

COLLISION EXPERIENCE AND MOBILITY CONCERNS OF THE RURAL ELDERLY

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Abstract

This paper compares road collision rates and accident patterns of elderly drivers living in rural areas against other groups. Should a re-licensing or screening program be developed for senior drivers, those living in rural areas who might lose their license will be particularly disadvantaged due to a lack of transportation alternatives.

Using several years of New Brunswick provincial accident data, it was found that older seniors (over 80 years of age) living in rural areas experience substantially higher collision rates than their urban counterparts. Contributing to this outcome is the higher proportion who continue driving in later years rather than surrender their license.

The data indicate that there are significant differences between the accident characteristics of senior drivers living in rural versus urban areas. Recommendations are made for proactive countermeasures to improve the safety performance and maintenance of mobility among the elderly living in rural areas.

Résumé

Ce document compare le bilan des collisions et des accidents de la route impliquant des automobilistes âgés vivant dans des secteurs ruraux avec celui d'autres groupes. Si un programme de sélection ou de renouvellement des permis devait être mis sur pied pour les automobilistes âgés, la situation serait particulièrement problématique pour ceux qui vivent dans des secteurs

ruraux et qui seraient obligés de rendre leur permis, puisqu'ils n'auraient peut-être pas accès à aucun autre mode de transport.

En utilisant les données provinciales du Nouveau-Brunswick sur les accidents survenus sur une période de plusieurs années, on a découvert que les personnes très âgées (80 ans et plus) vivant dans des secteurs ruraux connaissent un taux de collision beaucoup plus élevé que leurs homologues des secteurs urbains. Un élément qui contribue à ce résultat, c'est la proportion plus élevée de personnes qui continuent à conduire malgré leur âge avancé plutôt que de rendre leur permis.

Les données indiquent qu'il y a des différences importantes entre les caractéristiques des accidents d'automobilistes âgés vivant dans des secteurs ruraux et ceux vivant dans des secteurs urbains. Nous recommandons de prendre des mesures de prévention proactives pour améliorer la sécurité tout en assurant la mobilité des personnes âgées vivant dans des secteurs ruraux.

1. Introduction

The increasing proportion of elderly Canadians will provide a significant challenge to road safety experts over the next few decades. Projections indicate that the proportion of Canadians 65 years of age and over will increase from 12.7 percent today to 21.4 percent by 2026¹. Furthermore, the overall number of elderly Canadians will more than double during this period. It is likely that the number of elderly drivers and the annual mileages driven by this group will increase even more dramatically as seniors are expected to be relatively more affluent, active, and car dependent than previous cohorts.

Elderly drivers living in rural areas are a vulnerable subgroup of those who are licensed. Rural seniors typically travel greater distances to reach basic services and are less likely to have alternative means other than driving themselves. Although Canada is a highly urbanized

nation, the province of New Brunswick estimated that 52.3 percent of its population lives in rural areas². If provinces move toward more stringent re-licensing measures targeted at elderly drivers, those living in rural areas are particularly susceptible to a loss in mobility.

An understanding of the nature of the collision experience of rural elderly drivers is essential in formulating policies which are both effective and equitable. Without an understanding of their accident patterns, it is not possible to draft re-licensing procedures which will be reasonably effective at screening unsafe drivers. An understanding of accident experience may also permit the formulation of less drastic remedial measures other than a complete suspension of driving privileges.

2. Data

The main source of data for this study was New Brunswick accident records covering 1996 through 1999. For the analysis, the data needed to be disaggregated by age and area of residence (rural vs. urban). Unfortunately, neither of these fields were provided with the accident data. A second file was obtained from the New Brunswick Department of Transportation Motor Vehicle Branch which contained these fields and was subsequently cross-linked using the police accident case number. Area of residence was based on the home postal code of the driver using Canada Post definitions for rural areas³. Out of 72,281 total accidents for the four-year period, 61,222 (84.7 percent) were successfully linked.

To estimate collision, injury, and fatality rates for elderly drivers, an estimate of annual total mileage driven by each group was necessary. An estimate of annual mileage per driver came from a 1988 University of New Brunswick survey of 1,432 drivers. Although this information is somewhat dated, it was the only survey of New Brunswick drivers available that allowed the rural/urban division to be based on postal code.

3. Risk Exposure of Rural Elderly Drivers

Based on studies of the travel behaviour of rural senior drivers it is evident that they are self-regulate to avoid difficult driving conditions. In a 1994 survey of Illinois drivers 77 years of age and over, more than 80 percent indicated they avoid driving in conditions of snow and ice, over 65 percent avoided nighttime driving, more than 50 percent avoided rush hour, and over 20 percent avoided driving in rainy conditions⁴.

Other surveys have yielded similar results. Data from the 1988 UNB Transportation Group survey indicated that rural elderly drivers are also likely to avoid urban streets, highways, nighttime driving, and peak traffic. An analysis of trips by American drivers from the 1995 Nationwide Personal Transportation Survey (NPTS) indicated that rural drivers under 66 years of age were 3.5 times more likely than drivers 66 and over to drive between 10 p.m. and 6 a.m.. The rural group over 66 years of age was also more than 20 percent less likely to drive during peak hours.

