

# **Alcohol Involvement in Recreational Vehicle Fatalities in Canada**

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## **Abstract**

This paper examines alcohol use among fatally injured operators of three types of recreational vehicles – snowmobiles, bicycles and all terrain vehicles (ATVs) -- in Canada between 1987 and 1997. It uses data from the TIRF Fatality Database to compare alcohol involvement in fatally injured operators of these vehicles to that among fatally injured drivers of automobiles. The implications of the findings for programs and policies are discussed.

## **Introduction**

The use of recreational vehicles has become a popular activity over the past decade. For example, the Canadian Council of Snowmobile Organizations (1) estimates that in 1999 there were approximately 707,000 registered snowmobiles in Canada. Snowmobile enthusiasts have formed 922 snowmobile clubs representing 532,652 family snowmobilers across the country. These clubs operate and maintain an expanding network of over 132,000 kilometers of groomed snowmobile trails. The annual growth in snowmobiling is estimated at 3.2% per year.

The Canadian Cycling Association reports that a recent poll found that 66% of Canadians age 18 and over (about 13.7 million people) are non-competitive cyclists (2). They also report that increased bicycle sales and participation in cycling events suggest that there are more cyclists now than ever before in Canada. The fastest growing segment of the cycling community are teens and adults.

The use of ATVs has also become a popular form of recreational activity. The all-season capability of these vehicles makes them a particularly attractive and versatile form of recreation. No information was available on the extent of use of these vehicles.

Although these vehicles are referred to in this paper as recreational vehicles, it should be noted that they are often used for other purposes. For example, ATVs are used in farming and transportation in areas not easily accessible to conventional vehicles. Snowmobiles serve a similar function in winter and are also a primary form of transportation in some areas. Bicycles, as well, are often used for transportation and commuting as well as recreation.

The growth in recreational vehicle use has been associated with increased concern about deaths and injuries as a result of crashes. The actual number of persons killed and injured in crashes involving a recreational vehicle can be difficult to ascertain. Although motor vehicle departments routinely capture data on crashes involving these vehicles that occur on public

highways, similar data are not routinely available on those crashes that occur on private property. Hence, the full extent of the problem can be elusive.

Over the past several years, media reports have highlighted the role of alcohol in a number of fatal crashes involving recreational vehicles. Alcohol is commonly consumed in association with recreational activities. When the activity happens to involve the operation of a vehicle, the combination can have particularly tragic consequences. In recognition of the inherent dangers of operating a motor vehicle under the influence of alcohol, the *Criminal Code of Canada* indicates that it is an offence to operate any type of motor vehicle while impaired or with a BAC in excess of 80 mg%. It does not matter whether the vehicle is being operated on a public roadway or on private property. The law and its penalties are applied to snowmobile and ATV operators the same as they are to drivers of highway vehicles. The one notable exception is that operators of bicycles have been specifically excluded from the legislation.

Alcohol involvement in highway crashes has been well-documented (3). Considerably less attention has been paid to the role of alcohol in fatal crashes involving other types of crashes, particularly those that do not occur on public roadways and involve vehicles typically used for recreational purposes. The impairment of the ability to operate a vehicle undoubtedly applies to all types of vehicles, not just those that travel public roadways.

This paper examines alcohol use among fatally injured operators of three types of recreational vehicles – snowmobiles, bicycles, ATVs – in Canada over the 11-year period from 1987 through 1997. The paper also compares alcohol involvement in fatal recreational vehicle crashes to that in fatal crashes involving drivers of automobiles.

## **Method**

The primary data on vehicle operator fatalities were obtained from the TIRF Fatality Database (3). These data, collected from all provinces and territories in Canada, include information from coroners' files on the results of toxicological tests for the presence and amount of alcohol in persons fatally injured in motor vehicle crashes. A unique feature of this database is that it includes not only those fatalities that occur on public roadways but those that occur on private property as well. This paper reports data on recreational vehicle operator fatalities (including snowmobiles, bicycles, and ATVs) age 16 years and over for the years 1987 through 1997. Fatally injured drivers of automobiles are used as a comparison.

