by a 8 member Board of Directors and is managed by an executive director.	36,490/ 28	21/ 21	M-F 6:00 AM - 8:00 PM SAT 9:00 AM - 3:00 PM	Miles: 566,540 Vehicle Hours: 40,261 Passengers: 174,661 Total Eligible Expenses: $1,754,795
Huron Transit Corporation	The Huron Transit Corporation, known as TAT (Thumb Area Transit) was established in 1981 to service the residents of Huron County. TAT is a nonprofit corporation operated by the county of Huron and managed by a transit director. TAT offers public transit service throughout Huron County, serves five area school districts, and operates in a demand/response mode.	35,150/ 29	28/ 28	M-F 6:00 AM - 6:00 PM SAT 9:00 AM - 5:00 PM	Miles: 729,266 Vehicle Hours: 38,985 Passengers: 184,313 Total Eligible Expenses: $1,571,838
Isabella County Transportation Commission	Dial-A-Ride service began in the City of Mt. Pleasant in March 1974. The Isabella County Transportation Commission (ICTC) was established in 1977 between the county and the City of Mt. Pleasant, and transit service is now countywide. ICTC	59,890/ 69	39/ 39	M-SAT 6:30 AM - Midnight SUN 8:00 AM - 5:00 PM	Miles: 1,252,053 Vehicle Hours: 118,402 Passengers: 557,405 Total Eligible Expenses:

	covers an area of 575 square miles.				$4,131,932
Midland County Connection	County Connection is a demand/response transit system operated for and supervised by the County of Midland. Services are county-wide, and available to all residents of Midland County except those within the city of Midland, depending on destination. County Connection provides curb-to-curb transportation services for Midland County residents to and from work, school, medical appointments, and shopping.	41,189/ 37	20/ 17	M-F 5:00 AM-11:00 PM	Miles: 872,135 Vehicle Hours: 39,186 Passengers: 62,735 Total Eligible Expenses: $1,731,206
City of Midland Dial-A-Ride	In 1974 the City of Midland started it's Dial-A-Ride, providing demand-response service to its residents. Midland Dial-A-Ride currently is authorized to provide mass transportation within the city limits only. Midland's system is managed and administered by City of Midland staff.	41,685/ 30	14/ 13	M-F 6:30 AM - 10:30 PM SAT 9:00 AM - 8:00 PM SUN 8:30 AM - 6:00 PM	Miles: 492,291 Vehicle Hours: 37,342 Passengers: 142,314 Total Eligible Expenses: $1,702,493
Sanilac Transportation Corporation	County-wide transportation is provided by the County Board of Commissioners. The service is operated by the Sanilac Transportation Corporation (STC). STC works closely with human services agencies to meet the transportation needs in the county.	45,000/ 19	13/ 13	M-F 6:00 AM - 6:00 PM	Miles: 459,664 Vehicle Hours: 20,656 Passengers: 112,946 Total Eligible Expenses: $1,140,196
Region 2-Grand					
	Harbor Transit operates in a 10.6 square mile area. The system serves the City of Grand Haven, the Village of Spring Lake, the City of Ferrysburg, and is contracted to serve portions of Grand Haven Charter Township and Spring Lake Township. Harbor Transit is administered by the City of Grand Haven and policy direction is provided by a local Advisory Committee, which is composed of representatives of the participating units of governments. Each governmental unit contributes financial support for Harbor Transit through a special elected mill (one mill per community - perpetual) and general fund. Services provided by Harbor Transit include demand-response public bus transit, contractual services, and trolley transportation.	28,902/ 28	15/ 14	M-F 6:00 AM - 6:00 PM SAT 9:00 AM - 4:00 PM SUN 8:00 AM - 1:00 PM By 24 Hours Advance Reservation Trolley - Memorial Day Weekend to Labor Day Daily 11:00 AM - 10:00 p.m	Miles: 247,933 Vehicle Hours: 19,230 Passengers: 125,700 Total Eligible Expenses: $1,460,857
Interurban Transit Partnership – The Rapid	The Rapid is an independent authority serving the greater Grand Rapids metro area. Fixed route bus service is available throughout the six-city service area of Grand Rapids, East Grand Rapids, Grandville, Kentwood, Walker, and Wyoming. Contracted service is provided to the townships of Ada, Alpine, Byron, Cascade, and Gaines. Under a contract with Grand Valley State University, The Rapid provides service	451,597/ 308	195/ 195	M-F 5:45 AM - 11:15 PM SAT 6:30 AM - 9:30 PM SUN 8:15 AM - 6:45 PM Not all routes	Miles: 6,884,285 Vehicle Hours: 517,950 Passengers: 8,666,364 Total Eligible Expenses: $32,486,075

	between the Allendale and downtown Grand Rapids facilities, along with a number of routes in and around the campuses. County Connection, a demand response system serves all of Kent County. Additional services include paratransit, a suburban connector service called PASS, car and vanpooling assistance, and tailored services to increase transportation alternatives for local employers and employees. The Rapid is a transit district organized under Public Act 196 and is governed by a 15-member Board of Directors, appointed by the cities in the service area. The Rapid is responsible for the planning, construction, and operation of public transportation services and facilities within its district.			operate at all times. Hours for other services vary depending on program.	
Macatawa Area Express (MAX) Transportation Authority	The Macatawa Area Express Transportation Authority is a local transit system that serves the Holland/Zeeland area in Western Michigan. MAX operates seven fixed routes, six days a week, Monday through Saturday, as well as demand response service. All buses in the fleet are equipped with lifts and bike racks. Seniors and ADA Card holders ride free on the fixed routes.	71, 572/ 47	26/ 26	M-F 6:00 AM - 7:00 PM SAT 8:00 AM - 7:00 PM	Miles: 828,601 Vehicle Hours: 68,005 Passengers: 313,822 Total Eligible Expenses: $3,543,687
Muskegon Area Transit System	The Muskegon Area Transit System (MATS) was originally formed in 1969 as the Muskegon County Metropolitan Transportation System (MCMTS). In 1972, MCMTS absorbed the operation of another public transit organization, the Muskegon Area Transit Authority (MTA), and became the Muskegon Area Transit System. MATS is a Department of Muskegon County and is authorized to provide public mass transportation services within Muskegon County. MATS currently operates service on nine fixed-routes with a 100 percent accessible fleet utilizing 10 buses during maximum peak service and serving the urbanized areas consisting of the cities of Muskegon, Muskegon Heights, Roosevelt Park and Norton Shores and Muskegon Township. MATS also provides paratransit services to meet the public demand.	170,200/ 40	23/ 23	M-F 7:00 AM - 6:00 PM SAT 10:00 AM - 6:00 PM	Miles: 534,484 Vehicle Hours: 39,841 Passengers: 617,828 Total Eligible Expenses: $2,417,897
Belding Dial-A-Ride	Belding Dial-A-Ride was established as a demand-response system in 1975, and serves the City of Belding residents.	6,049/ 10	5/ 4	M-F 6:30 AM - 6:00 PM SAT 9:00 AM - 2:00 PM	Miles: 45,558 Vehicle Hours: 4,797 Passengers: 26,663 Total Eligible Expenses: $227,681
Big Rapids Dial-A-Ride	The City of Big Rapids Dial-A-Ride system was established in 1975 to provide demand-response transportation services to 11,000 city residents and 12,000 Ferris State University	10,849/ 12	7/ 6	M-F 6:30 AM - 6:30 PM SAT 9:00 AM - 5:00	Miles: 100,361 Vehicle Hours: 8,621 Passengers: 61,842 Total

	students. Senior citizens and disabled persons comprise over one third of the annual ridership.			PM	Eligible Expenses: $377,870
Greenville Transit	(none on website)	8,573/ 9	7/ 7	M-F 6:00 AM - 6:00 PM SAT 9:00 AM - 5:30 PM	Miles: 88,774 Vehicle Hours: 9,411 Passengers: 30,072 Total Eligible Expenses: $278,123
Ionia Dial-A-Ride	The Ionia Dial-A-Ride was established in 1980 and is operated by the City of Ionia. It serves the residents of the city, and through contractual agreements provides transportation to the Townships of Berlin, Easton, Ionia, and Orange. Ionia Dial-A-Ride is a combined demand-response and advance reservation system.	14,789/ 16	9/ 7	M-F 6:30 AM - 6:00 PM SAT 9:00 - 1:00 PM	Miles: 106,393 Vehicle Hours: 8,192 Passengers: 49,588 Total Eligible Expenses: $441,277
Mecosta Osceola Transit Authority (MOTA)	Mecosta County initiated public transportation services in 1978 and provides countywide services in this northwestern lower Michigan area. The system operates in a 556-square mile area (excluding the City of Big Rapids). Through a coordination effort to provide more efficient and effective rural public transportation services, Osceola County (adjacent county) in 1987 began contracting with Mecosta County to provide public transportation services in Osceola County. Collectively, MOTA services a two county population of approximately 63,000 and includes a total service area of 1,070 square miles. Nearly 90% of riders are elderly and/or disabled.	49,119/ 8	9/ 8	M-F 5:30 AM - 6:00 PM	Miles: 271,700 Vehicle Hours: 11,021 Passengers: 54,533 Total Eligible Expenses: $569,183
Region 3-Metro					
Detroit Department of Transportation	The Detroit Department of Transportation (DDOT), which is the largest bus transit carrier in Michigan, offers service to residents of the City of Detroit, as well as 23 surrounding communities. DDOT provides service along 44 fixed-route bus lines. The system carries approximately 80 percent of the region's bus passengers, which includes commuters, students, senior citizens, and persons with disabilities. DDOT also offers the Detroit Metro Lift ADA Complementary Paratransit Service. Metro Lift serves all trip purposes, origins and destinations for ADA certified passengers in the DDOT service area within 3/4 mile of an operating fixed route.	1,768,526/ 1,532	507/ 507	M-SUN 24 Hour Service (Depending on Route)	Miles: 21,111,840 Vehicle Hours: 1,490,186 Passengers: 38,630,014 Total Eligible Expenses: $171,297,998
Detroit Transportation Corporation	The Detroit Transportation Corporation is owner and operator of the Detroit People Mover (DPM). The DPM is the largest municipal rail system in the state of Michigan. It is a fully automated light rail system that operates clockwise on an	100,000/ 86	12	M-THUR 6:30 AM -12 Midnight FRI 6:30 AM - 2:00 AM	Miles: 470,514 Vehicle Hours: 42,256 Passengers: 1,978,246 Total Eligible Expenses:

	elevated single track 2.9 mile loop in Detroit's central business district. Round trip on the system is approximately 15 minutes, and trains arrive approximately every 3 to 4 minutes. Fare is 50¢ per ride, and children 5 and under ride free. The DPM system provides connections between the municipal complexes, courts, and administrative offices of several levels of government, Joe Louis Arena, Ford Field, Comerica Park, Greektown, Cobo Convention and Exhibition Center, major hotels, and commercial, banking and retail districts. Close proximity of the Detroit People Mover to the stadia, theatre district, the Detroit Riverwalk and the Rosa Parks Transit Center make reaching your destination downtown easily accessible to other Downtown destinations. The integration of eight of the thirteen People Mover stations into pre-existing structures links over 9 million square feet that can be traversed unimpeded by outside elements. 12 of the 13 stations are handicapped accessible, and each vehicle has two wheelchair securement positions. The system regularly carries approximately 2,000,000 riders per year.				$12,394,823
Blue Water Transportation Commission	The Blue Water Area Transportation Commission (BWATC) offers service to the residents of the City of Port Huron, the City of Marysville, and Fort Gratiot, Port Huron and Burtchville Townships. BWATC provides transportation to anyone in its service area including many senior citizens and persons with disabilities. In addition BWATC provides transportation throughout St. Clair County for various non-profit agencies as well as countywide transportation broker services.	53,588/ 84	37/ 37	M-F 6:15 AM -10:00 PM SAT 8:15 AM - 6:00 PM	Miles: 2,517,901 Vehicle Hours: 163,212 Passengers: 1,128,606 Total Eligible Expenses: $7,984,097
Suburban Mobility Authority for Regional Transportation (SMART)	The Suburban Mobility for Regional Transportation (SMART) is the suburban bus system operating in 75 communities of Macomb, Oakland and Wayne Counties covering more than 1,200 square miles. The authority operates over 283 fixed route buses and 350 paratransit vehicles. SMART is responsible for the planning, construction and operation of the public transportation facilities and services within four counties of southeastern Michigan (Wayne, Oakland, Macomb, and Monroe); excluding the City of Detroit in which this responsibility belongs to the Detroit Department of Transportation. SMART is also the fiduciary for state and federal grant funds passed on to communities in Wayne, Oakland, Macomb and Monroe counties, including areas that	1,590,766/ 1,018(996 FT and 22 PT)	389/ 389	M-SUN 22 Hours A Day	Miles: 17,094,061 Vehicle Hours: 904,744 Passengers: 12,666,653 Total Eligible Expenses: $93,065,469

	do not contribute financially to SMART services and operation.				
Region 4-North					
Antrim County Transportation	Antrim County Transportation (ACT) was established in 1977 to make public transit services available to all citizens of Antrim County.	23,110/ 14	16/ 15	M-F 6:00 AM - 6:00 PM	Miles: 279,415 Vehicle Hours: 11,788 Passengers: 47,243 Total Eligible Expenses: $668,661
Bay Area Transportation Authority	Bay Area Transportation Authority (BATA) was established on February 1, 1985, combining the former Leelanau County Public Transit (formed November 16, 1981) and the City of Traverse City Dial-A-Ride (formed May 28, 1974). BATA, an Act 196 authority, comprises all of Leelanau and Grand Traverse Counties as of June 1, 1998. In addition to its regular service, BATA provides transportation for the senior center, and essential transportation for persons with disabilities. BATA provides both demand-response and line haul service.	98.773/ 90	60/ 58	M-S 6:00 AM - 12:30 PM SUN 7:30 AM - 12:30 PM	Miles: 1,852,077 Vehicle Hours: 122,345 Passengers: 511,274 Total Eligible Expenses: $5,726,938
Beaver Island Transportation Authority	The Beaver Island Transportation Authority was formed in 1993 to meet the needs of the traveling public between Beaver Island, Michigan and Charlevoix, Michigan. The Authority took possession of the M/V Emerald Isle in 1997 offering round trip passage between its two port cities, her service was added to the current M/V Beaver Islander, which is owned and operated by the Beaver Island Boat Company. On behalf of the Beaver Island Transportation Authority, the Beaver Island Boat Company operates the Emerald Isle. The Beaver Island Transportation Authority, which was incorporated by St. James Township, consists of a 5 member Board of Directors and meets monthly to plan, promote, and improve the transportation system for the greater Beaver Island Area.	The Greater Beaver Island Area	1/ 1	April - December	Passengers: 24,177 Total Eligible Expenses: $477,168
Benzie Transportation Authority (The Benzie Bus)	Benzie County, located in northwestern lower Michigan initiated county wide on demand service on January 2, 2007. The Benzie Transportation Authority (The Benzie Bus) is an Act 196 transit system that operates in a service area of approximately 316 square miles. In cooperation with the Council on Aging and other local agencies, seniors and persons with disabilities comprise approximately 1/2 of our ridership. We continue to have cooperative efforts with adjoining transit agencies to offer Benzie County residents services to Grand Traverse County and hope to implement travel to Mainstee County in 2008. We have seen an increase from 1,150	15,998/ 32	21/ 19	M-F 6:00 AM - 10:00 PM SAT 7:00 AM - 6:00 PM	Miles: 693,457 Vehicle Hours: 37,261 Passengers: 67,474 Total Eligible Expenses: $1,602,824

	passengers in our first month to over 5,700 in January 2008.				
Cadillac/Wexford Transit Authority	The Cadillac/Wexford Transit Authority (CWTA) is a county-wide demand-response system that operates Monday through Friday from 5:00 AM - 6:00 PM and Saturday from 10:00 AM - 4:00 PM Public Transportation services can be reached by contacting Dispatch at 779-0123 or Toll Free 1-866-647-5465. CWTA provides a highly trained staff, is wheelchair accessible and is currently located at 1202 North Mitchell Street.	31,876/ 44	20/ 20	M-F 5:00 AM - 6:00 PM SAT 10:00 a.m - 4:00 p.m	**FY 2008 System Data** Miles: 530,250 Vehicle Hours: 33,621 Passengers: 134,239 Total Eligible Expenses: $1,810,719
Charlevoix County Public Transit	Charlevoix County Public Transportation (CCPT) is county operated and began countywide demand-response public transportation on June 28, 1980, with five buses. In addition to its regular service, CCPT provides essential transportation for seniors and disabled residents. Currently CCPT receives local millage funding to support public transportation.	24,073/ 20	17/ 17	M-F 6:00 AM - 6:00 PM	Miles: 333,447 Vehicle Hours: 20,965 Passengers: 79,271 Total Eligible Expenses: $1,106,140
Crawford County Transportation Authority	The Crawford County Transportation Authority has been providing safe, dependable transit services to the citizens of Crawford County and the City of Grayling since 1976. It is one of the first countywide systems in Michigan. The system prides itself on providing an extremely high level of service to a relatively low, sparsely populated county, which results in a high per capita level of ridership.	14, 226/ 26	17/ 16	M-F 6:00 AM - 6:00 PM	Miles: 476,735 Vehicle Hours: 25,755 Passengers: 109,474 Total Eligible Expenses: $1,456,228
Iosco Transit Corporation	Iosco Transit Corporation (ITC) began operation in 1979 and serves the citizens of Iosco County. ITC provides demand/response service in the cities of Oscoda and Tawas, as well as time share/flexible route services to other areas of the county.	23,996/ 8	7/ 7	M-F 7:00 AM - 5:00 PM	Miles: 181,069 Vehicle Hours: 8,612 Passengers: 33,153 Total Eligible Expenses: $348,125
Kalkaska Public Transit Authority	Kalkaska Public Transit Authority (KPTA) began operating a county wide public transportation service on October 8, 1984. Kalkaska County is the hub of Northwest lower Michigan. KPTA, provides county wide transportation for the residents of Kalkaska County. Kalkaska Public Transit Authority has a flex route within Kalkaska County that helps students get to and from school each day. Working with the local Commission on Aging we are able to assist the elderly of our county with their transportation needs. In a contract with Munson Medical Center we are able to provide medical trips to their facilities for Kalkaska County residents at no cost to them. Kalkaska County residents have supported the public transportation system by voting in a millage to help provide public transportation for the county residents.	15,191/ 17	21/ 13	M-F 6:30 AM - 6:30 PM	Miles: 191,456 Vehicle Hours: 10,397 Passengers: 103,998 Total Eligible Expenses: $626,809