Ruralelderly drivers also self-regulate their collisionrisk by dramatically reducing their amount of driving. Figure 1 depicts average annual mileages for rural and urban drivers calculated from the 1988 UNB Transportation group survey. Rural senior drivers substantially reduce their annual mileage in comparison to both younger drivers and urban elderly drivers. An analysis of NPTS data revealed similar, although less dramatic, trends.

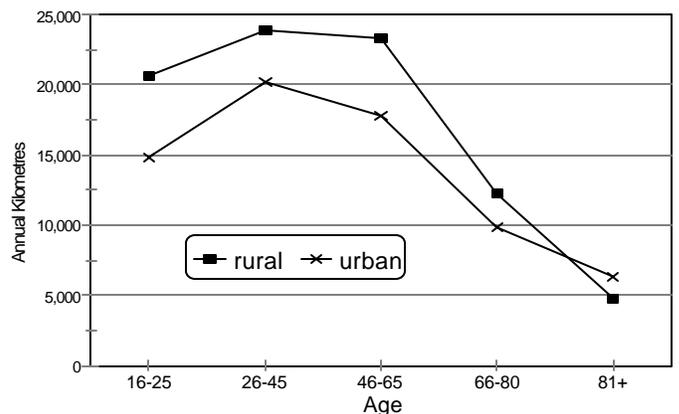


Figure 1: Annual Kilometres Driven

4. Safety of Rural Elderly Drivers

Calculations of collision rates for New Brunswick drivers were consistent with previous studies of other areas. The highest accident rates among New Brunswick drivers are in the youngest and oldest age groups. It is also apparent that urban residents have a higher accident rate overall (1.8 accidents per million kilometres for urban drivers versus 1.3 accidents per million kilometres for rural drivers). Results are shown in Figure 2.

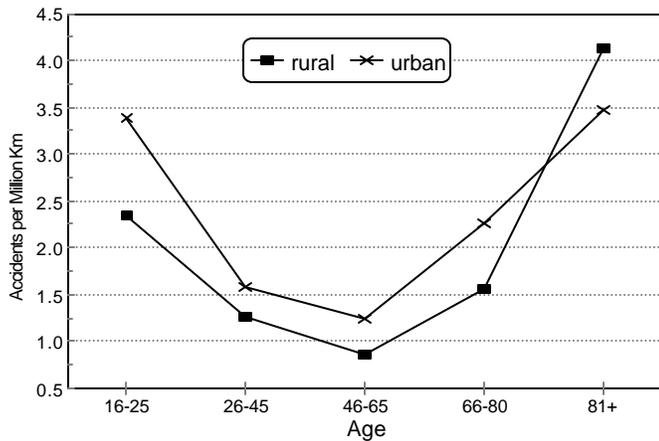


Figure 2: Accident Rates

There are two troubling trends when the accident rates for rural drivers over 80 years of age are examined. First, the accident rate for the oldest rural age group is 4.8 times greater than the rate for rural drivers aged 46 to 65 years. Second, the collision rate for rural drivers over 80 years of age exceeds the rate for their urban counterparts. On a per kilometre basis, this is the only rural group that experiences a higher collision rate than for those living in urban areas. Although older senior rural drivers take measures to reduce their collision risks, they experience sharply increasing accident rates relative to younger drivers and urban drivers of the same age.

An examination of involvement rates for injury accidents yielded similar results. For involvement in injury accidents the collision rate was higher for all urban groups except those over 80 years of age. As shown in Table 1, the

‘proportion’ of accidents involving an injury showed little variance ranging from 29.6 to 35.9 percent. Nevertheless, the proportion was slightly higher for urban than rural drivers, and actually tended to decline with age. It is notable that the proportion of injury accidents increased only for those living in rural areas over 80 years of age.

Table 1: Percentage of Collisions Involving an Injury

age	rural	urban
16-25	34.5	35.9
26-45	31.1	33.5
46-65	30.1	32.6
66-80	29.6	31.9
81+	31.2	31.1

An investigation of fatal collisions found that rural drivers over 80 years of age had a substantially high involvement rate. The rate for rural drivers in the 81+ age group was nearly 18 times the rate for rural drivers aged 46-65 years. For rural drivers over 80 years, 2.8 percent of all accidents were fatal which is a proportion four times that for the 46-65 rural age group. In the corresponding 81+ urban age group, there were no involvements in fatal accidents during the four years studied. Results are shown in Figure 3.

