

**THE OLDER DRIVER IN OREGON: A  
SURVEY OF DRIVING BEHAVIOR AND  
CESSATION  
Final Report**

**SPR 639**



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by

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16. Abstract <p>In a study of older adults and their travel patterns in Oregon, a statewide mail survey and telephone interviews were conducted with older drivers and older adults who had voluntarily chosen to stop driving. The purpose of the study was to determine: (1) the factors that influence driving cessation; (2) the physical and emotional barriers that delay driving cessation; (3) what opportunities exist for alternative transportation after driving cessation; (4) whether drivers make relocation decisions on the basis of driving cessation; (5) the warning signs that make a driver stop driving; and (6) whether a crisis situation generally forces a driver to stop driving. Completed mail surveys included those from 342 respondents who were current drivers (184 urban and 141 rural, plus 17 who did not report whether they lived in an urban or rural area) and 158 respondents who had voluntarily ceased driving (110 urban and 37 rural, plus 11 who did not report their urban/rural status). Telephone interviews were completed with 33 urban drivers, 36 rural drivers, 25 urban ceasers, and 6 rural ceasers. Changes in driving patterns, occurred gradually and late, mostly for respondents in their late 70's or early 80's. Among the results of the study was the finding that those most likely to have chosen to stop driving were older, depressed females in poorer health who were living in senior housing, using alternative transportation when available, making fewer trips, and seeing fewer limitations associated with using alternative transportation. Relocation to improve access to transportation alternatives was not seen by most respondents as a viable option. Because this study was a cross-sectional, not longitudinal, analysis, it was not possible to determine causality (e.g., to know whether people became depressed as a <i>result</i> of ceasing to drive or being depressed <i>led</i> them to cease driving, or to know whether poor health was the <i>result</i> or <i>cause</i> of driving cessation). Additional research is needed to establish causality, ideally following groups of individuals in particular age cohorts over time, including individuals forced to stop driving through the <i>Medically-At-Risk Program</i>. Such research would enable better understanding of the factors affecting driving decisions and the effects of those decisions, and help to signal possible strategies to implement to encourage the use of alternative transportation.</p>					
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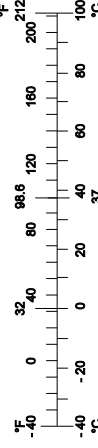
## SI\* (MODERN METRIC) CONVERSION FACTORS

### APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
<b><u>LENGTH</u></b>				
in	inches	25.4	millimeters	Mm
ft	feet	0.305	meters	M
yd	yards	0.914	meters	M
mi	miles	1.61	kilometers	Km
<b><u>AREA</u></b>				
in <sup>2</sup>	square inches	645.2	millimeters squared	mm <sup>2</sup>
ft <sup>2</sup>	square feet	0.093	meters squared	m <sup>2</sup>
yd <sup>2</sup>	square yards	0.836	meters squared	m <sup>2</sup>
ac	acres	0.405	hectares	Ha
mi <sup>2</sup>	square miles	2.59	kilometers squared	km <sup>2</sup>
<b><u>VOLUME</u></b>				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft <sup>3</sup>	cubic feet	0.028	meters cubed	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.765	meters cubed	m <sup>3</sup>
NOTE: Volumes greater than 1000 L shall be shown in m <sup>3</sup> .				
<b><u>MASS</u></b>				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
<b><u>TEMPERATURE (exact)</u></b>				
°F	Fahrenheit temperature	5(F-32)/9	Celsius temperature	°C

### APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
<b><u>LENGTH</u></b>				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
<b><u>AREA</u></b>				
mm <sup>2</sup>	millimeters squared	0.0016	square inches	in <sup>2</sup>
m <sup>2</sup>	meters squared	10.764	square feet	ft <sup>2</sup>
ha	hectares	2.47	acres	ac
km <sup>2</sup>	kilometers squared	0.386	square miles	mi <sup>2</sup>
<b><u>VOLUME</u></b>				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m <sup>3</sup>	meters cubed	35.315	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	meters cubed	1.308	cubic yards	yd <sup>3</sup>
<b><u>MASS</u></b>				
g	grams	0.035	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams	1.102	short tons (2000 lb)	T
<b><u>TEMPERATURE (exact)</u></b>				
°C	Celsius temperature	1.8 + 32	Fahrenheit	°F



\* SI is the symbol for the International System of Measurement

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## EXECUTIVE SUMMARY

As part of a study of older adults and their travel patterns, the Institute on Aging at Portland State University, with support from the Oregon Department of Transportation (ODOT), undertook a statewide mail survey and telephone interviews with older drivers and older adults who had voluntarily chosen to stop driving. The purpose of the study was to determine: (1) the factors that influence driving cessation; (2) the physical and emotional barriers that delay driving cessation; (3) what opportunities exist for alternative transportation after driving cessation; (4) whether drivers make relocation decisions on the basis of driving cessation; (5) the warning signs that make a driver stop driving; and (6) whether a crisis situation generally forces a driver to stop driving. The information garnered will assist ODOT in planning for the transit needs of the growing population of older Oregonians, both those who drive and those who have chosen to stop driving (who are termed “voluntary ceasers” or “ceasers” here).

This report presents the findings from a review of the literature, from 500 mail surveys, and from 100 telephone interviews conducted with a sample of older adults who indicated on their completed mail survey that they were willing to be called for a follow-up interview. Completed mail surveys included those from 342 respondents who were current drivers (184 urban and 141 rural, plus 17 who did not report whether they lived in an urban or rural area) and 158 respondents who had voluntarily ceased driving (110 urban and 37 rural, plus 11 who did not report their urban/rural status). Telephone interviews were completed with 33 urban drivers, 36 rural drivers, 25 urban ceasers, and 6 rural ceasers.

For the mail survey, both drivers and ceasers were identified using records from 1999 to 2006 that were provided by ODOT, Driver and Motor Vehicle Services. A one-page survey was developed and mailed to a sample of holders of a current driver’s license, an expired driver’s license, or a state ID card to determine response rates by groups (drivers and ceasers, urban and rural), and therefore the sample size needed. Older adults in rural areas were over-sampled to increase the size of this subgroup and enable comparisons to be made between the experiences of older adults in rural versus urban areas. A survey instrument to address the study’s research questions then was developed and mailed in late spring 2007 to those individuals who had indicated a willingness to participate.

The telephone follow-up interviews were conducted to provide elaboration of the transportation experiences of older adults, including: changes in driving patterns with age; reasons and circumstances surrounding ceasing to drive; the impacts of ceasing to drive; the availability, use, and limitations of transit options; and suggestions for transportation planners to better meet the needs of older drivers and non-drivers around the state. These topics were explored through open-ended questions asking participants to talk in greater detail about their transportation experiences and, if applicable, their decision to stop driving. Analysis of the interview data was completed using qualitative analytic software, allowing the researchers to examine, across types of respondents, common themes and differences that emerged from the narrative data.

For both the mail survey and the telephone interviews, the analyses focused on similarities and differences between drivers and ceasers, as well as contrasts between urban and rural drivers, and between urban and rural ceasers.

Numerous research studies have shown that with age, older adults may experience loss of vision, cognition, and reaction and execution abilities to the point that driving may become hazardous. Existing literature has demonstrated that proportionally more seniors die as a result of traffic fatalities than any other age group, and that when vehicle miles traveled are considered, seniors are the second most likely age group to be in an accident; however, recent research questions this latter finding. Although the majority of older drivers do not pose a safety threat, and many choose voluntarily to restrict or cease driving as a result of physical or other issues, previous research has found that some older drivers continue to drive even when they are not able to do so safely. The results of the study described here reflect many of those found in earlier research, but elaborate on the factors contributing to older Oregonians' decisions to continue or to cease driving, the effects of ceasing to drive, and the transportation needs of older Oregonians across geographic (e.g., urban versus rural) areas.

The study's key findings and conclusions are summarized below in the context of the six research questions stipulated by ODOT. As was clearly illustrated, the availability of transportation was not just a practical need, but rather has implications for individuals' quality of life and their ability to function as contributing members of society.

