PRESERVING THE MOBILITY AND SAFETY OF OLDER AMERICANS

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TRIP
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Founded in 1971, TRIP ® of Washington, DC, is a nonprofit organization that researches, evaluates and distributes economic and technical data on surface transportation issues. TRIP is sponsored by insurance companies, equipment manufacturers, distributors and suppliers; businesses involved in highway and transit engineering and construction; labor unions; and organizations concerned with efficient and safe surface transportation.

Executive Summary

Today's older Americans enjoy a level of mobility and an active lifestyle that far outpaces previous generations. Demographic trends indicate that the number and proportion of older Americans have increased dramatically in recent years and will continue to do so. The provision of transportation improvements that will make it easier for older American's to maintain their mobility will benefit users of all ages. And anticipated developments in self-driving and connected vehicles have the potential to provide older Americans with additional mobility options in the future.

As the number and proportion of older drivers increases, roadway safety improvements designed to make it easier for older drivers to navigate traffic are becoming increasingly important, as older Americans grapple with the effects of aging while trying to maintain a level of mobility that matches their active lifestyle.

This report explores mobility and safety issues for older Americans and presents a set of recommendations for implementing a transportation system that can better serve the safety and mobility needs of older Americans and the population at large.

OLDER AMERICAN DEMOGRAPHICS

Older Americans form a significant proportion of the overall population and a rapidly increasing number and share of licensed drivers. The number and proportion of older Americans is expected to increase dramatically in the coming years.

- An estimated 46 million Americans are 65 or older, accounting for 15 percent of the total population. By 2060, the number of Americans ages 65 and older is projected to more than double to over 98 million, and the proportion of the total population over 65 will rise to nearly 24 percent.

- The number and proportion of licensed drivers 65 or older has surged in the last decade. From 2006 to 2016, the number of licensed drivers 65 or older has increased 38 percent – from 30.1 million in 2006 to 41.7 million in 2016. The proportion of licensed drivers 65 or older has risen from 15 percent in 2006 to 17 percent in 2012 to 19 percent in 2016.

- The number of all licensed drivers in the U.S. increased by nine percent from 2006 to 2016 from 202.8 million to 221.7 million and the number of licensed drivers less than 65 increased by four percent from 2006 to 2016 from 172.7 million to 180 million.

- The number of licensed drivers who are 65 or older increased by 16 percent from 2012 to 2016.

- The number of all licensed drivers increased by five percent from 2012 to 2016 and the number of licensed drivers less than 65 increased by two percent from 2012 to 2016.

- California, Florida, Texas, New York and Pennsylvania lead the nation in the number of licensed drivers 65 and older. West Virginia, Florida, Maine, Vermont and Arkansas lead the nation in the proportion of licensed drivers who are 65 years or older. Louisiana, Arkansas, South Carolina, Tennessee and Hawaii have seen the greatest increases in the number of licensed drivers in the last five years. The chart below details the 20 states with the highest number of licensed drivers 65 and older, the highest proportion of licensed drivers 65 and older, and the states with the largest increase in the number of licensed drivers 65 and older from 2012 to 2016. Data for all 50 states can be found in the appendix.

RANK	STATE	DRIVERS 65+	STATE	PERCENTAGE 65+	STATE	INCREASE IN 65+ DRIVERS
1	California	3,999,876	West Virginia	25%	Louisiana	44%
2	Florida	3,341,250	Arkansas	23%	Arkansas	28%
3	Texas	2,544,333	Florida	23%	South Carolina	28%
4	New York	2,442,349	Maine	23%	Tennessee	27%
5	Pennsylvania	1,911,928	Vermont	22%	Hawaii	26%
6	Ohio	1,616,214	Oregon	22%	New Hampshire	26%
7	Illinois	1,507,439	Delaware	21%	Utah	26%
8	Michigan	1,432,987	Pennsylvania	21%	Alaska	25%
9	North Carolina	1,376,260	Alabama	21%	New York	24%
10	Georgia	1,186,660	South Dakota	21%	Virginia	23%
11	New Jersey	1,153,534	Montana	21%	Vermont	22%
12	Virginia	1,087,440	Minnesota	21%	North Carolina	22%
13	Tennessee	1,035,885	South Carolina	20%	Washington	22%
14	Washington	970,075	New York	20%	Georgia	22%
15	Massachusetts	921,308	Ohio	20%	Colorado	22%
16	Arizona	899,807	Michigan	20%	Arizona	21%
17	Indiana	848,297	Oklahoma	20%	Nevada	21%
18	Alabama	837,360	Rhode Island	20%	Montana	20%
19	Missouri	830,871	Hawaii	20%	New Mexico	20%
20	Wisconsin	817,848	Mississippi	20%	Delaware	20%

FATALITY AND CRASH RATES AMONG OLDER DRIVERS

The number of older drivers killed or involved in fatal crashes has increased significantly in the last five years, partly due to the increasing number of older drivers and the larger share of drivers who are 65 and older.

- From 2012 to 2016, there was a 22 percent increase in the number of fatalities in crashes involving at least one driver 65 or older. The number of drivers 65 or older killed in crashes increased 21 percent from 2012 to 2016. Data for all 50 states, as well as a comparison to 2012, can be found in the appendix.

- The overall number of traffic fatalities in the U.S. increased 11 percent from 2012 to 2016, from 33,782 to 37,461 fatalities.

- The chart below details the 20 states with the highest number of traffic fatalities in crashes involving at least one driver age 65 or older in 2016, as well as the states with the highest proportion of fatalities in crashes involving at least one driver 65 or older.