## **Results**

During the eleven-year period from 1987 to 1997, a total of 22,135 persons died while operating either a car (n=19,818), snowmobile (n=789), bicycle (n=1136) or ATV (n=392). Of these, 5,491 were under 16 years of age. Tests for alcohol are rarely performed on fatally injured operators under age 16; hence, only operator 16 years of age and over were included in the analysis. Of the remaining 16,644 cases, 14,919 were drivers of passenger cars, 674 were bicyclists, 754 were snowmobile operators and 297 were ATV drivers. Testing rates for alcohol were: 78.9% for automobile drivers; 59.8% for bicyclists; 81.6% for snowmobile operators; and 67.7% for ATV drivers. Only those cases tested for alcohol are included in the following analyses.

The number (and percent) of fatally injured drivers of each type of vehicle who tested negative for alcohol as well as the number (and percent) who tested positive for alcohol are displayed in the first two columns of Table 1. Snowmobile operators had the highest incidence of alcohol involvement at 71.5%. This was followed by operators of ATVs at 56.7%. Among fatally injured bicyclists, 24.8% were found to have been drinking. In comparison, alcohol was found in 44.5% fatally injured automobile drivers.

In Table 1, the column labeled “Odds” indicates the odds of a fatally injured driver of that type of vehicle testing positive for alcohol. For example, a fatally injured snowmobile operator is 2.51 times more likely to have been drinking than not. Similarly, fatally injured ATV drivers are 1.31 times more likely to have been drinking than not. On the other hand, the values of the odds ratios for automobile drivers and bicyclists are both less than one, indicating that these drivers are less likely to have been drinking than not drinking.

The relative odds provide a means to compare the likelihood of alcohol involvement in fatal crashes of recreational vehicles to that in automobile crashes. The relative odds is simply the ratio of the odds of alcohol involvement in driver fatalities of one type of vehicle to the odds of alcohol involvement in automobile driver deaths. The 95% confidence interval provides an indication of the statistical significance of the relative odds. These findings indicate that fatally injured snowmobile operators are 3.13 times more likely to have been drinking than fatally injured car drivers. The likelihood that a fatally injured driver of an ATV had been drinking is 1.63 times more likely than a car driver to have consumed alcohol. On the other hand, fatally injured bicyclists are less likely to have been drinking than car drivers.

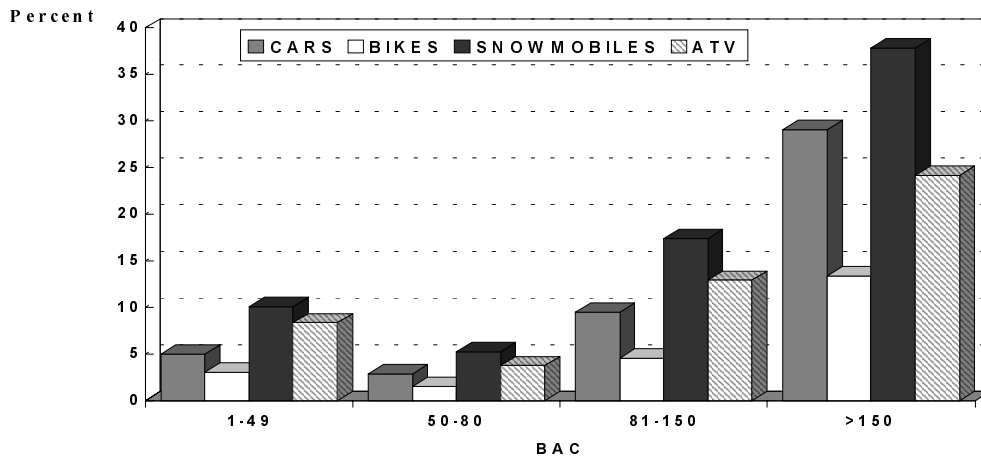
**Table 1. Number, percent, and relative odds ratios of fatally injured drivers according to vehicle type and alcohol use**