## 1. WHAT ARE THE FACTORS THAT INFLUENCE DRIVING CESSATION?

- **Individuals who had voluntarily chosen to stop driving differed from current drivers with respect to many demographic characteristics.** Voluntary ceasers were, on average: 10 years older than the current drivers (ceasers' average age was 84); more likely to be female; more likely to be widowed and to live alone; more likely to have less education and a lower income; less likely to be employed and to volunteer; more likely to live in senior housing; more likely to live in an urban area; less likely to own their residence; more likely to have lower self-rated health status; more likely to have altered their travel due to their health; more likely to be depressed; and more likely to use public transit when it was available.
- **Those most likely to have chosen to stop driving were older, depressed females in poorer health who were living in senior housing, using alternative transportation when available, making fewer trips, and seeing fewer limitations associated with using alternative transportation.** Results of a logistic regression analysis, used to determine demographic and travel pattern characteristics, were predictive of voluntarily ceasing to drive, but because this was a cross-sectional, not longitudinal, analysis, it was not possible to determine causality (e.g., to know whether people became depressed as a *result* of ceasing to drive or being depressed *led* them to cease driving, or to know whether poor health was the *result* or *cause* of driving cessation).
- **An important finding of this study was that some people who generally had ceased to drive reported actual instances of continuing to drive, and other ceasers reported that they would still drive if they felt it was necessary to do so.** Key reasons for

continuing to drive beyond the point when one should do so were emergencies, needing to get to medical appointments, and a lack of options other than driving.

## 2. WHAT ARE THE PHYSICAL AND EMOTIONAL BARRIERS THAT DELAY DRIVING CESSATION?

- **Some respondents saw no alternative but to drive; this clearly was a barrier that delays driving cessation** (see the findings pertaining to Research Question 3, below).
- **There were negative effects of no longer driving, as reported by ceasers, including social isolation** (reduced social activities, seeing friends less, reduced work and volunteer activities) **and being able to visit places less often.**
- **Anticipated negative impacts of no longer driving likely influenced drivers' unwillingness to consider ceasing to drive.** Current drivers anticipated even greater negative effects of ceasing to drive than ceasers reported had actually occurred.
- **Some drivers, who had made changes in their driving, experienced greatly reduced activities, along with a sense of lost independence and discomfort** as a result of needing to rely on others for more, or most, of their transportation needs. However, the impact of changes individuals had made in their driving (e.g. deciding to drive less, driving only at certain times of the day and/or only to certain places) was reportedly mild for some drivers.

## 3. WHAT OPPORTUNITIES EXIST FOR ALTERNATIVE TRANSPORTATION AFTER DRIVING CESSATION?

- **There was a lack of awareness, particularly of special transportation options,** especially on the part of drivers (urban and rural) and rural ceasers. For drivers, this lack of awareness may have been due in part to their perceived lack of a need for transportation alternatives. About 22 percent of rural drivers and 17 percent of urban drivers stated they did not know if special transportation was available in their community. Among ceasers, 27 percent of those living in rural areas and 10 percent of urban ceasers reported that they did not know if special transportation options existed in their community. Over one-third of both current drivers and voluntary ceasers were not aware of transportation options other than driving or relying on friends and family, even when it is likely that such options were available. For drivers, this lack of awareness was due in part to their lack of need.
- **In rural areas, especially, there was a reported lack of transportation options** other than driving or relying on family and friends. Nearly one-half (49%) of rural drivers reported that no public transportation was available in their community and 19 percent said no special transportation services were available. (This compared to 15% and 4% of urban drivers, respectively). Among rural ceasers, 57 percent reported that there was no public transportation, and 32 percent said there were no special transportation services in their community (compared to 13% and 6%, respectively, of urban ceasers). The decline

in rail and bus services in the past few years was reported by rural residents, as was the fact that, although many coastal communities and inland areas of the state have very high percentages of older adults, there are few services. At the same time, rural drivers and ceasers alike were cognizant of the economic disincentive to provide public and special transportation in the state's rural areas and small towns.

- **Few drivers viewed the transit options available to them as *viable* alternatives to driving, and few of the urban drivers and ceasers alike *used* the transit options available for regular daily travel.** Key limitations seen in the transportation alternatives available included a lack of service or limited service, and scheduling and reliability issues with dial-a-ride, appointment-based programs. Distance to stops, infrequent service, lack of service on evenings and weekends, and insufficient routes also limited the use of public transportation. Users and non-users of either public or special transportation did not differ with respect to the limitations in transit that they cited, except that 63 percent of non-users of either form of transit stated that it was just easier to drive, compared to 42 percent of users.
- **More than 40 suggestions for transportation improvements for older adults were provided, with overall better public transportation topping the list.** Among the other frequent recommendations were improved dial-a-ride and on-call services, as well as enhanced bus service, including more routes, more frequent service, more stops, and better transit connections (between bus, rail, taxi, and van). More and frequent screening of older adults who continued to drive was commonly suggested, as were infrastructure improvements that would enhance overall mobility and use of transit, such as better sidewalks, lighting, and covered benches at all stops. Because driving and having transportation options are seen as crucial to quality of life, **study participants identified the need for older adults themselves to be actively involved in transportation planning and decision-making.**

#### 4. DO DRIVERS MAKE RELOCATION DECISIONS ON THE BASIS OF DRIVING CESSATION?

- **The vast majority of both current drivers and ceasers had not considered and/or would not consider relocating in order to have better access to public transportation.** Over 80 percent of both urban and rural drivers, and more than 85 percent of urban and rural ceasers, reported that they had not/would not consider relocating for this purpose. Most of those interviewed mentioned satisfaction with their homes and communities as the reason they would not relocate, although some had already moved to be near children, services, or to retirement communities. Among current drivers, some said they just had not had to consider relocating yet, and a small number said they might do so should they (or their spouse's) ability to drive change. Rural drivers were the group most likely to say that they would or might consider this.
- **If relocation *were* to be considered, factors seen as key in the decision-making process included access to public transportation and a setting where one could meet all of one's daily needs** (e.g., shopping, medical care). For rural drivers, access to

friends and family was also considered to be an important factor in their relocation decision. The most common ways in which older drivers and ceasers reported that they would research relocation options (or had already done so) included asking friends and family, calling or visiting specific locations/facilities, using the Internet, and contacting local agencies. Among ceasers, finding a specialized retirement facility that provided transportation for residents was an important factor in their search.

## 5. WHAT ARE THE WARNING SIGNS THAT MAKE A DRIVER STOP DRIVING?

- **Individuals who had ceased driving most often reported doing so due to poor vision. Other key reasons included feeling they were not a safe driver, having someone else available to drive them, and losing confidence in their driving.** Having too many accidents or citations, not being able to afford driving, and not wanting to go out were mentioned least often by ceasers as reasons for having stopped driving.
- **Drivers gave greater importance to each of the various health and personal factors, which were listed, as possible reasons for ceasing to drive than did ceasers reporting on their actual experience.** This finding is similar in nature to that in which drivers anticipated more negative impacts of driving than ceasers actually reported experiencing. It could be that ceasers did not recall all of the factors that went into their decision, or that drivers overestimated what actually would cause them to cease driving, should the time come to do so.
- **Current drivers cited numerous factors as reasons that would cause them to stop driving.** Those rated as most important included: having too many accidents, not seeing themselves as a safe driver, having their doctor or family or friends advise them to stop driving, having too many citations, losing confidence in their driving, getting confused while driving, no longer wanting to drive, poor vision, taking medication that affects driving, and no longer feeling able to afford driving.
- **The most frequently cited anticipated reasons for stopping driving differed somewhat between respondents to the survey and those interviewed by telephone.** The most common factors that would cause them to stop driving, as reported by drivers interviewed by telephone, included health/medical issues, a decline in vision, diminished reflexes and coordination, and having a friend or family member advise one to stop. Among rural drivers, another important consideration was seeing oneself as a hazard to others. Among ceasers, health/medical issues were cited most frequently by urban ceasers, followed by loss of confidence, poor vision, and having an accident or hitting something. Poor vision was mentioned most often by the rural ceasers who were interviewed.
- **The most common changes in driving made by the older adult drivers in urban and rural areas alike were avoiding traffic congestion and avoiding rush hour.** Most drivers had made several changes in their driving behavior and did so gradually over time. Other common changes included reduced night driving and avoiding bad weather.

**6. WAS THERE A CRISIS SITUATION THAT FORCED THE DRIVER TO STOP DRIVING AND, IF SO, WHAT WAS IT?**

- **In general, various health/physical and personal changes which occurred gradually over time, rather than a crisis, were found to lead to changes in driving patterns, including ceasing.** These changes occurred most often over a period of one to two years, with a majority of all of those interviewed saying changes had occurred in four years or less. Most of the changes identified occurred when the driver was between the ages of 75 and 80.