Ludington Mass Transportation Authority	Ludington Mass Transportation Authority (LMTA) is an independent transit authority. Established in 1974, LMTA serves residents in the cities of Ludington, Scottville and portions of Pere Marquette and Amber Townships. As a special service, LMTA provides contract service to clients of West Michigan Community Health, Senior Meals Program, Intermediate School District, Ludington area and Scottville Schools.	11,925/ 37	19/ 19	M-F 6:00 AM - 7:00 PM SAT 8:00 AM - 4:00 PM SUN 8:00 AM - 2:00 PM	Miles: 334,860 Vehicle Hours: 30,215 Passengers: 156,209 Total Eligible Expenses: $1,327,375
Manistee County Transportation	Manistee County initiated countywide public transportation services in 1975 and is operated by Manistee County Transportation, Inc., a private nonprofit corporation, located in northwestern lower Michigan. The transit system operates in a service area of approximately 544 square miles. Services to seniors and persons with disabilities comprise 40 percent of the total ridership. Manistee County presently has a dedicated transportation millage to support public transportation services.	22,164/ 21	22/ 22	M-F 9:00 AM - 5:00 PM SAT Noon - 6:00 PM	Miles: 394,514 Vehicle Hours: 24,768 Passengers: 114,038 Total Eligible Expenses: $1,422,486
Ogemaw County Public Transportation	Ogemaw County Public Transit (OCPT) is operated by the county of Ogemaw to provide demand-response transit services to the citizens in its area. The system was established in 1980 after four years of providing services as a specialized paratransit agency. OCPT is especially proud of the high usage by the area senior citizens and persons with disabilities, and has received several certificates of appreciation and honors recognizing the significance of the service to the area. OCPT is also known for its operational efficiency and cost-effective measures.	20,230/ 10	9/ 8	M-F 7:30 AM - 4:30 PM	Miles: 279,302 Vehicle Hours: 13,722 Passengers: 50,512 Total Eligible Expenses: $538,138
Otsego County Bus System	The Otsego County Bus System was established in 1978 as a demand-response system servicing area seniors and persons with disabilities. In 1980, it became a countywide transit system serving all county residents. The Otsego County Bus System has taken an active role in promoting tourism in the area, and has provided a high level of service to handicapper and senior groups in Otsego County.	23,301/ 35	26/ 23	M-F 6:00 AM - 6:00 PM SAT 7:00 AM - 7:00 PM	Miles: 469,919 Vehicle Hours: 31,378 Passengers: 108,121 Total Eligible Expenses: $1,565,826
Roscommon County Transportation Authority	In 1980, the Rosco Mini-Bus System was established by Roscommon County to serve the residents of the county. This system has seen significant growth by providing efficient, dependable transportation services to all area citizens. Rosco Mini-Bus has been the recipient of a number of community and state awards, and has demonstrated a remarkable safety record in its history.	25,469/ 26	20/ 17	M-F 6:00 AM - 7:00 PM SAT 9:00 AM - 4:00 PM	Miles: 707,508 Vehicle Hours: 32,524 Passengers: 130,450 Total Eligible Expenses: $1,648,850

Straits Regional Ride	The Straits Regional Ride (SRR) was established in 2000 under the Regional Transportation Program. SRR initially provided a regional public transit link servicing Cheboygan, Emmet and Presque Isle Counties in northern Lower Peninsula. In 2003, SRR completed the regional program and became eligible for State and Federal funding. Currently, SRR is also supporting the Cities of Cheboygan, Mackinaw City and Petoskey with local service as well. The Straits Regional Ride is very involved with promoting mobility and provides an important level of service within the region.	72,297/ 11	14/ 14	M-F 6:00 AM - 5:00 PM	Miles: 320,340 Vehicle Hours: 15,636 Passengers: 40,797 Total Eligible Expenses: $669,327
Thunderbay Transportation Authority	Thunder Bay Transportation Authority is formed of the City of Alpena, Alpena, Alcona, and Montmorency counties. Formed in 2006 to deliver the service formally provided by the Thunderbay Transportation Corporation.	51,411/ 55	33/ 31	M-TH 7:00 AM - 7:00 PM F 7:00 AM - 9:00 PM SAT 8:00 AM - 7:00 PM SUN 9:00 AM - 6:00 PM	Miles: 683,551 Vehicle Hours: 35,793 Passengers: 118,062 Total Eligible Expenses: $2,169,326
Yates Township Transportation System	Yates Dial-A-Ride was established in August 1976 as a demand-response system operated by Yates Township in Lake County. Transportation services are also provided to three adjacent townships. In addition to its regular service, Yates Dial-A-Ride provides transportation to the area human service agencies, Senior Center, and essential transportation for its residents with disabilities.	9,381/ 27	26/ 18	M-F 6:30 AM - 6:00 PM SAT 9:00 AM - 4:00 PM	Miles: 513,366 Vehicle Hours: 28,218 Passengers: 210,743 Total Eligible Expenses: $1,390,508
Region 5- Southwest					
Battle Creek Transit	Battle Creek Transit has provided continuous service since 1932 and operates as a city department. The service is operated from the transit terminal located on W. Michigan Avenue. The terminal houses all vehicles, maintenance, and administrative activities. The service consists of both line-haul and demand-response service. Line-haul service operates on a central hub pulse mode with service available six days a week. The demand-response service, called Tele-transit, operates primarily to accommodate special needs customers but is open to the general public. Battle Creek Transit also oversees the intermodal terminal which accommodates both intercity rail and bus travelers. Located adjacent to the transfer center, a passenger may easily transfer from intercity to local public transit.	53,369/ 36	22/ 22	Tele-Transit: M-F 5:15 AM - 11:30 PM Line-haul: M-F 5:15 AM - 6:45 PM All Services: SAT 9:15 AM - 5:15 PM	Miles: 575,943 Vehicle Hours: 41,960 Passengers: 536,962 Total Eligible Expenses: $3,302,320
Benton Harbor /	The Twin Cities Area Transportation Authority (TCATA) was	62,215/	23/	WEEKDAYS	Miles: 477,149

Twin Cities Area Transportation Authority	established in 1974 and serves the city of Benton Harbor, City of St. Joseph, Benton Township, part of St. Joseph Township, and Royalton Township.	36	19	Demand Response: 6:00 AM - 6:00 PM Line Haul: 6:00 AM - 10:00 PM SATURDAY Demand Response: 8:00 AM - 4:30 PM Line Haul: 8:00 AM - 10:00 PM	Vehicle Hours: 41,074 Passengers: 172,758 Total Eligible Expenses: $1,431,211
Kalamazoo Metro Transit System	Kalamazoo Metro Transit System (KMTS) is owned and operated by the City of Kalamazoo under the direction of a Transit Authority Board. Fixed route service is provided within the Kalamazoo urbanized area, including the City of Kalamazoo, the City of Portage, Oshtemo Township, the City of Parchment, Comstock Township, Kalamazoo Township, and Kalamazoo Valley Community College. Demand Response service is provided county-wide.	183, 288/ 120	89/ 89	M-SAT 6:00 AM - 10:15 PM	Miles: 2,205,238 Vehicle Hours: 172,802 Passengers: 3,265,659 Total Eligible Expenses: $12,559,703
Niles Dial-A-Ride	The Niles Dial-A-Ride system started in November 1974, and is operated by a private transit provider under contract to the City of Niles. The service consists of both demand response service and one deviated fixed route. Service is within the City of Niles and the Township of Niles proper. All administration, maintenance, and storage is housed in the same facility.	17,717/ 17	4/ 4	M-F 7:00 AM - 5:00 PM SAT 10:00 AM - 3:00 PM SUN & Holidays Closed.	Miles: 109,002 Vehicle Hours: 9,048 Passengers: 33,299 Total Eligible Expenses: $402,021
Allegan County Transit	Allegan County Transportation provides advance reservation and limited demand-response services to the residents of Allegan County. The service is in two thirds of the county. The program is funded with State and Federal grants and local funds through agency support.	110,000/ 28	24/ 14	M-F 5:30 AM - 5:30 PM	Miles: 550,784 Vehicle Hours: 24,878 Passengers: 35,817 Total Eligible Expenses: $1,101,211
Barry County Transit	Barry County began operating Barry County Transit in 1982. They provide curb-to-curb service countywide and demand actuated service to every City Village and Township in the County at least one day per week.	56,755/ 22	11/ 11	M-F 5:30 AM - 5:30 PM	Miles: 215,502 Vehicle Hours: 15,545 Passengers: 74,030 Total Eligible Expenses: $801,276
Berrien County Public Transportation	The Berrien County system was started in 1983 and is operated by a private transit provider under the trade name of Berrien Bus. The service consists of both semi-fixed route service and demand-response service within the Berrien	79,398/ 23	24/ 23	M-F 5:00 AM - 5:00 PM	Miles: 501,890 Vehicle Hours: 23,651 Passengers: 85,303 Total Eligible Expenses:

	County proper. Service is housed in a facility located in Berrien Springs. The facility provides storage, maintenance, and administration for the system. Additionally, the Buchanan Dial-A-Ride system is operated out of this facility. The service provider operates under a contract with the county government and is monitored by the county transportation coordinator. The system provides tripper service between Niles and Benton Harbor four times each day.				$1,099,370
Branch Area Transit Authority	The Branch County system started in October 1984 as a demand-response system serving the entire county. Service has evolved to a combination of demand-response and semi-fixed route service. Administration of the system is overseen by an authority board formed under P.A. 196 of 1986.	40,347/ 23	12/ 11	M-F 6:00 AM - 6:00 PM SAT 9:00 AM - 5:00 PM (Specialized Services only) SUN 9:00 AM - 1:00 PM	Miles: 320,884 Vehicle Hours: 20,922 Passengers: 94,627 Total Eligible Expenses: $1,207,840
Buchanan Dial-A-Ride	Service was first started in 1980. The service is the responsibility of the city and consists of demand-response service within the Buchanan area and regular shuttle service with the larger neighbor community of Niles. The system prides itself on service to the senior and disabled community and strongly supports its bus service.	4,969/ 3	3/ 3	M-F 7:00 AM - 5:30 PM SAT 9:00 AM - 3:00 PM	Miles: 47,330 Vehicle Hours: 3,626 Passengers: 11,882 Total Eligible Expenses: $175,786
Cass County Transportation Authority	The Cass County system was started in 1988 under a state demonstration program. Cass County is one of the largest hog producing county in the United States and was a major thorough fare for the Underground Railroad during the 1800's. The transit system consists of eleven small buses operated in both the demand-response and semi-fixed route mode. The service is operated by a private for profit company. Oversight is provided by a transit coordinator. Overall administration is provided by a transit authority formed under Michigan P.A. 196.	49,477/ 11	11/ 11	M-F 6:00 AM - 6:00 PM	**FY 2008 System Data** Miles: 240,541 Vehicle Hours: 10,553 Passengers: 27,510 Total Eligible Expenses: $506,124
Dowagiac Dial-A-Ride	One of the oldest dial-a-ride services in Michigan, Dowagiac DART began service in June 1975 with a three bus fleet. The service is provided to the community of Dowagiac with service extended out to Southwestern Michigan College. The service is provided by the city administration and is operated from a multi-modal terminal located on an Amtrak line. In its former life, the building was a Grand Truck and Western train station. The building has been preserved and is carefully maintained by the City of Dowagiac	5,662/ 3	3/ 2	M-F 8:00 AM - 5:00 PM	Miles: 42,635 Vehicle Hours: 4,470 Passengers: 22,995 Total Eligible Expenses: $213,591
Interurban Transit	Saugatuck Township Interurban Transit has been providing	4,193/	6/	M-F 7:00 AM - 6:00	Miles: 139,884

Authority	door-to-door demand-response service since 1980. On January 1, 1990, Interurban officially became an authority. The Interurban operates in the City of Saugatuck, Saugatuck Township, and the City of Douglas.	12	4	PM SAT 9:00 AM - 6:30 PM SUN 9:00 AM - 4:00 PM	Vehicle Hours: 10,438 Passengers: 54,749 Total Eligible Expenses: $629,533
City of Marshall Dial-A-Ride	The City of Marshall Dial-A-Ride service is owned and operated by the municipality. Dial-A-Ride is a demand-response public transportation service that has been providing safe, affordable and reliable transportation to its residents since its inception in 1974. The service is operated out of the City's Utility Services Building.	7,111/ 8	5/ 5	M-F 7:00 AM - 6:00 PM SAT 9:00 AM - 5:00 PM	Miles: 68,898 Vehicle Hours: 7,535 Passengers: 41,469 Total Eligible Expenses: $359,500
St. Joseph County Transportation Authority	St. Joseph County Transportation Authority was formed under Michigan P.A. 196 and began service on October 1, 2002. The service was started by combining buses owned by ARCH, Inc. and the Commission on Aging. Until this time, only specialized service was available to the residents of the county. By combining both fleets and restructuring under the Authority Act, service was made available to all residents within the county. The service provided is both contractual and demand response. The demand response service requires a 24 hour advance reservation. The authority also acts as fiduciary agent for two specialized service projects within the county.	62,964/ 13 Full-time, 22 part-time	18/ 16	M-F 6:00 AM - 6:00 PM Sat 6:00 AM - 5:00 PM	Miles: 628,230 Vehicle Hours: 31,230 Passengers: 64,218 Total Eligible Expenses: $1,182,061
Van Buren Public Transit	Van Buren Public Transit began providing demand-response and advance reservation service to the residents of Van Buren County in 1979. The service is housed in its own facility located in Bangor, Michigan.	76,263/ 27	17/ 13	M-F 6:00 AM - 8:30 PM SAT 8:00 AM - 4:00 PM	Miles: 480,983 Vehicle Hours: 28,289 Passengers: 65,050 Total Eligible Expenses: $1,153,937
Region 6-Superior					
ALTRAN Transit Authority	Countywide public transit services were initiated in January 1982. The Alger/Marquette Community Action Board was the third-party operator of transit services for Alger County until March 1990. ALTRAN, an Act 196 transit authority, was created in March 1990 to provide the countywide transit services. Senior citizens and handicappers comprise 60 percent of the annual ridership.	9,735/ 23	14/ 10	M-SAT 5:30 AM - 7:00 PM F-SAT evenings 7:00 PM - 2:30 AM Week Nights and Sunday work trip runs only. SAT Church Runs 4:00 PM - 6:00 PM	Miles: 400,811 Vehicle Hours: 22,766 Passengers: 80,640 Total Eligible Expenses: $754,743
Delta Area Transit Authority	The Delta Area Transit Authority (DATA) initiated countywide public transportation services in 1989. The DATA system is completing the third year of operations, providing transit services to over 38,000 county residents. This system provides	39,984/ 25	16/ 15	M-F 6:00 AM - 6:00 PM	Miles: 414,225 Vehicle Hours: 28,090 Passengers: 114,405 Total Eligible Expenses:

	a high level (64% of ridership) of senior and disabled transportation services.				$1,240,693
Eastern U.P. Transportation Authority	The Eastern Upper Peninsula Transportation Authority (EUPTA) is a two-county, Luce and Chippewa, transportation system that provides bus and ferry service to the residents of the area. The system was established in 1976, and provides a high level of service to several area human service agencies and employment generated passengers. EUPTA is proud of its community service activities. For example, the system and their drivers donated time to provide transportation for the area's Special Olympic games.	28,526/ 10	8/ 4	M-F 5:00 AM - 11:30 PM	**Bus Service Ferry Service** Miles: 288,727 Vehicle Hours: 12,553 Passengers: 53,001 790,238 Total Eligible Expenses: $454,781 $2,434,752
Gogebic County Transit	Gogebic County Transit (GCT), an Act 196 Authority, has been in operation since 1981. GCT is proud of service it provides for area seniors and persons with disabilities who compose nearly 70% of its ridership. Gogebic County is the seventh largest county by total acreage in Michigan and is able to make transit service available to the entire area. Services to medical complexes allow residents to access rural health care. Local Indian Trails ticket agent.	16,980/ 9	7/ 7	M-F 6:00 AM - 6:00 PM	Miles: 98,160 Vehicle Hours: 7,056 Passengers: 26,162 Total Eligible Expenses: $444,667
City of Hancock	Demand Service (Door to Door). Operational boundaries include warning light on top of Quincy Hill near Portage Health System, Copper Bowl Lanes in Ripley, Hancock Beach/Campground, and Copper Country Mall in Houghton.	4,323/ 4	4/ 4	M-F 7:00 AM - 5:00 PM	Miles: 63,372 Vehicle Hours: 5,588 Passengers: 20,992 Total Eligible Expenses: $155,881
Houghton Motor Transit Line	The Houghton Motor Transit Line is operated by the City of Houghton and started service in May, 1982. Senior citizens and persons with disabilities comprise 39 percent of the annual ridership. Service provided from 5 PM to 11 PM, seven days a week when MTU is in session Sept - May.	7,025/ 10	10/9	M-F 7:00 AM - 5:00 PM	Miles: 129,138 Vehicle Hours: 11,414 Passengers: 79,995 Total Eligible Expenses: $368,464
Marquette County Transit Authority	Marquette County Transit Authority (MARQ-TRAN) was created in 1985 through the consolidation of three public transit systems within Marquette County. MARQ-TRAN currently makes transit services available to all Marquette County citizens. MARQ-TRAN operates both fixed-route and demand-response service to meet the public demand. MARQTRAN operates 365 days per year, 366 during leap years. MARQ-TRAN serves as the Indian Trails ticket agent and tickets are available at MARQ-TRAN's new facility at 1325 Commerce Drive.	64,634/ 45	36/ 25	M-SAT 6:30 AM - 8:00 PM SUN 8:30 AM - 5:00 PM	Miles: 951,412 Vehicle Hours: 48,482 Passengers: 298,595 Total Eligible Expenses: $2,822,735
Ontonagon County Public Transit	Countywide public transportation services were initiated in July 1981. Ontonagon County Public Transit serves a county	7,517/ 8	6/ 6	M-F 6:00 AM - 6:00 PM	Miles: 140,777 Vehicle Hours: 8,193