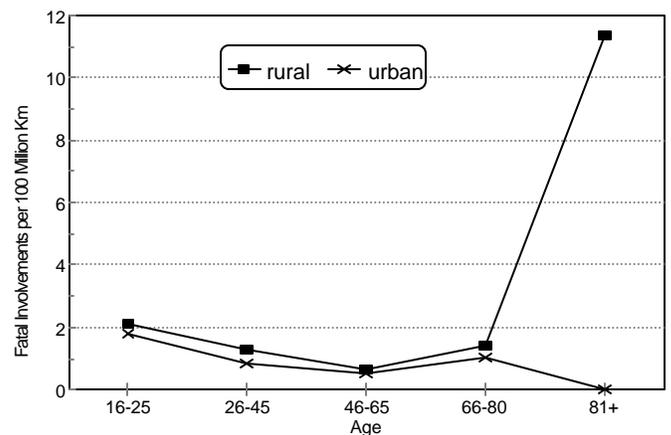


Figure 3: Fatal Accident Involvement Rates

These results were not entirely unexpected, as a disproportionately high elderly involvement rate in fatal accidents is not unique to this study. A 1998 NTHSA study found that the fatality rate for drivers 85 years of age and over was more than 9 times the rate for those aged 25 to 69⁵. Other studies demonstrating high elderly involvement rates in fatal accidents include those undertaken by TRB (1988)⁶ and Evans (1991)⁷.

The magnitude of the difference in the fatal involvement rate between rural and urban drivers over 80 years of age was surprising. Accident data covering a longer period than four years is necessary to develop a clearer understanding of the true difference. However, based in part on the results of previous studies it is likely that the fatal accident involvement rate of older seniors from rural areas is indeed substantially higher than for those living in urban centres. Contributing to this difference are higher average operating speeds on rural roads, slower emergency response times in rural areas, and the physical frailty of elderly drivers in general. The increased rate of license retention among the very old in rural areas likely plays a key role as well.

5. Collision Experience of Rural Elderly Drivers

In order to establish an overview of the nature of rural elderly accidents, 26 variables from New Brunswick accident files were examined. Results are expressed as percentages of total accidents. This means that the results are an expression of both driver performance and exposure to certain driving conditions.

5.1 Multi-Vehicle Collisions

Several previous studies have found that elderly drivers are overly involved in multi-vehicle collisions. In a 1994 study of Michigan drivers, Taylor found that accidents shifted from single-vehicle to multi-vehicle as drivers age⁸. A 1999 study of collisions on rural roads also concluded that elderly drivers are over-involved in multi-vehicle crashes⁹.

An examination of the New Brunswick accident data also supported this trend. The results of this analysis are shown in Figure 4. For nearly every age group, the percentage of multi-vehicle collisions was greater than in the preceding age group. Urban drivers also had a higher proportion of multi-vehicle crashes than rural drivers. However, the discrepancy between rural and urban drivers narrowed slightly among the elderly age groups indicating poorer performance among rural seniors.

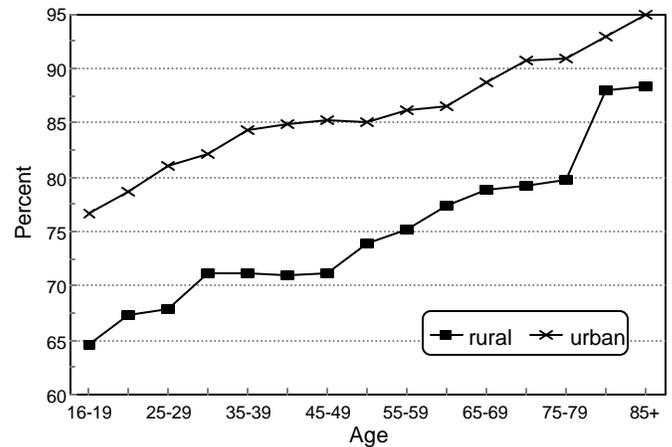


Figure 4: Incidence of Multi-Vehicle Accidents

5.2 Accident Configuration

A review of accident configurations showed that rural drivers over 65 years of age were most likely to be involved in right angle or rear-end configurations. It is noteworthy that both of these configurations are multi-vehicle in nature. In comparison to younger rural drivers, there was an increase in the proportion of right angle, left-turn and improper turn collisions. However, compared to the urban elderly group there was a higher incidence of accidents where the vehicle left the roadway or struck a fixed object. The results are displayed in Table 2.

5.3 Accident Location

Accidents involving the rural elderly are most likely to occur in urban areas and on provincial highways. Despite evidence that this group reduces its exposure to urban

driving, 57.8 percent of their accidents occurred on urban roads, 37.0 percent of which were on highways. Both of these proportions are higher than for younger rural drivers. Rural drivers 65 years

Table 2: Common Accident Configurations (percent)

	rural		urban	
	16-64	65+	16-64	65+
right angle	20.3	28.5	26.4	37.1
rear-end	22.0	18.5	27.5	21.7
left roadway	19.2	12.3	10.9	5.5
fixed object	13.5	9.7	10.0	7.2
left turn	5.7	9.0	7.9	11.2
improper turn	7.0	8.6	6.5	6.7
other	12.3	13.4	10.8	10.6

of age and older were also nearly as likely as the corresponding urban group to have an accident on an urban provincial highway. Table 3 outlines the locations of collisions for rural and urban drivers. These results indicate that rural elderly drivers experience difficulties on city streets, especially the busiest city streets which are labelled provincial highways.