## **1.0 INTRODUCTION**

### **1.1 OVERVIEW OF THE STUDY**

The Oregon Department of Transportation (ODOT) is currently interested in learning more about the transportation needs of older adults, aged 65 and over, across the state. Included in that interest are the factors that affect older adults' decisions to continue or to cease driving, the perceived availability of alternate forms of transportation options and the willingness to use those options.

With the sponsorship of ODOT, in the spring and summer of 2007, the Institute on Aging at Portland State University conducted a study of persons aged 65 and over, including those who were still driving (termed "drivers") and those who had voluntarily ceased to drive (termed "ceasers"). Both drivers and ceasers were identified using records from 1999 to 2006, provided by ODOT, Driver and Motor Vehicle Services. A one-page survey was developed and mailed to a sample of holders of a current driver's license, an expired driver's license, or a state ID card to determine response rates by groups (drivers and ceasers, urban and rural), and therefore the needed sample size. A larger mail survey was then developed and sent in late spring 2007 to those individuals who had indicated a willingness to participate in the longer survey. A total of 488 completed surveys were returned.

In addition to the survey data, ODOT requested that more detailed, qualitative information be gathered via a telephone interview to provide an elaboration of the transportation experiences of older adults in the state. The interview subjects were selected from among those who completed the mail survey and who indicated their willingness to be called for a follow-up interview by telephone. A total of 100 telephone interviews were completed with these individuals in May and June 2007.

The information garnered from the mail survey and the telephone interviews will assist ODOT in planning for the transit needs of the growing population of older Oregonians, both those who drive and those who have ceased.

### **1.2 PROBLEM STATEMENT**

As of January 2002, the Oregon Department of Transportation reported 428,305<sup>1</sup> drivers aged 65 and over (Personal communication, Vince Van Der Hyde, August 15, 2007). This number will continue to grow as Oregon's population ages. To prepare for the transportation needs of older adults in Oregon, greater understanding is needed of the reasons for voluntary driving cessation

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<sup>1</sup> This number represents a total of all drivers, aged 65 and over, who lived in Oregon at some point during the reporting period.

among older adults; reasons for continued driving among older adults who should not drive due to safety concerns; and impacts of ceasing to drive on older Oregonians.

A preliminary literature review found no Oregon-specific study or any other statewide examination of either the reasons for voluntary driving cessation by aging drivers, or their transportation needs after ceasing to drive. In addition, little or no data were found comparing current elderly drivers with former drivers in the same population. Few studies had examined alternative transportation needs, especially across geographic (e.g., urban versus rural) areas.

### **1.3 OBJECTIVES OF THE STUDY**

In an effort to understand and plan for the transportation needs of Oregon's aging population, the Oregon Department of Transportation commissioned the Institute on Aging at Portland State University to conduct a study of persons aged 65 and older. The study was to address six questions:

1. What are the factors that influence voluntary driving cessation?
2. What are the physical and emotional barriers that delay driving cessation?
3. What opportunities exist for alternative transportation after driving cessation?
4. Do drivers make relocation decisions on the basis of driving cessation?
5. What are the warning signs that make a driver stop driving?
6. Was there a crisis situation that forced the driver to stop driving and, if so, what was it?

The results of the study were intended to be useful for ODOT in developing the *Oregon Transportation Plan* for the Public Transit Division and the Department of Human Services to use in developing programs for alternative transportation services for older adults after driving cessation. In addition the results were also intended to be useful for ODOT's Research Unit for answering questions related to driving cessation and alternative transportation posed by the Oregon Legislature, ODOT staff, and staff of other state and local governments.

### **1.4 ORGANIZATION OF THE REPORT**

This report provides an analysis of both the mail survey and the telephone interview data collected from older drivers and those no longer driving in both rural and urban areas of Oregon. Similarities and differences in the views and experiences of drivers versus ceasers are examined based on the survey and the interview data, and as, or where appropriate, those similarities and differences are compared between rural and urban members of each of those two groups. An extensive literature review is provided in Chapter 2. Chapter 3 describes the methodology used in the study. Chapter 4 constitutes the bulk of the report and presents the findings. Chapter 5 summarizes the findings, highlighting key themes, as well as differences where they exist,

between urban and rural drivers and ceasers, and between the survey and the telephone interview data.

The appendices contain the survey instruments for the three phases of the study: Appendix A includes a copy of the cover letter and short one-page survey; Appendix B includes the cover letters and longer mail surveys for both drivers and ceasers, as well as resulting data from each question; and Appendix C includes copies of the telephone interview surveys conducted for the third phase of the study.



## 2.0 REVIEW OF THE LITERATURE

### 2.1 AGING OF THE POPULATION

The number of persons aged 65 and older will increase dramatically over the course of the next twenty years due to the aging of the baby-boom generation (defined as those born between 1946 and 1964). According to the Administration on Aging's (AoA) *A Profile of Older Americans: 2005 (AoA 2005)*, the population of those aged 65 and older increased 9.3 percent from 1994 to 2004 (from 33.0 to 36.3 million). During that same period, those aged 46-54, a group that includes a large part of the baby-boomer population, increased 39 percent. Overall, in 2004, one in eight Americans, or 12.4 percent of the U.S. population, was aged 65 years or older. Future predictions by the AoA (2005) indicate that by 2030, there will be nearly twice as many individuals aged 65 or older (71.5 million) in comparison to 2004. This will represent an increase of 7.6 percent in persons aged 65 and over, and will result in one in five persons, or 20 percent of the entire population, being 65 years of age or over (AoA 2005). In Oregon, 447,408 residents currently are aged 65 or older, and the state is home to over 1.2 million baby boomers (U.S. Census 2005).

The proportion of Oregonians who are 65 years of age and older is similar to, although slightly higher than, the proportion of those 65 years and older in the general U.S. population (Table 2.1) (U.S. Census 2000). In Oregon, 12.8 percent of the population was 65 years of age or older in 2000; in the U.S., it was 12.4 percent. The ratio of the number of males to females generally declines with age and is considerably lower for the 65+ population, compared to those aged 45 to 54. For example, in the United States, among those aged 45 to 49, there are 96.8 males for every 100 females, compared to only 69.8 males for every 100 females among those aged 65 and older. In Oregon, the disparity is somewhat smaller, with 98.4 males for every 100 females among those aged 45 to 49, and 74.2 males for every 100 females among those aged 65+ (U.S. Census 2000).

**Table 2.1: Aging Demographics for Oregon versus the United States.**

Geographic Area	Percent Of Total Population				Male To Female Ratio			
	45 to 49	50 to 54	55 to 64	65+	45 to 49	50 to 54	55 to 64	65+
United States	7.2	6.2	8.6	12.4	96.8	95.5	91.8	69.8
Oregon	8.0	6.9	8.9	12.8	98.4	98.8	96.2	74.2

Source: *US Census 2000*, SFT 1, Table P8. 'Total Population by Age'.

According to the State of Oregon's Office of Economic Analysis, the population of Oregonians aged 45 to 64 is expected to grow by a total of 26.49 percent between 2000 and 2010 (2000). The population of people aged 65 and older in Oregon is projected to increase by 18.29 percent in the same decade.

Table 2.2 shows the projections for each of these age groups through 2013.

**Table 2.2: Growth of Oregon’s Aging Population 2001-2013.**

YEAR	AGES 45-64			AGES 65+		
	Population	Change from previous year or decade		Population	Change from previous year or decade	
		Number	Percent		Number	Percent
2001	846,655	29,702	3.64	441,507	2,502	0.57
2002	875,385	28,729	3.39	443,771	2,264	0.51
2003	902,527	27,142	3.10	447,878	4,107	0.93
2004	928,965	26,438	2.93	452,708	4,830	1.08
2005	956,919	27,953	3.01	459,861	7,153	1.58
2006	984,801	27,882	2.91	469,115	9,254	2.01
2007	1,008,560	23,760	2.41	480,358	11,243	2.40
2008	1,026,589	18,028	1.79	495,787	15,429	3.21
2009	1,044,358	17,769	1.73	510,735	14,948	3.01
2010	1,060,856	16,498	1.58	526,006	15,271	2.99
2011	1,074,586	13,730	1.29	541,412	15,406	2.93
2012	1,075,614	1,028	.10	569,454	28,042	5.18
2013	1,079,697	4,083	.38	595,268	25,814	4.53

Source: State of Oregon Office of Economic Analysis, *Short-Term State Population Forecast through 2013*, 2000. Appendix C: Population Forecasts by Age and Sex, State of Oregon.

