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16. Abstract Many factors can contribute to a senior being involved in a traffic accident, i.e. poor vision, declining health, roadway hazards, and declining driving skills, etc. Throughout the US, laws are being enacted to ensure that seniors can continue driving without harming themselves or the general public. Katie's Law (H.B. 84) represents an attempt to make roadways safer for senior drivers in Texas. Katie's Law requires that elderly persons age 79 and over must renew their licenses in person at Department of Safety offices. This study examines data from Texas Department of Transportation's (TxDOT's) accident records during 2003-2008, to determine if enacting Katie's law resulted in a decrease in senior fatalities. Finally, the study ends by looking at additional senior friendly transportation initiatives.					
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**Senior Automobile Crashes and Fatalities in Texas:  
Are Older Texas Drivers Safe?**

by

**Anthony Price**

and

**Gwendolyn C. Goodwin**

**Research Report SWUTC/11/476660-00049-1**

**Center for Transportation Training and Research  
Texas Southern University  
3100 Cleburne Ave.  
Houston, Texas 77004**

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## ABSTRACT

The 2000 Census indicated that roughly 9.9 percent of Texas' population was 65 and older. By 2030, this number is expected to reach 15.6 percent. As the "baby-boom" generation continues to age, researchers and city officials will not only face the challenges of an over burdened healthcare system, but they will also wrestle with issues regarding senior mobility.

Today, Americans are better educated regarding health care and this has increased life expectancy, dramatically improved the quality of life, promoted independence and continued employment. As a result, some seniors are still mobile well into retirement. However, other seniors are living longer with major illnesses and diseases. Often once vibrant older adults may find themselves battling with illnesses and diminishing driving skills. Still other seniors will face living on a fixed income and needing transport to the doctor, grocery store, or church.

Despite the above issues that seniors may encounter, many of these seniors continue to drive. As a result, researchers are seeing a rise in the number of crashes and fatalities among senior drivers. All over the country, laws are being enacted to ensure that seniors can continue driving without harming themselves or the general public.

The goals of this research are to assess the number of senior drivers involved in fatal car crashes in the State of Texas and to deem the safety of these drivers due to recently enacted state laws and other initiatives that are being taken to boost driving safety. The research considers how Baby Boomers will impact the number and driving safety of senior drivers on the road. In order to achieve these goals, crash data involving drivers ages 65 and above were collected and analyzed for various years throughout the State of Texas. The analysis of this research included the following:

- Reviewing the State of Texas' licensing provisions for all elderly drivers before 2007 and comparing these requirements with the newly enacted requirements after 2007.
- Accessing crash data provided by the Texas Department of Public Safety to determine if the number of elderly crashes in conjunction with the number of licensed senior drivers on the road decreased prior to and after the 2007 provisions.
- Determining if older drivers will be safe in future years based on information and data presented from the licensing provisions, crash data, and outside supporting information.



## EXECUTIVE SUMMARY

Currently, there are more male and female drivers on the road as opposed to forty years ago, when middle aged males primarily drove. Also noteworthy is that the number of seniors with driver licenses has increased. While licensed senior drivers and senior driver car accidents make up a small percentage of all licensed drivers and all accidents, seniors are more vulnerable to severe injury or even fatal injuries if involved in a collision. Researchers note that the number of senior citizens involved in fatal accidents has become a major issue in the United States.

Texas is the second most populated state in the United States, and almost 10 % of the state's population was comprised of seniors in 2000. Many of these seniors may continue to drive while ingesting numerous medications, experiencing diminishing senses such as sight and hearing, and slowing reflexes. These factors could potentially result in older drivers being involved in car accidents.

With concern for the safety of seniors, other drivers, and riders on the road, the Texas legislature enacted stricter licensing renewal provisions for elderly drivers. These provisions, known as Katie's Law (H.B. 84), attempt to weed out drivers who pose a threat to others on the road by not being mentally or physically capable of handling a vehicle. Although this law was only effective in 2007, data for the following year shows a slight decrease among senior drivers involved in accidents.

### Findings

This research used the results from the passing of Katie's Law, additional senior friendly transportation initiatives, 2008 Traffic Safety Facts provided by the National Highway Transportation Safety Administration (NHTSA) as well as statistical crash data analysis provided by the Texas Department of Transportation (TxDOT) to examine senior driving safety in Texas.

First, this study examined elderly citizens involved in fatal car wrecks to determine if these fatal accidents could be reduced in future years using safety techniques such as driver's license renewal provisions within the State of Texas. Licensing renewal provisions is one way a state can ensure that all senior drivers, whether living in rural or urban areas, are fit to operate vehicles.

Provisions that played a major part in Texas' Katie's Law (H.B. 84) being effective are the accelerated renewal of licenses cycle for drivers 85 and above, vision screening test, and requiring drivers 79 and above to renew their licenses in person and not electronically or by mail. The overall goals of safety enactments like Katie's Law is to make sure that elderly citizens are equipped with the correct physical, mental, and motor skills to successfully and safely operate vehicles. Less crash related deaths per year, increased public transportation usage, and increased driving awareness are several benefits associated with making sure that senior drivers in Texas are safe. The overall goal of these safety initiatives is to ensure that the lives of these drivers as well as other motorists and pedestrians are not at risk.

Next, this study evaluated fatal crash and licensing data among senior drivers in Texas for a span of six years. In order to prove the theory that the number of senior drivers involved in fatal car wrecks will be minimized, there had to be a relationship link created between the number of senior drivers documented as licensed per year and those senior drivers involved in fatal wrecks per year. Additional supporting senior friendly public transportation programs and driving enhancement programs were also used to help support the hypothesis in this study.

So are senior drivers safe in Texas? After reviewing the crash data supplied by TxDOT, the number of drivers licensed by FHWA, the implications and impact of Katie's Law, and the alternative senior friendly transportation programs, these factors could imply that the safety of senior drivers will be better in the future. However, the full impact of Baby Boomer drivers will also play a key factor in the future. As the number of senior drivers on the road continues to climb, researchers anticipate that the number of deaths will decline. TxDOT data indicates that the number of senior deaths decreased slightly from previous years. The implementation of Katie's Law may also help ensure that the death toll continues to drop. This study's assessment shows little to no impact from bad weather conditions and more crashes occurring on days with clear/cloudy forecast. However, the time of day did show a rise in crashes occurring with the majority of wrecks happening between the Midday and PM Peak Ranges.

## **Recommendations**

There are several recommendations that can be done in future studies similar to this one to assist the hypothesis of this study. First, more outside input from others in the community and surrounding areas can be considered to use in the study. Back ground information and statistical data presented to random individuals could be used to survey their knowledge of the law regarding senior drivers and whether they would agree to even greater provisions. This could serve to make citizens more aware of the senior fatality problem that occurs not only in Texas, but around the country and what is being done to help solve the problem.