	population of approximately 8,854 residents. Seniors and persons with disabilities comprise 57 percent of the annual ridership.				Passengers: 29,445 Total Eligible Expenses: $554,690
City of Sault Sainte Marie	Sault Ste. Marie's transit service was established in 1974. The system serves the city of Sault Sainte Marie plus operates the International Bridge Bus to Sault Sainte Marie, Ontario.	16,403/ 7	7/ 7	M-F 7:00 AM - 6:00 PM (Demand Response) M-F 7:00 AM - 7:00 PM (International Bridge Bus)	Miles: 85,819 Vehicle Hours: 8,305 Passengers: 28,424 Total Eligible Expenses: $338,567
Schoolcraft County Public Transportation	Countywide public transit services were initiated in September 15, 1980. Senior citizens and persons with disabilities comprise 52 percent of the annual ridership.	8,175/ 7	9/ 4	M-F 7:30 AM - 5:00 PM SAT-SUN By Appointment	Miles: 172,416 Vehicle Hours: 6,894 Passengers: 33,545 Total Eligible Expenses: $574,836
Region 7-University					
Ann Arbor Transportation Authority	Ann Arbor Transportation Authority (AATA) provides fixed-route service on twenty-seven local routes. AATA's **"A-Ride"** uses a combination of taxicabs, vans, and small buses to provide over 150,000 rides a year to persons with disabilities whose disabilities prevent them from using the regular fixed route service and senior citizens.	273,312/ 171	75/ 75	M-F 6:00 AM - 11:00 PM SAT 8:00 AM - 6:15 PM SUN 8:00 AM - 6:15 PM Taxi-operated service for general public and persons with disabilities M-F 11:00 PM - 6:00 AM SAT & SUN 7:00 PM - 6:00 AM	Miles: 3,486,081 Vehicle Hours: 259,370 Passengers: 6,227,927 Total Eligible Expenses: 21,274,048
Lake Erie Transit	Lake Erie Transit was established in 1975 to provide demand/response service to aid seniors and handicappers in the county of Monroe. It also provides general public fixed route service in the city of Monroe and Dial-A-Ride services in Frenchtown and Bedford townships.	135,783/ 68	24/ 24	M-F 7:00 AM - 5:30 PM SAT 10:00 AM - 4:00 PM	Miles: 695,469 Vehicle Hours: 52,000 Passengers: 358,196 Total Eligible Expenses: $3,555,377
Jackson Transportation Authority	The Jackson Transportation Authority (JTA) has been in existence since the early 1930s. The current fixed route service consists of eight routes that connect the trip generators of the urbanized area of Jackson. Fixed route accounts for 75% of JTA's ridership. The JTA's Demand	150,854/ 70	56/ 56	M-F 6:15 AM - 10:00 PM SAT 10:15 AM - 10:00 PM SUN 7:00 AM - 4:00	Miles: 738,864 Vehicle Hours: 55,762 Passengers: 551,584 Total Eligible Expenses: $3,772,967

	Response service (Reserve-A-Ride) provides curb to curb service throughout Jackson County and reservations are required. A premium Demand Response service called the "PET" (Paratransit for Employment Training) program provides work related transportation for disabled City of Jackson residents. All other disabled County residents benefit from the JARC (Job Access/Reverse Commute) program providing work related transportation 24 hours per day.			PM P-E-T (SUN-SAT 6:00 AM - 10:00 PM) JARC (24 hours, 7 days a week)	
Capital Area Transportation Authority	The Capital Area Transportation Authority (CATA) is the regional public transportation provider for the Greater Lansing area. Service area includes Ingham, Eaton and Clinton counties. CATA's current funding areas include the cities of Lansing, East Lansing and townships of Lansing, Delhi and Meridian, where over 30 fixed routes operate. Advance-reservation curb-to-curb services are provided for persons with disabilities as well as for residents of Ingham County's outlying areas and Delhi and Meridian Townships. CATA's Clean Commute Options program educates the community about the importance of improving the tri-county's air quality and choosing alternatives to driving alone. CATA also provides all campus bus service to Michigan State University (MSU) with 24/7 campus service availability during Fall and Spring terms.	310,092/ 296	150/134	CATA service hours vary by service type. Customers should call for more detailed information.	Miles: 6,450,482 Vehicle Hours: 459,033 Passengers: 11,353,591 Total Eligible Expenses: $34,810,146
Adrian Dial-A-Ride	Adrian Dial-A-Ride began service April 7, 1976. This demand-response system provides curb-to-curb service to the residents of the City of Adrian. People residing within Lenawee County also have transportation service. Both the Lenawee County system and Adrian Dial-A-Ride are operated by Quick Service Inc., a private operator. Common dispatch, maintenance, and management ensure optimum coordination and efficiencies to area residents.	22,580/ 12	7/ 7	M-F 6:00 AM - 5:45 PM	Miles: 137,132 Vehicle Hours: 12,915 Passengers: 79,471 Total Eligible Expenses: $437,049
Clinton Area Transit System	Clinton Transit serves all of Clinton County and is based in St. Johns, the county seat. Clinton Transit operates curb to curb service. Door to door service is available at higher rates. Fares are based on distance traveled by passenger. Half price discounts are available for Seniors and Persons with Disabilities.	67,609/ 38	25/ 25	M-F 6:30 AM - 5:30 PM	Miles: 481,628 Vehicle Hours: 28,628 Passengers: 59,999 Total Eligible Expenses: $1,256,550
Eaton County Transportation Authority	The Eaton County Transportation Authority (EATRAN) was established in 1980 to serve the residents of Eaton County and in 1989, completed a new 11,600 sq. ft. transportation facility.	103,655/ 40	28/ 27	M-F 6:00 AM - 6:00 PM	Miles: 795,109 Vehicle Hours: 43,232 Passengers: 149,082 Total Eligible Expenses:

					$2,357,361
Hillsdale Dial-A-ride	The City of Hillsdale started providing transportation service to its city residents June 10, 1975. This demand-response system provides door-to-door service and is operated by the City of Hillsdale with city employees. Maintenance of buses is also performed by the city.	8,744/ 6	6/ 6	M-F 7:30 AM - 4:30 PM	Miles: 65,252 Vehicle Hours: 6,834 Passengers: 44,867 Total Eligible Expenses: $404,719
Lenawee Transportation Corporation	Lenawee Transportation Corporation is a demand/response and semi-fixed-route transit system operated for and supervised by the county of Lenawee. Services provided are within the county and available to most citizens. Lenawee Transportation provides contract service to the consumers participating in the Community Mental Health programs and Goodwill Industries. Transportation service is also provided for the general public and for other Human Service Agency programs.	70,645/ 12	9/ 6	M-F 6:45 AM - 5:00 PM	Miles: 198,653 Vehicle Hours: 10,186 Passengers: 52,136 Total Eligible Expenses: $483,934
Shiawassee Area Transportation Agency	Shiawassee Area Transportation Agency (SATA) started operations in January of 2000. SATA was formed under Act 7 by the communities of Owosso, Corunna, Perry, Durand, the Shiawassee Regional Educational Service District (RESD), and Caledonia Charter Township. The system started with a consolidation of vehicles from several private and public agencies. Service is primarily provided in and around the member communities with limited county wide service.	72,000/ 14	15/ 15	M-F 6:00 AM - 6:00 PM Durand and Perry M-F 6:00 AM - 10:00 PM Owosso and Corunna	Miles: 425,883 Vehicle Hours: 25,814 Passengers: 99,292 Total Eligible Expenses: $922,344
Suburban Mobility Authority for Regional Transportation	The Suburban Mobility for Regional Transportation (SMART) is the suburban bus system operating in 75 communities of Macomb, Oakland and Wayne Counties covering more than 1,200 square miles. The authority operates over 283 fixed route buses and 350 paratransit vehicles. SMART is responsible for the planning, construction and operation of the public transportation facilities and services within four counties of southeastern Michigan (Wayne, Oakland, Macomb, and Monroe); excluding the City of Detroit in which this responsibility belongs to the Detroit Department of Transportation. SMART is also the fiduciary for state and federal grant funds passed on to communities in Wayne, Oakland, Macomb and Monroe counties, including areas that	1,590,766/ 1,018(996 FT and 22 PT)	389/ 389	M-SUN 22 Hours A Day	Miles: 17,094,061 Vehicle Hours: 904,744 Passengers: 12,666,653 Total Eligible Expenses: $93,065,469

	do not contribute financially to SMART services and operation.				

*Information compiled from Michigan Department of Transportation: http://www.michigan.gov/mdot/0,1607,7-151-9625_21607-31837--,00.html. Accessed February 15, 2011.

Appendix B: MDOT Administered Transportation Programs for Older Adults and People with Disabilities

Source: MDOT Bureau of Passenger Transportation

Program Descriptions

New Freedom (Federal Transit Administration (FTA) Section 5317)

Program Overview

The New Freedom formula grant program aims to provide additional tools to overcome existing barriers facing Americans with disabilities seeking integration into the work force and participation in society. Lack of adequate transportation is a primary barrier to work for individuals with disabilities. The 2000 Census showed that only 60% of people between the ages of 16 and 64 with disabilities are employed. The New Freedom formula grant program seeks to reduce barriers to transportation services and expand the transportation mobility options available to people with disabilities beyond the requirements of the Americans with Disabilities Act (ADA) of 1990.

Eligible Recipients

States and public bodies are eligible designated recipients. Eligible subrecipients are private non-profit organizations, State or local governments, and operators of public transportation services including private operators of public transportation services.

Eligible Activities

Capital and operating expenses for new public transportation services and new public transportation alternatives beyond those required by the American with Disabilities Act of 1990 (ADA), that are designed to assist individuals with disabilities.

Federal Transit Administration (FTA) Section 5310

Program Overview

This program (49 U.S.C. 5310) provides formula funding to States for the purpose of assisting private nonprofit groups in meeting the transportation needs of the elderly and persons with disabilities when the transportation service provided is unavailable, insufficient, or inappropriate to meeting these needs. Funds are apportioned based on each State's share of population for these groups of people.

Funds are obligated based on the annual program of projects included in a statewide grant application. The State agency ensures that local applicants and project activities are eligible and in compliance with Federal requirements, that private not-for-profit transportation providers have an opportunity to participate as feasible, and that the program provides for coordination of Federally assisted transportation services assisted by other Federal sources. Once FTA approves the application, funds are available for state administration of its program and for allocation to individual subrecipients within the state.

Eligible Recipients

States are direct recipients. Eligible subrecipients are private non-profit organizations, governmental authorities where no non-profit organizations are available to provide service and governmental authorities approve to coordinate services.

Eligible Activities

Capital expenses that support transportation to meet the special needs of older adults and persons with disabilities.

Specialized Services (State of Michigan program)

Operating Assistance

These funds are to be used for operating assistance, including purchase of service and vehicle leases. The amount of operating assistance will be subject to the level of need, the level of local coordination and commitment, funding availability, and legislative appropriation for specialized services.

Specialized services operating funds distribution will be determined based upon an annual application process. A local coordination plan is a requirement of the application. As part of the coordination plan, efficiency and effectiveness of the services shall be reviewed by the local coordination committee.

One coordinating agency representing the transit interests of the elderly and persons with disabilities is eligible to receive a grant per county or multi-county region. This agency shall be the applicant for all specialized services funding requests in that county or region, regardless of who actually provides the specialized transit services. In order of priority the coordinating agency must be one of the following:

a) A public transit agency; or if no public transit agency exists:
b) A governmental agency; or,
c) An existing 5310 agency; or,
d) A non-profit corporation representing specialized services interest.

FY 2010 Section 5310 Program of Projects

Recipient	Description of Project	Total Cost
American Red Cross - GR	(1) Sports Utility Vehicle - expansion	$30,300
	(2) Full size auto - replacement	$55,550
American Red Cross - Muskegon	(1) Full size auto - replacement	$25,250
Area Community Service	(3) 9-passenger vans w/lift - replacement	$133,320
	(1) cutaway bus - replacement	$69,015
	(1) medium duty bus w/lift - expansion	$131,940
Baraga Houghton Keweenaw CAA	(1) 8-passenger van - replacement	$21,210
	(1) 15-passenger van - replacement	$26,260
Baragaland Senior Citizens, Inc.	(1) 15-passenger van - replacement	$24,240
Clare County Transit Corporation	up to (1) medium duty buses w/lifts - replacement	$46,757
	Up to 1 Medium Duty Replacement Bus	28,030
	Up to 2 Medium Duty Replacement Buses	143,975
	(3) medium duty buses w/lifts - expansion	$351,850
Community Action Agency of South, Central MI	(1) 8-passenger van - replacement	$20,200
	(1) 15-passenger van - replacement	$21,210
Community Inclusive Recreation	(1) cutaway bus w/lift - replacement	$72,165
Handicappers Info Council	(3) minivans w/lifts - replacement	$133,320
Hope Network, Inc.	(13) 7-passenger minivans - replacment	$262,600
	(3) cutaway bus w/lift - replacement	$196,395
	(1) cutaway bus w/lift - expansion	$65,465
	(2) med duty w/lift - replacement	$260,750
Huron Transit Corp	(4) 30' < 35' buses - replacement	$603,840
Ionia County Comm on Aging	(1) 7-passenger van - replacement	$25,250
Key Opportunities	(1) 15-passenger van - replacement	$21,200
Lapeer Team Work	(1) 15-passenger van - replacement	$22,220
	(1) 15-passenger van w/lift - replacement	$32,320
Manistee County Transportation	(1) cutaway bus w/lift - replacement	$115,260
	(3) medium duty w/lift - replacement	$380,390
Newaygo County Comm on Aging	(3) 9 passenger vans w/lifts - replacement	$121,200
Northfields Human Service Agency	(2) 8-passenger vans w/lift - replacement	$68,680
Oceana County Council on Aging	(1) cutaway bus w/lift - expansion	$66,570
People's Express	up to (1) cutaway bus w/lift - replacement	$4,442
	Up to 4 Medium Duty Replacement Bus - using	226,440
Pioneer Resources	(4) 7-passenger vans w/ lifts - replacement	$181,800
	(2) 15-passenger vans - replacement	$101,000
	(2) cutaway buses w/lifts - replacement	$134,755
	(2) cutaway buses w/lifts - expansion	$134,755
	(2) medium duty buses w/lifts - replacement	$249,175
	(2) 35' < 40 ft. buses - replacement	$306,000
Region 3B Area Agency on Aging	(1) 7-passenger van w/lift - replacement	$30,300
Saginaw COA	(1) 7-passenger van w/lift - replacement	$40,400
	(1) Sedan - replacement	$20,200
Sanilac Transportation Corp	(2) medium duty buses w/ lifts - expansion	272970
Senior Neighbors	(1) cutaway w/lift - replacement	74555
SMART	up to (1) 7-passenger van w/ lift (NOTA) - expansion	$10,871
	Up to 8 Medium Duty Replacement Buses;	81,785
	3 Medium Duty Expansion Buses; and up to 1	285,037
	Up to 3 exp and Up to 3 replac <30' buses and 1 Expansion Van	415,499
St. Mary's of MI Guardian Angel	(1) 7-passenger van - expansion	$25,250
TRICO	(3) 7-passenger vans - replacement	$60,600
UP Community Services	(1) cutaway bus w/lift - replacement	$61,925
Western Washtenaw Area Value Exp	(1) medium duty w/lift diesel - replacement	$98,490
Total FY2011 Program		**$6,392,981**

source: Bureau of Passenger Transportation, MDOT

FY 2011 SECTION 5317 NEW FREEDOM PROJECTS

RECIPIENT	DESCRIPTION OF PROJECT	TOTAL AMOUNT
Allegan County BOC	Mobility Management	$20,000
Caro Transit Authority	Operating	$39,420
Clinton Aea Transit	Operating	$100,000
	(2) minivans	$82,000
Disability Connection	Operating	$32,000
	Mobility Mgt	$25,300
	Operating (New)	$18,744
Gratiot County COA	Operating	$20,000
Hope Network	Capital - Mobile data terminals	$400,000
Jackson Transportation Authority	Bus Shelters	$250,000
Key Opportunities	Operating	$20,000
Macatawa Area Express TA	Operating	$118,000
	Mobility Mgt	$40,000
	Mobile Data (AUL)Phase II	$120,000
Muskegon Co. BOC (MATA) (new)	Mobility Management	$100,000
	(8) vans w/lifts (expansion)	$440,000
Peoples Express	Operating	$100,000
	Mobility Mgt - travel training	$30,000
Pioneer Resources	Operating	$100,000
	Mobility Mgt	$5,000
Saginaw Transit Auth. Regional Services	Operating	$50,000
	Marketing	$10,000
	(1) 21 foot bus (replacement)	$60,000
Shiawassee Area Transp Agency	Operating	$46,444
	Operating (volunteer driver)	$69,424
SMART - NOTA	Operating	$186,068
Twin Cities	Mobility Management	$75,000
Thunder Bay Transportation Authority	Operating	$466,000
	Operating (expansion)	$184,000
Total FY2011 Program		**$3,207,400**

