1. INTRODUCTION

America is graying. The proportion of the population that is 65 years of age or older is increasing each year, and the group of older persons who are age 85 or over is the fastest growing segment of the population (Figure 1.1). These increases in the elderly population raise many issues, among which transportation safety is a major concern. Physical and cognitive limitations are known to affect the driving performance of the elderly, and their relative frailty further exacerbates the effects of a crash that younger people would more readily survive. As the over-65 population grows, American society is also changing, with more elderly – especially women – driving more miles and more frequently, with people working later in life, and with vast changes in health management and in physical and functional abilities. These and other factors are likely to contribute to changes in the number of fatal traffic crashes involving the elderly. The purpose of this research is to develop projections from 2000 through 2025 of highway traffic fatalities that involve older drivers.
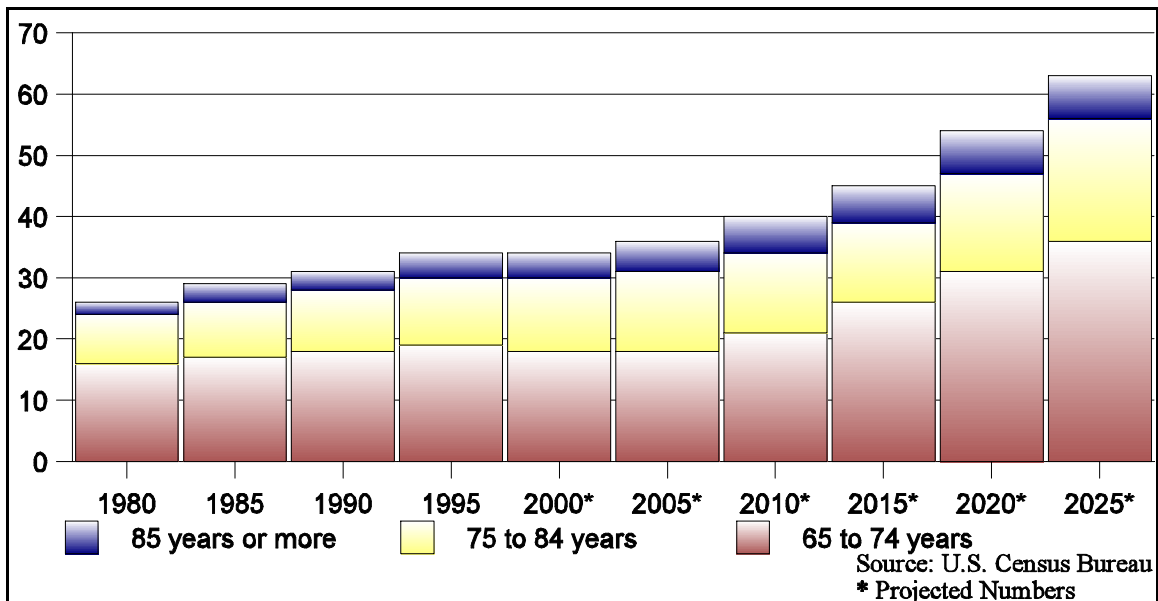
Figure 1.1. U.S. Elderly Population Estimates, by Age and Year (in millions)

This research was funded by General Motors (GM) pursuant to an agreement between GM and the U.S. Department of Transportation (DOT). Under Section I.G of the agreement, GM agreed to conduct or fund research in the area of driver impairment, including the effects of aging. The other older driver research projects agreed upon by both GM and the National Highway Traffic Safety Administration (NHTSA) are listed in Table 1.1.

Table 1.1. Older Driver Research Projects Sponsored by General Motors Corporation

Project ID	Project Name
G.1	Changes in Crash-Involvement Rates as Drivers Age
G.2	Self-Regulation as a Mechanism for Improving the Safety of Older Drivers
G.3	Understanding the Influence of Older Driver Disability on Mobility and Quality of Life
G.4	Improvement of Senior-Driver Safety Through Self-Evaluation
G.5	Reduction or Cessation of Driving Among Older Drivers
G.6	*Projections of Crashes and Casualties Caused by Older Drivers*
G.7	Factors Contributing to Premature Reduction or Cessation of Driving by Older Men and Women
G.8	Investigations of Crashes and Casualties Associated with Older Drivers
G.9	Remediation Through Adaptive Equipment and Training

Oak Ridge National Laboratory (ORNL) was tasked (GM Project G.6) to conduct research and develop a model to project the numbers of fatalities in highway crashes involving older drivers. Tasks included a brief review/overview of the literature on older drivers in the United States, a study of travel behavior and patterns of the elderly, an investigation of the influence of various factors on older drivers' crash involvement, and an extensive examination

of existing data bases, including historical crash records. These tasks led to the development of a model to predict the involvement of older drivers in fatal vehicle crashes in the future.