RANK	STATE	Number of fatalities involving at least one 65+ driver	RANK	STATE	Percentage of fatalities involving at least one 65+ Driver
1	Florida	682	1	Wisconsin	26%
2	Texas	568	2	Minnesota	25%
3	California	554	3	Kansas	25%
4	Georgia	299	4	Nebraska	24%
5	North Carolina	285	5	Rhode Island	24%
6	Pennsylvania	267	6	Maine	23%
7	Ohio	250	7	Oregon	23%
8	Tennessee	233	8	Pennsylvania	22%
9	Illinois	232	9	Tennessee	22%
10	Michigan	231	10	West Virginia	22%
11	New York	222	11	Ohio	22%
12	Missouri	206	12	New Jersey	22%
13	Arizona	179	13	Missouri	22%
14	Kentucky	178	14	Michigan	22%
15	Alabama	161	15	New York	22%
16	Indiana	161	16	Iowa	22%
17	South Carolina	160	17	Florida	21%
18	Wisconsin	159	18	Illinois	21%
19	Virginia	151	19	Kentucky	21%
20	Mississippi	141	20	Arkansas	21%

- The chart below details the 20 states with the greatest increase between 2012 and 2016 in the number of fatalities in crashes involving at least one driver 65 or older. Nationwide, fatalities in crashes involving at least one driver 65 or older increased 22 percent from 2012 to 2016.

RANK	STATE	Fatalities involving at least one 65+ driver 2012	Fatalities involving at least one 65+ driver 2016	Change in fatalities involving at least one 65+ driver 2012-2016
1	Utah	27	50	85%
2	Oregon	64	113	77%
3	Colorado	77	128	66%
4	Washington	69	114	65%
5	Arizona	116	179	54%
6	Hawaii	17	25	47%
7	Missouri	141	206	46%
8	Georgia	206	299	45%
9	Illinois	161	232	44%
10	Florida	483	682	41%
11	Iowa	63	87	38%
12	Texas	418	568	36%
13	Idaho	38	51	34%
14	North Carolina	219	285	30%
15	Nebraska	41	53	29%
16	Kentucky	138	178	29%
17	California	435	554	27%
18	Nevada	54	66	22%
19	South Carolina	133	160	20%
20	Tennessee	194	233	20%

- The chart below details the 20 states with the highest number of drivers 65 and older killed in traffic crashes in 2016. Data for all 50 states, as well as a comparison to 2012, can be found in the appendix.

RANK	STATE	Driver 65+ Killed
1	Florida	357
2	Texas	318
3	California	278
4	Georgia	202
5	North Carolina	175
6	Pennsylvania	156
7	Tennessee	151
8	Ohio	147
9	Missouri	136
10	Michigan	135
11	Illinois	132
12	Kentucky	112
13	New York	104
14	Indiana	98
15	Wisconsin	95
16	South Carolina	93
17	Alabama	92
18	Mississippi	92
19	Virginia	89
20	Arizona	88

OLDER DRIVER MOBILITY AND QUALITY OF LIFE

Older Americans are more mobile and active than ever and want to maintain that lifestyle for as long as possible. Private vehicles remain the overwhelming transportation mode of choice for older Americans. The level of mobility enjoyed by older Americans is closely tied to their quality of life.

- For those 65 and older, 90 percent of travel takes place in a private vehicle, and for Americans 85 and older, 80 percent of travel occurs in a private vehicle.

- The majority of older Americans – 79 percent- tend to live in car-dependent suburban and rural communities, which typically require frequent, longer distance trips by automobile.

- Because they tend to limit their driving to non-peak hours (typically 9:00 a.m. to 1:00 p.m.), older drivers are disproportionately affected by growing levels of congestion. Their window of opportunity for travel narrows considerably as morning and evening rush hours become longer and midday congestion continues to grow.

- Many older drivers report self-regulating their driving by traveling only on familiar routes during daylight hours, avoiding left turns and sticking to less complex roads with lower traffic volumes during off-peak travel times.

- More than 600,000 people aged 70 or older stop driving each year and become dependent on others to meet their transportation needs. Men typically outlive their driving days by seven years and women by ten years.

- Compared with older drivers, older non-drivers in the U.S. make 15 percent fewer trips to the doctor, 59 percent fewer shopping trips and restaurant trips, and 65 percent fewer trips for social, family and religious activities.

CHALLENGES FOR OLDER DRIVERS

Certain situations and driving environments can be especially challenging or hazardous for older motorists. The higher instance of fatalities among older drivers is largely attributable to physical fragility that makes surviving a crash less likely than younger drivers.

- Beginning at age 65, the primary danger facing older drivers is their physical fragility, making older drivers much more likely to die when they do crash.

- Compared to experienced middle-aged drivers, research has found that 60-95 percent of the elevated fatality rates per mile driven for older drivers can be attributed to fragility that makes surviving a crash more difficult. By comparison, for drivers younger than 20, over-involvement in crashes accounts for more than 95 percent of their excess fatality rates compared with middle-aged drivers.

- On average, drivers in their mid- to late-eighties have lower crash rates per miles driven than drivers in their early twenties, and roughly half the crash rates of teenagers.

- In the face of elevated risks, older drivers tend to be very responsible on the road, with a higher rate of seatbelt use than younger drivers, greater avoidance of higher-risk driving environments (such as at night or in rain), and lower likelihood to drink and drive or be otherwise impaired.

- As people age, their eyesight, reaction time, cognitive ability and muscle dexterity may deteriorate, often making the tasks associated with driving more difficult. Aging may also limit a body's range of motion, making it more difficult to scan all directions for nearby vehicles or potential hazards.

- According to the National Highway Traffic Safety Administration (NHTSA), in 2016, 37 percent of all fatal crashes where at least one driver was aged 65 or older occurred at an intersection or were related to an intersection. However, for fatal crashes where no driver was aged 65 or older, only 20 percent were at an intersection or intersection related.