## 2.2 DRIVING SAFETY AND OLDER ADULTS

By 2030, the number of those who are 65 years of age or older and who drive automobiles is expected to double (*Rosenbloom 2003*). By 2050, it is estimated that 15 percent of all drivers will be 65 years of age or older, which is equal to approximately 50 million drivers aged 65+ on U.S. roadways (*Anstey et al. 2005; Carr 2000; Carr, Shead, and Stroandt 2005; Rosenbloom 2003*). Indeed, the demographic of who is driving on U.S. roadways is simply one impact of the aging of the baby-boom generation.

One major concern raised in the literature is the number of fatalities of older drivers due to auto accidents. In fact, older drivers are three times more likely to die from injuries attributed to vehicle accidents than younger drivers (*Cobb 1998; Stewart et al. 1993*). The gerontological literature has also reported that when vehicle miles traveled are accounted for, older drivers are second only to 18 to 25 year-old drivers in the number of traffic accidents they cause. A recent study in Holland, however, questions the methodology of past research (*Langord, Methorst, and Hakamies-Blomqvist 2005*). That study found that when drivers over age 75 are compared with all other drivers who drive the same or a similar number of kilometers each year, older drivers cause the fewest number of accidents. According to Langord et al. (2005), more research needs to be done in reference to older drivers and crash involvement to determine whether there is a need to increase licensure requirements for this population group. Tay (2006) addressed this issue and created a theoretical model using crash data, assumptions of self-regulation by older drivers, and population estimates. His model revealed that increasing the licensure requirements for older adults would have an insignificant impact on the number of vehicle accidents. Tay’s findings suggest that efforts to restrict the licenses of older adults or to increase licensure requirements based upon chronological age may be ineffective.

Single-occupancy vehicles are the most commonly used form of transportation in the U.S. (Giuliano, Hu, and Lee 2003; Kostyniuk and Shope 2003; Rosenbloom 1993); American society has become deeply dependent on this form of transportation (Kelsey and Janke 2005). The automobile has changed personal transportation for today's seniors and baby-boomers alike. The baby-boom generation is reported to be even more independent, healthier, while also wanting to and able to live out their lives in their own homes (Lin 2003).

Questions, however, are being raised as to: the safety of older drivers, what steps can be taken to improve driving safety among this population, what factors result in some older drivers voluntarily ceasing to drive, and the transportation needs of these older adults. There is little literature that indicates why some drivers choose to voluntarily cease driving, or that compares those who choose to continue driving and those who voluntarily cease. This review of the literature will examine the problems experienced by older drivers, what is known about voluntary cessation and its consequences, and alternative transportation needs for older individuals post driving cessation.

Understanding the senior population of drivers is important for several reasons, but one of the most crucial is safety. Older drivers, particularly those 80 years of age and older, tend to limit the total number of vehicle miles they travel; however, they are three times more likely to die from injuries attributed to a vehicle accident. In fact, approximately 3,000 older drivers die each year in the U.S. due to the injuries they receive as a result of a traffic accident and another 100,000 are injured in automobile accidents (Cobb 1998; Dellinger et al. 2001; Stewart et al. 1993). The rate of accident fatalities for older adults is a concern, but so too is the fact that accidents can involve other cars, pedestrians, and cyclists. As the population of drivers continues to age, a better understanding of the problems faced by older drivers is imperative, particularly as the rate of mass transit usage among the elderly has remained stagnant for at least the past two decades (Giuliano et al. 2003).

The increase in numbers of older drivers must be examined and planned for to ensure the safety of public roadways for all and to provide for the transportation needs of older Oregonians. Several studies have been done concerning how aging impacts driving ability; a review of that literature will help to give perspective on the challenges to be faced as a result of the aging of our population of drivers.

## **2.3 CHALLENGES FACED BY OLDER DRIVERS**

A number of studies have examined the challenges faced by older drivers. Older drivers face four main challenges to driving that younger drivers typically do not experience, these include: sensory and perceptual changes, cognitive changes, response and execution changes, and the effects of medication(s) on one's driving abilities (Klavora and Heslegrave 2002). Examples of issues affecting an individual's ability to drive safely include: the negative effects of poor eyesight, the taking of prescription drugs, and the onset of dementia (Anstey et al. 2005; Cobb 1998; Hopkins et al. 2004; Kakaiya, Tisovec, and Fulkerson 2000; Keefe et al. 2002; Klavora and Heslegrave 2002; Odenheimer et al. 1994; Reger et al. 2004).

With age, vision becomes impaired due to lens-protein changes and a decrease in lens density. These two changes can cause nighttime driving to be harder for older drivers, making reading traffic signs more difficult, and making it more difficult for older drivers to recover from glare. Older drivers have also been found to not track moving objects as well than younger drivers (*Trick et al. 2005*). This reduced ability to track moving objects can lead to an increased risk for traffic accidents. In addition, the prevalence of ocular diseases, such as cataracts, glaucoma, macular degeneration, and corneal disease, increases with age, also putting older drivers at greater risk of having an accident due to visual impairment.

Previous research has found that vision problems are the most common reason given for driving cessation among older adults (*Dellinger et al. 2001*); however, a study by Keefe et al. (2002) found that some older adults with vision limitations continue to drive. This same study revealed that older drivers with impaired vision do tend to reduce their amount of driving, thus limiting the likelihood of getting into an accident. The researchers noted that older drivers often do not drive at night, avoid driving during rush hour, and reduce the number of vehicle miles traveled in order to compensate for decreased visual acuity. Although vision appears to be a key problem for drivers as they age, there is no consensus as to which vision tests are best able to predict driving ability, nor which type of vision (dynamic, binocular, or color) is most important for driving safety (*Wood 2002*).

Cognitive changes can also occur in older adults. Studies have shown that some older people with dementia continue to drive, even when their cognitive deficits have limited their ability to drive safely (*Hopkins et al. 2004; Klavora and Heslegrave 2002*). This is important because higher rates of accidents have been linked to cognitive impairment. The results from a meta-analysis that investigated existing research on dementia and driving ability concluded that dementia does lead to poor driving, as assessed by both on-road and off-road tests (*Reger et al. 2004*). Hopkins et al. (2004) found that the number of drivers with dementia had increased in Ontario, Canada, by over 50 percent, from 15,000 in 1986 to 34,000 in 2000. That study concluded that drivers in the early stages of dementia may pose no significant risk to roadway safety; however, as the disease progresses, they do pose greater risks, particularly on more heavily traveled roads.

Slower reaction time and the ability to effectively execute driving tasks have also been linked to decreased muscle and joint strength as drivers age. These changes suggest that as older drivers lose motor control and strength, they are less able to drive safely and more likely to get into accidents (*Stewart et al. 1993*).

Another important factor which may affect driving ability among older adults concerns medications. Here, however, there is conflicting evidence. A study in Florida (*Stewart et al. 1993*) found that the 50 most commonly prescribed drugs to seniors did not negatively impact their ability to drive safely. This finding, however, is contrary to the conventional wisdom that the use of medications, particularly those that can affect vision or motor function, will impact driving ability (*Klavora and Heslegrave 2002*).

Although many older adults compensate for the decreased physical functioning that typically accompanies the aging process, the majority of older Americans continue to drive because many live in rural areas or suburban areas with limited access to public transportation (*Cobb 1998*). In

terms of which age group is more likely to cause accidents, Cobb (1998) noted that the answer depends on how the question is asked. Crash involvement rates are highest among the youngest drivers and the lowest rates are among the elderly. If, however, one looks at crash involvement rates taking into account the number of miles traveled, although the youngest drivers still have the highest rates, the elderly have the second-highest rates. This is because older adults generally do not drive as many miles as do younger drivers, but for the miles they do travel, they have a high incidence of traffic accidents.

## 2.4 FACTORS LEADING TO VOLUNTARY CESSATION OF DRIVING

Previous research has shown that the decision to voluntarily cease driving is influenced by the age of the driver and their gender, as well as by medical and non-medical self-reported reasons (Brayne et al. 2000; Dellinger et al. 2001; Ragland et al. 2004). With the anticipated increase in the number of older drivers on Oregon roadways in the next 20 years, it is important to understand what leads some to cease driving and the effects of that decision.