Table 3: Accidents by Location (percent)

	rural		urban	
	16-64	65+	16-64	65+
rural street	47.6	42.0	20.5	14.8
urban street	52.2	57.8	79.4	85.2
provincial hwy	67.6	71.1	52.6	40.4
rural hwy	35.5	34.1	15.7	12.4
urban hwy	32.1	37.0	36.9	38

5.4 Accidents at Intersections

There is considerable evidence that elderly drivers perform poorly at intersections. McKelvey (1988) demonstrated that elderly driver performance is most deficient at intersections, especially those which are rural and un-signalized¹⁰. A recent HSIS study also found that elderly drivers were more likely to be at fault in intersection collisions. Depending on the type of intersection, drivers over 75 years of age were three to five times more apt to be at fault than 30 to 50 year old drivers¹¹.

An examination of the proportion of accidents at intersections confirmed these prior findings. Figure 5 depicts the percentage of accidents at intersections for rural and urban drivers. For both rural and urban drivers, the proportion of accidents at intersections increases with age. However, the increase for rural and urban elderly drivers from middle age is approximately equal (12.6 percent for rural seniors and 13.2 percent for urban seniors).

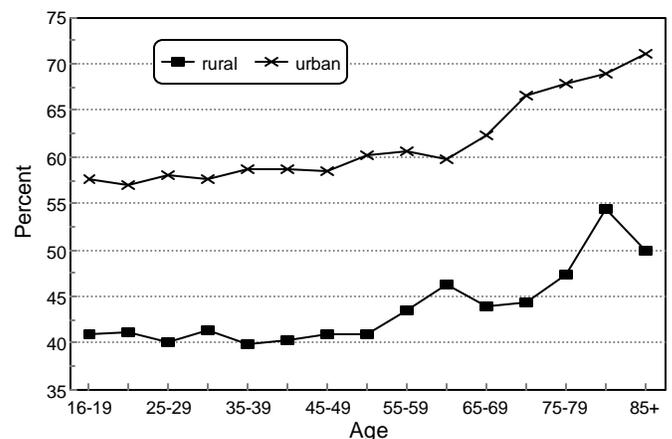


Figure 5: Accidents at Intersections

The high proportions of elderly collisions occurring at intersections warranted an examination of the type of traffic control at these intersections. In accidents involving seniors from rural areas where traffic control was present, 55.0 percent were stop controlled and 36.9 percent were signalized. There were also small percentages of collisions where flashing lights or yield signs were present. In

comparison to younger rural driver age groups, seniors had smaller percentages of accidents where signals, flashing lights, or yield signs were present, and a higher percentage at stop controlled intersections. These differences are summarized in Table 4.

Table 4: Distribution of Collisions by Traffic Control (percent)

	rural		urban	
	16-64	65+	16-64	65+
signal	41.9	36.9	54.7	46.1
flashing	4.9	2.6	3.6	3.8
yield	7.8	5.5	9.6	5.7
stop	45.1	55.0	32.2	44.9

Urban groups were found to have a greater percentage of accidents at signalized intersections in comparison to rural groups. However, as in the rural groups, elderly urban drivers are more prone to be involved in accidents at stop controlled intersections.

An examination of the percentage of intersection collisions by intersecting roadway indicates that differences result from place of residence rather than age. Results are shown in Table 5. Rural residents are less likely than urban residents to have accidents at intersections with urban streets, and more likely to have accidents at intersections with rural streets, provincial highways, and private entrances. Although rural elderly drivers experience an increasing percentage of intersection accidents, they are distributed in a similar manner to the intersection accidents of younger rural drivers.

Table 5: Intersection Accidents by Intersecting Roadway (percent)

	rural		urban	
	16-65	65+	16-65	65+
prov. hwy.	15.6	16.3	11.6	9.6
rural street	12.1	10.5	3.8	3.7
urban street	51.0	47.8	69.5	71.5
commercial	10.7	14.1	9.6	9.6
private	10.3	11.0	5.3	5.4

5.5 Pre-Collision Actions

A review of drivers' pre-collision actions revealed considerable differences between the rural elderly and other drivers. For most drivers, a majority of accidents occur as drivers are going straight. However, for rural drivers over 80 years of age the proportion slips below one-half. As the proportion of accidents occurring while going straight declines, there is a sharp increase in accidents which occur while turning left and starting from a stop. Elderly rural residents were also over-represented in accidents which occurred while backing, parking, merging, changing lanes, and making a U-turn when compared to younger drivers. The distribution for pre-collision actions is summarized in Table 6.

The results suggest that pre-collision actions are more dependent on age than place of residence. Although there were differences between rural and urban drivers of the same age groups, they were considerably less than the difference between age groups. The most notable difference between age groups is that elderly groups are nearly twice as likely as younger groups to be turning left when an accident occurs.