- In 2015 74 percent of traffic fatalities in crashes involving older drivers occurred during the daytime, 70 percent occurred on weekdays, and 67 percent involved other vehicles. This is compared to all fatalities in 2015, where 49 percent occurred during the daytime, 59 percent on weekdays, and 44 percent involved another vehicle

- Left hand turns are more problematic for older drivers, as they must make speed, distance and gap judgments simultaneously to enter or cross the through roadway.

- Deteriorated vision among older drivers may make small or complex road signage difficult to process. Signs may be misunderstood or not seen quickly enough to caution older drivers about upcoming exits, obstacles or changes in traffic patterns. The amount of light needed by drivers doubles every 13 years, starting at age 20. A 72-year-old needs 16 times the amount of light required by a 20-year-old to drive safely.

DRIVING ALTERNATIVES FOR OLDER AMERICANS

Older drivers who decide to give up the keys still have options available for maintaining their mobility, though some may come with challenges or drawbacks. Advancements in self-driving and connected vehicle technology may eventually allow older Americans to retain the convenience of private vehicle travel after they are no longer able to drive.

TRANSIT

- While public transit offers an alternative to driving, for older Americans, public transit accounts for just two percent of trips.

- Older Americans may be reluctant to use transit options because they may have difficulty getting from home to the transit pick-up, or from the transit drop off to their ultimate destination. Crowding, long waits and the physical challenges of boarding a bus may also deter older travelers from using available transit options.

- A significant proportion of older Americans live in rural areas, where transit options may not be readily available. Seventy percent of Americans over fifty live where transit does not exist or serves the area very poorly.

- Transit systems can be improved to better accommodate older Americans as well as the population at large. These improvements include expanded bus routes; transit vehicles, stops or facilities that better accommodate older or physically challenged passengers; and, additional non-traditional and private sector approaches to transit, including formal and informal ridesharing and taxi services.

RIDE SHARING SERVICES

- Ride sharing services like Uber or Lyft can help older Americans maintain their mobility if they are no longer driving. Ridesharing services allow a passenger to use a smartphone app to set a specific pick-up and drop-off point for their trip and summon a private vehicle driven by its owner to complete the trip. However, ride sharing services often require the use of smartphones, yet less than one -third of Americans over age 65 own a smartphone.

- Ride sharing services may not be available or may be limited in rural areas, where many older Americans live.

SELF-DRIVING AND CONNECTED VEHICLES

- Advances in automotive technology include self-driving vehicles, which do not require the driver to be in control of the vehicle, and connected vehicles, which recognize potential collision situations and allow for crash avoidance through communication between nearby vehicles.

- Approximately 94 percent of crashes involve human error. Advanced vehicle technology can be of particular assistance to older drivers as it addresses the deficits that may impact motorists as they age. These include identifying vehicles or objects in blind spots, intersection navigation, left turn assist, early warning when vehicles ahead slow or brake suddenly, or warnings when it is not safe to change lanes or pass another vehicle. While these technologies can provide warnings that help drivers avoid a collision, they may also increase distractions behind the wheel.

- For those who have completely stopped driving, self-driving vehicles may offer the ability to regain their mobility in a private vehicle. However, the timeline for the widespread use of self-driving and connected vehicles is uncertain, and their adoption by older drivers may be slower than that of the general population.

- In addition to the long timeframe for potential widespread adoption of self-driving vehicles, other uncertainties about the technology still exist, including: the relatively early stage of research and deployment of self-driving technology outside tightly controlled environments, questions about human interactions with the technology, and the potential detriment of overreliance on self-driving technology.

- While widespread use and adoption of self-driving vehicles may not happen in the near future, many vehicles are already equipped with technological features that are found in self-driving cars. These include adaptive cruise control and headlights; backup and parking assist; blind spot, forward collision and lane departure warning systems; navigation assistance; and integrated Bluetooth capabilities for cell phones. Research by the AAA Foundation for Traffic Safety found that nearly 60 percent of older drivers surveyed had at least one advanced technology in their primary vehicle.

RECOMMENDATIONS FOR IMPROVING MOBILITY AND SAFETY FOR OLDER AMERICANS

The following set of recommendations can improve the mobility and safety of older Americans. These improvements will also improve mobility and safety for all motorists.

SAFER ROADS:

- Clearer, brighter and simpler signage with larger lettering, including overhead indicators for turning lanes and overhead street signs. This should include minimum levels of retroreflectivity.
- Brighter street lighting, particularly at intersections, and bright, retroreflective pavement markings. Studies also show that increasing the width of pavement markings from 4 inches to 6 inches helps with decreasing lane departure and crashes, especially with older drivers.
- Where appropriate, widening or adding left-turn lanes and increasing the length of merge or exit lanes.
- Where appropriate, replacing intersections with roundabouts can eliminate left turns and slow the speed of traffic through an intersection, both of which address common challenges among older drivers.
- Where appropriate, widening lanes and shoulders to reduce the consequence of driving mistakes.
- Adding rumble strips to warn motorists when they are leaving the roadway.
- Making roadway curves more gradual and easier to navigate.
- Where appropriate, design and operate roads to accommodate all users of the roadway.
- Adding countdown pedestrian signals and leading pedestrian intervals, which allow for additional time for pedestrians in the intersection before cars get a green light.
- Adding refuge islands for pedestrians at intersections.
- Highway network and transportation system planning, design, maintenance, and operations functions are all likely to require adaptation to meet technical, policy, and legal expectations of a changing vehicle fleet that is technologically connected to other vehicles and the roadway itself.

SAFER ROAD USERS

- Promotion of education and training programs for older drivers.
- Raising awareness among older drivers of appropriate safety precautions and seat belt use.