	<i>BAC=0</i> <i>N (%)</i>	<i>BAC&gt;0</i> <i>N (%)</i>	<i>Total</i> <i>N</i>	<i>Odds</i>	<i>Relative</i> <i>Odds</i>	<i>Confidence</i> <i>Intervals</i>
<b>CARS</b>	6531 (55.5)	5244 (44.5)	11775	0.80	1.00	
<b>BICYCLES</b>	303 (75.2)	100 (24.8)	403	0.33	0.41	0.33 - 0.52
<b>SNOWMOBILES</b>	175 (28.5)	440 (71.5)	615	2.51	3.13	2.62 - 3.74
<b>ATV</b>	87 (43.3)	114 (56.7)	201	1.31	1.63	1.23 – 2.16

The distribution of BAC among fatally injured operators of each of the four types of vehicles is displayed in Figure 1. At each level of BAC, the percent of fatally injured snowmobile drivers is greater than that of fatally injured automobile drivers. With the exception of the highest BAC category, the same is true for ATV operators. The reverse is true for bicycle riders. Their BAC levels are typically lower than those among automobile drivers.

Within each type of recreational vehicle, however, the distribution of BAC reveals a pattern similar to that among automobile driver fatalities. The proportion of drivers decreases from the 1 to 49 mg% range to their lowest values in the 50 to 80 mg% range, then increases in the 81 to 150 mg% range. Drivers with BACs in excess of 150 mg% comprise the largest category of alcohol-positive fatalities.

**Figure 1: BAC Distribution of Fatally Injured Drivers According to Vehicle Type**



The number (and percent) of fatally injured drivers of each type of vehicle who tested negative for alcohol as well as the number (and percent) who tested positive for alcohol in five age groups are displayed in the first two columns of Table 2. Overall, alcohol involvement was highest among fatally injured drivers aged 21 to 25 and 26 to 35 across all vehicle types. Drivers over 55 years of age had the lowest percent of alcohol involvement.

The relative odds and 95% confidence intervals are presented in the last two columns of Table 2. The relative odds provide a means to compare the likelihood of alcohol involvement in fatal crashes of recreational vehicles to that in automobile crashes within each age group. These findings indicate that in every age group, fatally injured snowmobile operators are significantly more likely to have been drinking than fatally injured car drivers. The likelihood that fatally injured drivers of ATVs had been drinking is significantly different from that of car drivers for only those aged 26 to 35 and 36 to 55. Bicycle riders were less likely than car drivers to have been drinking in all age groups.

## DISCUSSION

Over the past two decades, the unprecedented attention directed towards the alcohol-crash problem focused almost exclusively on drivers of passenger vehicles on public highways. The data presented in the present paper highlight the fact that the problem does not end where the road stops. In fact, fatally injured snowmobile and ATV operators fatalities were more likely to have drinking than fatally injured drivers of automobiles.

The relatively high involvement of alcohol in snowmobile operator fatalities was evident across all age groups. The same was true for ATV operators with the exception of those over 55 years of age. This finding suggests that the association between alcohol and these types of recreational vehicles fatalities is not necessarily an age-related phenomenon. Although risk-taking among

youth and young adults may play a role in some crashes, the problem persists through older ages. Further research on the characteristics of people who participate in these forms of recreational activity may contribute to our understanding of the high rates of alcohol involvement.

**Table 2. Number, percent, and relative odds ratios of fatally injured drivers of four vehicle types according to alcohol use and age**