Another suggestion would be a national renewal licensing standard implemented by FHWA and state governments. Both state governments and FHWA could work together to set a national licensing provisions policy that all licensing territories had to abide by to maintain a constant casualty in all states, regardless of population. This would subject each state to a uniform safety basis. In the process it would ensure that senior drivers, regardless of where they reside, are capable of operating a vehicle especially if they plan on making interstate related trips. States could also implement extra provisions in their respective areas to help combat the problem.

A major recommendation is that TxDOT, along with FHWA, look into the task of trying to rectify the problem of more elderly male drivers involved in fatal accidents compared to senior female drivers on the road. Officials could host workshops or implement programs that male drivers could attend to boost driving awareness and/or safety to help bring down the amount of male drivers involved in fatal crashes.

When looking with the number of rural fatalities compared to urbanized fatalities, TxDOT could step in and make improvements to roadways. This recommendation could be a very important

factor, not only in urbanized areas, but in rural areas as well. This recommendation could assist drivers tremendously and cut down on fatalities especially in rural areas where the most fatal crashes are happening and public transportation is less used.

Finally, as with any new policy, the public and transportation officials will just have to be patient in seeing changes take place. Of course there will still be senior casualties along with other setbacks until these provisions are fully used and recognized by all licensed senior drivers. Although Texas has seen a decrease in the number of casualties since the enforcement of Katie's Law, this is only the beginning in what will be a safe transition for Baby Boomer drivers who will dominate the roads in the next couple of decades.



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# INTRODUCTION

## Background of Research

Today it is common to see more elderly drivers on the road compared to years past. In 1997, the number of persons ages 65 and above on the road climbed to 17.7 million, which represents a 45 percent increase from 1987. Due to better health care and life expectancy growth, this number is estimated to grow from 17.7 million people to 70 million people by the year 2030 (“Elderly Drivers Need...,” 2001).

The trend of elderly drivers involved in car crashes, whether they are fatal or non-fatal, has risen dramatically in recent years and has even surpassed the leading age group of drivers in crashes, which is teenage drivers (Senior Citizen Driving, [n.d.](#)). It is estimated that by 2030, when most baby boomers will be 66-84 years old, drivers ages 65 and older will account for 25 percent of all highway fatalities and 16 percent of all car crashes (“Elderly Drivers Need...,” 2001). Statistics show that fatalities rose by seven percent for drivers 75 and older from 1981 to 2000. These numbers remained steady for drivers from 65-74, but dropped for younger drivers on a national observation (“Elderly Drivers Increasingly,” 2007).

Transportation officials in Texas along, with outside agencies and auto manufactures, have recently taken steps to increase the safety of senior citizens using the following strategies: 1) imposing driver’s license provisions at a certain age, 2) offering driver’s ability assessment tests, 3) providing state driving programs, and 4) modifying vehicles to better accommodate seniors. The American Automobile Association (AAA) has joined in the act of protecting seniors and assisting the elderly by continuing their driving privileges as well as by implementing a program designed to address ignored mobility issues affecting people over the age of 65 called “Lifelong Safe Mobility.” America is pushing to assist the expected 40 million licensed drivers over the age of 65 that are to be on the road by 2020 (“AAA Launches Program,” 2003).

AAA is looking into addressing other issues to aid senior drivers including the following:

- creating educational materials, programs and services for older drivers and their adult children;
- helping older drivers become aware of their options;
- finding more effective ways to identify driving problems so they can be addressed before they create difficulties on the road;
- advising auto makers of vehicle-design options that are helpful for older drivers;
- supporting funding for traffic-safety improvements such as larger letters on road signs and more visible pavement markings (“AAA Launches Program,” 2003).

Some AAA Texas offices have even enlisted the aid of a Fog Chart, a figure designed to check vision in progressively dimmer lighting conditions, which resembles an eye figure and has 12 letters on each of eight lines. When using this figure each letter becomes progressively fainter

than the one preceding it. This figure shows senior drivers the natural process of aging and how it affects driving (“AAA Launches Program,” 2003).

State departments of transportation (DOTs) and the Federal Department of Transportation (DOT) have worked individually and together to offer transportation programs that focus on making public transportation more attractive to seniors, while simultaneously improving driving awareness. They also provide tips on how senior drivers can make alterations to vehicles to better accommodate their needs. In an effort to help reduce the issue of senior drivers involved in car crashes, various states are imposing additional regulations on elderly drivers. For example, more states adopted stricter driver’s license renewal policies for seniors. Each state, including the District of Columbia, has its own license renewal policies as an approach intended to weed out drivers that pose potential threats to themselves and others on the road.

## **Objective**

The goals of this research are to assess the number of senior drivers involved in fatal car crashes in the State of Texas and to deem the safety of these drivers due to recently enacted state laws and other initiatives that are being taken to boost driving safety. The research will also consider how Baby Boomers will impact the number and driving safety of senior drivers on the road. In order to achieve these goals, crash data involving drivers ages 65 and above were collected and analyzed for various years throughout the state of Texas. The analysis of this research included the following:

- Reviewing the State of Texas’ licensing provisions for all elderly drivers before 2007 and comparing these requirements with the newly enacted requirements after 2007.
- Accessing crash data provided by the Texas Department of Public Safety to determine if the number of elderly crashes in conjunction with the number of licensed senior drivers on the road decreased prior to and after the 2007 provisions.
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## LITERATURE REVIEW

### **The Increase of Crashes and Fatalities**

In 1995, elderly citizens made up nine percent of the population but accounted for 14 percent of all traffic fatalities and 17 percent of all pedestrian fatalities (Older Drivers, Elderly, 2008). A 1997 study showed that at the age of 75, the risk of driver fatality increased drastically because older drivers are more vulnerable to both crash-related injury and death (Older Drivers, Elderly, 2008).

The declining health of an elderly driver only adds to the likelihood that he or she will be involved in a fatal accident. In an overturned vehicle accident, an elderly male driver's chances of dying were increased by 220 percent as opposed to 523 percent for older women ("Elderly Drivers Increasingly," 2007). Neglecting to use safety belts increased the likelihood of injury by 187 percent for older women, not to mention that drivers 65 and over killed in car accidents were significantly more likely to die of a chest injury ("Elderly Drivers Increasingly," 2007). Along with the contributing factors previously stated, behavior factors that contribute to the trend are poor judgment in making left-hand turns, drifting within the traffic lane, and decreased ability to change behavior in response to an unexpected or rapidly changing situation (Older Drivers, Elderly, 2008).