Bailey (2004) used the 2001 National Household Transportation Survey data to look at aging Americans' mobility patterns and found that more than one-in-five (21%) Americans over the age of 65 did not drive for reasons including declining physical and cognitive limitations, safety concerns, and having no car or no access to a car. Over half of non-drivers 65 and older stayed at home because they had no transportation options.

A study done in Great Britain of seniors aged 84 and older found that a minority of these seniors (8.4%) were still driving (Brayne et al. 2000). Those who did continue to drive automobiles had no physical or cognitive limitations aside from some hearing loss (22.6%), while the non-drivers often cited poor health (48.5%) as the primary reason for having stopped driving (Brayne et al. 2000). This study is consistent with the theory of selective optimization and compensation (Baltes and Baltes 1990), which states that as we age, we:

1. Select (or deselect) certain activities based upon our physical and cognitive abilities,
2. Optimize what we can do, and
3. Compensate to accomplish tasks in new ways.

This theory is supported by the fact that some drivers voluntarily deselect driving as a form of transportation due to physical limitations.

At the same time, there also is evidence that not all older drivers who have physical and cognitive limitations choose to cease driving (Dellinger et al. 2001). A study of 1,950 seniors living in southern California found that while medical or physical limitations were the most common self-reported reasons for ceasing, other elders, with a greater number of medical conditions and more physical limitations, continued to drive (Dellinger et al. 2001). In fact, the number of medical conditions and the decision to cease driving were found to be inversely correlated, meaning that those who were most limited in their ability to drive tended to continue to do so (Dellinger et al. 2001). Among those who had ceased to drive, the medical reasons cited most often were poor vision and cardiovascular problems. While vision was the most

common self-reported reason for driver cessation, vision itself has been shown to be correlated with increased risk of accident only after age 70 (*Dellinger et al. 2001; Ragland, Satariano, and MacLeod 2004*).

Dellinger et al. (2001) also found other non-medical reasons given for driving cessation, including loss of confidence, trouble with licensing, concern about being in an accident, fear of crime, and not being able to pay for vehicle upkeep. In addition, gender has been found to be a factor; specifically, several studies have shown that women are more likely to cease driving at an earlier age than are their male counterparts (*Dellinger et al. 2001; Ragland et al. 2004*), despite being physically and cognitively able to continue (*Stewart et al. 1993*).

A recent study by Carr, Shead, and Storandt (2005) compared older drivers who had dementia to those who had dementia but who had voluntarily ceased driving. The researchers expected to find that those who had ceased driving were more cognitively challenged than those who had continued to drive. Instead, they found no significant difference in impairment between the two groups; in fact, on some measures, such as word fluency and mental control, the non-driver group actually scored higher than the driver group. Taken together, these studies suggest that some seniors see their physical or mental limitations as reasons to discontinue driving, while others do not. There is no consensus as to why some drivers with dementia choose to cease driving while others do not.

Little intervention research aimed at identifying ways to help older drivers more realistically gauge their driving ability has been conducted. An exception is a study by Eby et al. (2003), which developed a self-assessment driver evaluation workbook and an on-road test. Respondents were asked to answer questions that were formulated to assess their individual driving. The three categories were health, driving experiences, and driving attitudes. In post-survey interviews, most of the respondents believed the workbook was highly educational and 14 percent claimed they discovered limitations to their driving ability that they had not previously noted. The researchers concluded that not only was the workbook a good educational tool, but it provided a tool for families to discuss driving cessation. The workbook may be a way to educate those who seem unwilling to cease driving despite physical or cognitive limitations. Kostyniuk and Shope (2003), for example, found that 33 percent of drivers who anticipated problems in their ability to drive reported that they would continue to drive regardless. An educational intervention may be one method of increasing the number of seniors who voluntarily choose to cease driving.

## **2.5 OUTCOMES OF DRIVING CESSATION**

Some research has examined the impacts of driving cessation on older adults. Among the outcomes found include susceptibility to depression and to isolation. Specifically, researchers have demonstrated a correlation between driving cessation and increased depressive symptoms, and also between driving cessation and a reduction of activities outside the home (*Fonda et al. 2001; Marottoli et al. 2000; Ragland et al. 2005*). Even reductions in driving, or partial cessation, were shown to increase the likelihood of depression. Furthermore, the presence of a spouse did not mediate depressive symptoms of those who cease to drive. It is important to note that the depressive symptoms did not precede driving cessation; thus, there appears to be a causal

relationship between cessation and driving, with cessation being the catalyst (*Ragland et al. 2005*). The likelihood of depression as an outcome to driving cessation (either total or partial) indicates the possible utility of transitional programs that, by assisting seniors to adjust from being drivers to non-drivers, would help deter the onset of depression (*Fonda et al. 2001*).

One factor that may influence whether a senior who ceases driving becomes depressed is the amount of activity she or he has outside the home. It is now well understood that activity and social interaction can impact a person's health (*Marottoli et al. 2000*) and Marottoli et al. found driving cessation to be strongly associated with a decline in activity outside the home. These findings suggest that driving cessation can lead some seniors to a more isolated existence. Programs that help in the adjustment from driver to non-driver, along with increased public transportation options, may be valuable ways to keep seniors who cannot drive active in their communities and, thus, help to preserve their health.

It should be noted that none of the studies, cited above, examined the impact of mandatory driving cessation. Cessation that is mandatory in nature may well have greater, or different, impacts for those older drivers who are required to forfeit their driving privileges, as opposed to the impacts experienced by drivers who have chosen voluntarily to stop driving. Because Oregon's *Medically At-Risk Driver Program* has a mandatory cessation component, further research is needed to study the impact of driving cessation on those who, through ODOT's, Driver and Vehicle Services enforcement of regulations, to forfeit their driving privileges.

## **2.6 ALTERNATIVE TRANSPORTATION NEEDS OF OLDER ADULTS**

Little research exists on the mobility needs of non-driving seniors in the U.S.. Indeed, although speculation is common in the literature about the need to increase transit availability for seniors, there is little evidence that seniors would use public transportation if it were available, and furthermore little evidence that seniors use it in areas where it is already available (*Giuliano et al. 2003*). Rosenbloom (2003) argued that seniors are more mobile now, than at any other time in U.S. history, due to land-use patterns that support decentralized living (specifically, suburban developments). Rosenbloom (2003) further argued that decentralization fosters a greater dependence on single occupancy vehicle travel, especially where public transportation is not available. The number of transportation choices available to seniors can improve their ability to leave their homes and be active in their community.

The American Public Transportation Association (2005) released findings from a cross-sectional telephone survey of 404 U.S. older adults showing that nearly all respondents (98%) reported maintaining their independence was extremely important, and 82 percent worried that they would be stranded and unable to get around when they can no longer drive. Two-thirds (66%) believed that their community needed to provide more transportation options for older adults, such as easy-access buses and senior mini-van services. Results showed that respondents would use public transportation on a regular basis if transit services were convenient and easily accessible (80%), took them to many of the destinations that they seek (75%), and if stops were located near businesses that offer senior discounts (68%).

However, a study done in Michigan found that most seniors in that state would not take public transportation, even if it were an option, and that for seniors whose communities already provided public transportation, the majority were unaware of the service (*Kostyniuk and Shope 2003*). Furthermore, of the seniors surveyed, only 2.5 percent used public transportation at all, while most relied on rides from either family or friends. Similarly, although the Administration on Aging (*2005*) reported that 82 percent of older respondents considered public transportation a better alternative than driving alone, especially at night, most (63%) respondents reported that even when public transportation was available, they did not use it.

A 2004 study by the American Association of Retired Persons (AARP) found that although transit use is often an option for urban seniors, seniors living in rural areas face particular mobility difficulties if they are non-drivers. Rural transportation providers often must cover vast service areas, with relatively few riders, making reliable and cost-effective strategies a challenge. In rural areas, 31 percent of transit trips were found to be made by older adults – a much higher proportion than in non-rural areas (*AARP 2004*).

Coughlin (*2001*) performed a study using focus groups to generate information about the perceptions and preferences for transportation options among adults aged 75 and older. Suburban drivers and non-drivers, as well as urban non-drivers, noted that mobility was a critical element of overall life satisfaction, both for meeting the daily necessities of life and for maintaining social connections. A strong preference was expressed for use of the personal automobile for transportation, whether respondents were drivers or non-drivers. Alternatives such as public transportation, walking, taxis, and senior vans all were seen as less attractive alternatives. Urban non-drivers seemed most flexible in the mode of transportation that they would consider, especially in regard to public transportation. Persons in the suburbs had little information about transportation alternatives to the automobile in the community.