Table 6: Pre-collision Actions (percent)

	rural		urban	
	16-64	65+	16-64	65+
going strait	65.9	54.4	61.3	51.6
turning left	10.7	19.9	11.8	21.3
slowing/stopped	10.3	7.3	13.8	11.2
starting	2.6	5.7	2.7	4.7
backing	3.3	3.9	2.7	3.1
turning right	3.6	4.6	4.1	4.4

5.6 Road Alignment

Most accidents for all age groups occur on straight and level road surfaces. However the proportion of accidents on straight and level roads increases steadily with age, while the percentage of accidents on curves and grades decreases after the age of 65. These trends are shown in Figure 6. The trends were similar among urban groups, except that a greater portion of urban driver accidents occur on strait and level surfaces.

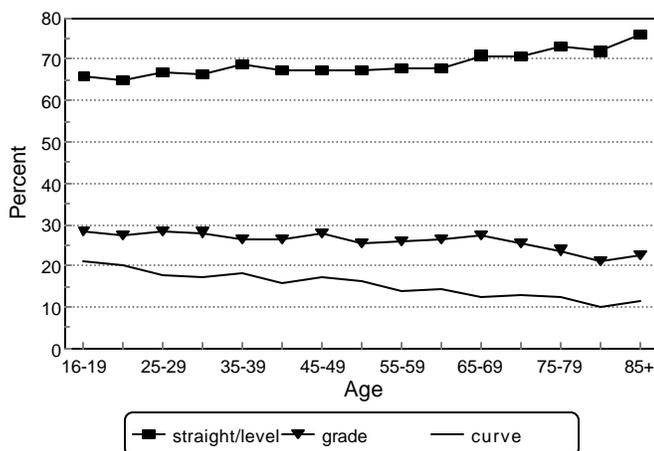


Figure 6: Roadway Alignment for Rural Driver Collisions

These findings were somewhat surprising since one might expect elderly drivers to have difficulty with the limited sight distances at grades and curves. In reality elderly rural drivers experience a lower proportion of their accidents under these conditions. This trend may be the result of elderly drivers successfully reducing their risks in these situations by exercising additional caution.

5.7 Weather Conditions

An analysis of the weather conditions reported at the time of the accidents shows that an increasing majority of elderly collisions occur when there is no precipitation. Rural elderly drivers have proportionally fewer accidents than younger drivers in rainy and snowy conditions. In comparison to urban drivers, the rural groups were more likely to have accidents in the snow, but less likely to have accidents in the rain. Results are summarized in Table 7.

Table 7: Weather Conditions During Accidents (percent)

	rural		urban	
	16-64	65+	16-64	65+
no precipitation	77.2	83.6	78.5	84.3
rain	9.5	8.2	9.7	9.0
snow/mix	10.5	6.7	9.6	5.7

The lower percentage of accidents for rural elderly drivers in snow and rain may be the result of modified travel behaviour rather than better driving. The performance of elderly drivers (expressed as an accident rate) is likely to be worse than younger drivers when one considers their low exposure to these conditions. A survey of Ontario drivers found that the winter collision rate for drivers 80 years of age and older was more than 4 times the rate for 25 to 59 year-old drivers. A similar comparison for autumn driving yielded a rate for the very old only double

that of the younger age group¹². This study suggests that winter weather has a greater impact on elderly drivers.

The affect of rainy conditions on accident involvement is less clear. Evidence suggest that elderly drivers are only moderately inclined to avoid rainy conditions. This implies that the percentage of elderly exposure to rainy conditions may not be substantially less than in younger groups. If this is true, rural elderly drivers may be no more vulnerable to rainy conditions than other drivers.

5.8 Nighttime Collisions

Nighttime hours were defined as those between 7 p.m. and 6 a.m.. Based on this definition, 13.9 percent of rural elderly accidents occurred during nighttime, considerably fewer than the 27.2 percent for rural drivers under 65 years of age. There was also a consistent decline in the percentage of nighttime accidents as drivers aged. Rural 16 to 19 year-old drivers had 39.1 percent of accidents during these hours, but the oldest rural drivers had only 10.0 percent of their collisions during nighttime hours. The trends were found to be similar for urban drivers. Results are displayed in Figure 7.