SAFER VEHICLES:

- Implementing self-driving and connected vehicle technology and the inclusion of additional safety features on new vehicles to address the deficits drivers may face as they age.
- Improving crashworthiness of vehicles to better protect occupants and withstand impacts.
- Development of Intelligent Transportation System (ITS) technologies, including crash avoidance technologies.

IMPROVED TRANSPORTATION OPTIONS

- Ensuring public transit vehicles, facilities and stops are easily accessible and accommodating to elderly or disabled passengers.
- Expanding bus and transit routes.
- Implementing non-traditional and public sector approaches that are tailored to the needs of older adults, including ride sharing, volunteer driving programs, door-to-door community transportation services, taxi services and vehicle donation.

All data used in this report is the most current available. Sources of information for this report include: The Federal Highway Administration (FHWA), the National Highway Traffic Safety Administration (NHTSA), ChORUS (Clearinghouse for Older Road User Safety), AAA, The Brookings Institution, Monash University, AARP Public Policy Institute; the Insurance Institute for Highway Safety(IIHS) and the U.S. Census Bureau.

INTRODUCTION

Today's older Americans enjoy a level of mobility and an active lifestyle that far outpaces previous generations. Demographic trends indicate that the number and proportion of older Americans have increased dramatically in recent years and will continue to do so. This aging population will both create and face significant transportation challenges, including a transportation system that lacks many features that would accommodate the level of mobility and safety older Americans desire and expect. Transportation innovations and improvements to accommodate older American's need for improved safety and mobility will benefit users of all ages.

For older Americans, as well as the population in general, the ability to travel represents freedom, activity and choice. Older Americans prize their mobility and active lifestyles and want to maintain them as long as possible. For many older people, driving remains the most convenient means of transportation.

Older drivers make up a disproportionately high share of those involved in fatal traffic crashes. Roadway safety improvements designed to make it easier for older drivers to navigate traffic are becoming increasingly important, as older Americans grapple with the effects of aging while trying to maintain a level of mobility that matches their active lifestyle.

This report explores mobility and safety issues for older Americans and presents a set of recommendations for implementing a transportation system that can better serve the safety and mobility needs of older Americans and the population at large.

A SNAPSHOT OF OLDER AMERICANS – DEMOGRAPHICS & TRENDS

Demographic trends predict unprecedented growth in the number and proportion of Americans who are age 65 or older. An estimated 46 million Americans are 65 or older, accounting for 15 percent of the total population.[1] By 2060, the number of Americans ages 65 and older is projected to more than double to over 98 million, and the proportion of the total population 65 and over will rise to nearly 24 percent.[2]

The number and proportion of licensed drivers who are 65 or older has surged in the last decade. From 2006 to 2016, the number of licensed drivers 65 or older has increased 38 percent –

from 30.1 million licensed drivers in 2006 to 41.7 million in 2016. [3] The proportion of all licensed drivers 65 or older has risen from 15 percent in 2006 to 17 percent in 2012 to 19 percent in 2016. [4]

The number of all licensed drivers in the U.S. increased by nine percent from 2006 to 2016 from 202.8 million to 221.7 million and the number of licensed drivers less than 65 increased by four percent from 2006 to 2016 from 172.7 million to 180 million.[5]

California, Florida, Texas, New York and Pennsylvania lead the nation in the number of licensed drivers 65 and older. West Virginia, Florida, Maine, Vermont and Arkansas lead the nation in the proportion of licensed drivers who 65 or older. Louisiana, Arkansas, South Carolina, Tennessee, Hawaii and New Hampshire have seen the greatest increases in the number of licensed drivers from 2012-2016. Chart 1 details the 20 states with the highest number and proportion of licensed drivers who are 65 years or older. Information for all 50 states can be found in the appendix.

Chart 1. States with the highest number of licensed drivers 65 or older, states with the highest proportion of licensed drivers 65 or older, and states with the largest increase in the number of licensed drivers 65 and older from 2012 to 2016.

RANK	STATE	DRIVERS 65+	STATE	PERCENTAGE 65+	STATE	INCREASE IN 65+ DRIVERS
1	California	3,999,876	West Virginia	25%	Louisiana	44%
2	Florida	3,341,250	Arkansas	23%	Arkansas	28%
3	Texas	2,544,333	Florida	23%	South Carolina	28%
4	New York	2,442,349	Maine	23%	Tennessee	27%
5	Pennsylvania	1,911,928	Vermont	22%	Hawaii	26%
6	Ohio	1,616,214	Oregon	22%	New Hampshire	26%
7	Illinois	1,507,439	Delaware	21%	Utah	26%
8	Michigan	1,432,987	Pennsylvania	21%	Alaska	25%
9	North Carolina	1,376,260	Alabama	21%	New York	24%
10	Georgia	1,186,660	South Dakota	21%	Virginia	23%
11	New Jersey	1,153,534	Montana	21%	Vermont	22%
12	Virginia	1,087,440	Minnesota	21%	North Carolina	22%
13	Tennessee	1,035,885	South Carolina	20%	Washington	22%
14	Washington	970,075	New York	20%	Georgia	22%
15	Massachusetts	921,308	Ohio	20%	Colorado	22%
16	Arizona	899,807	Michigan	20%	Arizona	21%
17	Indiana	848,297	Oklahoma	20%	Nevada	21%
18	Alabama	837,360	Rhode Island	20%	Montana	20%
19	Missouri	830,871	Hawaii	20%	New Mexico	20%
20	Wisconsin	817,848	Mississippi	20%	Delaware	20%

Source: Federal Highway Administration Highway Statistics 2016. Chart DL-22.