source: Bureau of Passenger Transportation, MDOT

FY2011 SPECIALIZED SERVICES

GRANTEE/ SUBRECIPIENT(S)	DESCRIPTION OF PROJECT	AMOUNT
Allegan County	Operating	$106,704
ALTRAN Transit Authority	Operating	$18,763
Ann Arbor Transportation Authority	Operating	$176,840
Baragaland Senior Citizens, Inc.	Operating	$14,672
Battle Creek	Operating	$92,624
Bay Metro Transportation Authority	Operating	$138,434
Branch Area Transit Authority	Operating	$27,701
CATA	Operating	$82,189
Cheboygan County COA	Operating	$25,000
Chippewa-Luce-Mackinac CAA	Operating	$25,842
Detroit DOT	Operating	$377,758
Emmet, County, Friendship Center	Operating	$93,214
HICPEL	Operating	$41,213
Houghton, City of	Operating	$58,172
ITP/The Rapid	Operating	$463,289
Ionia, City of	Operating	$21,507
Kalamazoo, City of	Operating	$60,000
Key Opportunities, Inc. (Hillsdale County)	Operating	$56,999
Lapeer Teamwork, Inc.	Operating	$18,216
Lenawee County BOC	Operating	$15,449
Livingston County	Operating	$59,862
Marquette County Transit Authority	Operating	$46,961
Mass Transportation Authority	Operating	$306,772
Mecosta County BOC	Operating	$34,431
Menominee/Delta/Schoolcraft CAA	Operating	$44,290
Missaukee County COA (Volunteer Driver)	Operating	$17,300
Montcalm County Commission On Aging	Operating	$13,749
Muskegon County BOC	Operating	$65,499
Newaygo County COA	Operating	$32,410
Oceana County BOC	Operating	$27,828
Oscoda County Area Transit Specialist	Operating	$49,751
Ottawa County BOC	Operating	$157,569
Presque Isle County COA	Operating	$43,411
Saginaw Transit Authority Regional Services	Operating	$98,924
Shiawasee Area Transportation Authority	Operating	$78,374
SMART	Operating	$787,819
St. Joseph County T A	Operating	$18,690
U.P. COMMUNITY SERVICES, INC.	Operating	$128,445
Yates Township Dial-A-Ride (Volunteer Driver	Operating	$17,048
Total FY2011 Program		**$3,943,719**

source: Bureau of Passenger Transportation, MDOT

Appendix C: Selected Supplemental Transportation Programs and Specialized Transportation Programs in Michigan

Selected Supplemental Transportation Programs and Specialized Transportation Programs In Michigan*		
Region/ Selected Programs	**Program Description**	**Source**
Region 1-Bay		
Senior Services of Midland, Michigan	Senior Services began in 1963 and offers a variety of services including transportation, home care, adult day care, early memory loss program, home delivered meals, senior centers, caregiver education, support groups, counseling, volunteer and handyman work. Its transportation program serves adults age 60 and older for critical needs such as medical appointments, dementia specific adult day health services, dialysis, grocery shopping and more. Senior Services is unique in providing extensive dementia training to its 75 volunteer drivers, including training on types and stages of dementia and the physical and behavioral changes typical of the disease. The drivers openly discuss transportation challenges and effective techniques with each other. They understand and know what to do if someone becomes agitated, gets disoriented or wants out of the car. A fleet of 10 company cars and handicapped vans has been expanded recently by the addition of a 12 passenger bus which is more efficient due to the larger capacity. The expansion of the transportation department now consists of the adult day program aides who have obtained their chauffer's licenses and drive the bus. The bus is used during the day for community events and outings. Senior Services recently received a Brookdale Foundation grant for the development of an early memory loss program which will be enhanced by providing transportation to those who are no longer able to drive.	Winner of the 2010 STAR Special Recognition Award to Senior Services; recognized for its extensive dementia training provided to its 75 volunteer drivers. Information compiled from Beverly Foundation (2010).
Carman-Ainsworth Senior Center	Carmen Ainsworth Senior Center is an adult day care located in Flint. Adult day care offers organized daily activities in a community-based setting along with personal care services. The Center coordinates with the transit authority to provide bus services to meet members' daily transportation needs within Genesee County, including all area hospitals. The cost is $1.50 each way. Rides must be scheduled with the Carman-Ainsworth Senior Center. The Center requests that people make an appointment 24 hours in advance. Same day service is available only if a bus is available at that time. Service hours are: 8:00 AM - 4:00 PM Monday-Friday. There is no service on holidays.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.carman.k12.mi.us/71721096 12343733/lib/7172109612343733/Januar y_2010.pdf Accessed March 3, 2011
Sunrise Side Senior Services	The Center does not provide formalized transportation services. It will occasionally pick up seniors to bring them to the Center or take to the doctor but in the latter case, only as part of a home care visit.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from personal communication (phone 989-653-2692).

		No website available.
Region 2-Grand		
The Area Agency on Aging of Western Michigan	The RIDELINK program was organized to meet the need for coordinated transportation for older adults. Prior to RIDELINK, when older adults in the county needed transportation, they had a myriad of services to choose from, but no single access point to call for service. RIDELINK was implemented with the idea that older adults would be able to call one number to take care of their transportation needs. The system maximizes the use of available funds and transportation options geared toward older adults. RIDELINK's call-center operations began on December 29, 2006 and its transportation services began on January 2, 2007. Partner agencies in the project provide curb-to-curb, door-to- door and door-through-door transportation to seniors based on needs identified at the point of registration. Ridelink is a collaboration of five agencies providing transportation for adults 60 and over in Kent County, Michigan. Ridelink agencies include; ACSET- Latin American Services, American Red Cross, Hope Network Transportation, Senior Neighbors and United Methodist Community House. Ridelink is coordinated by The Rapid and the Area Agency on Aging of Western Michigan.	Winner of the 2009 STAR Special Recognition Award for its RIDELINK program (for coordinating transportation for older adults). Information compiled from Beverly Foundation (2009) and: http://www.aaawm.org/ridelink Accessed on March 3, 2011
Hope Network	Hope Network Transportation supports a higher level of independence and quality of life for individuals with disabilities, disadvantages and older adults through its Specialized Transportation Services and Volunteer Transportation System. For its Specialized Transportation Services, Hope Network utilizes a fleet of 63 vehicles, and more than 60 professionally trained staff. D rivers provide door-through-door transportation for older adults and door-to-door transportation for individuals with a disability. Transportation services take individuals to crucial medical appointments, day programming, jobs or other activities in the community. Its Volunteer Transportation System (VTS) was founded in 1997 to address the unmet transportation needs of Medicaid and disadvantaged residents in rural areas. VTS has over 130 active volunteers living in both Michigan and Ohio. These volunteers drive over 1.3 million miles annually, serving over 3,000 people who would otherwise have no access to medical care. Hope Network is a partner in Kent County's coordinated senior transportation network, RideLink. In 2009, Hope Network Transportation Services provided over 248,000 rides totaling more than 2.5 million miles.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.hopenetwork.org/Support-Services/Transportation.aspx Accessed March 3, 2011
Mecosta County Commission on Aging	Transportation services are provided as part of in-home support services. Qualifying Seniors are transported to and from medical appointments and other limited needs. Volunteer Drivers are trained to transport individual Seniors. DART Tickets are available to qualifying Seniors in Big Rapids. Four vans are available for handicapped, medical and group social trips. The Commission on Aging (COA) is funded by County	Respondent to 2010 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.co.mecosta.mi.us/services.as

	millage, private contributions, memorials, Mecosta & Osceola United Way and the Michigan Department of Transportation. Grant funding through the Older Americans Act, Office of Services to the Aging, Area Agency on Aging of, Title 111B, State Alternative Care, and Senior Center staffing also play an important role in service provision.	p Accessed March 3, 2011
Georgetown Senior Center	The Georgetown Senior Center offers a variety of social, recreational, and educational activities for individuals age 55 and over. The Center offers transportation to Georgetown township residents to locations including the doctor, the store, work or to the senior center? The Center picks up users and takes them where they want to go. Prices range from $2.50-$15 depending on the zone of travel. Zones include: Zone A **(**from a location within Georgetown Township to Senior Center; from Senior Center to a location within Georgetown Township; from a location within Georgetown Township to another Township location); Zone B (cities of Hudsovnille or Grandville, or similar distance); Zone C (regularly scheduled trip to Grand Rapids, Zeeland, Wyoming, Allendale, Holland, Cutlerville, Walker, Beltline area, or similar distance; special trip to Grand Rapids, Zeeland, Wyoming, Allendale, Holland, Cutlerville, Walker, Beltline area, or similar distance); Travel to outside these established areas may be arranged by calling ahead.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.georgetown-mi.gov/senior/index.html Accessed February 28, 2011
Mecosta County Commission on Aging	The purpose of the Mecosta County Commission on Aging (COA) is to improve the quality of life of the county's 60-plus population. The agency's goal is to support Seniors in their efforts to remain in their own homes, maintaining independence, health, dignity, and self-respect. Eligibility for services is determined on a priority basis. The Commission on Aging (COA) is funded by County millage, private contributions, memorials, Mecosta & Osceola United Way and the Michigan Department of Transportation. Grant funding through the Older Americans Act, Office of Services to the Aging, Area Agency on Aging of, Title 111B, State Alternative Care, and Senior Center staffing also play an important role in service provision. The Center offers transportation services through its in-home support program. Qualifying Seniors are transported to and from medical appointments and other limited needs. Volunteer Drivers are trained to transport individual Seniors. DART Tickets are available to qualifying Seniors in Big Rapids. Four vans are available for handicapped, medical, and group social trips.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.co.mecosta.mi.us/coa.asp Accessed February 28, 2011
Region 3-Metro		
Jewish Family Service of Metro Detroit of West Bloomfield,	Jewish Family Service of Metro Detroit, incorporated in 1928, is a non-sectarian nonprofit organization that provides a safety net for individuals and families facing difficult life situations. JFS provides several personalized, culturally sensitive social and mental health services, which include geriatric care management, mental health and	Winner of Beverly Foundation's STAR Award for Excellence in 2010 for its flexibility and adaptability in responding to the needs of its passengers.

Michigan (JFS)	substance abuse counseling, meals on wheels, home care, transportation and others. Transportation Services were created to respond to the community need for access to health care and lack of specialized mobility options. The program started with two volunteer drivers using their vehicles, and developed to what is now a staff of eleven drivers, volunteer receptionists, two dispatchers, a service director, and a fleet of thirteen agency-owned vehicles. The program now provides 26,000 to 30,000 rides per year, serving from 987 to 1200 riders annually. The curb-to-curb service was expanded to door-to-door assistance in 1995, and then to door-through-door and wheel-chair assistance in 2005 in response to the needs of fragile older adult riders with dementia and other mental health and cognitive impairment issues. JFS transportation is individualized and has the capacity to respond to people who may have difficulty scheduling rides, remembering appointments, handling money, and/or staying alone in the vehicle. Drivers undergo a defensive driving and a special passenger training provided in partnership with the local transit provider, and dispatchers and volunteers are trained to provide extra reminders to clients regarding their appointments and handle multiple calls from clients with patience and respect. Its sophisticated scheduling and dispatching software allows JFS to keep track of clients' destinations and special needs. Its transportation services are available not only to people with dementia, who are mainstreamed with other passengers, but also to their caregivers and family members, who travelled free of charge, and the number of rides is unlimited. In addition to demand-response scheduling, passengers have an option of subscription rides, allowing them to book on-going trips with one call.	Information compiled from Beverly Foundation (2010).
Macomb County Interfaith Volunteer Caregivers	Located in Warren, Michigan, Macomb County Interfaith Volunteer Caregivers was organized in 1992. It serves a suburban area, and offers transportation as part of a menu of services on a budget of $46,545. It does not charge for rides, and its major sources of funding include community donations (87%), grants (11%), and rider donations (2%). The program provides rides to 219 senior riders, and involves 158 volunteer drivers, 56% of whom are age 65+. Drivers use their own vehicles to provide curb-to-curb, door-to-door, door-through-door, assistance at the destination, and escort services to passengers. Macomb County Interfaith Volunteer Caregivers maintains linking relationships with a variety of human service agencies as well as transportation services. Words that describe the relationship of its mission to its transportation services are: independence, home, and caregiving. In 2006, the program provided 4,058 rides at an estimated cost per ride of $12.00. Designed specifically to fill transportation gaps, MCIVC provides rides beyond municipal boundaries, in the early morning for outpatient surgeries, late at night for special social outings, and offers various kinds of assistance at the destination. Thanks to MCIVC's efforts, premature institutionalization was prevented for many seniors.	Winner of 2007 STAR Award by Beverly Foundation. Respondent to 2008 and 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from Beverly Foundation (2007) and: http://www.casscoa.org/homeCare.htm Accessed March 3, 2011

Troy Medi-Go Plus	Troy Medi-Go *Plus* is a non-profit community organization dedicated to helping Troy senior citizens and adults with disabiilties in need of transportation to get to medical appointments and other important destinations. Troy Medi-Go *Plus* provides door-to-door transportation for Troy residents age 60 and older and persons with disabilities age 18 and older. Troy Medi-Go *Plus* receives funding and support from: The City of Troy, Michigan; SMART (Suburban Mobility Authority for Regional Transportation); Michigan Department of Transportation; The Beaumont Foundation; Rider and Supporter Donations.	Respondent to 2009 and 2010 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://site.troymedigo.org/ Accessed on March 3, 2011
Matrix Human Services, Reuther Human Services	Reuther Older Adult and Wellness Services (Reuther) was founded in 1953 by the United Automobile Workers as a social program to meet the needs of all retired men and women. Reuther promotes physical and mental well-being, and financial stability for vulnerable low-income seniors. Clients' basic needs are met by case management interventions that provide food, in-home services of homemaking, personal care and chores, as well as medical transportation, and access to vital self-sufficiency supports, Transportation services include transportation for medical appointments and personal business. Medical transportation includes door-to-door transportation to medical appointments.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.matrixhumanservices.org/index.php?option=com_wrapper&Itemid=91 Accessed March 3, 2011
North American Indian Association	Current funding does not allow for transportation program. Will hopefully be getting funding next year to re-instate program.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information from personal communication on March 3, 2011
City of Royal Oak Senior Transportation	The City of Royal Oak Senior or Handicapped Transportation program is available from 9:15 AM - 3:30 PM, Monday – Friday. Calls can be made to the dispatch number (248-246-3914) between the hours of 9:30 AM and 12:30 PM, up to two weeks ahead, to schedule an appointment. Handicapped lifts are available. The transportation boundaries for the program are Nine Mile Rd to Fifteen Mile Rd., between Southfield Rd. and Stephenson Hwy. A fare of $2 is suggested for each one-way trip. A fare of $3 is suggested for each round trip. There is a daily shuttle to and from the Senior/Community Center or Salter Community Center, and daily transportation to medical appointments (within above boundaries plus Livernois and Crooks Rd North to 16 Mile Rd., and Dequindre to 11 Mile Rd.). Transportation to other locations within the program boundaries is also provided daily. Transportation to the Northwood Shopping Center is available on Tuesdays, to Meijers on Thursdays, Oakland Mall on the 1st and 3rd Wednesday of each month, and Somerset Mall the 2nd Wednesday of each month.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.ci.royal-oak.mi.us/portal/departments/senior-community-center/transportation Accessed February 28, 2011
The City of	The City of Southfield and SMART (Suburban Mobility Authority Regional	Respondent to 2009 STAR Search/Awards