### **Health Conditions Related to Crashes**

As previously noted taking medications, diminishing senses such as sight and hearing, and slowing reflexes are just some of the speculations as to why older drivers are getting into more car accidents. Even though no state requires a mental or competency test as a prerequisite for obtaining a license renewal, once a person reaches a certain age some states allow a loved one, a doctor, or a law enforcement official to notify the state regarding the mental well-being of a driver. If this situation does occur, then the state requires the person in question to undergo a mental health examination (Reutter, 2005). Insurance providers have tried the approach of taking away car insurance discount premiums to the elderly, if their driving records show that they are a risk to other motorists by involvement in constant auto infractions ("Elderly Drivers Need...", 2001).

### **Why Do Seniors Continue to Drive?**

With all the risks, one might ask, "Why do the elderly continue to get on the road?" That question can be easily answered because many elderly drivers do not believe that they are a safety risk. They believe that by altering their driving habits, driving during the daytime, avoiding hazardous weather, and driving fewer trips they are reducing the likelihood of a car wreck; unfortunately this is not true. In addition, many elderly drivers want to be independent and do not like the assistance or feel the need to depend on others. These seniors believe that they were brought up to care for themselves and to depend on others for assistance is not an option (Johnson, 2002).

An example of this need to feel independent occurred in Dallas when a 90 year old woman was noticed by her neighbor trying to drive to the store. In the process of backing the car out of the driveway, she had trouble. The driver barely made it a mile from her home when she ran a red light, struck another car driven by a teenage driver and killed her (Davis, 2007). The neighbor, feeling guilty about the death of the teenager, said that there was little he could do simply because the senior refused to quit driving.

Being unaware of driving safety and independence are not the only factors that contribute to reasons the elderly continue to drive. Many of these senior citizens just begin to feel isolated, especially those who are single. If they were to give up their licenses, many would experience decreased social interaction and would have trouble finding transportation to and from their desired destinations; so they believe they have no choice but to continue to stay on the road or be left out (Johnson, 2002).

### **Mobility Without a License**

Senior drivers are faced with several scenarios. Some elderly drivers are able to retain their licenses without medications; others must implement tools found in the programs designed to aid their declining senses. Unfortunately some drivers are not as lucky. These drivers may be forced to give up their licenses or choose to surrender their licenses because they are not capable of safely driving on the road.

To provide seniors an option to driving, the public transportation industry, along with the American Public Transportation Association (APTA), developed the "Easy Rider: Advancing Mobility Needs for Aging Americans" which was designed to address the transportation needs of older Americans. More than 6,000 transit systems nationwide currently provide some form of service for older riders. Easy Rider uses these systems, along with a collection of successful activities, sample materials and case studies contributed by transit systems to provide the elderly with various and more attractive public transportation options ("Program Launched," 2005).

The concept of the public transportation system assisting the elderly is not only getting attention on the statewide level but on the national level as well. In 2005, a survey was conducted by APTA with citizens ages 65 or older about mobility options and public transportation in their communities. The findings were brought before the White House Conference on Aging to make the issue of senior mobility a national priority, which was slated for December of the same year. The survey concluded that 82 percent of American senior citizens ages 65 or older worry that they will be stranded and unable to get around when they can no longer drive. Eighty percent of these seniors believed a good public transportation system is safer, easier and more convenient than driving (Miller, 2005). Another survey showed that 82 percent considered public transportation to be a better alternative to driving alone, especially at night (Miller, 2005). Finally, 66 percent believed that their communities need to provide more transportation options for older adults, such as easy access buses and senior citizen mini-van services ("Public Transportation Group," 2005).

Largely, because transportation options are limited, the survey also concluded that half of all non-drivers ages 65 or older stay home. This is particularly true in rural and smaller

communities. Isolation of this nature can cause serious social and economic effects for the United States as the number of seniors increase. A study conducted by the Surface Transportation Policy Project (STPP) and the American Association of Retired People (AARP) found that the United States is ill prepared to provide adequate transportation choices for a rapidly aging population (“Public Transportation Group,” 2005).

### **Various State Restrictions on Senior Drivers**

Department of Public Safety (DPS), Department of Transportation (DOT), physicians, and insurance companies are working together to reduce or at least hold steady the growing problem of the elderly involved in car incidents. In Florida, drivers 80 and older are required to pass a vision test. This requirement resulted in the loss of a license for about seven percent of elderly drivers seeking renewal (Davis, 2007). In Maryland, a simple motor skills test that requires the elderly to follow basic commands and repeat simple movements is used; people who perform poorly are considered 25 percent more likely to cause a crash (Davis, 2007). California also requires license retesting for anyone involved in a fatal crash or three or more crashes in one year; drivers over 70 years of age are also required to retest, if they are involved in two or more crashes in one year (Older Drivers, Elderly, 2008).

### **Taking the Next Step in Texas**

The initiative for the safety of senior drivers in Texas took a gigantic step in 2007 when the Texas State Legislature passed Katie’s Law. This law, which went into effect September 1, 2007, was passed as a result of a Texas teen being killed by an elderly driver who ran a red light and crashed into the teen’s vehicle. The new law required drivers ages 79 and older to renew their licenses in person, rather than over the internet or through the mail. The law also required drivers ages 85 and older to renew their licenses every two years and pass a vision test as opposed to the regular six year renewal cycle younger drivers receive. With the addition of this new law, Texas became the 17<sup>th</sup> state to impose an accelerated license renewal for older drivers (Lindenberger, 2007).

The attempt to make the roadways safer for senior drivers is viewed as a step in the right direction. The newly enacted Katie’s Law that requires seniors age 79 and above to renew their licenses in person will certainly raise red flags when the number of senior drivers show up to DPS offices. But, this type of requirement is the most significant factor in distinguishing at risk drivers based on disorientation and other noticeable extraordinary characteristics (Silverstein, 2009). A year after passing the law, the state saw some improvement with a decline in crashes. After the law took effect in 2007, the state saw a 6 percent overall and 25 percent fatal decline in crashes when compared to the yearly average before the law was passed (Whitley, 2008).

The decrease of senior fatalities is not just a trend seen in Texas over the past couple of years. On a national level, the amount of elderly drivers involved in fatal car crashes decreased from 1998 to 2008. In fact, the number of drivers involved in fatal car crashes had a 17 percent decrease, and the number of total traffic fatalities decreased 24 percent (Older Population, 2008).

Providing additional transportation options as well as updating license renewal requirements are different strategies being used in Texas to ensure driving safety. This is a great start to safer travel for senior citizens although state officials say it is too early to draw conclusions about the law's effects. By taking the first step in trying to rectify this problem, Texas is not only correcting a serious matter amongst senior drivers but attempting to solve safety problems for motorists and pedestrians of all ages.

# METHODOLOGY

## Study Design Summary

This study will analyze the crash rates of senior drivers in Texas. The first step in proceeding on this issue is to gather crash data recorded in Texas. In order to find proper information about crash data, a request must be submitted to the Texas Department of Transportation (TxDOT) regarding crash information. The years covered in this study are 2003 through 2008 regarding fatal and non fatal car crashes for drivers ages 65 and above. Using previous background material and information from the preceding chapter, the following underlying questions will attempt to be answered at the end of this study.