The number of licensed drivers who are 65 or older increased by 16 percent from 2012 to 2016.[6] The number of all licensed drivers increased by five percent from 2012 to 2016 and the number of licensed drivers less than 65 increased by two percent from 2012 to 2016.[7]

FATALITIES AND CRASHES AMONG OLDER DRIVERS

The number of people killed in crashes involving older drivers and the number of older drivers killed in crashes increased at a higher rate than the nation's overall number of traffic fatalities from 2012 to 2016. In 2016, there were 7,256 fatalities in crashes involving at least one driver aged 65 or over, a 22 percent increase over 2012, when 5,940 people were killed in crashes involving at least one driver 65 or older.[8] In 2016, 4,204 drivers 65 or older were killed in crashes, an increase of 21 percent since 2012, when 3,471 drivers 65 or older were killed.[9] Nationwide, the total number of traffic fatalities increased 11 percent from 2012 to 2016, from 33,782 fatalities to 37,461, while the number of licensed drivers 65 and older increased 16 percent.[10]

Florida, Texas, California, Georgia and North Carolina had the highest number of traffic fatalities involving at least one driver 65 or older in 2016.[11] Wisconsin, Minnesota, Kansas, Nebraska and Rhode Island had the highest proportion of fatalities in crashes involving at least one driver 65 or older in 2016.[12] Chart 2 details the 20 states with the highest number of traffic fatalities in crashes involving at least one driver age 65 or older in 2016, as well as the states with the highest proportion of fatalities in crashes involving at least one driver 65 or older. Information for all 50 states, as well as a comparison to 2012, can be found in the appendix.

Chart 2. States with the highest number and proportion of traffic fatalities involving at least one driver age 65 or older in 2016.

RANK	STATE	Number of fatalities involving at least one 65+ driver	RANK	STATE	Percentage of fatalities involving at least one 65+ Driver
1	Florida	682	1	Wisconsin	26%
2	Texas	568	2	Minnesota	25%
3	California	554	3	Kansas	25%
4	Georgia	299	4	Nebraska	24%
5	North Carolina	285	5	Rhode Island	24%
6	Pennsylvania	267	6	Maine	23%
7	Ohio	250	7	Oregon	23%
8	Tennessee	233	8	Pennsylvania	22%
9	Illinois	232	9	Tennessee	22%
10	Michigan	231	10	West Virginia	22%
11	New York	222	11	Ohio	22%
12	Missouri	206	12	New Jersey	22%
13	Arizona	179	13	Missouri	22%
14	Kentucky	178	14	Michigan	22%
15	Alabama	161	15	New York	22%
16	Indiana	161	16	Iowa	22%
17	South Carolina	160	17	Florida	21%
18	Wisconsin	159	18	Illinois	21%
19	Virginia	151	19	Kentucky	21%
20	Mississippi	141	20	Arkansas	21%

Source: National Highway Traffic Safety Administration response to TRIP survey.

Utah, Oregon, Colorado, Washington and Arizona had the largest increase between 2012 and 2016 in the number of fatalities in crashes involving at least one driver 65 or older.[13] Chart 3 details the 20 states with the greatest increase between 2012 and 2016 in the number of fatalities in crashes involving at least one driver 65 or older. Nationwide, fatalities in crashes involving at least one driver 65 or older increased 22 percent from 2012 to 2016.

Chart 3. States with the greatest increase between 2012 and 2016 in the number of fatalities in crashes involving at least one driver 65 or older.

RANK	STATE	Fatalities involving at least one 65+ driver 2012	Fatalities involving at least one 65+ driver 2016	Change in fatalities involving at least one 65+ driver 2012-2016
1	Utah	27	50	85%
2	Oregon	64	113	77%
3	Colorado	77	128	66%
4	Washington	69	114	65%
5	Arizona	116	179	54%
6	Hawaii	17	25	47%
7	Missouri	141	206	46%
8	Georgia	206	299	45%
9	Illinois	161	232	44%
10	Florida	483	682	41%
11	Iowa	63	87	38%
12	Texas	418	568	36%
13	Idaho	38	51	34%
14	North Carolina	219	285	30%
15	Nebraska	41	53	29%
16	Kentucky	138	178	29%
17	California	435	554	27%
18	Nevada	54	66	22%
19	South Carolina	133	160	20%
20	Tennessee	194	233	20%

Source: National Highway Traffic Safety Administration response to TRIP survey.

Florida leads the nation in the number of drivers age 65 or older killed in a traffic crash in 2016, followed by Texas, California, Georgia and North Carolina.[14] Chart 4 below details the 20 states with the highest number of drivers 65 or older killed in traffic crashes in 2016. Information for all 50 states, as well as a comparison with 2012 data, can be found in the appendix.

Chart 4. States with the highest number of drivers 65 and older killed in traffic crashes in 2016.

RANK	STATE	Driver 65+ Killed
1	Florida	357
2	Texas	318
3	California	278
4	Georgia	202
5	North Carolina	175
6	Pennsylvania	156
7	Tennessee	151
8	Ohio	147
9	Missouri	136
10	Michigan	135
11	Illinois	132
12	Kentucky	112
13	New York	104
14	Indiana	98
15	Wisconsin	95
16	South Carolina	93
17	Alabama	92
18	Mississippi	92
19	Virginia	89
20	Arizona	88

Source: National Highway Traffic Safety Administration response to TRIP survey.