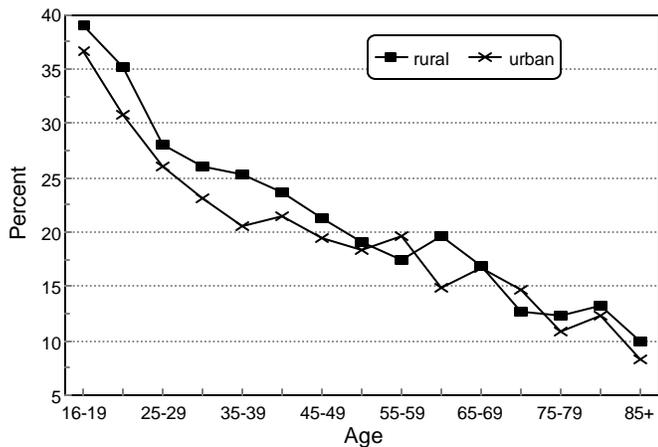


Figure 7: Night Collisions

The declining percentages of nighttime accidents should not be interpreted as an indication of improving performance during nighttime hours. While 13.9 percent

of rural elderly accidents occurred at night, it is likely that exposure is considerably lower. Data from the NPTS show that elderly American drivers make only 7.5 percent of trips during nighttime hours. In a 1988 survey of New Brunswick drivers, two-thirds of those 81 years of age and over indicated that they seldom or never drive after dark¹³. As with accidents during snowy conditions, it appears that rural elderly drivers offset declining performance by restricting their exposure.

5.9 Contributing Factors

An examination of contributing factors to accidents indicated that rural elderly drivers are more likely than any other group to be at fault in a collision. It can be generally assumed that drivers for which a contributing factor is listed were to some degree at fault or contributed to the occurrence of an accident. As shown in Figure 8, the percentage of drivers cited with contributing factors is lowest in the middle ages and increases sharply for the elderly age groups. Rural drivers are more likely to have a contributing factor reported due to the greater percentage of single-vehicle accidents in rural areas.

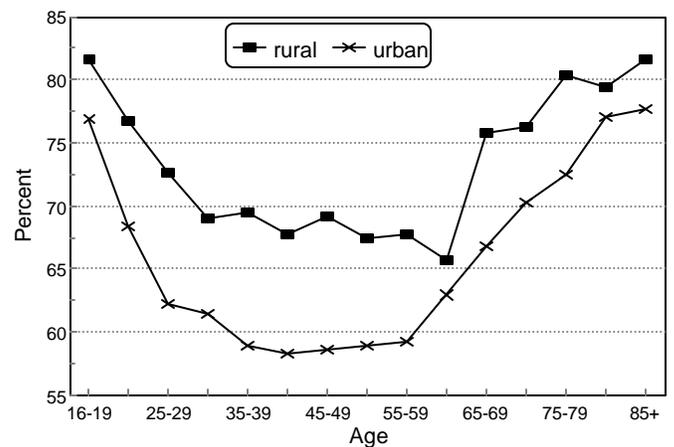


Figure 8: Percent Time At-Fault

An examination of the primary contributing factors for rural elderly drivers shows that a majority of accidents are attributed to a small number of factors. In 22.3 percent of

rural elderly accidents, no contributing factor was cited. In those collisions where there was a contributing factor, driver inattention was the primary factor 47.6 percent of the time. Failure to yield the right-of-way (9.1 percent), travelling too fast on a slippery road surface (8.4 percent), and striking an animal (6.7 percent) also were significant factors. Other factors of less consequence included inexperience/confusion, driver distraction, drunk/impaired driving, speed, improper turning, limited/obstructed view, and disregarding traffic control. Numerous other factors accounted for the remaining factors cited. Results are depicted in Figure 9.

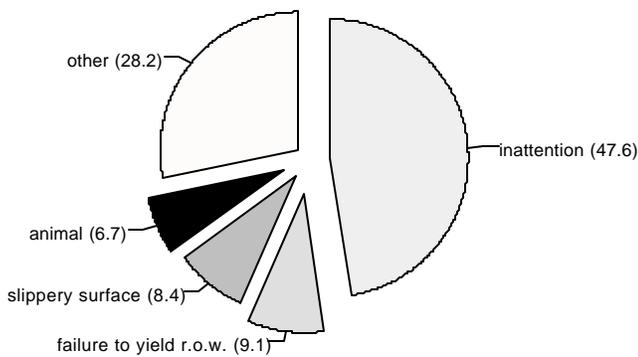


Figure 9: Contributing Factors (rural elderly)

There were considerable differences in the primary factors cited in rural elderly accidents and younger rural driver accidents. Inexperience/confusion was frequently cited in the youngest age groups, declined in the middle ages, and then increased again in the elderly age groups. Younger rural drivers were more likely to have slippery surfaces, animals, drunk/impaired driving, and speed cited as primary contributing factors. For younger rural drivers, there were no contributing factors reported in 26.5 percent of collisions.

Comparing rural seniors to those living in urban areas it was found that they were assigned a contributing factor in 7 percent more accidents. Urban elderly drivers were more likely to be cited for inattention, failure to yield right-of-way, driver distraction and disregarding traffic

control. Factors more common among rural seniors included confusion, improper turns, driving too quickly on slippery surfaces, striking an animal, drunk/impaired driving, speeding, and limited/obstructed view.

5.10 Review Recommended

One means of identifying potentially unsafe drivers using the accident data set is whether the reporting police officer recommended a review of the driver involved in an accident. If the reporting officer advises a review, this is an indication that a physical or mental condition significant enough to make the driver unsafe might exist (in the opinion of the officer).