- Were the drivers involved in the majority of the wrecks male or female?
- Was the driver making a left hand turn?
- What time of day did most of the crashes occur?
- Did the crashes take place in more rural or urban areas?
- Did weather conditions make a huge impact in the amount of car wrecks?

Crashes as they occur will be mapped covering the state of Texas. Finally, findings and conclusions based on the statistical data and literature found will be documented.

## Gathering and Analyzing Data

As stated in the previous paragraph, the senior crash data shall be gathered, compiled, and analyzed courtesy of TxDOT. The acquisition of car crashes from the years 2003 to 2008 is essential in determining whether the findings support the literature's proposal that safety for older drivers is improving. Records, acquired by requesting crash data analysis from TxDOT, were broken down into three different information criteria for all six years of documented crashes. The criteria consisted of vehicle, crash, and personal information. A fourth component, the Look Up Index, was also included with the criteria to assist in identifying field headings and numerical representations that were in the various tables.

After receiving these crash records was the task of combining the vehicle, crash, and personal information into a database that could be used to analyze all records. In an effort to build a data base for analysis, the crash data were uploaded to a computer on a year by year basis. First, all of the crash data which were originally sent in the Microsoft Excel program were converted into Microsoft Access files so that the database could be started. Next, was to find whether a relationship between crash, vehicle, and personal information existed and link this relationship so that all records were accurate and used the same crash number. After this link was completed, a spread sheet was developed that used desired categories from each of the three information criteria compiled into the database and edited to specifically show fatal car crashes with drivers ages 65 and above. Some records have multiple cases - meaning that they might have the same crash number but multiple victims were involved. In these cases, the passenger(s) and driver of the crash were both senior citizens and lost their lives in the car crash(s).

Finally, was the task of finding trends among certain variables when multiple variables were put together in order to have more evidence on certain issues related to the topic. The program that was used to compile the raw data bases was Statistical Package for the Social Sciences (SPSS). SPSS converted yearly database tables that were done in access and compiled this information into graphs and statistical figures to be used for analysis during data examination. This program was also beneficial for taking the steps to focus on whether the rates of crashes among elderly drivers are declining in the State of Texas.

### **Documenting Conclusions and Findings**

After all data and supporting literature were successfully analyzed and properly documented, the question of the future safety of elderly drivers was then answered. The data and literature answered the following additional concerns that accompanied the underlying questions:

- Which gender group gets into more car crashes?
- Which population group has the highest fatal crash rates among seniors? (Population group can be based on small and large population areas with different ranges that will be later specified in figures.)
- Do weather conditions cause or contribute to any of these crashes?
- Does time of the day have an effect on the amount of crashes involving the elderly?

## EVALUATION OF RESULTS AND DISCUSSIONS

### Licensing in Texas

The Federal Highway Administration (FHWA) collects licensing information for each state. In 2007, Texas had over 15 million documented licensed drivers. Of these licensed drivers almost two million were senior drivers, which are about 13 percent of the total licensed drivers in Texas, but accounted for 14 percent of all traffic fatalities and 17 percent of all pedestrian fatalities (Ulfarsson, 2006 p. 71). Analyzing the data for elderly drivers requires reevaluating various aspects of crash data. The data figures presented in this chapter focus on crash data in Texas before and after the enactment of safety initiatives such as Katie's Law and demonstrate how these acts have cut down on crash fatalities in more recent years as opposed to years prior. Data in this chapter will be assessed by Texas population, gender, left-turn traffic maneuvering, weather conditions, and time of day range per crash.

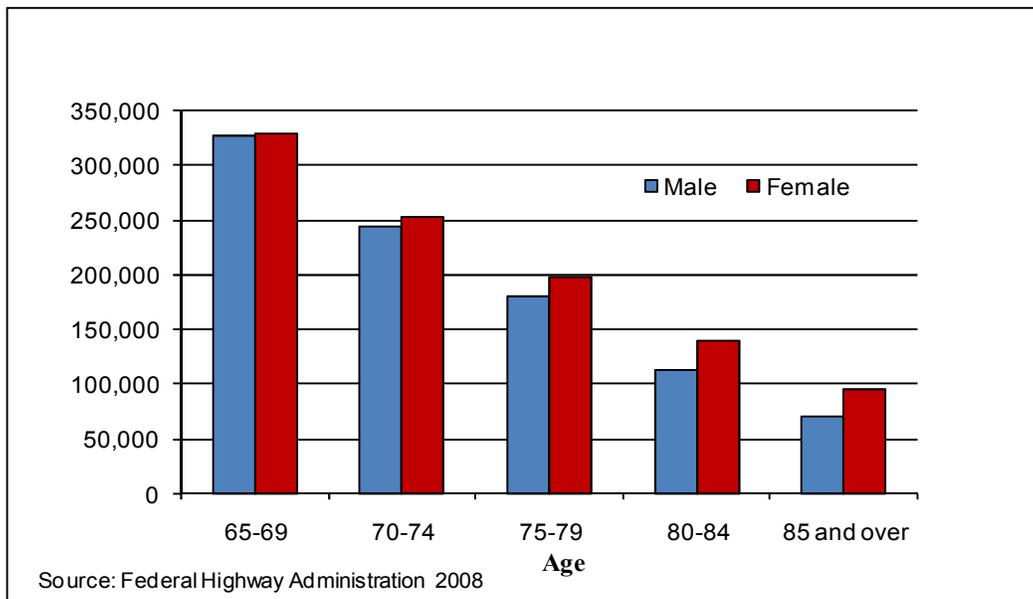


Figure 1: Licensed Senior Drivers in Texas by Gender

Figure 1 indicates a breakdown of senior drivers in different age ranges by gender. A careful examination of the data reveals female drivers outnumber male drivers in Texas. Figure 1 also shows that female drivers outnumber male drivers for all age ranges as well. The strong representation of women results because women typically have a longer life expectancy than men (Cromie, 1998).

## Crashes in Texas

The number of drivers in a heavily populated state such as Texas contributes to the expectation of an extremely large number of licensees, which may lead to a number of crashes. Starting in 2003 until 2008 there were 3,380,428 total crashes that occurred in Texas. (These deaths include drivers, passengers, and pedestrians.) Of these 3.3 million crashes, 21,706 resulted in deaths. Seniors accounted for 2,751, which is approximately 12.67 percent of all the deaths due to fatal car wrecks. A graphical representation of how the annual break down of total deaths in Texas due to wrecks is shown below.