OLDER DRIVER MOBILITY AND QUALITY OF LIFE

Older Americans are more mobile and active than ever and want to maintain that lifestyle for as long as possible. Because of good nutrition, improved health care, better education and higher incomes, new generations of older Americans will be more mobile, healthy and active for a longer and greater percentage of their lives than any previous generations.[15] The majority of older Americans – 79 percent- tend to live in car-dependent suburban and rural communities, which typically require frequent, longer distance trips by automobile.[16]

The purpose of travel also changes as we age. Older drivers make a greater proportion of shopping trips, more family and personal errands, and more trips for social and recreational activities than younger adults.[17]

Older Americans are retaining their mobility and, like their younger counterparts, overwhelmingly use private vehicles as their primary mode of transportation. For those 65 and older, 90 percent of travel takes place in a private vehicle, and for Americans 85 and older, 80 percent of travel occurs in a private vehicle.[18] Private vehicles are often the most convenient travel option for older Americans, who also may be physically unable to use other modes such as transit, walking or cycling.

Because they tend to limit their driving to non-peak hours (typically 9:00 a.m. to 1:00 p.m.), older drivers are disproportionately affected by growing levels of congestion. Their window of opportunity for travel narrows considerably as morning and evening rush hours become longer and midday congestion continues to grow.[19]

Although they value their mobility, many older people tend to self-regulate their driving as they age in order to avoid certain situations. Many older drivers report traveling only on familiar routes during daylight hours, avoiding left turns, and sticking to less complex roads with lower traffic volumes during off-peak travel times.

While many older drivers are likely to self-regulate, they may ultimately stop driving for reasons relating to health, costs related to driving, driving-induced anxiety, or the advice of family or physicians. More than 600,000 people aged 70 or older stop driving each year and become dependent on others to meet their transportation needs.[20] Men typically outlive their driving days by seven years and women by ten years.[21]

This lack of mobility leaves older Americans with a decreased ability to participate in the community and the economy. Compared with older drivers, older non-drivers in the U.S. make 15 percent fewer trips to the doctor, 59 percent fewer shopping trips and restaurant trips, and 65 percent fewer trips for social, family and religious activities.[22]

CHALLENGES TO OLDER DRIVERS

The effects of injuries sustained in traffic crashes may be more severe in older drivers because of physical frailty and existing medical issues, resulting in a greater likelihood that they would die or be injured in a crash than their younger counterparts.

While older drivers are less likely to drive aggressively or too fast, as people age, their eyesight, reaction time, cognitive ability and muscle dexterity may deteriorate, making the tasks associated with

driving more difficult. While many older individuals want to maintain the freedom and mobility afforded them by driving, certain situations may be especially challenging or hazardous to older drivers.

The heightened physical fragility of older drivers is among the greatest factors in their overrepresentation in fatal crashes and their elevated death rates per mile driven. Compared to experienced middle-aged drivers, research has found that 60-95 percent of the elevated death rates per mile driven for older drivers can be attributed to fragility that makes surviving a crash more difficult.[23] By comparison, for drivers younger than 20, over-involvement in crashes accounts for more than 95 percent of their excess death rates compared with middle-aged drivers.[24]

Older drivers tend to have similar or only slightly higher fatal crash involvement rates as younger drivers. On average, drivers in their mid- to late-eighties have lower crash rates per mile driven than drivers in their early twenties, and roughly half the crash rates of teenagers.[25]

The primary danger facing older drivers is their own physical fragility, making older drivers more likely to die when they do crash.[26]

In the face of elevated risks, older drivers tend to be very responsible on the road, with a higher rate of seatbelt use than younger drivers, greater avoidance of higher-risk driving environments (such as at night or in rain), and lower likelihood to drink and drive or be otherwise impaired.[27]

Driving situations involving complex speed-distance judgments under time constraints, the typical scenario at intersections, can be more challenging for older drivers due to their slower reaction time for complex motor-cognitive tasks. Aging may limit a body's range of motion, making it more difficult to scan all directions for nearby vehicles or potential hazards.

According to the National Highway Traffic Safety Administration (NHTSA), in 2016, 37 percent of all fatal crashes where at least one driver was aged 65 or older occurred at an intersection or were related to an intersection. [28] However, for fatal crashes where no driver was aged 65 or older, only 20 percent were at an intersection or intersection related.[29]

Left hand turns are also more problematic for older drivers, as they must simultaneously make speed, distance, and gap judgments to enter or cross the through roadway. Older drivers generally have problems selecting appropriate gaps in oncoming traffic and estimating the speed of oncoming vehicles with respect to left turns off a mainline highway. Each advancing year of age after 65 increases by eight percent the odds of getting into a crash that involves turning left.[30]

In 2015 most traffic fatalities in crashes involving older drivers occurred during the daytime (74 percent), on weekdays (70 percent), and involved other vehicles (67 percent).[31] This is significantly more than all fatalities in 2015, where 49 percent occurred during the daytime, 59 percent on weekdays, and 44 percent involved another vehicle.[32]

Diminished vision and the inability to clearly see road signs and traffic signals can make driving more difficult and dangerous for older drivers. Small or complex signage may be misunderstood or not seen quickly enough to caution older motorists about upcoming exits, obstacles, or changes in traffic patterns. With the advancing age of much of the population, it becomes important to design road signs and traffic signals that are easily visible and readily understood. These changes would benefit motorists of any age and increase overall traffic safety. The amount of light needed by drivers doubles every 13 years, starting at age 20.[33] A 72-year-old needs 16 times the amount of light required by a 20-year-old to drive safely.

MOBILITY ALTERNATIVES FOR OLDER AMERICANS

Older Americans who decide to give up driving still have options available for maintaining their mobility and independence, though some of these options may come with challenges or drawbacks and may not fully replace driving.

TRANSIT

While public transit may offer an alternative to driving in some areas, among older Americans, public transit accounts for just two percent of trips.[34] Older Americans may be reluctant to use transit options because they may still have difficulty getting from home to the transit pick-up, or from the transit drop off to their ultimate destination. Crowding, long waits and the physical challenges of boarding a bus may also deter older travelers from using available transit options.