Ernst and McCann (*2005*) reviewed laws that promote non-motorized mobility and laws that place age-based restrictions on driver's license renewals. Four states (California, Colorado, Maine, and Oregon) promote the mobility options of public transit, walking, and bicycling for all state residents. Ernst and McCann (*2005*) concluded that better transit, walking, and bicycling systems for everyone would allow older people to transition seamlessly from driving to other travel modes, or to supplement their driving by using these alternatives modes, thereby reducing their loss of independence and enhancing their mobility. They also concluded that this would allow individuals to remain integrated with the rest of their communities as they shared buses, trains, bike lanes, and sidewalks with the general population. However, empirical evidence to support these conclusions does not yet exist.

## **2.7 CONCLUSION**

Existing literature reveals that with age, older adults may experience loss of vision, as well as reaction, execution, and cognitive abilities to the point that driving may become hazardous. Proportionally more seniors die as a result of traffic fatalities than any other age group; and when vehicle miles traveled are considered, seniors are the second most likely age group to be in an accident.

Some, but not all, older adults who experience physical or cognitive difficulties choose voluntarily to restrict or cease driving. Although the majority of older drivers do not pose a safety threat, previous research has found that some older drivers continue to drive even when they are not able to do so safely. Additional research concerning the factors affecting the decision to cease or to continue driving is needed.

Furthermore, greater understanding of the impacts of driving cessation – particularly the loss of independence, reduced activity outside the home, and the increased risk of depression and isolation – is needed, as are ideas for ways in which the needs of older drivers who must transition to non-driver status can be met. Programs that may assist older drivers who forfeit their licenses include mental health counseling and educational forums on how to access alternative transportation options, although little evaluative research exists on the effectiveness of these programs. Some research studies also have suggested ways to make it easier for older adults to drive longer. Ideas include larger traffic signs and stop lights, better lighting, driver education, and self-assessment tests (*Baggett 2003; Eby et al. 2003; Kelsey and Janke 2005*).

The remainder of this report describes a study designed to address some of these research needs, specifically in Oregon. In particular, the factors that influence voluntary driving cessation and keep older adults in Oregon driving beyond the time that it is safe for them to do so, along with the availability of and use of alternative transportation options, and the factors affecting use, are examined.



## 3.0 METHODOLOGY

### 3.1 OVERVIEW

This study consisted of three phases. The first phase involved a short screening survey sent to a sample of older adults in Oregon. The purpose of the survey was to assess their willingness to respond to a longer survey about the transportation behaviors and needs of older adults. The second phase involved developing and mailing the larger survey, which included a request for volunteers to participate in a follow-up telephone interview. The third phase consisted of conducting telephone interviews with a sample of those respondents to the second mail survey, who volunteered to be interviewed.

The study began with the development and mailing of a short one-page survey to 2,000 randomly selected persons aged 65 or older in the State of Oregon. This sample consisted of current drivers, persons with expired drivers' licenses, and state ID card holders. Persons who had been mandated to stop driving under Oregon's *Medically At-Risk Driver Program* were excluded from the sample, as the focus of this study was on the factors affecting voluntary, not mandatory, cessation of driving. This sample was further segmented (disproportionately, so as to have approximately equal groups) by a *rural* versus *urban* designation, as defined by the U.S. Census (Gibson 1998). The one-page survey was meant to determine the response rate by groups (e.g., current drivers versus those who had voluntarily ceased driving, urban versus rural) that could be anticipated for the larger survey and to develop a list of approximately 1,500 potential respondents.

Due to a low response from both the expired license holders and the state ID card holders, the one-page survey was mailed to an additional 3,601 persons with expired licenses or ID cards. From the two mailings combined, a total of 1,154 persons indicated they would be willing to complete the longer mail survey.

Two versions of the second mail survey were developed: one for those who had voluntarily ceased driving (called "ceasers") and the other for those who were still driving (called "drivers"). A total of 488 completed surveys were returned. At the end of the mail survey, respondents were asked if they would be willing to be interviewed by telephone so that the researchers could learn more about their experiences or thoughts about transportation for older Oregonians. A sample of those willing to be interviewed was selected, two versions of the interview guide were developed (for ceasers and for drivers), and 100 telephone interviews were completed.

## 3.2 SAMPLE SELECTION

### 3.2.1 Response-Rate Determination Survey

The sample sizes originally stipulated for this study were based on one of its initial goals – to compare older adults who voluntarily ceased driving (ceasers) with those who were referred for mandatory cessation (“mandatory ceasers”). Through 2004, there were a minimum of 1,500 individuals under the mandatory referral program; therefore, an initial sampling goal for the study was to identify 1,500 voluntary ceasers. Although mandatory ceasers were eventually eliminated from examination in the present study, achieving a similar sample size facilitates future comparative studies of mandatory and voluntary ceasers. Thus, the present study involved an examination of driving behavior and voluntary, not mandatory, cessation among older adults in Oregon.

To identify the sample, ODOT’s Driver and Motor Vehicle Services provided data files containing three different populations of individuals aged 65 and over – those with: (1) Oregon driver licenses; (2) Oregon identification cards; or (3) expired Oregon driver licenses. From these data, cases dating from 1999-2006 were selected to represent the standard license renewal period.

In order to determine the rate of voluntary ceasers within the three sampling populations (driver’s licenses, ID cards, and expired licenses), as well as the rate of response by group that could be expected to take the survey (i.e., current driver, ceaser), a one-page survey was sent to 2,000 individuals. As described in Section 3.3.1 below, in this brief response-rate determination survey, individuals were asked whether they were currently driving in Oregon or not, and whether they would participate in a mail survey about older adults and transportation in Oregon.

Because of ODOT’s interest in similarities and differences between urban and rural drivers, and between drivers and ceasers, the 2,000 individuals were randomly selected from a total of 61,874. First, a proportional sample was developed based on the three populations, and then a disproportional sample was created based on the designation of the area of each individual’s residence as defined as *urban* or *rural* in the 2000 Census. For this disproportional sample, individuals were stratified by zip code, and then each zip code was given an *urban* or *rural* designation; if 50 percent or more of the population had been designated in the 2000 U.S. Census as urban, the zip code was classified as urban.<sup>2</sup> Cases having zip codes without this designation (e.g., zip codes created after the 2000 Census) were excluded from the sample. See Table 3.1 for details.

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<sup>2</sup> An *urban area* is all territory, population, and housing units in urbanized areas and in places of more than 2,500 persons outside of urbanized areas. "Urban" classification cuts across other hierarchies and can include zip codes located in metropolitan or non-metropolitan areas. For the 2000 Census, there were two types of urban areas: *urban clusters* and *urbanized areas*. An *urban cluster* was defined for Census 2000 as a densely settled territory that has at least 2,500 people, but fewer than 50,000. An *urbanized area* was defined as an area consisting of a central place(s) and adjacent territory with a general population density of at least 1,000 people per square mile of land area that together has a minimum residential population of at least 50,000 people. A *rural area* was defined as all territory, population and housing units not classified as urban. "Rural" classification cuts across other hierarchies and also can include zip codes located in metropolitan as well as non-metropolitan areas.

**Table 3.1: Sample – First Mailing.**

Population		Total	Percent	Sample
Proportional Sample By Type Of Licensure/Id (1999-2006)				
Expired		9,867	16	320
ID cards		8,821	14	286
Licenses		<u>43,186</u>	<u>70</u>	<u>1,394</u>
Total		61,874	100	2,000
Disproportional Sample By Urban-Rural Strata				
Expired	Rural	1,665	17	160
	Urban	<u>8,040</u>	<u>83</u>	<u>160</u>
	Subtotal	9,705	100	320
	[Missing zip] <sup>a</sup>	[162]		
ID Cards	Rural	969	11	143
	Urban	<u>7,697</u>	<u>89</u>	<u>143</u>
	Subtotal	8,666	100	286
	[Missing zip] <sup>a</sup>	[155]		
Licenses	Rural	7,299	17	697
	Urban	<u>35,093</u>	<u>83</u>	<u>697</u>
	Subtotal	42,392	100	1,394
	[Missing zip] <sup>a</sup>	[794]		
Total		60,763		2,000
[Excluding missing zips] <sup>a</sup>				

<sup>a</sup> Missing zip” refers to addresses with new zip codes, created since 2000, that did not have an urban-rural designation available. Individuals for whom urban-rural designation could not be determined were excluded from the sample.