This project provides national estimates and estimates for each of the four Census regions, in five-year increments between the year 2000 and the year 2025, for:

- The number of older drivers in the future who will still be driving, by age group and gender,
- The average number of miles to be driven annually by an elderly driver, by age group and gender,
- The total number of elderly *driver* fatalities resulting from crashes in which older drivers are involved, and
- The total number of *all occupant and non-occupant* fatalities (all ages) resulting from crashes in which older drivers are involved.

Estimates are generated for each Census region of the country: Midwest, Northeast, South and West, anticipating that the elderly population will continue the migration trends to the southern and western regions. According to population projections estimated by the U.S. Census Bureau, the elderly population in the western region will more than double by the year 2020 (Figure 1.2).

The relationships in our model are based on statistical examination of travel behavior and crash involvement over the previous quarter century. Among the influences on travel behavior and crashes are health status, household income, employment status, the presence of another driver in the household, the availability of public transit, and seat belt use and usage of other in-vehicle devices. The model relies on the evolution of these determinants of driving behavior and crash involvement to project future fatal crashes among the American elderly population, by gender and five-year age groups.
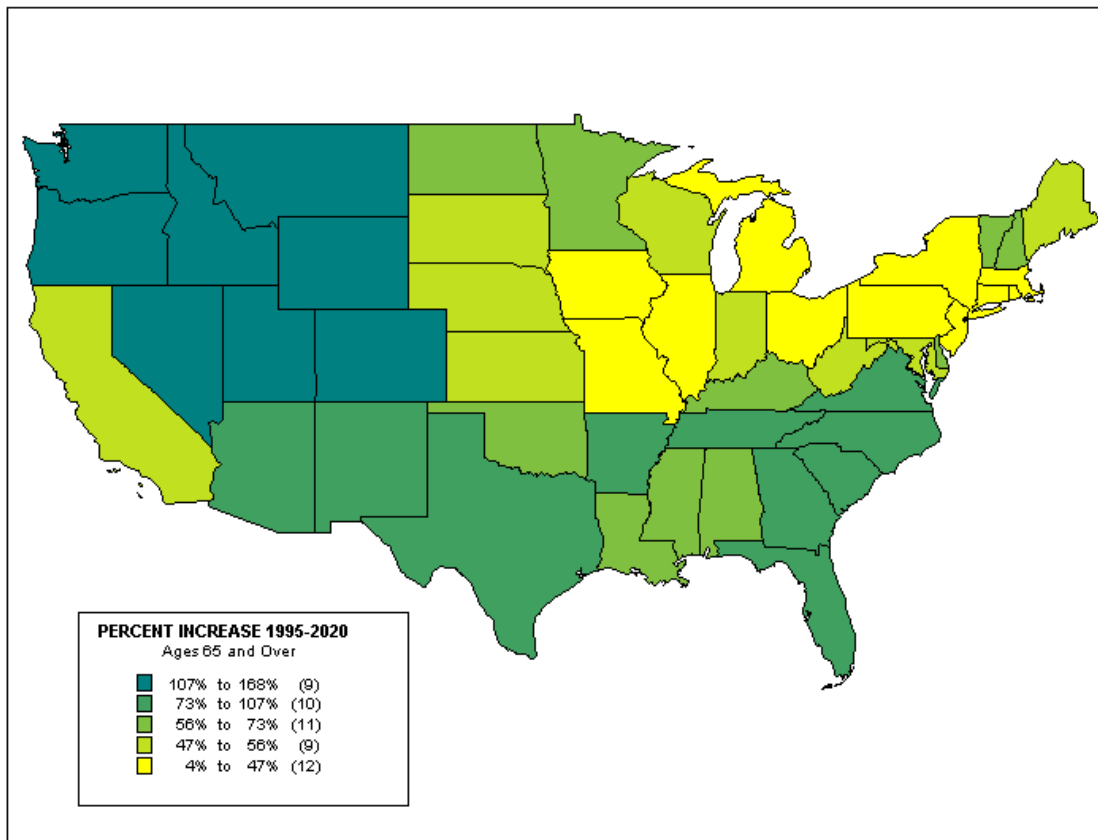
Figure 1.2. United States Projected Population Increase, 1995 to 2020

A spreadsheet-based tool was developed that allows a user of the model to modify the assumptions used in projecting highway fatalities. These assumptions include projections of household income, health and employment status, and other determinants of driving and crash involvement. This feature provides a mechanism to consider alternative scenarios about the future.

This report documents the research that was conducted, describes the model, and provides output from the model. Specifically, Chapter 2 describes the research method we applied to derive the fatality projections. An overview of the literature that focuses on driving behavior and crash involvement of older drivers is reported in Chapter 3. Chapter 4 discusses

various data sources and their ability to meet our modeling needs. A series of models that led to the final fatality projections are detailed in Chapters 5 through 8. Chapter 9 presents an analysis of different components that contribute to the change in total projected fatalities. Chapter 10 concludes this report by summarizing major findings, and recommending future research and data needs.