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Final Report

Project Title:

Clear Roads' Safety Effect on Elderly Drivers

Project Number:

Project End Date:

Submission Date:

UMER 20-11

August 31, 2011

October 4, 2011

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The New England University Transportation Center is a consortium of 8 universities funded by the U.S. Department of Transportation, University Transportation Centers Program. Members of the consortium are MIT, the University of Connecticut, University of Maine, University of Massachusetts, University of New Hampshire, University of Rhode Island, University of Vermont and Harvard University. MIT is the lead university.

Background and Objective

Driving on roads that are covered with ice or snow is hazardous for all drivers, but there may be disproportionately high risks for certain age groups on certain road types and different winter maintenance practices may also have a greater influence on drivers of certain ages.

Methodology and Results Study 1

Three two way chi-squared analyses are used to examine the inter-dependence of road classification, road surface condition, and driver age on all police reported winter road surface condition crashes in the state of Maine for a five-year period. Special focus is paid to the relatively new practice of anti-icing that the Maine Department of Transportation is using, and its effect on the number of crashes experienced by drivers in different age groups. It was found that all age groups experience more winter crashes on rural roads where the speed limits are higher, regardless of whether de-icing or anti-icing is used. Younger drivers (16-17 yrs.) are especially susceptible on urban townways (roads maintained by the town). On urban state highways, where anti-icing is used, every age group is experiencing fewer winter crashes than expected. Most municipalities in the state of Maine are still using a de-icing strategy for winter roadway maintenance, and it is possible that the crash numbers could be reduced if more of them switch to the anti-icing technique that is practiced by Maine Department of Transportation.

Methodology and Results Study 2

Using state-level data and regression analysis, our research shows that young (<19) and older (65+) drivers are significantly overrepresented in crashes during winter road conditions. Drivers in Maine are, on average, involved in 93 crashes per day, about one crash per 10,000 drivers. The daily number of crashes varies with many factors, including two that are the focus of this study: temperature and snowfall. Winter-maintenance activities also influence safety and mobility and are costly. Maine spent \$98 million in 2008-2009 on winter road maintenance efforts to improve safety and mobility. In order to efficiently allocate winter road maintenance resources, managers and policy makers need to understand the relationship between road safety and varying levels of adverse winter weather. Our analysis improves on past studies by exploring the relationship between winter weather and vehicle crashes for different age groups on a state level rather than a national level where it is more difficult to control for confounding variables. The methodology advances past efforts by employing a model allowing for greater heterogeneity and using more detailed weather, traffic volume and crash data. Results indicate that young drivers have the highest crash risk with below freezing temperature and mid-levels of daily snowfall amongst all age groups. Crash risk is also shown to increase for young drivers by 13% on Fridays with trace amounts of snowfall.

Overall Conclusions

Perhaps the most surprising result is the lack of significance on weather variables for older drivers. On one hand, this result may be derived from older drivers deciding not to drive during winter weather events since the exposure term used does not differentiate miles driven by age group. On the other hand, the positive sign on each weather variable, indicating more crashes are to be expected with heavy snow and colder temperatures, follows what is to be expected. In addition, the risk for older drivers increases with more snow and colder temperatures, in a similar fashion as for all other ages, indicating that a possible relationship does exist.

With respect to Maine Department of Transportation's change in policy from de-icing towards anti-icing, the following conclusions can be drawn:

- Drivers are exposed to fewer road conditions of snow and ice than a decade ago, and this has led to improved mobility.
- There are significantly fewer crashes in Maine than a decade ago, both during winter road conditions (snow, slush, ice) and during non-winter road conditions.
- In winter months (not conditions) between 1989 and 2008, the number of crashes has not been reduced when compared to crashes during the rest of the year. This is true for state highways as well as for all other roads. Data were not available to determine the level of vehicle travel during storm events.
- In winter months between 1989 and 2008, there is a significant reduction in the number of fatalities on state highways. This reduction does not occur on town roads and state-aid highways. This is consistent with our finding of a statistically significant decrease in fatalities on state highways since Maine Department of Transportation's anti-icing policy was implemented. It is unknown whether the anti-icing policy is the cause of the decrease.
- Colder temperatures with snowfall lead to large increases in daily crash totals. Temperatures below 25 degrees with a daily snowfall greater than one inch contribute to 127 additional crashes beyond the "average" day of 82 crashes.
- There are fewer crashes in extremely low temperatures with snowfall above 5 inches, possibly due to the lower number of drivers in these conditions.

Documentation

There are three papers and one report that have resulted from this project in combination with another project funded by Maine Department of Transportation. Two of the papers have been published, the publication of the third is still pending. The 2010 report was delivered to Maine Department of Transportation:

- T. Olaf Johnson, Per Gårder, Adam Stern, and Jonathan Rubin, "Driver age and Safety on Winter Roads," Published in the 90th Annual TRB Meeting Compendium of Papers, 2011
- Adam Stern, Per Gårder, T. Olaf Johnson, and Jonathan Rubin, "Effects of Adverse Winter Weather on Drivers in High Risk Age Groups: Statewide Analysis," Published in the 90th Annual TRB Meeting Compendium of Papers, 2011
- Jonathan Rubin, Per E. Gårder, Charles E. Morris, Peggy McKee, Kenneth L. Nichols, John M. Peckenham, Adam Stern, T. Olaf Johnson, "Public Decisions for Winter Roads: Salt, Safety, Environment and Cost," submitted in October 2010 to State and Local Government Review - Manuscript ID SLGR-10-0071
- Jonathan Rubin, Per E. Gårder, Charles E. Morris, Kenneth L. Nichols, John M. Peckenham, Peggy McKee, Adam Stern, and T. Olaf Johnson, *Maine Winter Roads: Salt, Safety, Environment and Cost*, a Report by the Margaret Chase Smith Policy Center, The University of Maine, February 2010

Electronic copies of the papers and the report can be obtained from Per Garder by contacting him by e-mail at Garder@Maine.edu