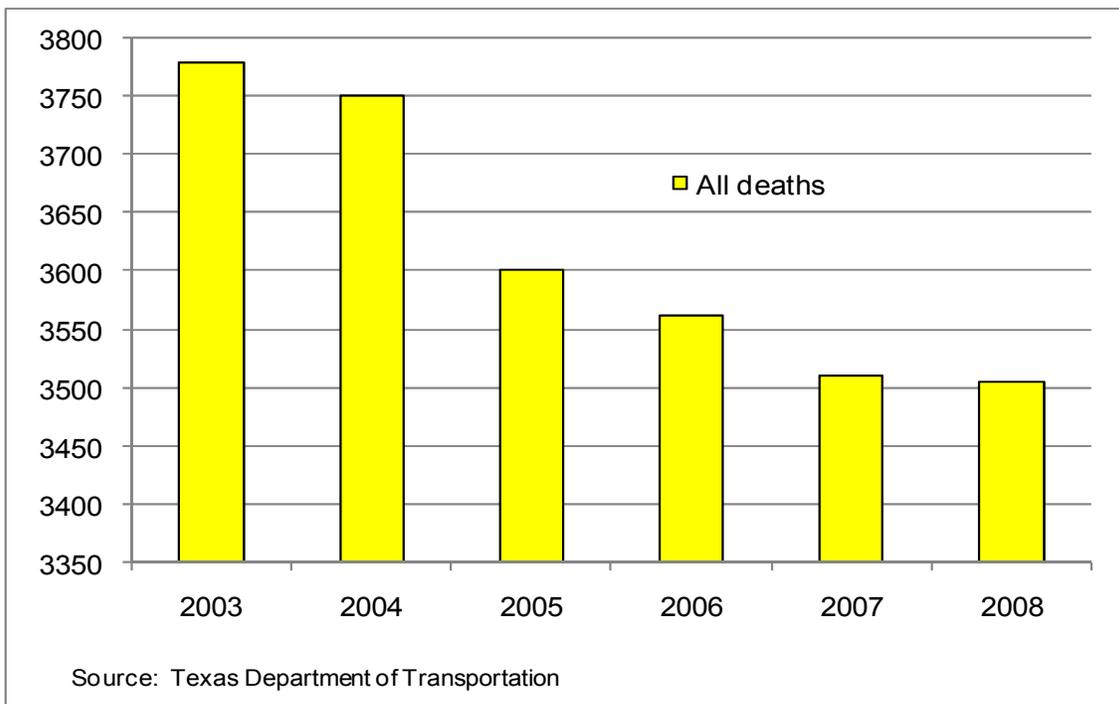


Figure 2: Deaths All Ages in Texas

Figure 2 shows the number of casualties due to car wrecks in Texas decreased on an annual basis from 2003 to 2008. When examining fatal deaths for seniors, a slightly different trend emerges. Figure 3 shows that the trend for senior fatalities varies from year to year with the lowest amount of crash fatalities happening in 2008. This is the same year following the September 1, 2007 enactment of Katie's Law. Using the formula  $((y2 - y1) / y1) * 100$ , the percent change of deaths related to crashes was calculated to demonstrate a decrease in deaths. In fact there was actually a -10.58 percent change in crash related deaths between the years 2008 and 2003. As additional data become available, researchers will be able to determine the law's impact.

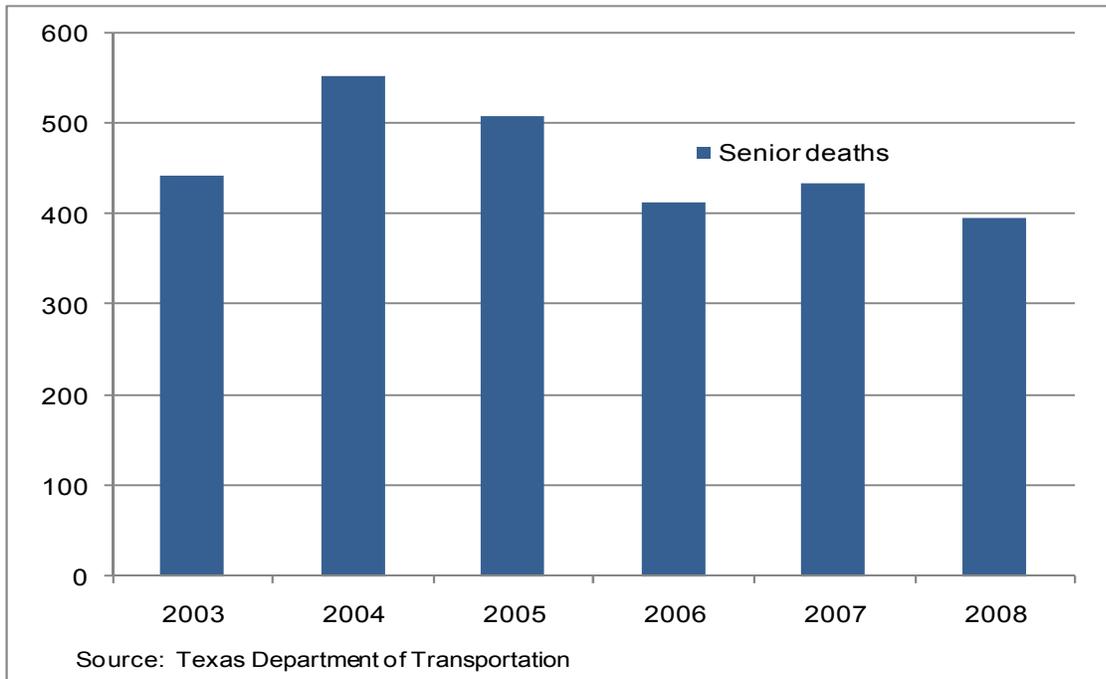


Figure 3: Senior Deaths

### County/Population Groups

Casualties, due to wrecks, are spread across all of the 253 counties in Texas. Of these counties, Harris County had the highest percentage of deaths followed by Dallas and Bexar (San Antonio) Counties (TxDOT, 2003-2008). These counties contain three of the largest metropolitan areas in the state. Did the amount of seniors involved in fatal crashes occur in more heavily populated areas or in smaller rural areas? Figure 4 compares the total amount of deaths in rural areas (0-49,000) to urbanized areas (50,000 and above) from 2003-2008.

Figure 4 demonstrates the amount of rural deaths is doubled compared to the amount of urbanized deaths, although urbanized areas are more populated. So, what population area makes up the majority of these fatalities? The following figure gives a more detailed look at the number of fatalities spread out across different population ranges. Figure 5 breaks down the total amount of crashes percentage wise into nine different population group ranges that are classified by TxDOT.

Deaths by county population show almost 40% of senior fatalities occur in metropolitan areas (population more than 250,000) and rural counties (population less than 500). Worth noting is that almost 66 % of senior fatalities occurred in rural counties with populations less than 50,000.