Southfiled	Transportation) work together to improve community transit service to accommodate the needs of Southfield's senior citizens and those with disabilities. They do this in several ways. Transportation of Southfield Seniors (TOSS), uses lift-equipped vans to transport senior residents (age 60+) who reside in Southfield or Lathrup Village. TOSS accommodates permanently physically challenged persons of any age. For information and arrangements please call (248) 796-4658. A donation of $5 per round trip is suggested. Additional donations are welcome. In addition to medical appointments, TOSS provides services to local supermarkets and banks, to doctors and other medical appointments. There is also the SMART Connector**.** Regular scheduled stops for SMART buses have been arranged at more than 25 Southfield locations. Scheduled transportation to theaters, sporting events, shopping, and personal errands are available. For a listing of pickup locations and destinations users can call the Southfield Adult Recreation Center 50+ at (248) 796-4650. Curb-to-Curb bus service is available by appointment. Those requiring regular service through SMART may call their offices at (248) 476-6630 at least two days in advance of the required pickup.	survey conducted by Beverly Foundation. Information compiled from: http://www.cityofsouthfield.com/Government/CityDepartments/LZ/ParksRecreation/ServicesforSeniors/tabid/507/Default.aspx Accessed February 28, 2011
Transportation Program of the Dublin Senior Center	White Lake Township offers a transportation program. This service is open to the senior and disabled residents of White Lake, Commerce and Wolverine Village. Vehicles are available to transport people to the Dublin Community Senior Center, medical appointments, employment, grocery shopping, pharmacies, malls and more. For information people can call 248-698-3994 Monday – Friday between 8:30am – 12:30 PM Reservations may be taken up to two weeks in advance but no later than one day before. Space may not be available on short notice. $1 suggested fare for each one-way trip.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.whitelaketwp.com/Committees/SeniorCenter/Newsletters/2005/April%2005%20Newsletter.pdf Accessed February 28, 2011
Region 4-North		
Otsego County Commission on Aging's (OCCOA) Medical Transportation Program	OCCOA's Medical Transportation Program offers rides to Otsego County older adults for medical appointments, including those to doctors, labs, dentists, eye care practitioners, and pharmacies. Rides are provided free of charge by Retired Senior Volunteer Program (RSVP) volunteers on an as-needed basis. Those willing to utilize the Otsego County Bus System may obtain free bus tokens from OCCOA for appointments scheduled in Otsego County. The program is limited to Otsego County residents and is targeted toward those who are 60 years of age or older. Availability of rides is based on volunteer availability. Most drivers provide rides to local appointments in Gaylord. There are others who are willing to drive to other locations, including Petoskey, Traverse City, Grand Rapids, Midland/Saginaw/Bay City, Ann Arbor, and Detroit. Because the program is volunteer-based, OCCOA cannot guarantee that an RSVP driver will be available when you need them. However, approximately 75% of requests are filled. The sooner you submit your request for a ride, the more likely a	Respondent to 2010 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.otsegocountycoa.org/medtrans.cfm Accessed March 3, 2011

	driver will be able to drive you. Participants need to be able to get in and out of the volunteer's vehicle with limited assistance. If you need to be lifted in and out of the volunteer's vehicle, please arrange for a family member or friend to help you. You will need to arrange for similar assistance at the facility to which you are traveling.	
Cheboygan County Council on Aging	**The Cheboygan County Council on Aging is a private non-profit 501 C-3 organization incorporated in 1974 to serve the needs of Cheboygan county's senior citizens. Senior transportation services are provided including a van with a handicap lift. Qualifying users include seniors and persons with disabilities within the existing transit service areas of the County of Cheboygan. Services are provided to the following destinations only: doctors appointments and senior centers for meals and recreation. Medical Centers include all Medical Centers in Cheboygan, Indian River, and Wolverine cities.** Arrangements must be made 2 working days in advance. In Cheboygan call the Cheboygan Senior Center at (231) 627-7234, Sunday through Thursday, 8:30 AM – Noon. Escorts are available.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.3coa.com/show/transportation.html Accessed March 3, 2011
Friendship Centers of Emmet County	Friendship Center buses help meet the mobility needs of senior citizens for a variety of purposes including doctor's appointments, employment, grocery shopping, volunteering, socialization, and assorted personal care requirements. The buses are lift-equipped to handle wheel chairs and persons with other special needs. Bus service is available Monday-Friday between the hours of 9:00 AM and 4:30 PM Calls are accepted between the hours of 8:30 AM and 5:00 PM Fares for seniors age 60 and older range from $1.50 one way for in-town rides and $2.50 one way for out-of-town rides. Routes include: North Route - Monday thru Friday a bus comes down to Petoskey from the Pellston area. The route is determined by rider usage. Riders can come into town and spend the day and return at 2:00 or 4:00; Harbor Springs Route - Call for specific information. The schedule for this bus is determined by rider usage; East Mitchell Route - On Tuesdays and Fridays the bus leaves Petoskey for pick-ups in the eastern part of Emmet County (Maxwell Road; Pickerel Lake Road area). Riders can spend the day in town and return around 3 PM. Rides are also provided to the Casino by reservation. For medical and other appointments, users must call at least one day ahead. For shopping, users can call anytime but are encouraged to plan ahead to be accommodated.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.emmetcoa.org/services/transportation Accessed February 28, 2011
Region 5-Southwest		
Shepherd's Center Escort Transportation -	Escort Transportation is a one-on-one personalized transportation service to health related appointments. Transportation is available Monday through Thursday: There is a limit of two rides per week per individual. A donation to the Shepherd's	Winner of STAR Award for Excellence. Information compiled from:

Kalamazoo, MI	Center of $5.00 is suggested for a round trip. This may be paid to the driver. Non-Medical escort transportation is a one-on-one personalized transportation service for non-medical needs such as shopping, banking, library, and nursing home visits. Service are available Wednesdays and Thursdays and are limited to two rides a month And 3 hours per trip. A donation to the Shepherd's Center of $5.00 is suggested for a round trip. This may be paid to the driver. Volunteer drivers provide one to one transportation. The program's goal to assist older adults to remain independent by providing transportation to appointments. Drivers donate their time and use their *own* vehicles. They remain with the rider and are available to assist as necessary.	http://www.shepherdscenterkalamazoo.com/transportation.php Accessed February 28, 2011
Portage Senior Center	Established in 1979, the Portage Senior Center is the first nationally accredited senior center in Michigan. It is a vital, busy place offering a variety of services and activities that change with the needs and desires of its members. The mission of the Portage Senior Center is to provide, with the help of its members, information and a range of services, activities and volunteer opportunities that promote personal growth, health, friendship and independence for area persons over the age of 50. Transportation to and from the Center via the PSC mini-bus is available to City of Portage residents who are members of the Center. Members are asked to call at least one day in advance to make arrangements. Transportation is also provided for local weekly shopping excursions. A donation of $3 per round trip is suggested.	Respondent to 2009 and 2010 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.portagemi.gov/Departments/SeniorCitizenServices.aspx Accessed on March 3, 2011
Cass County Council on Aging	The Cass County Council on Aging Home Care department mission is to maintain and improve the quality of life for mature adults (over 60 years of age); by providing 24 hour a day basic in-home care, seven days a week (as staff are available). The staff of bonded and trained Care Givers (Direct Care Workers) cover the entire Cass County providing services to individuals and families on both a short and long term basis. As part of its Home Care Program, the Council provides transportation to out of county medical appointments. The team of volunteer drivers may drive their own cars or drive the handicap accessible van. Transportation is provided to non-Medicaid seniors over 60.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.casscoa.org/homeCare.htm
North Berrien Senior Center	The North Berrien Senior Center has been committed to serving persons 60 years of age or older and their spouses for over 25 years. The service area primarily consists of the cities of Coloma and Watervliet and the townships of Bainbridge, Coloma, Hager and Watervliet. All area seniors can participate in any of its programs. The North Berrien Senior Center is funded largely through Berrien County millage, Region Four Area Agency on Aging through Title III-B of older America Act, Community Hospital Watervliet, and private donations. In terms of transportation, volunteers donate their time to drive the center's vehicles to bring seniors who live in our service area and are 60 years of age or older to medical appointments, grocery shopping, and rides to the center for lunch. Transportation is available from 9:00 AM - 3:00 PM Monday through	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.northberrienseniorcenter.org/index.html Accessed March 3, 2011

	Friday and is limited to areas of Berrien County.	
Southwest Michigan Planning Commission SWMPC) Senior Transportation Demonstration Program	In 2008, SWMPC's grant proposal was one of eight selected for funding by the National Center for Senior Transportation. The funds are being used to purchase web-based software for public transit agencies in southwest Michigan to improve customer satisfaction, increase efficiency and lessen staff time spent on generating reports. The project involves 8 public transit agencies and 4 senior agencies and is intended to improve regionalization of services and coordination between agencies. Implementation strategies include: 1) purchasing and implementing a regionalized, web-based program in rural/small transit agencies to allow for efficiencies, improve customer service, and expand services; 2) survey the older adult populations in Van Buren and St. Joseph Counties to inform transportation planning; and 3) pilot a program in Branch County (Senior Connect) to allow seniors to travel on public transit with an escort or mentor without additional charge.	National Center for Senior Transportation 2008 Grant Project Information compiled from: http://www.swmpc.org/ncst.asp Accessed February 28, 2011
Region 6-Superior		
ALTRAN-Alger County Public Transportation	ALTRAN provides dial-a-ride service for all transportation needs. Passengers are asked to make reservations in advance. Same day call ins may not be able to get the scheduled time they request due to advance reservations. Each time someone boards the bus he or she must pay a fare. Children two and under, when accompanied by an adult, ride free. If a personal care attendant is needed, the attendant rides for free.	Respondent to 2010 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.altranbus.com/ Accessed March 3, 2011
Little Brothers – Friends of the Elderly	Little Brothers - Friends of the Elderly is a national network of non-profit, volunteer-based organizations committed to relieving isolation and loneliness among the elderly. Among the direct services offered by the branch in the Superior Region are a local Medical Transportation Program and a Medical Transportation Program to Marquette. Both programs are free of charge. They also have two wheelchair vans available to transport elderly who need assistance. They also offer to stay with the elderly person as needed. Their goal is to make their transportation program special for the elderly.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://houghton.littlebrothers.org/ Accessed March 3, 2011
Hospice of the EUP	The Hospice of the EUP offers transportation services to seniors through its Faith In Action Bridging Program which provides community support through volunteer services to homebound individuals throughout Chippewa County. These services are designed to help clients and their families to maintain their independence, dignity and quality of life. Services include transportation for medical appointments, shopping, errands, and other trips. There is no fee for the service.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: personal communication (906-253-3151) http://www.faithinactionmi.org/hospice_of_chippewa/

		Accessed February 28, 2011
Region 7-University		
Blueprint for Aging – Catholic Social Services of Washtenaw County	The Blueprint for Aging is a collaborative of seniors, family members, nonprofits, businesses, and government agencies working to improve services, care, and quality of life for older adults in Washtenaw County. The Blueprint has developed four initiatives to institute fundamental system changes: 1) foundation building; 2) aging in place; 3) senior leadership; and 4) technological innovations. The Blueprint for Aging website (http://blueprintforaging.org/) provides information about senior resources in Washtenaw County, including transportation services (e.g., Rideconnect, Neighborhood Senior Services Medical Access Program, and Jewish Family Services Patient Partners Program). One of the pilot projects initiated in 2008 involved the development and implementation of a transportation voucher program for seniors. Expansion of the voucher program to rural parts of the county is planned.	Respondent to 2010 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.csswashtenaw.org/index.php?page=blueprint-for-aging and http://blueprintforaging.org/ Accessed March 3, 2011
Jewish Family Services of Washtenaw County	The JFS Transportation Program has grown to include 3 vans, one of which is equipped with a wheelchair lift. The program is designed to provide low-cost transportation for Older Adults and disabled clients to doctor's appointments, grocery stores, work and to events and programs at both the JFS office and Jewish Community Center. JFS carefully selects and hires caring, safe, and professional drivers to provide quality services including door-to-door escorted transportation to our frail older adults needing personal assistance. Detained information on the program, scheduling and fees is contained in the JFS Car/Van Transportation Program booklet on the website.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.jfsannarbor.org/services/transportation/ Accessed March 3, 2011
Western-Washtenaw Area Value Express (WAVE)	WAVE is a non-profit service organization that exists to provide affordable transportation to older adults, persons with disabilities, and other transit-dependent individuals in western Washtenaw County. Services include: door-to-door bus service in the Chelsea and Dexter area; inter-urban express bus linking Chelsea with Dexter and Ann Arbor; special trips bus for groups; and LifeLine Services Van program that can drive a western Washtenaw County resident to anywhere within Washtenaw County. These services operate Monday through Friday, with the exception of holidays. Participants call (734) 475-9494 for details or to arrange a ride.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.ridethewavebus.org/ Accessed March 3, 2011
East Lansing Prime Time	The East Lansing Prime Time Seniors' Program mission is to provide welcoming and enjoyable opportunities that meet the educational, leisure, and service interests of East Lansing seniors and to reach out and lend personal support through our many programs. The program is open to all area persons 55+. Transportation programs include a Gold Card Taxi Service which provides taxi fare assistance to seniors age 60+ who live within the boundaries of East Lansing. The card is good for $20 off taxi fare	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://www.cityofeastlansing.com/PrimeTime/

	each month and a $10 start fee for the card as well.	Accessed March 3, 2011
Hillsdale County Senior Services Center, Inc.	Hillsdale County Senior Services Center, Inc. offers a Volunteer Transportation program as a service for county residents needing transportation to and from non-emergency medical appointments. To be eligible, users must be a Hillsdale County resident, 60 years of age or disabled (transportation is available to those not disabled and under 60 for a fee). The Senior Center must be notified five working days in advance of the date with time and location of appointment. The transportation Specialist from the Center will return calls with verification of transport which includes pick-up time and the driver's name. The Center also provides Socialization Transportation for special events and to encourage isolated older persons to visit the Center and stay involved in the community. Socialization Transportation is available on Wednesdays, Thursdays and the second Friday of every month for BINGO.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://hillsdaleseniorcenter.org/main/ Accessed March 1, 2011
Milan Senior Activity Center	The Center provides transportation to anyone age 50 and older who resides in the greater Milan area (zip code 48160). Services include door-to-door on demand transportation. A 24-hour advance notification is requests, although shorter notice is accepted. Services are offered Monday, Wednesday, and Thursday from 9 AM to 2 PM. Fees are based on distance traveled with a limit of 20 miles outside of town and range from $1.00 to $5.00 each way. Funding for the program comes from the Monroe County Commission on Aging, the city of Milan, and various small grants.	Respondent to 2009 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from personal communication with Center (phone 734-508-6229). Website under construction.
The ARC Shiawassee – Supporting Inclusive Transportation	The ARC Shiawassee – Supporting Inclusive Transportation (SIT) is a pilot transportation voucher program funded by the Michigan Developmental Disabilities Council to help Developmentally Disabled individuals in the rural areas of Shiawassee County gain access to the community by supplementing the costs of transportation. This does not include public transportation such as SATA and Thomas Transportation nor is it intended to replace those existing services. Vouchers can be used to reimburse drivers for taking you places such as Employment, School, Medical, Errands, Social and Leisure, and Civic Involvement. Riders must be able to request on their own to be enrolled and participate in the program or indicate in some other way their interest. Enrollment requests from family or providers will be considered only when it is clear that the potential rider is interested and will benefit. Riders must complete an orientation training designed to ensure they understand how the program works and the designed to help them choose safe drivers. Drivers will be reimbursed for expenses using the voucher system. It is the responsibility of the driver to sign the voucher, therefore validating the accuracy, and to submit it to The Arc Shiawassee for payment.	Respondent to 2008 STAR Search/Awards survey conducted by Beverly Foundation. Information compiled from: http://ucpmichigan.ucplabs.org/uploads/media_items/shiawassee-policies.original.pdf Accessed February 28, 2011
Community Shopping Bus	The Community Shopping Bus Program helps seniors access local shopping centers at a reduced cost. The program was initiated and is sustained through a collaborative	Featured as a case study in the Beverly Foundation's Public Transportation

Program (Capital Area Transportation Authority)	effort with the human service agency. The shopping bus is a 30-foot, low floor bus with cargo compartments. It can carry more than 20 riders and their packages, as well as transport up to three people using wheelchairs. The bus makes regularly scheduled trips between senior housing complexes and local shopping centers. Reservations are not required.	Programs for Seniors (2007). Information compiled from that report.

*The specialized and supplemental programs contained in this table represent a selected set of such programs rather than an exhaustive inventory. Many have been chosen from the sample of programs that has responded to the Beverly Foundation's STAR Search and STAR Awards Program survey, an annual survey intended to identify transportation programs that meet the 5 "A"s of senior friendly transportation (available, affordable, accessible, acceptable, and adaptable). For a fuller listing of programs by region and county of the state as of 2005 and as a complement to this table, see Michigan Office of Services to the Aging (2005), as well as Appendix B.

Appendix B: Demographic Analysis

DEMOGRAPHIC ANALYSIS OF MICHIGAN'S OLDER ADULT POPULATION

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A deliverable for project number OR09102:

"Low-cost, high-impact measures to meet the transportation needs of Michigan's aging population"

Submitted to:

Michigan Department of Transportation

Office of Research and Best Practice
P.O. Box 30050
Lansing, MI 48909

Abstract

This report examines population projections and current trends in driver licensing, travel patterns and transportation-related fatality and injury rates of Michigan adults age 70 years and older. By 2030, the population of adults age 70 years and older is expected to be about 1.5 million, and comprise about 14% of the state's population. Women will account for 60% of this group and there will be approximately 2 women for each man age 85 or older. Currently 80% of all adults age 70 and older and 63 % of those 85 years and older are licensed to drive, and this trend is expected to continue. Analysis of a recent statewide travel survey data shows that about one-third of adults age 70 and older live alone and 12% do not have access to a car. Among adults age 85 and older, 43% live alone and 16% do not have access to a car. Adults age 70 and older make on average 2.6 trips per day. The most frequent trip purposes are for personal business, everyday shopping, eating out, and picking up or dropping off passengers, or accompanying another person. Most trips are made by car, either as a driver (73%) or passenger (23%). The portion of trips as a passenger increases with age. Walking accounts for about 4% of trips and public transportation accounts for about 1% of trips in this age group. Examination of Michigan crash records shows that each year about 575 adults age 70 and older are killed or severely injured in traffic crashes. The crash rate for drivers age 70 and older is 33 crashes per 1,000 licensed drivers per year, and the rate of fatal crashes is 0.2 per 1,000 licensed drivers per year.