Public transit options may not exist in the areas where many older Americans tend to reside. Seventy percent of Americans over fifty live where transit does not exist or serves the area very poorly.[35]

Transit systems can be improved to better accommodate older Americans as well as the population at large. These improvements include expanded bus routes; transit vehicles, stops or facilities that better accommodate older or physically challenged passengers; and, additional non-traditional and private sector approaches to transit, including formal and informal ridesharing and taxi

services.

RIDESHARING SERVICES

Ride sharing services like Uber or Lyft can help older Americans maintain their mobility if they are no longer comfortable driving themselves. Ridesharing services allow a passenger to use a smartphone to set a specific pick-up and drop-off point for their trip and summon a private vehicle driven by its owner to complete the trip.

While the door-to-door convenience of these services may be attractive for older Americans who have given up driving and for whom public transit is not an option, the use of ride sharing services often requires the use of smartphones, which may limit the number of older Americans who can access the service. Less than one-third of Americans over age 65 own a smartphone, often a prerequisite for using ridesharing services.[36]

Ridesharing services also may not be affordable for some older Americans and is also no available in some rural areas, where the majority of older Americans live.

SELF DRIVING AND CONNECTED VEHICLES

As advances in automotive technology continue and become more widely available and more widely used, older Americans may eventually be able to continue to rely on private vehicles for mobility beyond when they are able to drive a vehicle.

Advances in automotive technology include connected vehicles, which recognize potential collision situations and allow for crash avoidance through communication between nearby vehicles, and self-driving vehicles, which do not require the driver to be in control of the vehicle.

Many vehicles on the road today include some self-driving features, while the availability of fully self-driving or of connected vehicles is still some years away.

Advanced vehicle technology can be of particular assistance to older drivers as it addresses the deficits that may impact motorists as they age, including identifying vehicles or objects in blind spots, intersection navigation, left turn assist, early warning when vehicles ahead slow or brake suddenly, or warnings when it is not safe to change lanes or pass another vehicle. Given that approximately 94 percent of crashes involve human error, the widespread use of self-driving and connected vehicle technology can greatly reduce the number and severity of crashes.[37] While these technologies can provide warnings that help drivers avoid a collision, they may increase distractions or may not be used appropriately.

For older Americans who have stopped driving, self-driving and connected vehicles may someday offer the ability to regain their mobility in a private vehicle. However, the timeline for the widespread availability of advanced vehicle technology is uncertain, and their adoption by older drivers may be slower than that of the general population.

In addition to the long timeframe for potential widespread adoption of self-driving vehicles, other uncertainties about the technology still exist, including: the relatively early stage of research and deployment of self-driving technology outside tightly controlled environments, questions about human interactions with the technology, and the potential detriment of overreliance on self-driving technology.

While widespread use and adoption of self-driving vehicles may not happen in the near future, many vehicles are already equipped with technological features that are found in self-driving cars. These include adaptive cruise control and headlights; backup and parking assist; blind spot, forward collision and lane departure warning systems; navigation assistance; and integrated Bluetooth capabilities for cell phones. Research by the AAA Foundation for Traffic Safety found that nearly 60 percent of older drivers surveyed had at least one advanced technology in their primary vehicle.[38]

ASSESSMENTS AND GUIDELINES FOR OLDER DRIVERS

Although many older motorists tend to self-regulate and monitor their own driving abilities, many states require more stringent testing and license renewal policies for older drivers. A variety of organizations offer classes and independent evaluations for older drivers to sharpen their skills and determine the range of their driving abilities. Older drivers are often very reluctant to give up their driving privileges, and with them, their active and mobile lifestyle. AAA and AARP are just two organizations that offer courses in driver safety and self-assessments. Assessment and safety tips for older drivers and their loved ones are readily available online.

Additional licensing requirements for older drivers exist in 18 states and the District of Columbia. [39] Criteria in states that require more stringent and frequent testing and license renewal policies for older drivers can include shortened periods between renewals, in-person renewal after a certain age and vision and road tests that are not routinely required of younger drivers.

Some research suggests that age-based mandatory assessment programs may not effectively identify and manage the small portion of older motorists whose driving should be limited or stopped. And these restrictions may prematurely curtail the mobility of drivers who were already self-regulating and managing their driving.[40]

People whose driving has been limited by age-related issues experience a significant decline in quality of life and an increase in depressive symptoms.[41] Their restricted mobility adversely impacts the individual, their family, the community and the society in which they live.

Before they ultimately give up driving, many older motorists gradually ramp down their personal travel. While they still may be licensed, the oldest drivers tend to make less frequent trips in their vehicles. [42]

RECOMMENDATIONS FOR IMPROVING MOBILITY AND SAFETY FOR OLDER AMERICANS

Mobility and traffic safety are important issues for Americans of all ages, but especially for older Americans who may face increasingly limited transportation options and require a driving environment that is safer and more forgiving. A combination of highway repairs and improvements, driver education and evaluation, vehicle enhancements, and expanded transportation options can vastly improve the safety and mobility of older drivers and the population in general.

The following set of recommendations can help improve mobility and safety for older Americans as well as the population in general.

SAFER ROADS:

- Clearer, simplified and brighter signage with larger lettering, including overhead indicators for turning lanes and overhead street signs. This should include minimum levels of retroreflectivity.
- Brighter street lighting, particularly at intersections, and bright, retroreflective pavement markings. Studies also show that increasing the width of pavement markings from 4 inches to 6 inches helps with decreasing lane departure and crashes, especially with older drivers.
- Where appropriate, widening or adding left-turn lanes and increasing the length of merge or exit lanes.