The results of the first mailing are shown in Table 3.2. Of the 2,000 surveys mailed, 236 were returned as undeliverable. Of the remaining 1,764 cases, 888 responses (50%) were received. Of those who responded, 607 (68%) indicated that they were willing to participate in the larger mail survey. Of those 607 respondents, 14 (all with current licenses) were eliminated from the sample because proxies responding on their behalf indicated that the individual named could not participate due to mental or cognitive disability. Thus, based on this first mailing, 593 potential respondents for the larger mail survey were identified: 528 with current licenses, 18 whose licenses had expired, and 47 with ID cards.

Among the 593 initial mail respondents, there were approximately equal proportions of urban and rural individuals in each category (expired license, ID card, current license) who replied to the one-page survey. Individuals with current licenses were more likely to respond than were holders of state ID cards, or those with expired licenses. Although not depicted on Table 3.2, the response to this mailing confirmed that individuals holding ID cards and those whose licenses had expired indeed, generally, had ceased driving.

Among the respondents, purported willingness to participate in the larger survey was highest among drivers (79%), considerably lower among state ID card holders (39%), and even lower among respondents with expired licenses (23%). With respect to urban/rural differences, willingness to participate was about equal for urban and rural drivers, but urban individuals holding either expired licenses or ID cards were less likely to say they would be willing to participate in the larger survey than were their rural counterparts.

**Table 3.2: Response and Participation Rates – First Mailing.**

Category		Sample	Response		Willing to Participate	
			Replies	Percent	Replies	Percent
Expired	Rural	160	40	25	12	30
	Urban	<u>160</u>	<u>37</u>	<u>23</u>	<u>6</u>	<u>16</u>
	Subtotal	320	77	24	18	23
ID Cards	Rural	143	60	42	25	42
	Urban	<u>143</u>	<u>62</u>	<u>43</u>	<u>22</u>	<u>35</u>
	Subtotal	286	122	43	47	39
Licenses	Rural	697	338	48	255	75
	Urban	<u>697</u>	<u>351</u>	<u>50</u>	<u>287</u>	<u>82</u>
	Subtotal	1,394	689	49	542	79
Total Sample	Total Mailed	2000	888		607	68
	Returned as undeliverable	-236				
	Eliminated (ineligible with licenses)				-14	
	Adjusted Total	1,764	888	50	593	68

Based on the results from this first mailing, it was clear that to meet the study objectives, the number of individuals who had ceased driving and who would be willing to participate in the larger survey would have to be increased. Thus, a second mailing was sent to 3,600 state ID card holders (Table 3.3). Holders of expired licenses were not included in this additional mailing because, in the first survey, the number who agreed to participate in the larger survey was so low (23 out of 320).

**Table 3.3: Response and Participation Rates – Second Mailing.**

Category		Sample	Response		Willing to Participate	
			Replies	Percent	Replies	Percent
ID Cards	Rural	827	144	17	134	93
	Urban	<u>2,773</u>	<u>674</u>	<u>24</u>	<u>451</u>	<u>67</u>
	Subtotal	3,600	818	23	585	71
Returned as undeliverable		-468				
Eliminated					-24	
Adjusted Total		3,132	818	26	561	71

Of the 3,600 one-page surveys mailed in the second mailing, 468 (13%) were returned as undeliverable. Of the remaining 3,132, 818 (26%) responses were received; among those, the rate of willingness to participate was 72% (585 out of 818). However, 24 people were eliminated due to mental or cognitive disability, resulting in 561 voluntary ceasers who were eligible and agreed to complete the larger survey. When combined with the 47 individuals holding ID cards and the 18 individuals with expired licenses, identified in the first mailing, the sample of voluntary ceasers who indicated willingness to participate in the larger mail survey numbered 626. Thus, with the 528 drivers (holders of current licenses) who, in the first mailing,

had indicated willingness to participate, the total sample consisted of 1,154 individuals who agreed, initially, to be a part of the study by completing a mail survey. Of the 528 individuals who held a current Oregon Driver’s License, 253 identified themselves as living in a rural area of Oregon and 275 said they lived in an urban area. Of the 608 individuals who held Oregon State Identification Cards, 154 reported they lived in a rural area and 454 said they lived in an urban area. Of the 18 respondents who held an Oregon Driver’s License that had expired, 12 reported living in a rural area and 6 in an urban area.

### 3.2.2 Mail Survey of Driving Behavior and Ceasing Among Older Adults

The study’s mail survey of driving behavior and cessation was developed and sent to the 1,154 individuals who had agreed to be part of the study via the one-page response-rate determination survey described above. A total of 534 responses were received, as shown in Table 3.4; another 75 surveys were returned as undeliverable, for a response rate of 49.5 percent (534/1,079).

**Table 3.4: Disposition – Mail Surveys.**

Sample		Returned Surveys	Deceased	Other Problems	Usable Surveys
Urban	Driver	185		1	184
	Ceaser	<u>116</u>	<u>4</u>	<u>2</u>	<u>110</u>
	Subtotal	301	4	3	294
Rural	Driver	141			141
	Ceaser	<u>64</u>	<u>12</u>	<u>15</u>	<u>37</u>
	Subtotal	205	12	15	178
Unknown	Driver	17			17
	Ceaser	<u>11</u>			<u>11</u>
	Subtotal	28			28
Sample Total		534	16	18	500

Of the 534 completed surveys, 34 were not included in the analyses. These surveys were not useable based on the following reasons:

- Multiple respondents had provided answers (n=1).
- Persons other than the one to whom the survey was addressed completed the survey (n=5).
- The respondent had ripped off the last page of the survey containing his/her survey ID number and urban-rural designation (n=3).
- A note attached to the survey indicated the person was unable to respond (n=5).
- The returned survey was completely blank (n=4).

- The potential respondent had died (n=16; all were ceasers – 4 urban and 12 rural; in 2 cases we learned of this through phone calls to our office, in which a spouse notified us that because the respondent had died, the spouse had completed the original response-rate determination survey and then the mail survey itself).

The final sample of respondents whose surveys were included in the analysis, then, was 500: 342 respondents who were current drivers (184 urban and 141 rural, plus 17 who did not report whether they lived in an urban or rural area) and 158 respondents who had voluntarily ceased driving (110 urban and 37 rural, plus 11 who did not report their urban-rural status).

### 3.2.3 Follow-up Telephone Interviews with Drivers and Ceasers

Among the 500 usable mail surveys received, 190 respondents (38%) indicated that they would be willing to participate in a follow-up telephone interview. Those who were willing provided a telephone number and an indication of the days and times it would be convenient to call. Staff compiled these surveys, entered selected information from them into a spreadsheet, and copied selected portions of the surveys to be referred to in the interviews. From the call list, names were selected and provided to the interviewers.

As shown in Table 3.5, of the 190 individuals who agreed to be called, 130 were contacted, each at least once (e.g., one attempt made). A total of 246 calls were required to complete 100 interviews.

**Table 3.5: Disposition – Telephone Contacts.**

<b>Disposition</b>	<b>Number Of Calls</b>	<b>Percent Of Total Calls</b>
The number was not in service, had been disconnected, or yielded a recording indicating that it was no longer an active number	2	.8
The number rang, but no one answered; always an answering machine; always busy; the protocol requires 10 calls to non-answering numbers	24	10.0
An answering machine was reached at the telephone number	95	39.0
Those unable to participate due to death, self-defined health reasons or deafness	6	2.0
Contact was made with the household, but not necessarily the designated respondent; by the end of the field period, the case neither yielded a refusal or completed interview	12	5.0
The interview was interrupted, but not terminated; the field period ended before the full interview could be completed	2	.8
Caller, on contact, refused to participate in the study	4	2.0
Informant discontinued survey and would not complete	1	.4
An interview was completed with the designated respondent	100	40.0
<b>Total</b>	<b>246</b>	<b>100</b>

Due to time constraints, it was not possible to wait until all surveys were received and then randomly choose the sample. Instead, as surveys were returned, the list of names for a given time period was compiled and distributed to interviewers. Two weeks into the interview process, however, an analysis of completed interviews, by rural/urban and driver/ceaser, was done and it was noted that few interviews with rural ceasers had been completed. Extra effort was made to

reach more of these respondents in subsequent calls. Even with this approach, interviews were completed with only six rural ceasers. Completed interviews by type are shown in Table 3.6.