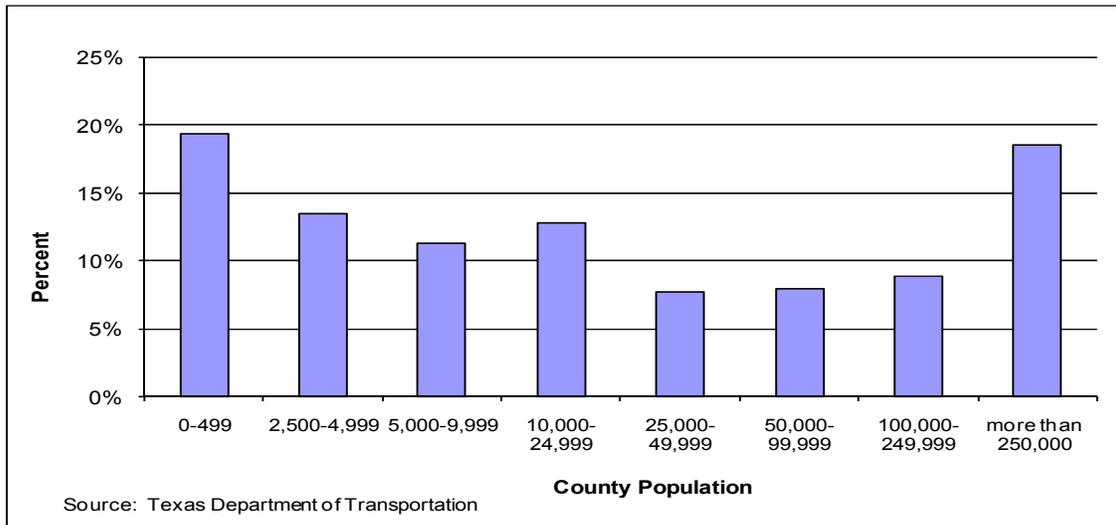


Figure 4: Senior Fatalities by County Population

## Gender

Figure 5, shown previously, demonstrates the growth among licensed senior drivers by gender on the road and indicates a breakdown of senior drivers in different age ranges by gender. This figure also shows that the number of female drivers outnumber the amount of drivers for all age

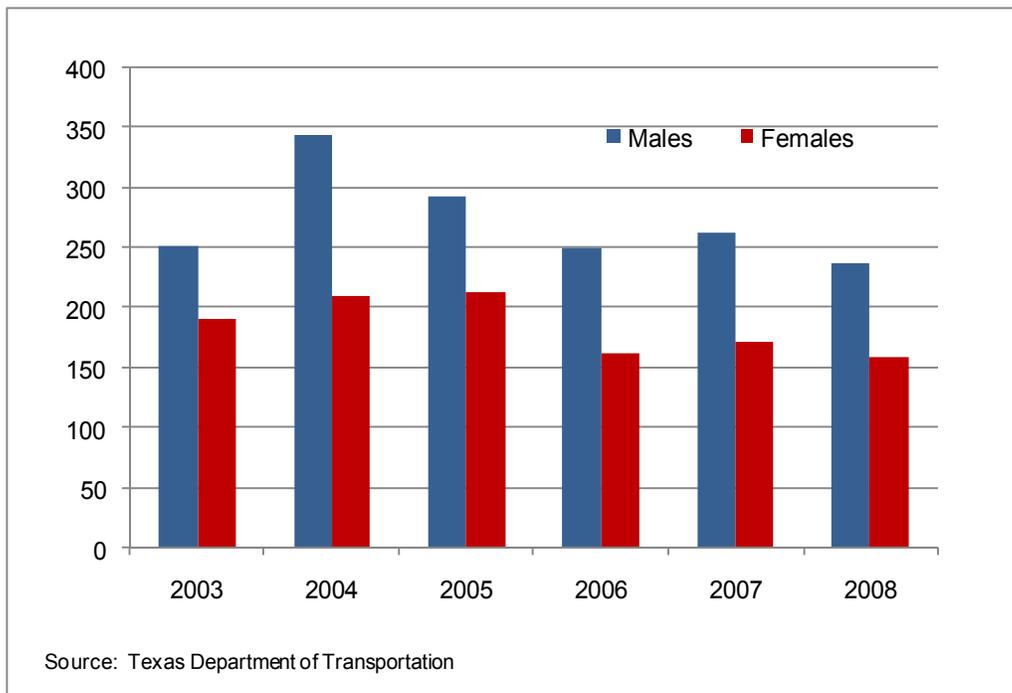


Figure 5: Senior Fatalities by Gender

ranges. Although female drivers outnumber male drivers on the road, there is still the question of female drivers accounting for more crash fatalities than male drivers.

Based on the comparisons above, males in each year outnumber females involved in crashes. Although the male totals outnumber the female totals, the overall gender totals made a decrease from 2007 to 2008 as well, due to Katie's Law.

### Time Range

The numbers of crashes were broken down into eight crashes ranges in chronological order from 12:00 a.m. to 11:59 p.m. In 2003, most accidents happened during afternoon hours with 26 percent taking place during that time range. The midday time range which proceeds the afternoon hours was second in crashes with 21 percent and the P.M. peak hour period following the afternoon hours had 17.2 percent crash fatalities occur during that time. This trend continued throughout the specified time frame of 2003-2008. The following figure displays the total cumulative fatality data for 2003-2008 for all eight time ranges in comparison to the total amount of crash fatalities during that time period.

Figure 6 below shows the majority of senior fatalities happening between the midday and PM peak time ranges. In fact, the afternoon time range shows the highest percentage of fatal senior crashes. This is most likely because elderly citizens try to drive during the day and when they believe traffic is low, i.e. during the day, and when fewer people are on the road (Johnson, 2002).