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Introduction

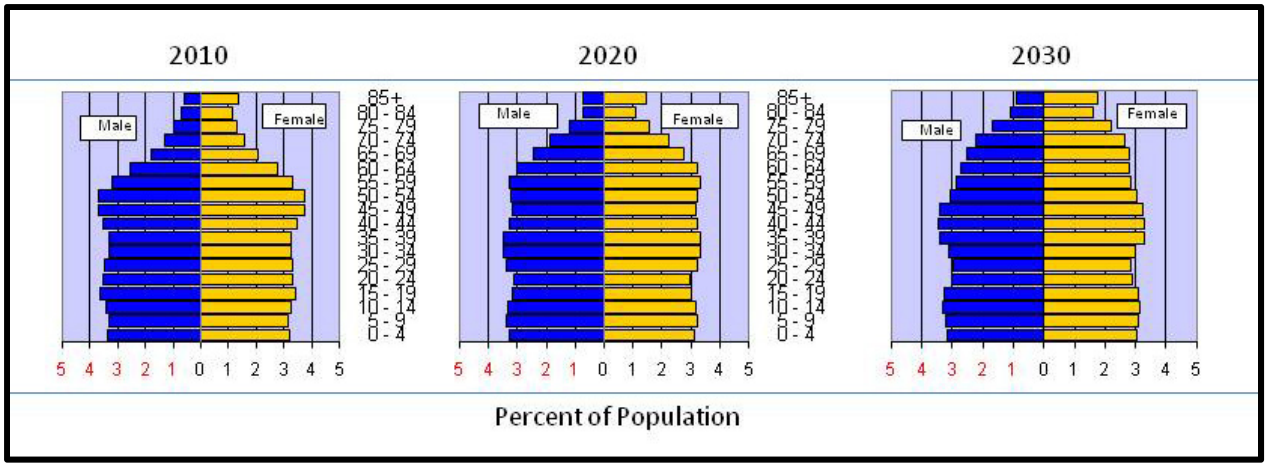
This document summarizes the demographic analysis task for the project, *Low-Cost, High Impact Measures to Meet the Transportation Needs of Michigan's Aging Population*. The purpose of this task is to better understand current travel patterns of the aging population of Michigan so that future transportation needs of this age group can be assessed. The report examines the size and distribution of the current population of adults age 70 and older in Michigan, and compiles population projections of this age group through 2030. Trip making behavior of older adults is examined through the current licensing patterns of this cohort and through trip making metrics from a recent statewide household travel survey. Vehicle-related crashes, deaths, and injuries are examined through a review of current Michigan crash records. Following this introduction, the second section of this report addresses the size and distribution of the population of older adults in Michigan. The third section explores driver licensing of older adults. Travel patterns of older adults are summarized in the fourth section, and crash-related injuries and fatalities are presented in the fifth section. Key findings are summarized in the last section.

Population

The US Census Bureau conducts a census of the population every 10 years, and estimates future populations for each state by age and sex for 30 years into the future. The projections are based on cohort analysis and demographic trends (i.e., birth and mortality rates, internal migration patterns) of that time period. Population data from the 2010 census were not available for this project, and projections based on the 2010 census will not be available for several years. Thus, population numbers and projections are based on US Census information from the 2000 census. For one set of analyses, information based on the 1990 census was also used.

The number of people in Michigan age 70 and older was estimated by the US Census Bureau to be 958,230 in 2010, and is expected to reach 1,207,218 by 2020, and 1,511,313 by 2030 (US Department of Commerce, 2005). This age group is expected to comprise 11% of Michigan's population in 2020, up from 9% in 2010. By 2030, this age group will account for 14% of the population of the state.[1] The population pyramids for the state of Michigan for 2010, 2020, and 2030 (Figure 1) clearly show the growth of the oldest age group relative to younger age groups through the "squaring" of the population pyramids.

[1] The percentages are based on total Michigan population projections of 10,428,683 for 2010, 10,695,993 for 2020, and 10,694,172 for 2030 from the US Census, Population Division, Interim State Projections, 2005.



Source: http://www.census.gov/population/ www/projections/statepyramid.html, Accessed February 5, 2011.

Figure 1. Michigan Population Pyramids for 2010, 2020, 2030

Table 1 shows the distribution of the 70+ age group by 5-year age groups and sex for 2010, 2020, and 2030. The trend in the growth of the older population of Michigan as well as the relative proportions of women to men can be more clearly seen in Figure 2.

Table 1. Michigan Population Projections by Age and Sex for 2010, 2020, and 2030									
Age	2010			2020			2030		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
70-74	133,560	162,755	296,315	197,920	240,115	438,035	236,411	284,619	521,030
75-79	99,790	136,876	236,666	127,674	169,511	297,185	178,178	233,251	411,429
80-84	74,889	118,286	193,175	76,322	115,436	191,758	117,506	174,259	291,765
85+	64,665	140,523	205,188	75,988	155,817	231,805	98,477	188,612	287,089
Total	372,904	558,440	931,344	477,904	680,879	1,158,783	630,572	880,741	1,511,313

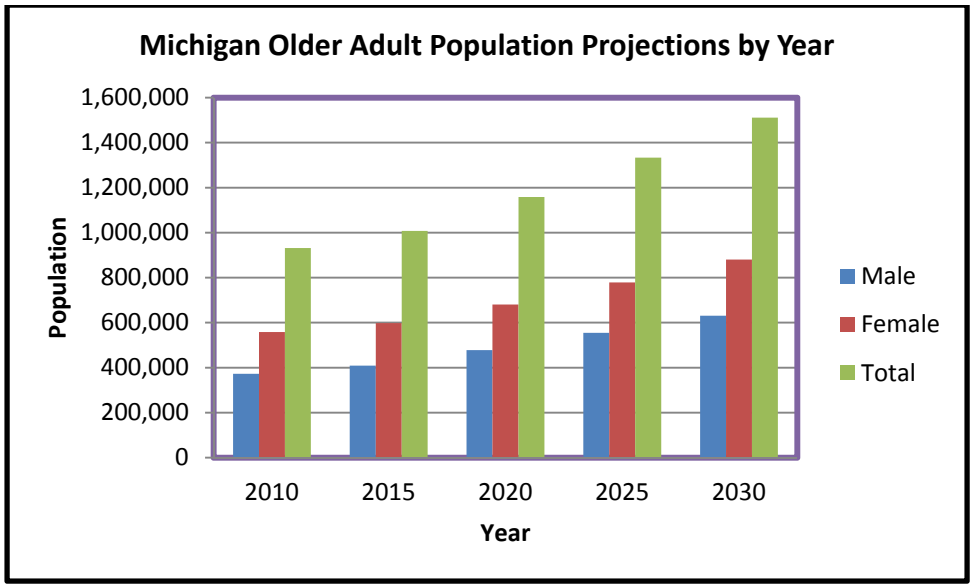


Figure 2. Population Projections of Adults Age 70 and Older by Sex in Michigan for 2010, 2020, and 2030

From Figure 2 it can be seen that among adults age 70 and older, women will continue to outnumber men. Table 2 further examines this trend by showing the percent of women in the projected older adult population and also the ratio of women to men in each 5-year age group from 2010 to 2030. The ratios appear to be stable over this time, and overall women will account for close to 60% of the 70 and older age group, close to 55% of the 70-74 year age group, 57% of the 75-78 year age group, about 60% of the 80-84 year age group, and about 67% of those age 85 and older. There will be about 1.4 women for every man among those age 70 and older. Among people age 85 and older, there will be about 2 women for every man.

Table 2. Women as Percent of Total Population and as Ratio to Men by Age Group and Year

Year		Age Group				
		70-74	75-79	80-84	85+	Total 70-85+
2010	% women	54.93	57.84	61.23	68.48	59.96
	women/men	1.22	1.37	1.58	2.17	1.50
2020	% women	54.82	57.04	60.20	67.22	58.76
	women/men	1.21	1.33	1.51	2.05	1.42
2030	% women	54.63	56.69	59.73	65.70	58.28
	women/men	1.20	1.31	1.48	1.92	1.40

The Michigan Department of Transportation (MDOT) has divided the state into seven regions for administrative and management purposes (see Appendix A for list of counties in each MDOT

region). As part of this analysis, we planned to obtain population projections for each of the seven MDOT regions. Examination of census materials indicated that population projections by age and sex for counties were available from the 1990 census through year 2020 (Michigan Information Center, 1996). Lacking other information, we estimated the county level population by age and sex for 2010 to 2030 by applying the distributions for future years from the 1990 census to the total projections from the 2000 census. This preserved the distributions of population by county, age, and sex from the 1990 projections, but yielded the statewide total in the projections from the 2000 census. Aggregation of county projections yielded the population projections for each MDOT region.

The population projections for the years 2010, 2020, and 2030 of adults age 70 and older by sex for each MDOT region, are shown in Table 3 and graphically summarized in Figure 3. The estimation method is described in Appendix B. The population projections for MDOT regions by age and sex for 2010, 2020, and 2030 are also in Appendix B.

Table 3. Population Projections of Adults Age 70 and Older by MDOT Region, Sex, and Year

MDOT Region	Sex	Year		
		2010	2020	2030
Bay	M	49,585	62,121	75,633
	F	72,423	88,017	107,792
	Total	122,008	150,138	183,426
Grand	M	38,572	50,781	86,829
	F	55,875	68,899	117,665
	Total	94,447	119,680	204,494
Metro	M	147,980	185,493	250,088
	F	245,738	293,732	363,188
	Total	393,718	479,225	613,276
North	M	40,187	53,687	40,409
	F	44,549	57,020	52,785
	Total	84,738	110,706	93,194
Southwest	M	35,096	43,974	60,289
	F	51,707	61,997	83,334
	Total	86,803	105,971	143,623
Superior	M	16,741	20,403	20,577
	F	22,240	24,400	25,962
	Total	38,981	44,803	46,539
University	M	44,742	61,446	96,748
	F	65,907	86,814	130,013
	Total	116,049	148,260	226,761

Michigan	M	372,904	477,904	630,572
	F	558,440	680,879	880,741
	Total	931,334	1,158,783	1,511,313

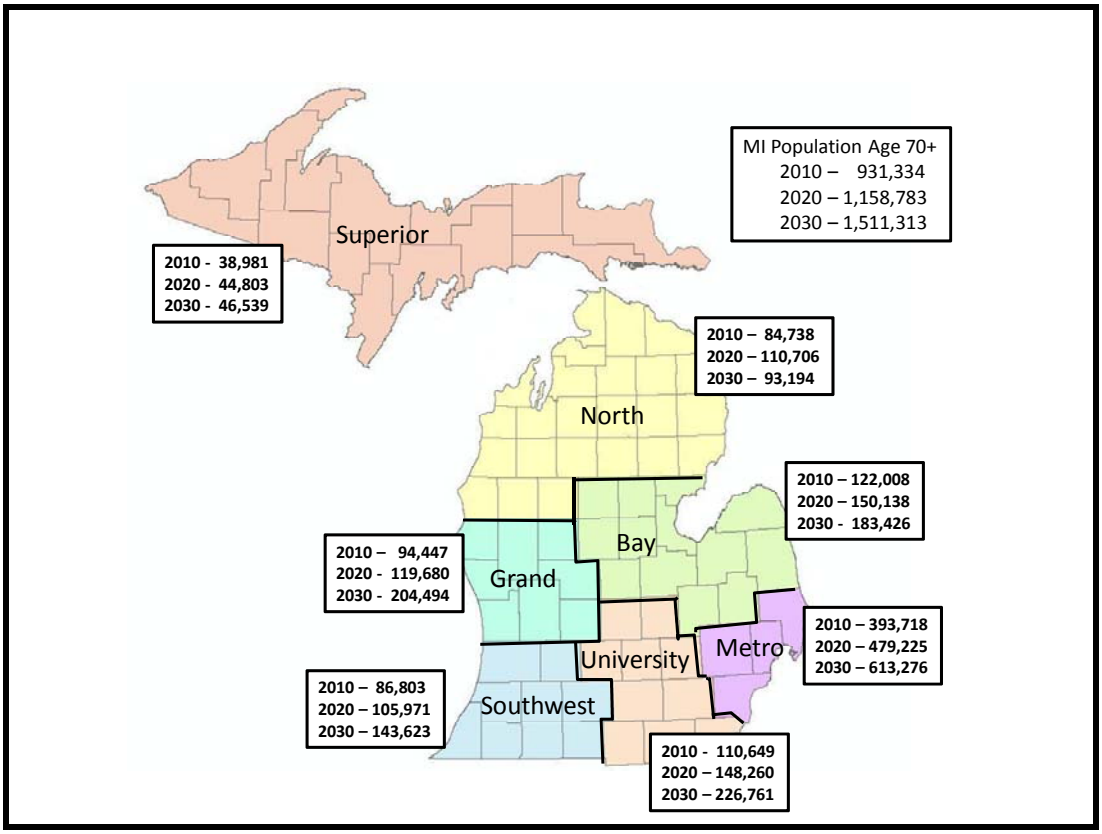


Figure 3. Projections of Michigan Population Age 70 Years and Older by MDOT Region

Driver Licenses

Driver license holding has increased over the years as the land use patterns and transportation system have become more automobile oriented and automobile ownership has increased. Members of the current cohort reaching age 70 are more likely to have obtained driver licenses earlier in their lives than members of previous cohorts, and also to have relied on automobiles to meet their transportation needs. Thus, we can expect that larger portions of older adults in the near future will have driver licenses than those in the past, and may be holding on to them longer.

We examined driver license holding trends by age, sex, and MDOT region over a 17-year span, from 1992 to 2009. These numbers are not projections, but rather the numbers of licensed drivers as recorded by the Michigan Department of State (Michigan Department of State 1992,

2000, 2009). These particular years were selected because 1992 was the first year and 2009 was the most recent year for which Michigan driver license records from the Michigan Department of State were available to us.

Table 4 shows the number of licensed drivers in Michigan by age group and sex in 1992, 2000, and 2009.

Table 4. Licensed Drivers by Age and Sex in Michigan in 1992, 2000, and 2009

Year	Sex	Age Group				
		70-74	75-79	80-84	85+	Total 70+
1992	M	117,658	79,415	41,608	20,383	259,064
	F	135,366	92,092	47,449	19,605	294,512
	Total	253,024	171,564	89057	39,988	553,576
2000	M	122,326	96,697	56,627	30,973	306,623
	F	144,576	118,511	73,188	38,263	374,538
	Total	266,902	215,208	129815	69,236	681,161
2009	M	117,312	91,195	70,089	49,106	327,702
	F	145,890	116,418	90,551	66,420	419,279
	Total	263,202	207,613	160,640	115,526	746,981

The percent of the Michigan population by age group that held a driver license in 1992, 2000, and 2010 was calculated by dividing the number of licensed drivers in each age and/or sex group by the number of adults in that group. In 1992, 70% of adults age 70 and older held driver licenses. By 2009, that portion had increased to 80%.

Table 5. Licensed Drivers as Percent of Age Group Population in Michigan

Year	Age Group				
	70-74	75-79	80-84	85+	Total 70+
1992	84.0	75.5	63.1	34.8	70.4
2000	85.0	82.5	74.2	48.2	76.2
2009	86.2	84.5	80.9	63.1	80.1

Further examination of Table 5 shows that license holding decreased for each successive age group at each time point. In 1992, 84% of the 70-74 age group was licensed, while only 34.8% of those 85 and older held driver licenses. Examining each age group shows an increase in each age group's licensed proportion over time. In 1992, about one-third of adults age 85 and older was licensed to drive, while in 2009, that portion had almost doubled, to 63%. The table also

shows that more recent cohorts were more likely to have driver license than earlier cohorts and also to hold on to their license longer.

Comparing driver license holding by sex (Table 6 and Table 7) shows that men are more likely to have a driver license than women. In 2009, approximately 87% of men age 70 and older had driver licenses compared to 76% of women.

Table 6. Percent of Men Licensed to Drive by Age Group and Year					
Year	Age Group				
	70-74	75-79	80-84	85+	Total 70-85+
1992	91.0	88.3	84.5	63.4	86. 2
2000	87.7	90.9	89.6	76.0	87.7
2009	84.3	87.1	88.7	87.8	86.5

Table 7. Percent of Women Licensed to Drive by Age Group and Year					
Year	Age Group				
	70-74	75-79	80-84	85+	Total 70+
1992	78.1	67.1	51.6	23.7	60.7
2000	82.9	77.1	66.3	37.6	69.3
2009	87.8	82.5	75.7	52.3	75.7

The comparison of age groups by sex further indicates that men are more likely to be licensed to drive than women. However, because women make up a greater portion of each age group considered here, there are more older female drivers than male drivers. Table 8 shows the percent of licensed drivers in each age group who are women, and also shows the ratio of licensed women to men (i.e., the number of licensed females to every licensed male in that age group). With one exception (1992), women comprised over one-half of those holding driver licenses, and even in that year, women were almost one-half of all license holders. In 2009, there were 1.3 women to every man licensed to drive among those age 70 and older.

Table 8. Women as Percent of Licensed Drivers and as Ratio to Men by Age Group and Year						
Year		Age Group				
		70-74	75-79	80-84	85+	Total 70+
1992	% Women	53.5%	53.7%	53.3%	49.0%	53.2%
	Licensed Women/Men	1.15	1.16	1.14	0.96	1.14
2000	% women	54.2%	55.1%	56.4%	55.3%	55.0%

	Licensed Women/Men	1.29	1.23	1.29	1.24	1.22
2009	% Women	55.4%	56.1%	56.4%	57.5%	56.1%
	Licensed Women/Men	1.24	1.28	1.29	1.35	1.28

For comparison purposes, the portion of women and the ratio of women to men in the general population for the same years (1992, 2000, and 2009) are shown in Table 9. The table reinforces the conclusion that men in the oldest age group are more likely than women in the oldest age group to have driver licenses. In 2009, there were 1.35 women to every man age 85 and older licensed to drive, while there were 1.91 women to every man in that age group in the population.

Table 9. Women as Percent of Population and as Ratio to Men by Age Group and Year

Year		70-74	75-79	80-84	85+	Total 70+
1992	% Women	54.9%	57.8%	61.2%	68.5%	60.0%
	Women/Men	1.21	1.33	1.51	2.05	1.42
2000	% Women	54.8%	57.0%	60.2%	67.2%	58.8%
	Women/Men	1.21	1.32	1.51	2.05	1.42
2009	% Women	54.6%	56.7%	59.7%	65.7%	58.3%
	Women/Men	1.20	1.31	1.48	1.91	1.40

Table 10 shows the percent of each age group in each MDOT region licensed to drive in 1992, 2000, and 2009.