Age Group	<i>BAC=0</i>	<i>BAC&gt;0</i>	<i>Total</i>	<i>Odds</i>	<i>Relative</i>	<i>Confidence</i>
16-20	<i>N (%)</i>	<i>N (%)</i>	<i>N</i>		<i>Odds</i>	<i>Intervals</i>
<b>CARS</b>	925 (52.7)	831 (47.3)	1756	0.90	1.00	
<b>BICYCLES</b>	61 (82.4)	13 (17.6)	74	0.21	0.24	0.13 - 0.43
<b>SNOWMOBILES</b>	24 (32.0)	51 (68.0)	75	2.13	2.37	1.44 - 3.88
<b>ATV</b>	30 (63.8)	17 (36.2)	47	0.57	0.63	0.35 - 1.15
<b>21-25</b>						
<b>CARS</b>	776 (41.5)	1093 (58.5)	1869	1.41	1.00	
<b>BICYCLES</b>	44 (67.7)	21 (32.3)	65	0.48	0.34	0.20 - 0.47
<b>SNOWMOBILES</b>	27 (22.3)	94 (77.7)	121	3.48	2.47	1.60 - 3.83
<b>ATV</b>	11 (32.4)	23 (67.6)	34	2.09	1.48	0.72 - 3.06
<b>26-35</b>						
<b>CARS</b>	1228 (44.8)	1511 (55.2)	2739	1.23	1.00	
<b>BICYCLES</b>	80 (72.7)	30 (27.3)	110	0.38	0.30	0.20 - 0.47
<b>SNOWMOBILES</b>	45 (19.8)	182 (80.2)	227	4.04	3.29	2.35 - 4.59
<b>ATV</b>	12 (25.5)	35 (74.5)	47	2.92	2.37	1.23 - 4.59
<b>36-55</b>						
<b>CARS</b>	1741 (56.9)	1317 (43.1)	3058	0.76	1.00	
<b>BICYCLES</b>	63 (67.7)	30 (32.3)	93	0.48	0.63	0.40 - 0.98
<b>SNOWMOBILES</b>	54 (35.5)	98 (64.5)	152	1.81	2.40	1.71 - 3.37
<b>ATV</b>	14 (31.1)	31 (68.9)	45	2.21	2.93	1.55 - 5.52
<b>&gt;55</b>						
<b>CARS</b>	1861 (79.1)	492 (20.9)	2353	0.26	1.00	
<b>BICYCLES</b>	55 (90.2)	6 (9.8)	61	0.11	0.41	0.18 - 0.96
<b>SNOWMOBILES</b>	25 (62.5)	15 (37.5)	40	0.60	2.27	1.19 - 4.34
<b>ATV</b>	20 (71.4)	8 (28.6)	28	0.40	1.51	0.66 - 3.46

Bicyclist fatalities present a different picture. Bicyclist fatalities are significantly less likely than automobile driver fatalities to involve alcohol. The relatively low rate of testing for alcohol among bicyclist fatalities, however, warrants caution be used in the interpretation of this finding. Nevertheless, the fact that approximately one-quarter of adult bicyclist fatalities involve alcohol use by the rider, and that most of these involve high BACs, is cause for concern.

The characteristics of bicycles and their use differ from other types of recreational vehicles as well. Bicycles are considerably more common and are used by a wider range of the population than either snowmobiles or ATVs. Bicycles typically travel at slower speeds but are more often used in situations where there is interaction with other vehicular traffic. Bicycles also require a

greater degree of balance and coordination to operate – skills easily disrupted by the consumption of alcohol.

Decades of research in the area of alcohol and traffic safety has clearly established that drinking drivers are at significantly greater risk of being involved in a serious motor vehicle crash than drivers who have not consumed alcohol. At this point, however, it is only an assumption that the same relationship holds with regards to recreational vehicle operators. The type of case-control studies that established the link between alcohol and highway vehicle crashes have not been done with recreational vehicles. Although it is probably safe to assume that alcohol, consumed in sufficient quantities, can impair the ability to operate a recreational vehicle safely, the degree of risk has not been established. The data presented in this paper provide evidence that alcohol is present in a relatively high proportion of recreational vehicle operator deaths each year; the extent to which alcohol is present among operators of these vehicles who do not crash is unknown. Without this latter piece of information, it is not possible to determine the extent to which alcohol is over- (or under-) represented among recreational operator fatalities. Random breathtesting surveys of recreational vehicle operators would be one means of helping to fill the information gap.

The lack of definitive studies on the risks of drinking and operating a recreational vehicles should not constrain efforts to enhance safety. Specific countermeasure initiatives are needed to address the apparently common practice of consuming alcohol as part of recreational vehicle use. For example, the dangers of operating a recreational vehicle after drinking could be outlined in educational programs and informational materials delivered through local snowmobile clubs, bicyclist organizations, manufacturers, suppliers, and retailers at the community level. This may be the most efficient and effective means of targeting awareness and generating concern about drinking and driving among recreational vehicle operators

There is also a role for increased enforcement of drinking-driving laws among recreational vehicle operators. Unfortunately, these activities often occur in relatively isolated areas which renders typical enforcement efforts difficult and inefficient. Greater use of enforcement teams travelling on similar types of vehicles may be an alternative worthy of consideration.

### **Acknowledgement**

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### **References**

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