An examination of the proportions of drivers recommended for reviews after an accident, showed two significant trends. First, the percentage of drivers recommended for review increases sharply after the age of 65. For rural drivers under 65, a review of the driver was only advised for 1.5 percent, but for rural drivers 65 years of age and over a review was recommended on average 15.6 percent of the time. For rural drivers 85 years of age and over the percentage escalated to 44.2. The second trend is that after the age of 65, rural drivers are considerably more likely than urban drivers to be recommended for a review after a collision. These results are displayed in Figure 10.

It was not surprising that the percentage of drivers for whom reviews were recommended increased with age. This is a natural result of the declining mental and physical capabilities associated with aging. However, the exceptionally high proportions in the oldest age groups suggest that a considerable portion of those involved in collisions may be unsafe and might subsequently be removed if a license renewal or screening program were enacted.

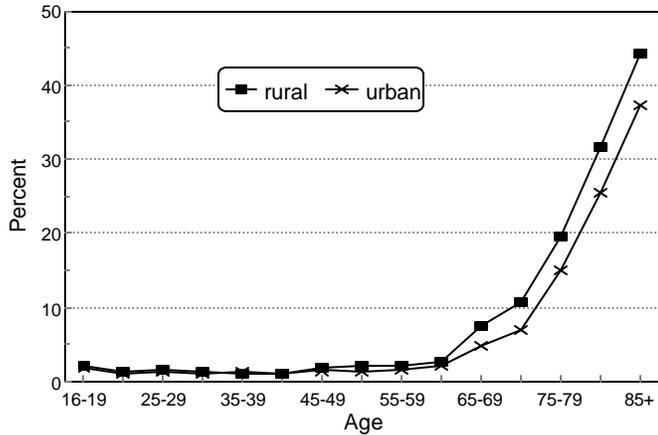


Figure 10: License Review Recommended

The differences between rural and urban elderly drivers indicate that the rural group is more likely to have diminished skills. The most probable explanation for this is that elderly persons living in rural areas are highly car dependent and those who would normally relinquish their licenses are not as apt to as urban residents.

To test this premise, the license rates for rural and urban New Brunswick residents were compared. Population statistics were obtained from Statistics Canada and a list of active license holders was obtained from the New Brunswick Department of Transportation Motor Vehicle Division. Both data sets were divided into rural and urban categories based on postal code. The results indicated that rural residents are slightly more likely to be licensed. However, after the age of 80, the discrepancy between rural and urban drivers increases dramatically. For drivers 85 and over, the rural license rate is 1.3 times the urban license rate. The ratio of rural to urban license rates is plotted in Figure 11.

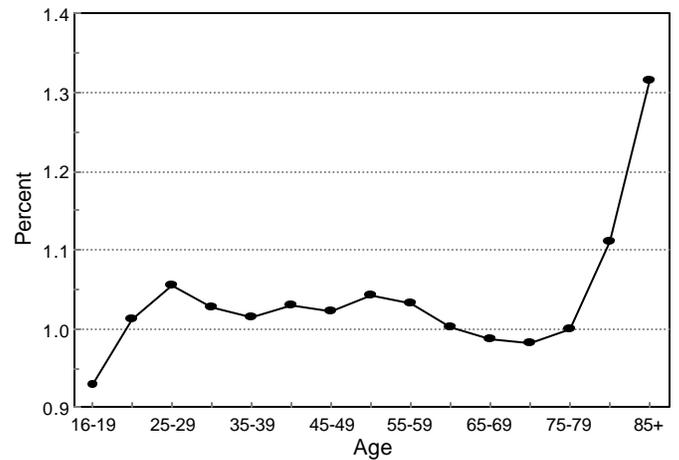


Figure 11: Ratio of Rural to Urban License Rates

6. Conclusions

Based on the collision, injury, and fatal accident rates calculated it is evident that rural elderly drivers pose a greater safety risk than their urban counterparts. In particular, rural drivers aged 81 years and older exhibited comparatively high accident rates despite greater declines in annual mileages driven.

The rate of involvement of the oldest rural drivers in fatal accidents is of concern. The proportion of those over 80 years of age involved in a fatal accidents is approximately 4 times that of middle-aged drivers. Furthermore, their involvement rate (when expressed on a per kilometre basis) is nearly 18 times that of middle-aged drivers. It appears that diminished skills, higher operating speeds in rural driving, slower emergency response times in rural areas, and the general physical frailty of elderly persons place the oldest rural drivers at considerable risk.

Despite evidence that rural seniors drive less in urban areas, the majority of their accidents occur in urban areas. There is considerable evidence that rural elderly drivers are most vulnerable to accidents at intersections. For rural drivers 80 years of age and over, 53.1 percent of accidents were at intersections. Elderly drivers are considerably more likely than others to be involved in a

right-angle collision, and turning left, turning right, or moving from a stop when an accident occurs. Closer examination of intersection accidents suggests that rural elderly drivers are especially vulnerable at stop sign controlled intersections in urban locations.