Table 10. Percent of Population of MDOT Region Licensed to Drive by Age in 1992, 2000, and 2009

Region	Year	Age Group				
		70-74	75-79	80-84	85+	Total 70+
Superior	1992	81.7	75.0	67.3	37.8	70.7
	2000	86.9	82.5	71.4	46.8	75.0
	2009	92.4	88.4	82.5	60.6	82.6
North	1992	96.4	87.9	74.9	44.4	82.7
	2000	92.2	91.3	84.1	55.2	84.8
	2009	92.2	94.7	92.5	73.8	90.2
Bay	1992	87.9	80.5	69.7	40.3	75.6
	2000	88.9	86.2	78.1	51.2	79.9
	2009	88.8	89.1	84.4	66.4	83.8
	1992	87.7	77.5	68.8	38.8	73.8

Southwest	2000	87.3	86. 3	77. 8	51.6	79.1
	2009	88.5	88.4	85.2	66.6	83.6
Grand	1992	87.5	79.2	67.9	36.3	73.5
	2000	87.7	85.1	76.0	48.7	77.9
	2009	88.6	87.3	83.4	61.7	81.7
Metro	1992	78.0	69.6	55.1	29.1	64.7
	2000	80.2	77.7	69.4	44.7	71.9
	2009	81.1	77.9	75.0	59.8	74.5
University	1992	86.6	79.7	65.6	38.0	73.2
	2000	88.3	85.2	77.7	50.1	79.1
	2009	88.4	87.1	84.0	64.6	82.6

Table 11 shows the portion of each age and sex group in each MDOT region licensed to drive in 1992, 2000, and 2009.

Table 11. Percent of Population of MDOT Regions Licensed to Drive by Sex, Age and Year

Region	Year	Sex	Age Group				
			70-74	75-79	80-84	85+	Total 70+
Superior	1992	Male	91.1	92.0	94.0	69.9	89.6
		Female	73.5	65.2	50.3	22.5	57.8
	2000	Male	90.9	92.3	88.2	74.0	88.3
		Female	83.4	75.2	60.9	34.2	65.8
	2009	Male	92.8	92.5	92.0	89.1	92.0
		Female	92.0	85.0	76.0	47.3	75.8
North	1992	Male	98.0	98.1	95.4	78.0	95.7
		Female	91.0	79.6	63.3	30.4	72.3
	2000	Male	93.1	97.8	96.3	82.9	93.9
		Female	91.4	86.0	76.0	42.7	77.8
	2009	Male	91.6	99.0	98.7	93.8	95.3
		Female	92.9	91.0	87.7	63.1	85.5
Bay	1992	Male	93.5	92.5	88.4	70.7	89.9
		Female	83.0	73.5	60.5	28.2	66.8
	2000	Male	90.3	93.0	90.9	75.9	89.5
		Female	87.7	81.5	70.8	41.4	73.6
	2009	Male	86.8	91.7	92.0	91.9	89.9
		Female	90.4	87.1	79.3	55.6	79.7
Southwest	1992	Male	92.3	87.4	89.7	68.0	87.7
		Female	82.5	71.9	58.8	27.9	65.2
	2000	Male	88.5	93.7	90.3	76.7	88.9
		Female	86.4	81.0	70.4	41.1	72.7

	2009	Male	85.4	90.7	92.8	93.8	89.5
		Female	91.2	86.8	80.2	54.8	79.5
Grand	1992	Male	91.5	89.5	90.6	66.5	87.9
		Female	83.3	72.5	55.9	24.5	64.3
	2000	Male	89.1	91.0	88.4	73.1	87.5
		Female	86.5	80.9	68.9	38.5	71.6
	2009	Male	85.6	88.0	90.3	85.9	87.3
		Female	91.2	86.6	78.7	50.9	77.8
Metro	1992	Male	88.2	84.9	78.5	57.1	82.5
		Female	71.9	59.8	42.8	19.1	54.5
	2000	Male	83.9	86.9	85.6	73.3	84.0
		Female	77.4	71.6	60.4	33.7	64.4
	2009	Male	79.3	80.4	83.4	83.7	81.2
		Female	82.4	76.2	69.7	49.5	70.2
University	1992	Male	91.8	91.7	84.8	68.0	88.0
		Female	82.0	72.1	57.2	28.0	64.6
	2000	Male	90.2	92.3	91.3	78.4	89.7
		Female	86.7	80.4	70.0	39.5	72.2
	2009	Male	85.4	88.9	90.4	90.0	88.0
		Female	91.1	85.7	79.7	53.8	78.7

Travel Patterns

The following section examines metrics of travel behavior of adults age 70 and older in Michigan, including the number of trips per day, the modes used on these trips, and the purposes of the trips. These measures are derived from data from the MI Travel Counts program of 2004/2005 (Michigan Department of Transportation, 2005). The program was undertaken by MDOT to obtain household travel information for input into the MDOT Statewide and Metropolitan Planning Organization travel demand models. As part of this program, a statewide household travel survey was conducted. Michigan households sampled by geographic region, household size, number of vehicles in household, and the number of workers in household were recruited through a Random Digit Dialing (RDD) telephone contact. Information was gathered about the household, its vehicles, and all members of the household were asked to complete 48-hour travel diaries. The final database from the MI Travel Counts survey contains detailed travel and out-of-home activity information for 37,475 individuals from 14,996 households.

Of the 37,475 individuals who completed the travel diaries, there were 3,717 respondents (about 10% of all respondents) age 70 and older. Although the sampling was based on geographic areas different than the MDOT regions used in this analysis, information on county of residence was available which allowed us to calculate travel measures by MDOT regions. All

measures presented here are unweighted and based on the sample of 3,717 respondents who were age 70 and older at the time of the survey.

Table 12 shows the respondents in the 70 and older age category and gender in each MDOT region.

Table 12. Respondents in each MDOT Region by Age, Group, and Sex									
Age	70-74		75-79		80-84		85+		Total
MDOT Region	M	F	M	F	M	F	M	F	
Bay	88	130	78	111	44	52	15	32	550
Grand	67	99	63	93	38	64	13	31	468
North	63	88	54	91	33	45	17	39	430
Metro	127	140	85	99	50	95	28	37	661
South West	64	97	49	69	29	43	14	40	405
Superior	140	166	102	140	67	92	43	64	814
University	63	73	55	69	37	46	14	32	389
Total	612	793	484	672	298	437	144	275	3,717

The number of people living in the households of the respondents is shown in Table 13. Overall, about one-third of the respondents lived alone, about 54% lived in two-person households, and about 14% lived in households with three or more people. The table shows that as people aged, they were more likely to live alone or be a member of a larger household.

Table 13. Respondents by Age Group and Household (HH) Size			
Age	1-person HH	2-person HH	3+-person HH
70-74	28.1	58.7	13.2
75-79	31.0	56.2	12.8
80-84	38.0	49.8	12.2
85+	43.0	37.2	19.9
Total	32.6	53.7	13.7

Overall, 88% of respondents had at least one car available to their household. The portion of respondents without a car increased with age. Among respondents age 85 and older, 28% did not have a car in their household. Table 14 shows car ownership of households of the respondents.

Table 14. Percent of Respondents in Age Group by Number of Cars in Household				
Age	0-car in HH	1-car in HH	2-cars in HH	3+ cars in HH
70-74	6.8	42.3	39.7	11.2
75-79	10.0	51.2	31.2	7.6
80-84	15.6	54.6	23.4	6.4
85+	27.9	43.9	22.2	6.0
Total	11.9	47.7	31.8	8.6

Table 15 shows the percent of households in each age group with no cars by MDOT region.

Table 15. Percent of Respondents in MDOT Region with No Car in Household by Age					
MDOT Region	70-74	75-79	80-84	85+	Total 70+
Bay	9.2	11.1	16.7	27.7	12.7
Grand	7.2	9.0	14.7	15.9	10.3
North	11.3	15.2	20.5	26.8	16.3
Metro	5.2	6.5	13.8	29.2	9.8
Southwest	6.2	5.1	16.7	40.7	12.4
Superior	6.2	8.9	13.3	17.4	13.1
University	2.2	8.9	13.3	17.,4	8.5
Total	6.8	10.0	15.6	27.9	11.9

About 12% of respondents lived in households in which no car was available. This percentage increased with age with about 7% of respondents age 70-74 and about 28% of adults age 85 and older in households with no cars. The North MDOT region had the highest portion (16%) of respondents with no cars available, and the University region had the lowest portion (2%) of respondents with no cars available to their household.

Table 16 shows the driver license holding of respondents. Overall 83% of respondents had a driver license, which is comparable to the statewide percentage of 80% for 2009 reported in the previous section of this report. Among respondents age 70-74, 91% were licensed to drive, while 56% of those 85 years and older held a driver license. In every age category, a greater portion of men than women was licensed. The portion of respondents age 70 and older holding a driver license is slightly higher that the statewide metric for each age group, except for the oldest, among which driver license holding is slightly lower (56% for respondents and 63% for state in the 85+ age group).

Table 16. Percent of Respondents with Driver License by Age and Sex			
Age	Men	Women	Total
70-74	94.8	87.2	90.5
75-79	93.4	80.8	86.1
80-84	90.6	72.1	79.6
85+	78.5	43.6	55.6
Total	92.0	76.7	83.0

The portion of respondents of each age group without a driver license is shown in Table 17.

Table 17. Percent in each Age and Sex Group without Driver License			
Age	Men	Women	Total
70-74	5.2	12.8	9.5
75-79	6.6	19.2	13.9
80-84	9.4	27.9	20.4
85+	21.5	56.4	44.4
Total	8.0	23.3	17.0

Table 17 shows that women are more likely than men to not have a driver license. Among women age 85 and older, 56% did not have a driver license. Among men in that age group, 22% did not have a driver license.

Table 18 shows the percent of people in every age group without a driver license by MDOT region. The regions with the largest portions with people with no driver license were in the most rural MDOT regions, the North (23%) and Superior (19%) regions. The Metro region and the University region had the smallest portions of respondents with no driver license: 14% and 13% respectively.

Table 18. Percent in Age Group without a Driver License by MDOT Region					
MDOT Region	70-74	75-79	80-84	85+	Total
Bay	9.2	15.9	20.8	44.7	16.6
Grand	11.5	12.2	17.7	43.2	16.0
North	11.9	18.6	30.8	50.0	22.6
Metro	7.1	10.3	17.9	41.5	13.6
Southwest	11.8	10.2	16.7	48.2	17.0
Superior	10.1	16.1	24.5	43.0	19.0
University	5.2	12.1	13.3	41.3	13.4
Total	9.5	13.9	20.4	44.4	17.0

An important travel behavior metric is the number of trips that a person makes per day. A trip is defined here as a one-way journey between an origin and a destination. The average statewide number of trips per day for all ages based on the MI travel counts data was 3.86 (Michigan Department of Transportation, 2005). The overall average number of trips for the subsample of adults 70 and older was 2.60 trips per day. Table 19 shows the average number of trips per day for men and women by age group. The number of trips per day decreases with age and on average, men made more trips than women.

Table 19. Average Number of Trips per Day by Age and Sex			
Age	Men	Women	Total
70-74	3.33	2.91	3.09
75-79	2.93	2.55	2.71
80-84	2.52	1.92	2.16
85+	1.80	1.11	1.35
Total	2.90	2.37	2.60

Examining the number of trips per day by age and MDOT region shows a similar pattern (Table 20). The average number of trips/day ranges from 2.5 to 2.9 with the lowest trip rate reported in the Metro region and the highest in the Grand region. The decreasing number of trips with age is seen in each region. Among the oldest age group, the number of trips per day was highest in the Grand region (1.8 trips/day) and lowest in the North region (0.9 trips/day).

Table 20. Average Number of Trips per Day by Age and MDOT Region					
MDOT Region	70-74	75-79	80-84	85+	Total
Bay	3.01	2.70	1.77	1.46	2.58
Grand	3.33	3.08	2.28	1.81	2.88
North	2.95	2.35	1.85	0.85	2.28
Metro	2.88	2.49	2.22	1.25	2.47
Southwest	3.15	2.84	2.30	1.18	2.64
Superior	3.14	2.81	2.04	1.35	2.59
University	3.22	2.66	2.77	1.75	2.77
Total	3.09	2.71	2.16	1.35	2.60

The modes of travel used by the respondents are examined next. Table 21 shows the percent of the trips made by car as a driver and as a passenger, by walking and by public transport (either bus or paratransit).[2]

[2] Trips by bus and paratransit are aggregated because there were very few of them.

Table 21. Percent of Trips by Mode by Age				
Age	Car* driver	Car* Passenger	Walk	Public transit and Paratransit
70-74	76.7	19.7	2.5	0.53
75-79	74.1	21.7	2.7	0.88
80-84	67.9	27.2	2.8	1.3
85+	56.2	40.9	2.8	1.1
Total	73.2	22.7	2.6	0.8
* Includes private passenger vehicles (passenger cars, vans, SUVs, and pickup trucks)				

About 96% of the trips made by the respondents were made by private passenger vehicles. As age increased, a greater portion of the trips was made as a passenger. Almost 77% of all trips by respondents age 70-74 were as driver, and about 20% as a passenger. Trips of respondents age 85 and older were 56% as a driver and 41% as a passenger. Between 2.5 to 2.8% of all trips were walking trips, and about 1% of all trips were on a public bus or paratransit.

Table 22 shows the modal distribution of trips by MDOT region. The largest portions of walking and transit trips were reported in the Superior region. However, these portions were still very small compared to the car driver and passenger modes.

Table 22. Percent of Trips in MDOT Region by Mode				
MDOT Region	Car Driver	Car Passenger	Walk	Public transit and Paratransit
Bay	72.79	23.40	2.50	0.81
Grand	68.71	27.39	2.30	0.89
North	73.62	21.88	2.71	0.72
Metro	74.81	21.79	2.18	0.70
Southwest	74.01	22.59	2.24	0.56
Superior	72.25	22.05	3.68	1.16
University	75.33	21.77	2.18	0.37

It is clear from Tables 28 and 29 that most trips were made in a passenger car, either as a driver or passenger. Of the reported walking trips, 77% were made by someone with a driver license, 68% were made by women, and 31% were in the Superior region. A total of 42% of the walking trips were made by respondents age 70-74, 34% by those age 75-79, 18% by those age 80-84, and 6% by respondents 85 years and older.

Of the trips reported by public transit or paratransit, 57% were by people without a driver license, 79% were made by women, and 32% were in the Superior region. Thirty-percent were made by adults age 70-74, 36% by adults age 75-79, 26% by adults age 80-84, and 8% by adults age 85 and older.

Table 23 shows the trip purpose (coded in the survey database as the primary activity) by age and sex.

Table 23. Distribution of Trips by Trip Purposes by Age (%)					
Trip purpose	70-74	75-79	80-84	85+	Total
Return home	31.7	31.8	32.8	37.7	31.9
Personal Business	20.2	21.2	21.8	22.7	21.0
Everyday Shopping	16.2	16.2	16.2	17.4	16.3
Eat Out	6.9	6.4	7.0	8.0	6.8
Social	5.0	4.8	4.9	4.7	4.9
Participate in Recreation	3.0	3.8	3.3	2.7	3.3
Religious/Community	3.3	3.0	3.1	3.2	3.2
Work	4.7	2.4	1.9	0.5	3.3
Accompany another person	2.2	2.7	3.9	4.2	2.7
Pick up/drop off passenger	3.7	4.7	2.7	2.7	3.8
Major Shopping	1.1	1.0	0.4	0.5	0.9

With the exception of the work purpose, the purposes of the trips made by the respondents do not vary much across the age groups. The most frequent trip purposes (not counting the trip purpose of returning home) are personal business (21%), followed by everyday shopping (16%) and eating out (7%). Picking up and dropping off passengers and accompanying another person account for about 6-7% collectively of all trips.

Comparing the purposes of trips of men and women shows that women are slightly more likely to make the everyday shopping trips and men are slightly more likely to make personal business trips.

Table 24. Distribution of Trips by Trip Purpose and Sex			
Trip purpose	Men	Women	Total
Return home	31.7	27.6	31.9

Personal Business	22.0	20.1	21.0
Everyday Shopping	15.0	17.4	16.3
Eat Out	6.7	6.8	6.8
Social	5.0	4.8	4.9
Participate in Recreation	3.2	3.3	3.3
Religious/Community	2.3	3.9	3.2
Work	4.1	2.5	3.3
Accompany another person	3.3	2.3	2.7
Pick up/drop off passenger	3.3	4.2	3.8
Major Shopping	0.95	0.9	0.9

Vehicle-Crash Related Deaths and Injuries

Each year in recent years, about 575 Michigan residents age 70 and older died or suffered an incapacitating injury (code K or A on Michigan crash records) as a result of vehicle crashes (numbers derived from data in reference, Michigan Office of Highway Safety Planning, 2010). Tables 25, 26, and 27 show the number of people killed or seriously injured by their mode of travel and age category for each year from 2007 to 2009.