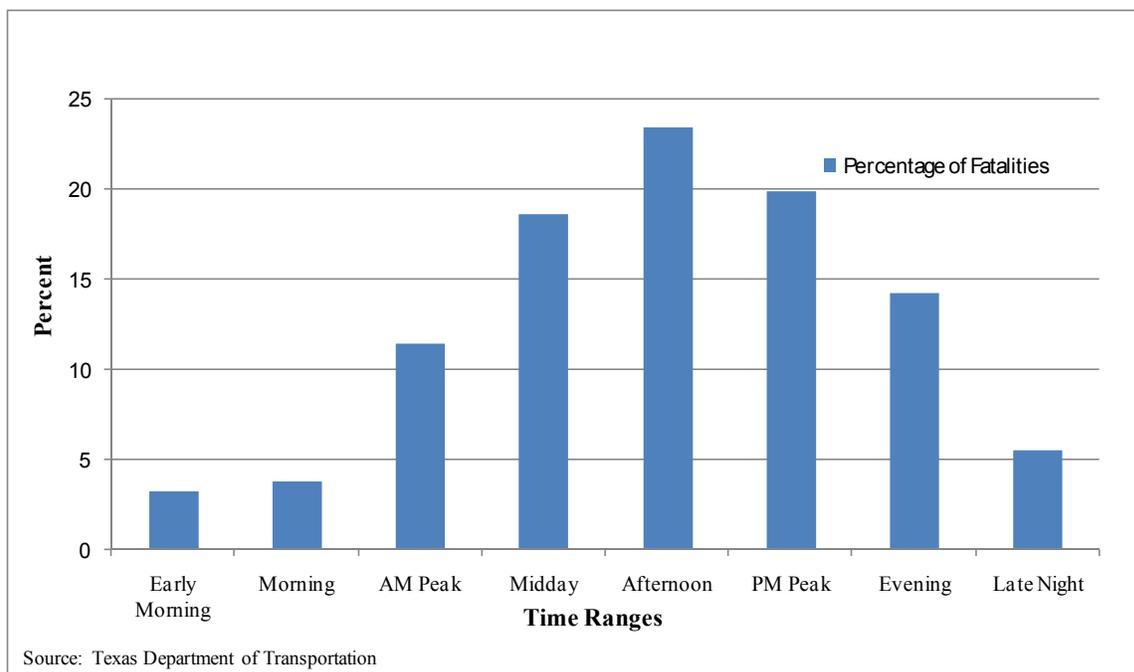


Figure 6: Senior Deaths by Time of Day

While seniors may encounter fewer people because most non-seniors are either at work or at school, many seniors may perceive this as a safer time to drive; this may mean that more seniors

are making trips (in automobiles or walking) which may explain why most of the senior fatalities occur during these off-peak time periods.

### Left Hand Turns

On a national scale it was cited that seniors make up 10 percent of the total amount of the total population in Texas and 13 percent of the total licensed drivers in the state (Ulfarsson, p. 71 2006). Senior drivers do, however, make up 13 percent of all crash deaths in the nation with a great deal of these due to seniors making left hand turns. This crash factor was specifically evaluated for the state of Texas to see if this could be a key reason why many elderly drivers were being involved in fatal crashes. The total amount of car crashes from 2003-2008 was then examined and compared to the total amount of fatal crashes due to left hand turns for those same years and compared them in the Figure 7.

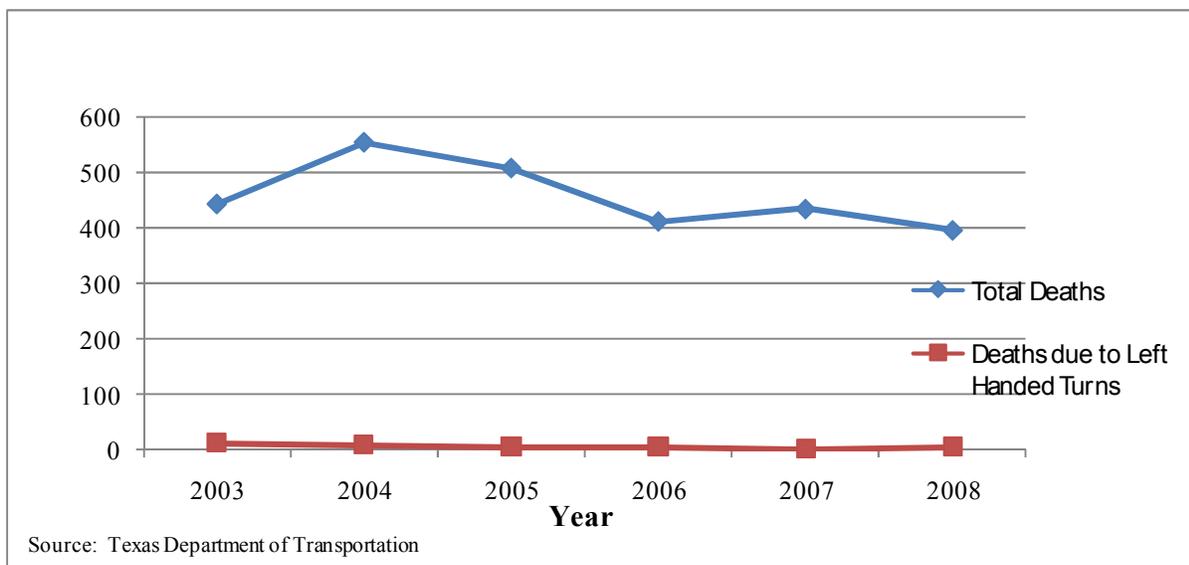


Figure 7: Senior Deaths due to Left Hand Turns

Figure 7 clearly demonstrates that this factor is not true in the state of Texas. From the year by year analysis shown for total deaths and left hand turns it was discovered that left hand turns only make up a minimal amount of fatalities per year in the state of Texas.

### Weather Conditions

Another factor considered that could potential impact senior fatalities included weather. Figure 8 displays senior crash fatalities relative to weather conditions. Only a small number of fatalities happened on rainy days. The deaths associated with non-clear days show a low of four percent in 2006 and highs of eight and nine percent in 2004 and 2006 respectively. Weather conditions may not be a major determinant of deaths because seniors typically avoid driving during inclement weather.

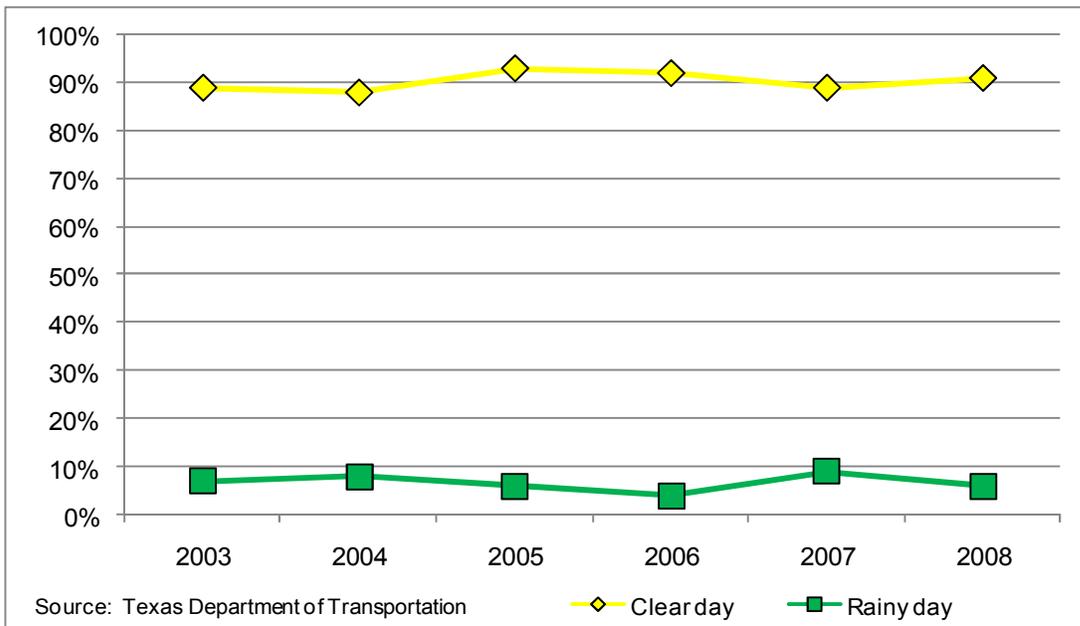


Figure 8: Senior Deaths by Weather Conditions

### Summary

Statistical figures from the crash data show that more crashes occur in either heavily populated areas or very small populated areas. Smaller populated areas actually had a higher rate of crashes than the heavily populated areas. Of these two ranges, all other population area ranges show a varied decrease/increase trend amongst population groups until the order of ranges reaches the largest populated area; then the rate went back up.