There are several conditions in which the rural elderly have been able to reduce their accident risks by altering their behaviour. Rural senior drivers experienced declining percentages of accidents on grades and curves, in snow and rain, and at night.

An examination of contributing factors in accidents shows that rural elderly drivers are more likely to be at fault than younger drivers. Among rural drivers 65 years of age and over involved in a collision, 78 percent had a contributing factor (driving error) reported. Middle-aged rural drivers were only assigned a contributing factor for 68 percent of collisions. The dominant error for rural elderly drivers was 'inattention'. Failure to yield the right-of-way was the second most dominant factor among rural seniors. Driving too quickly on slippery surfaces and striking animals were also significant factors for rural elderly drivers. Other contributing factors in which rural elderly drivers were over-represented were those indicative of poor performance at intersections.

7. Recommendations and Discussion

Strategies are needed to provide rural seniors with alternatives to driving themselves in latter years. In order to develop possible transportation alternatives, a better understanding of their travel patterns, needs, and desires is required. Possible programs could include rural taxis, shuttles, and bus services run either publically or through volunteer organizations.

Removing some drivers through license testing would likely have both positive and negative consequences. Based on the overall accident experience of drivers over the age of 65, an effective licence screening policy has the potential to prevent some accidents. The safety of the

rural elderly would benefit the most given their disproportionately high accident and fatal involvement rates. Unfortunately, it is clear that license screening would also have the greatest adverse effect on rural elderly drivers. This group is more captive to the personal automobile than urban elderly residents due to a lack of transportation alternatives. Evidence suggests that a larger percentage of rural elderly drivers would be affected by a licence testing program in New Brunswick, and that measures would be necessary to offset their loss of mobility.

Better awareness among seniors of their inflated risk under specific conditions may help them to better manage their driving. There is evidence that rural elderly drivers recognize the increased dangers of driving after dark and in poor weather, and avoid these conditions. However, evidence suggests that they are not as likely to recognize the hazards of intersections, particularly when they drive in urban areas.

In a survey of rural elderly Iowa drivers, participants were very hesitant to drive in the snow. Concern about left turns registered only about the same as concern for freeways, legibility of road signs, and being passed. Fewer participants were concerned about intersections than for any other hazard¹⁴. In another survey, senior drivers in Alabama indicated there were high levels of concern about rain and fog, but only 5.5 percent were concerned about left turns at intersections¹⁵. If rural elderly drivers were made more aware of the risks associated with intersections they might alter their behaviour to reduce these risks.

The results of this study also allow some comments to be made on the eventual enactment of license renewal or restriction policies targeting elderly drivers. Night-time or weather restrictions placed on driving are unlikely to have any effects, because elderly drivers already avoid these conditions. Restricting exposure to the difficulties of urban intersections has the potential to mitigate accidents involving rural seniors.

8. References

1. Statistics Canada; Projected Population by Sex and Age Group for Canada; Matrix 6900; 2000.
2. Province of New Brunswick; New Brunswick at the Dawn of a New Century; Province of New Brunswick; Fredericton, NB; 1996.
3. Canada Post; Householder Counts; <http://www.canadapost.ca/CPC2/addrm/hh/home.html>; October 21, 2000.
4. Benekohal R.F. et al.; Effects of Aging on Older Drivers' Travel Characteristics; Transportation Research Record; No. 1438; 1994.
5. NHTSA; Traffic Safety Facts 1998: Older Population; National Center for Statistics and Analysis; Washington D.C.; 1998.
6. TRB; Transportation in an Aging Society; Vol. 1; National Research Council; Washington D.C.; 1988.
7. Evans L.; Older-Driver Risks to Themselves and to Other Road Users; Transportation Research Record; No. 1325; 1991.
8. Taylor WC, Ahmad Z, and Stamatiadis P; Profile of the Accident Prone Older Driver; Journal of Advanced Transportation; Vol. 28; No. 1; pp. 89-105; 1994.
9. Stamatiadis N, Jones S, and Aultman-Hall L; Casual Factors for Accidents on Low-Volume Rural Roads; Transportation Research Record; No. 1652; 1999.
10. McKelvey FX et al; Highway Accidents and the Older Driver; Transportation Research Record; No. 1172; 1988.
11. HSIS; Accident Analysis of Older Drivers at Intersections; U.S. Department of Transportation; 2000.
12. Smiley A et al.; Seasonal Variations in the Age-Related Collision Risk of Ontario Drivers; Transportation Research Record; No. 1638; 1998.
13. Hildebrand E.D., Myrick B., and Creed T.; The Rural Elderly: Driving Patterns and Accident Involvement; Proc. CTRF-XXXV; pp. 175-191; 2000.
14. Kihl M. et al.; The Need for Transportation Alternatives for the Rural Elderly; Midwest Transportation Center; 1990.
15. Lyman J.M., GeGwin G., and Sims R.V.; Factors Related to Driving Difficulty and Habits in Older Drivers; Accident Analysis and Prevention; Vol. 33; pp. 413-421; 2001.