Table 25. Michigan 2009 Adults Killed or Seriously Injured in Vehicle Crash by Age Group

	Age Group				
	70-74	75-79	80-84	85+	All (70-85+)
Driver Killed	12	28	26	15	81
Driver Incapacitating Injury	93	72	70	55	290
Passenger Killed	0	4	13	16	33
Passenger Incapacitating Injury	25	20	36	21	102
Bicyclist Killed	2	1	1	0	4
Bicyclist Incapacitating Injury	0	0	0	0	0
Pedestrian Killed	0	0	0	0	0
Pedestrian Incapacitating Injury	0	0	0	0	0
Motorcyclist Killed	0	2	0	0	2
Motorcyclist Incapacitating Injury	0	0	0	0	0
Total	132	127	146	107	512

Table 26. Michigan 2008 Adults Killed or Seriously Injured in Vehicle Crash by Age Group					
	Age Group				
	70-74	75-79	80-84	85+	All (70-85+)
Driver Killed	27	32	23	16	98
Driver Incapacitating Injury	99	74	70	43	286
Passenger Killed	5	8	11	11	35
Passenger Incapacitating Injury	28	27	31	14	100
Bicyclist Killed	0	0	0	0	0
Bicyclist Incapacitating Injury	3	0	0	1	4
Pedestrian Killed	2	3	7	3	15
Pedestrian Incapacitating Injury	6	7	7	4	24
Motorcyclist Killed	1	1	0	0	2
Motorcyclist Incapacitating Injury	12	1	1	0	14
Total	183	153	150	92	578

Table 27. Michigan 2007 Adults Killed or Seriously Injured in Vehicle Crash by Age Group					
	Age Group				
	70-74	75-79	80-84	85+	All(70-85+)
Driver Killed	28	29	31	19	107
Driver Incapacitating Injury	76	108	82	40	306
Passenger Killed	8	12	9	13	42
Passenger Incapacitating Injury	35	32	32	20	119
Bicyclist Killed	1	0	0	0	1
Bicyclist Incapacitating Injury	5	0	1	0	6
Pedestrian Killed	7	6	6	1	20
Pedestrian Incapacitating Injury	9	11	5	3	28
Motorcyclist Killed	1	3	0	1	5
Motorcyclist Incapacitating Injury	3	0	0	0	3
Total	173	201	166	97	637

In each year from 2007 through 2009, on average 95 drivers, 37 passengers, 15 pedestrians, 2 bicyclists, and 3 motorcyclists age 70 and over were killed. Incapacitating injuries on average per year were sustained by 294 drivers, 107 passengers, 8 pedestrians, 3 bicyclists, and 6 motorcyclists.

The number of fatalities and serious injuries per 1,000 population for 2009 is shown in Table 28.

Table 28. Fatalities per 1,000 Population by Mode and Sex			
	Male	Female	Total
Driver	0.121	0.061	0.089
Passenger	0.024	0.040	0.035
Pedestrian	0.021	0.004	0.011

A crash is recorded in Michigan crash data files if it is reported to the police, and there is an injury or $1,000 of property damage. Fatal crashes are crashes in which at least one person died as a result of the crash within 30 days.

The numbers of vehicle and fatal crashes involving drivers age 70 and older are shown in Table 29.

Table 29. 2009 Crashes Involving Drivers by MDOT Region and Age Group All Crashes (Fatal Crashes)								
Age group	MDOT Region							Michigan
	Bay	Grand	Metro	North	South west	Superior	University	
70-74	1,379 (5)	1,085 (6)	3,451 (4)	917 (6)	985 (3)	431 (0)	1282 (0)	9,530 (24)
75-79	984 (11)	830 (6)	2,746 (15)	598 (4)	714 (9)	342 (0)	855 (3)	7,069 (48)
80-84	670 (9)	586 (9)	2,157 (10)	443 (4)	479 (5)	231 (2)	631 (6)	5,197 (45)
85+	408 (5)	347 (4)	1,319 (9)	237 (2)	311 (1)	130 (1)	400 (4)	3,152 (26)
All (70-85+)	3,441 (30)	2,848 (25)	9,673 (38)	2,195 (16)	2,489 (18)	1,134 (3)	3,168 (13)	24,948 (143)

The 2009 crash rate per licensed driver for crash involvement (any severity) and for fatal crash involvement by sex is shown in Table 30. Men's crash involvement per licensed driver for crashes of any severity is higher than for that of women.

Table 30. 2009 Crash Rate per 1,000 Licensed Drivers Age 70 and Older by Sex			
Crashes/1,000 Licensed Drivers	Men	Women	Michigan
All crashes	43.37	25.63	33.37
Fatal crashes	0.284	0.119	0.191

The 2009 crash rate per licensed driver for crash and fatal crash involvement by age is shown in Table 31. The rate of involvement in all crashes per licensed driver decreases with age. However, the fatal crash rate per licensed driver is highest for the 80-84 year age group.

Table 31. 2009 Crash Rate per 1,000 Licensed Drivers Age 70 and Older by Age					
Crashes/1,000 licensed drivers	70-74	75-79	80-84	85+	All (70-85+)
All crashes	36.21	34.05	32.35	27.28	33.37
Fatal crashes	0.091	0.231	0.280	0.225	0.191

The 2009 crash rate per licensed driver for crash and for fatal crash involvements for each MDOT region is shown in Table 32. The overall crash rates per licensed driver do not vary much across the MDOT regions, although the rate in the Superior region is somewhat higher than in the other areas. In addition, the fatal crash rate is lowest in the Superior region.

Table 32. 2009 Crash Rate per 1,000 Licensed Drivers Age 70 and Older by Region								
Crashes/1000 licensed drivers	Bay	Grand	Metro	North	SW	Superior	University	Michigan
All crashes	33.31	32.46	34.58	32.29	32.99	35.67	31.18	33.37
Fatal crashes	0.291	0.285	0.136	0.235	0.239	0.0945	0.128	0.191

Summary

The demographic analysis presented here examined the growth of the older population of Michigan and the trip making characteristics that will affect the identification and development of measures to meet the transportation needs of the older residents of the state. The following section highlights the key findings.

- The number of people in Michigan age 70 and older is estimated to reach 1.2 million in 2020 and 1.5 million in 2030. This segment of the population will comprise 11% and 14% of the total population of the state in those years respectively.
- About 20% of the older population (age 70 and older) will be age 85 and older in 2030.
- The population age 70 and older in 2020 by MDOT region is estimated to be about 47,000 in Superior; 111,000 in the North region; 120,000 in the Grand region; 106,000 in the Southwest region; 150,000 in the Bay region; 470,000 in the Metro region; and 148,000 in the University region.

- The population age 70 and older in 2030 by MDOT region is estimated to be about 45,000 in Superior; 93,000 in the North region; 204,000 in the Grand region; 144,000 in the Southwest region; 183,000 in the Bay region; 613,000 in the Metro region; and 227,000 in the University region.
- Women account for 60% of people age 70 and older, and 67% of those age 85 and older. There are 1.4 women for every man age 70 and older and 2 women for every man age 85 and older.
- Currently, 80% of people age 70 and older are licensed to drive. Among the youngest old (age 70-74) 86% are licensed. Among adults age 85 and older, 63% are licensed.
- Driver license holding is higher for men than for women; 87% of men and 76% of women age 70 and older have driver licenses.
- However, because there are more women in the older age groups there are more older women licensed to drive than men. In 2009, 56% of licensed drivers age 70 and older were women.
- In 2009, there were 1.3 women to every one man age 70 and older licensed to drive.
- In 2009, the Metro MDOT region had the lowest proportion of licensed drivers age 70 and older (75%), and the North MDOT region had the highest (90%).
- About one-third of adults age 70 and older live alone; about 54% live in two-person households, and about 14% live in larger households.
- Among adults age 85 and older, about 43% live alone and about 20% live in households of three-adults or more.
- Approximately 12% of adults age 70 and older do not have a car available to their household. Among adults age 80-84, this percentage is 16%, and among those 85 and older, this percentage is 28%.
- The MDOT region with the highest proportion of no-car households (for adults age 70 and older) is the Metro Region with 16%, and the lowest is the University MDOT region with 9%.
- The average number of trips per day for adults age 70 and older is 2.6.
- Women age 70 and older average 2.4 trips per day and men average 2.9 trips per day.
- People in the Grand MDOT region average 2.9 trips per day, and people in the North MDOT region average 2.3 trips per day.
- Most trips by adults age 70 and older are made by car (73% are as car driver and 23% are as car passenger).
- Of trips made by adults age 85 and older, 56% are as driver and 41% are as car passenger.
- About 3% of trips by adults age 70 and older are walking trips.
- About 1% of trips by adults age 70 and older are by public transit or paratransit.

- Among people who used transit, 57% do not have a driver license, and 79% are women.
- Among walkers, 77% have a driver license and 68% are women.
- The trips made by adults age 70 and older in order of decreasing frequency are: personal business, everyday shopping, eating out, dropping or picking up a passenger or accompanying another person.
- Each year recently, about 575 adults age 70 or older are killed or severely injured as a result of a vehicle crash.
- The vehicle-related fatality rates per year among adults age 70 and older are: 0.089 /1,000 adults for car drivers; 0.035/1000 adults for car passengers; and 0.011/1,000 for pedestrians.
- The crash rate for drivers age 70 and older is 33.37 crashes (of any severity, including property damage only) per 1,000 licensed drivers per year.
- The fatal crash rate for drivers age 70 and older is 0.191 per 1,000 licensed drivers per year.

This report has compiled projections for the numbers of older adults in Michigan by region, sex, and age group. The existing trip making patterns, including the number of trips, trip purposes, and modes of travel have been examined by age. License holding patterns and vehicle-crash related deaths and injuries have also been examined. Combining the projections of the size of the population and make-up of the population by age and sex, together with their existing travel patterns provides basis from which to estimate of travel needs of older adults in Michigan for the next 20 years.

References:

Michigan Information Center. (1996). "Population Projections for Michigan to Year 2020", Office of the State Demographer, Lansing, Michigan.

Michigan Office of Highway Safety Planning. (2010). Michigan Vehicle Crash Facts 2004-2009 Retrieved from http://www.michigantrafficcrashfacts.org

Michigan Department of State. (1992). Driver's License File "1992 Report DR9235" Lansing, Michigan.

Michigan Department of State. (2000). Driver's License File "DR9235FEB2001" Lansing, Michigan.

Michigan Department of State. (2009). Driver's License File "2009 Report DR9235" Lansing, Michigan.

Michigan Department of Transportation. (2005). "2004-2005 Comprehensive Household Travel Data Collection Program *MI Travel Counts* Final Report" Prepared by Morpace International, Farmington Hills, Michigan.

United States Department of Commerce, U.S. Census Bureau, Population Division. (2010). Annual Estimates of the Population for Counties of Michigan: April 1, 2000 to July 1, 2009. Release Date: March 2010.

United States Department of Commerce, U.S. Census Bureau, Population Division. (2005). Interim State Population Projections, 2005. Washington, DC.

Appendix A – Counties in MDOT Regions

The following table shows the counties in each of the 7 Michigan Department of Transportation (MDOT) regions.

Table A-1. Counties in MDOT Regions

Bay	Grand	Metro	North	Southwest	Superior	University
Arenac	Ionia	Macomb	Alcona	Allegan	Alger	Clinton
Bay	Kent	Oakland	Alpena	Barry	Baraga	Eaton
Clare	Mecosta	St. Clair	Antrim	Berrien	Chippewa	Hillsdale
Genesee	Montcalm	Wayne	Benzie	Branch	Delta	Ingham
Gladwin	Muskegon		Charlevoix	Calhoun	Dickinson	Jackson
Gratiot	Newaygo		Cheboygan	Cass	Gogebic	Lenawee
Huron	Oceana		Crawford	Kalamazoo	Houghton	Livingston
Isabella	Ottawa		Emmet	St. Joseph	Iron	Monroe
Lapeer			Grand Traverse	Van Buren	Keweenaw	Shiawassee
Midland			Iosco		Luce	Washtenaw
Saginaw			Kalkaska		Mackinac	
Sanilac			Lake		Marquette	
Tuscola			Leelanau		Menominee	
			Manistee		Ontonagon	
			Mason		Schoolcraft	
			Missaukee			
			Montmorency			
			Ogemaw			
			Osceola			
			Oscoda			
			Otsego			
			Presque Isle			
			Roscommon			
			Wexford			

Appendix B – Population Projections for MDOT Regions by Age and Sex

As part of this analysis, we wished to obtain population projections for each of the seven Michigan Department of Transportation regions. Examination of census materials indicated that population projections by age and sex for counties were available from the 1990 census through year 2020 (Michigan Information Center, 1996). Although the 2000 census provided statewide estimates by age and sex for each year through 2030, these projections were not available at the county level. Lacking other information, we used the county level distribution of the population by age and sex for 2010 and 2020 from the 1990 census and adjusted them to the total projections from the 2000 census. This preserved the distributions of population by county, age, and sex from the 1990 projections, but yielded the statewide total in the projections from the 2000 census.

Because the county level population projections by age and sex from the 1990 census only went to 2020, we generated 2030 estimates by multiplying the statewide projection of each sex and age group by the ratio of the county population to state population. For example, based on the 2020 projection from the 1990 census, women age 70-74 in Saginaw County comprised 2.06% of women age 70-74 in the state. Thus the projected number of women in that age group for 2030 was estimated by multiplying the statewide forecast for that sex and age group for 2030 from the 2000 census by .0206. Once we obtained estimates for each county, we aggregated the county level projections to the MDOT regions.

Tables B-1 to B-7 show the population projections by age and sex for years 2010, 2020, and 2030 for each of the 7 MDOT Regions.

Table B-1. Bay Region Population Projections of Adults Age 70 and Older by Age and Sex

Age	2010			2020			2030		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
70-74	18,265	22,455	40,720	25,199	31,394	56,593	28,356	34,834	63,190
75-79	13,329	18,331	31,660	16,746	22,491	39,237	21,371	28,547	49,919
80-84	9,637	14,945	24,582	10,149	15,462	25,612	14,094	21,327	35,421
85+	8,353	16,693	25,046	10,027	18,669	28,696	11,812	23,084	34,896
Total	49,585	72,423	122,008	62,121	88,017	150,138	75,633	107,792	183,426

Table B-2. Grand Region Population Projections of Adults Age 70 and Older by Age and Sex									
Age	2010			2020			2030		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
70-74	14,431	17,066	31,498	22,452	25,988	48,440	32,553	38,025	70,578
75-79	10,680	14,415	25,095	13,885	18,140	32,025	24,535	31,162	55,697
80-84	7,799	12,151	19,951	8,118	12,001	20,118	16,180	23,281	39,461
85+	5,661	12,243	17,904	6,326	12,770	19,096	13,560	25,198	38,758
Total	38,572	55,875	94,447	50,781	68,899	119,680	86,829	117,665	204,494

Table B-3. Metro Region Population Projections of Adults Age 70 and Older by Age and Sex									
Age	2010			2020			2030		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
70-74	49,505	66,177	115,682	74,153	98,465	172,617	93,762	117,367	211,129
75-79	37,931	57,944	95,875	48,303	69,918	118,221	70,666	96,185	166,851
80-84	30,348	52,640	82,988	28,220	48,155	76,375	46,603	71,859	118,462
85+	30,196	68,977	99,173	34,817	77,195	112,012	39,056	77,777	116,834
Total	147,980	245,738	393,718	185,493	293,732	479,225	250,088	363,188	613,276

Table B-4. North Region Population Projections of Adults age 70 and Older by Age and Sex									
Age	2010			2020			2030		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
70-74	15,308	14,543	29,851	21,928	20,315	42,243	15,150	17,058	32,208
75-79	11,528	11,427	22,955	14,431	14,409	28,840	11,418	13,979	25,398
80-84	7,764	8,923	16,687	9,176	9,952	19,127	7,530	10,444	17,974
85+	5,588	9,657	15,245	8,151	12,344	20,496	6,311	11,304	17,615
Total	40,189	44,549	84,738	53,687	57,020	110,706	40,409	52,785	93,194

Table B-5. Southwest Region Population Projections of Adults Age 70 and Older by Age and Sex									
Age	2010			2020			2030		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
70-74	12,897	15,793	28,690	18,654	22,900	41,555	22,603	26,930	49,533
75-79	9,601	13,111	22,711	12,071	16,050	28,121	17,036	22,070	39,105
80-84	7,096	11,293	18,388	7,248	11,034	18,282	11,235	16,488	27,723
85+	5,503	11,511	17,014	6,000	12,013	18,013	9,415	17,846	27,262
Total	35,096	51,707	86,803	43,974	61,997	105,971	60,289	83,334	143,623

Table B-6. Superior Region Population Projections of Adults Age 70 and Older by Age and Sex									
Age	2010			2020			2030		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
70-74	6,041	6,292	12,333	8,730	8,294	17,023	7,714	8,390	16,104
75-79	4,645	5,456	10,101	5,334	6,062	11,396	5,814	6,876	12,690
80-84	3,424	4,776	8,200	3,574	4,488	8,062	3,834	5,137	8,971
85+	2,630	5,717	8,347	2,765	5,557	8,322	3,213	5,560	8,773
Total	16,741	22,240	38,981	20,403	24,400	44,803	20,577	25,962	46,539

Table B-7. University Region Population Projections of Adults Age 70 and Older by Age and Sex									
Age	2010			2020			2030		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
70-74	17,112	20,429	37,541	26,804	32,759	59,563	36,272	42,015	78,287
75-79	12,075	16,193	28,269	16,904	22,442	39,346	27,338	34,432	61,770
80-84	8,820	13,559	22,379	9,837	14,345	24,182	18,029	25,724	43,752
85+	6,734	15,725	22,460	7,901	17,269	25,170	15,109	27,842	42,952
Total	44,742	65,907	110,649	61,446	86,814	148,260	96,748	130,013	226,761

Conversion Table

SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
		NOTE: volumes greater than 1000 L shall be shown in m^3		
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
^oF	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	^oC
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	$candela/m^2$	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
^oC	Celsius	1.8C+32	Fahrenheit	^oF
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	$candela/m^2$	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.
(Revised March 2003)