The study also looked at weather factors as possible causes for seniors getting into car wrecks. One might think that bad weather (rain, sleet, snow, etc.) was a big reason for senior drivers getting into fatal crashes; however, this assumption proved to be false. When comparing the total number of fatal crashes to those caused by bad weather, the number of crashes due to bad weather was extremely low. Also when comparing fatalities due to bad weather and fatalities due to clear/cloudy weather, the comparison proved there were significantly more crashes that happened during clear/cloudy conditions than bad weather.

When thinking about the amount of fatal wrecks that occur, there are actually more female drivers on the road, but male drivers represented the majority of those dying in crashes. Most wrecks happened during early afternoon traffic hours around 3 p.m. when most children are returning home from school and many adults are getting off work. It is also noted that although left-hand turns are the most difficult to perform while in traffic, it is not the major factor as to why many drivers have wrecks, although it did contribute to some casualties.

After considering all the findings presented from the data analysis to answer the underlying questions there was still the task of answering the main question of the study. Are older Texas drivers safe? From a death analysis standpoint, the answer is yes, especially when comparing the number of deaths in 2003 to those in 2008. When looking back at the first complete year with crash data that Katie's Law affected, 2008 had the lowest total of deaths involving seniors in all the years that were compared in the data analysis. In fact there was actually a -10.58 percent change in crash related deaths between the years 2008 and 2003, with the addition of the licensing renewal provisions.

## FINDINGS AND RECOMMENDATIONS

### Conclusions

This study examined the number of elderly citizens involved in fatal car wrecks on a yearly basis and to deem whether or not the trend of drivers involved in these wrecks would be reduced in future years by improving various safety techniques such as driver's license renewal provisions within the State of Texas. Designing a more rigorous license renewal process is without a doubt a good solution to help reduce the number of elderly citizens getting into fatal car crashes each year. Licensing renewal provisions is one way a state can ensure all senior drivers, whether living in rural or urban areas, are fit to operate vehicles.

Texas, by enforcing Katie's Law, requires seniors to go in front of TxDOT officials who can identify drivers whom they believe are physically and/or mentally unstable to operate a vehicle. Some of the different provisions that have played a major part in Katie's Law becoming effective in Texas are the usage of an accelerated renewal of licenses cycle for drivers 85 and above, passing a vision test, and not allowing drivers 79 and above to renew their licenses electronically or by mail. The overall goals of safety enactments like Katie's Law is to make sure that elderly citizens are equipped with the correct physical, mental, and motor skills to successfully and safely operate vehicles. Less crash related deaths per year, increased public transportation usage, and increased driving awareness are several benefits associated with making sure that senior drivers in Texas are safe. The overall goal of these safety initiatives is to ensure that the lives of these drivers as well as other motorists and pedestrians are not at risk.

This study evaluates fatal crash and licensing data among senior drivers in Texas for a span of six years. In order to prove the theory that the number of senior drivers involved in fatal car wrecks will be minimized, there had to be a relationship link created between the number of senior drivers documented as licensed per year and those senior drivers involved in fatal wrecks per year. Additional supporting senior friendly public transportation programs and driving enhancement programs were also used to help support the hypothesis in this study.

So are senior drivers safe in Texas? After reviewing the crash data supplied by TxDOT, the number of drivers licensed by FHWA, the implications and impact of Katie's Law, and the alternative senior friendly transportation programs, these factors could imply that the safety of senior drivers will be better in the future. However, the full impact of Baby Boomer drivers will also play a key factor in the future. As the number of senior drivers on the road continues to climb, researchers anticipate that the number of deaths will decline. TxDOT data indicates that the number of senior deaths decreased slightly from previous years. The implementation of Katie's Law may also help ensure that the death toll continues to drop. This study's assessment shows little to no impact from bad weather conditions and more crashes occurring on days with clear/cloudy forecast. However, the time of day did show a rise in crashes occurring with the majority of wrecks happening between the Midday and PM Peak Ranges.

## **Recommendations**

There are several recommendations that can be done in future studies to assist the hypothesis of this study. First, more outside input from others in the community and surrounding areas can be considered to use in the study. Background information and statistical data presented to random individuals could be used to survey their knowledge of the law regarding senior drivers and whether they would agree to even greater provisions. This could serve to make citizens more aware of the senior fatality problem that occurs not only in Texas, but around the country and what is being done to help solve the problem.

Another suggestion would be a national renewal licensing standard implemented by FHWA and state governments. Both state governments and FHWA could work together to set a national licensing provisions policy that all licensing territories had to abide by to maintain a constant casualty in all states, regardless of population. This would subject each state to a uniform safety basis. In the process it would ensure that senior drivers, regardless of where they reside, are capable of operating a vehicle especially if they plan on making interstate related trips. States could also implement extra provisions in their respective areas to help combat the problem.

A major recommendation is that TxDOT, along with FHWA, look into the task of trying to rectify the problem of more elderly male drivers involved in fatal accidents compared to senior female drivers on the road. Officials could host workshops or implement programs that male drivers could attend to boost driving awareness and/or safety to help bring down the amount of male drivers involved in fatal crashes.

When looking with the number of rural fatalities compared to urbanized fatalities, TxDOT could step in and make improvements to roadways. This recommendation could be a very important factor, not only in urbanized areas, but in rural areas as well. This recommendation could assist drivers tremendously and cut down on fatalities especially in rural areas where the most fatal crashes are happening and public transportation is less used.

Finally, as with any new policy, the public and transportation officials need to exercise patience in seeing changes take place. Of course there will still be senior casualties along with other setbacks until these provisions are fully used and recognized by all licensed senior drivers. Although Texas has seen a decrease in the number of casualties since the enforcement of Katie's Law, this is only the beginning in what will be a safe transition for Baby Boomer drivers who will dominate the roads in the next couple of decades.

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