- Where appropriate, widening lanes and shoulders to reduce the consequence of driving mistakes.
- Where appropriate, replacing intersections with roundabouts can eliminate left turns and slow the speed of traffic through an intersection, both of which address common challenges among older drivers.
- Adding rumble strips to warn motorists when they are leaving the roadway.
- Making roadway curves more gradual and easier to navigate.
- Where appropriate, design and operate roads to accommodate all users of the roadway.
- Adding countdown pedestrian signals.
- Adding refuge islands to assist pedestrians at intersections.
- Highway network and transportation system planning, design, maintenance, and operations functions are all likely to require adaptation to meet technical, policy, and legal expectations of a changing vehicle fleet that is technologically connected to other vehicles and the roadway itself.

SAFER ROAD USERS

- Promotion of education and training programs for older drivers.
- Raising awareness among older drivers of appropriate safety precautions and seat belt use.

SAFER VEHICLES

- Implementing additional safety features on new vehicles to address the deficits drivers may face as they age.
- Development of self-driving vehicles and connected vehicles.
- Improving crashworthiness of vehicles to better protect occupants and withstand impacts.

IMPROVED TRANSPORTATION OPTIONS

- Ensuring public transit vehicles, facilities and stops are easily accessible and accommodating to elderly or disabled passengers.
- Expanding bus and transit routes.
- Implementing non-traditional and public sector approaches that are tailored to the needs of older adults, including ride sharing, volunteer driving programs, door-to-door community transportation services, taxi services and vehicle donation.

CONCLUSION

Older Americans represent an increasing share of the nation's population and of its licensed drivers. As they strive to maintain the active and fulfilling lifestyles to which they have become accustomed, the nation's transportation system will need to be improved to accommodate them. Providing transportation improvements that will make it easier for older American's to maintain their mobility benefits users of all ages.

For older Americans, as well as the population in general, the ability to travel represents freedom, activity and choice. Older Americans prize their mobility and active lifestyles and want to maintain them as long as possible, often by maintaining their ability to drive.

Improvements in roadway design, additional highway safety features, expanded transportation options, driver education and the development of self-driving and connected vehicles can help older Americans maintain their mobility in a safe manner while also providing significant benefits to the larger traveling public.

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ENDNOTES

[1] U.S. Census Bureau.
[2] Population Reference Bureau. Population Bulletin, December 2015. Aging in the United States.
[3] Federal Highway Administration Highway Statistics 2006 and 2016. Chart DL-22
[4] Federal Highway Administration Highway Statistics 2006, 2012 and 2016. Chart DL-22
[5] Ibid.
[6] Ibid.
[7] Ibid.
[8] TRIP analysis of 2012-2016 fatality and crash data provided by the National Highway Traffic Safety Administration.
[9] Ibid.
[10] Ibid.
[11] Ibid.
[12] Ibid.
[13] Ibid.
[14] Ibid.
[15] The Mobility Needs of Older Americans: Implications for Transportation Reauthorization. Sandra Rosenbloom. The Brookings Institution Series on Transportation Reform, July 2003.
[16] Ibid.
[17] Ibid.
[18] Ibid.
[19] Ibid.
[20] Enhanced Mobility for Aging Populations Using Automated Vehicles – December 2015. Florida DOT
[21] AARP Public Policy Institute. Livable Communities. How the Affordable Care Act Can Help Provide Specialized Transportation for Older Adults. February 2015.
[22] Older Americans: Stranded Without Options. Linda Bailey. STPP, April 2004.
[23] Li, Guohua, Elisa Braver, and Li-Hui Chen. "Fragility versus excessive crash involvement as determinants of high death rates per vehicle-mile of travel among older drivers." *Accident Analysis and Prevention* (March 2003); Volume 35, Number 2, pp. 227-235
[24] Ibid.
[25] AAA Foundation for Traffic Safety. *Don't Be Fooled! Myth: "Beware Older Drivers: They'll Endanger Us All".*
[26] Li, Guohua, Elisa Braver, and Li-Hui Chen. "Fragility versus excessive crash involvement as determinants of high death rates per vehicle-mile of travel among older drivers." *Accident Analysis and Prevention* (March 2003); Volume 35, Number 2, pp. 227-235
[27] Centers for Disease Control and Prevention. Older Adult Drivers: Get the Facts. (Last updated March 14, 2011). National Center for Injury Prevention and Control, CDC.
[28] National Highway Traffic Safety Administration. 2015 Data.
[29] Ibid.
[30] Kentucky Transportation Center. University of Kentucky College of Engineering. Development of Accident Reduction Factors.
[31] NHTSA Traffic Safety Facts – 2015 Data (February 2017).
[32] Ibid.
[33] AAA, AARP and American Highway Users Alliance Comments on FHWA Retroreflectivity Amendment. October 2011.
[34] Enhanced Mobility for Aging Populations Using Automated Vehicles – December 2015. Florida DOT
[35] Ibid.
[36] Consumer Reports. Uber, Lyft, Self-Driving Cars Aren't Yet Answer to Seniors Driving Riddle. June, 2017.

[37] USDOT – Improving Safety and Mobility Through Vehicle to Vehicle Communication Technology.
[38] Use, Learning and Perceptions of In-Vehicle Technologies, and Vehicle Adaptations Among Older Drivers: A LongROAD Study. AAA Foundation for Traffic Safety Research Brief. November, 2017.
[39] Insurance Institute for Highway Safety. Older drivers: Licensing Renewal Provisions, October 2017.
[40] The Elderly and Mobility: A Review of the Literature. Monash University Accident Research Centre. November 2006. Whelan, Langford, Oxley, Koppel and Charlton.
[41] Ibid.
[42] The Mobility Needs of Older Americans: Implications for Transportation Reauthorization. Sandra Rosenbloom. The Brookings Institution Series on Transportation Reform, July 2003.