**Table 3.6: Sample – Telephone Interviews**

Respondent Type		Completed Interviews
Drivers	Rural	36
	Urban	<u>33</u>
	Subtotal	69
Ceasers	Rural	6
	Urban	<u>25</u>
	Subtotal	31
Total Sample		100

### 3.3 INSTRUMENT DEVELOPMENT

#### 3.3.1 Response Rate Determination Survey

As noted in the above description of the study’s sample, to determine what response rate could be expected for each subgroup to be surveyed as a part of the larger mail survey to be conducted of older adults and their travel patterns, an initial response-rate determination survey was created. Although this initial survey was originally proposed as a postcard, the team realized that to maintain respondent confidentiality, it would be necessary to have the survey returned in an envelope. As a result, the response-rate determination survey was designed as a one-page survey, in 14-point font. The survey packet included a cover letter on ODOT stationery that was signed by an ODOT official. The one-page survey (Appendix A), and a return envelope was addressed to the Institute on Aging at Portland State University. The packet was mailed in an ODOT envelope. In an effort to enhance response rate, per Dillman’s (2007) recommendations, stamps were placed by hand on each return envelope, rather than using a postage meter.

The one-page response-rate determination survey instrument consisted of questions eliciting the following information: whether the respondent currently drove motor vehicles on Oregon roads and, if not, if they ever had driven on Oregon roads; if they would be willing to participate in a larger survey of older adults concerning transportation in Oregon; if the address to which the survey was mailed was the respondent’s preferred address and, if not, what that address was; and, if someone other than the named respondent was completing the survey, why the original respondent was not able to respond. The draft survey instrument was reviewed by ODOT’s Technical Advisory Committee (TAC) and approved for mailing.

Each potential respondent was assigned a four-digit code for response-tracking purposes. As indicated in Section 3.2.1, the first mailing of the response-rate determination survey went to 2,000 persons aged 65 and older in Oregon. A supplemental sample of 3,600 state ID card holders and individuals with expired licenses then was drawn, due to low response rates from these groups, and the one-page survey was sent to those individuals as well.

### 3.3.2 Mail Survey of Driving Behavior and Ceasing Among Older Adults

The mail survey, *Driving Behavior and Cessation Among Older Adults in Oregon*, consisted of two versions. One version was developed for individuals who indicated in their response-rate determination survey that they were current drivers (drivers) and the other version for those who no longer were driving or who had never driven on Oregon roadways (ceasers). Drafts of both versions (driver and ceaser) of the instrument were reviewed by ODOT's Technical Advisory Committee, and comments and suggestions made by that group were integrated into the final versions. Given the study population, the final versions were printed in 14-point font to enhance readability. Each version consisted of 36 questions (Appendix B).

The two versions of the survey instrument were identical with respect to the questions on: demographic characteristics; depression; frequency of use of different modes of transportation; types and number of trips taken; whether or not a health problem had limited the respondent's travel; and knowledge and use of public transportation alternatives available in the respondent's community.

These general questions then were followed by a series of questions about changes in driving that were parallel, but not identical, for the two groups. Specifically, drivers were asked to report on changes they had made to their driving *in the previous year* and to speculate on what the health-related and/or personal reasons they *believed* would make them stop driving. Ceasers were asked the same questions, but phrased differently to reflect their situation. Specifically, ceasers were asked what changes they had made in their driving *in the year before they stopped driving* (offering an historical perspective), and what health and personal experiences had *actually* caused them to cease driving.

The next section of both versions of the instrument concerned the impact of driving cessation. In particular, drivers were asked to speculate on the impact they *anticipated* that driving cessation would have on their lives, whereas ceasers were asked about the *actual* impact cessation had had on their lives.

The final section of both versions of the instrument concerned vehicle ownership and miles driven. Drivers were asked how much longer they expect to drive and ceasers were asked how long it had been since they had stopped driving. Both drivers and ceasers were asked if they keep a vehicle to be driven by themselves or others, and how many miles they and/or others had driven the vehicle in the last year. At the end of the survey, both drivers and ceasers were given space to add additional comments and each respondent was asked if he or she would be willing to participate in a follow-up phone interview.

### 3.3.3 Follow-Up Telephone Interviews with Drivers and Ceasers

The telephone interview guide consisted of open-ended questions designed to build on, but go beyond, the survey responses regarding changes in driving habits, reasons to stop driving (hypothetical for those still driving, actual for ceasers), and transportation alternatives. In asking about changes in driving habits, for example, the interviewer would refer to the changes the respondents had cited on the survey as those done "always" or "often" (e.g., "limit distance I drive") and ask them to talk more about these changes, including over what period of time the

changes had occurred and the impact of these changes on their life. The exception to this process was if the individual mentioned only changes that had occurred “sometimes” or “hardly ever,” in which case the interviewer asked about any changes noted, regardless of frequency.

Similarly, those interviewed were prompted about their survey response to the availability of alternative forms of transportation in their community. If a person responded that there were no transportation alternatives in their community, the interviewer asked them to reflect on how this impacts their life, how they get around, and, if still driving, to what extent a lack of alternatives might influence their future driving decisions. If the person responded that they did have alternative forms of transportation, the interviewer would discuss whether these alternatives are used, how often, and to accomplish what types of activities. In this way, the interview followed on the mail survey responses, probing for elaboration of the older person’s transportation experiences.

Both drivers and ceasers were asked essentially the same questions, but with either a past or future tense. For example, ceasers were asked what changes they had made prior to ceasing to drive and the time period over which these changes had occurred. Drivers, similarly, were asked what changes they have seen in their driving and over what period of time. Ceasers were asked what finally made them stop driving, while drivers were asked what they thought might make them stop at some point in the future.

Although the interviews were anticipated to take 45 minutes to one hour, most averaged 20 to 30 minutes. In some cases, respondents were fatigued or in poor health, and even this length of time proved difficult. Others noted that they had sent in a card agreeing to do the mail survey, had completed the mail survey, and they were not sure they had much more to add. Even with skilled probing by the interviewers, few interviews lasted more than one-half hour. Interviewers’ assessments were that an hour-long interview would be difficult for many (with the exception of the young-old) individuals in the population under study.

Each of the interviews was recorded and transcribed for analysis. Copies of the interview guides are included in Appendix C.

## **3.4 DATA ANALYSIS**

### **3.4.1 Response-Rate Determination Survey**

Microsoft *Excel* software was used to track answers from individual respondents. The tracking was aided by four-digit codes assigned to each member of the sample at the beginning of the study. In addition, *SPSS* statistical analysis software was used to determine the overall and subgroup response rates, and to analyze the data from the responses to each item on the *Response Rate Determination Survey*.

### **3.4.2 Mail Survey of Driving Behavior and Ceasing Among Older Adults**

All analyses were performed using *SPSS* statistical software (versions 13 and 15). Descriptive analyses were conducted for all items on both versions (drivers and ceasers) of the survey.

Frequencies and percentages for the responses on each item are provided for each version of the survey instrument (Appendix B). In addition, t-tests and chi-square analyses were conducted, as appropriate, to determine group differences (i.e., ceasers vs. drivers, rural vs. urban ceasers, and rural vs. urban drivers). In this report,  $p$  values of  $\leq .05$  are reported as indicating a statistically significant difference between groups and are highlighted in the tables using bold type.

Respondents' own assessment as to whether they resided in an urban or rural area was used for the purposes of group comparisons, as opposed to the less refined Census designation (see Footnote 1). Logistic regression analysis was conducted to identify the factors that predict driving status (current driver versus voluntary ceaser).

### **3.4.3 Follow-Up Telephone Interviews with Drivers and Ceasers**

Analysis of the interview data was completed using qualitative analytic software, *ATLAS.ti (Version 5.0)*. This software provides a powerful tool to gain a detailed view, across types of respondents, of common themes and differences that emerge from the narrative data. To analyze the telephone interview data, then, the transcribed interview texts were read, passages of interest were selected, and code words and/or memos were assigned to quotations. Although this process does allow for analysis involving "counting mentions" or responses in the text, here it was not used only in this strictly code-retrieval way; it was used to provide depth and insight, based solidly in what those interviewed said, and to facilitate the selection of key illustrative quotations. Comments made anywhere in the interview that were relevant to a topic were included in the analysis, regardless of whether they were made in direct response to a question.





































































































































































































































