

# Factors Other Than Alcohol In Fatal Drink Driving Accidents

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## Abstract

Data in our In-depth Fatal Accident Database for the years 1994 to 1996 have been analyzed using multivariate cluster analysis for fatally injured drivers at fault in their accident. The database has been created by matching official data on accidents, coroners' reports, hospital and post-mortem blood alcohol levels, and criminal and traffic offending histories. Factors that are found to be important in drink driving accidents in addition to alcohol are the use of cannabis, adverse weather, the driver falling asleep, and involvement of a truck. Some of these factors may be more readily addressed with remedial measures than that of alcohol.

## Introduction

Much research on fatal road accidents has focussed largely on information about the blood alcohol concentrations (BACs) of the drivers, with some data on the ages of the drivers. Our earlier studies of fatal road accidents (1) have convinced us that account should be taken of a wider range of factors in discussing drink driving accidents. We believe that many of these other factors are more amenable to treatment than the often deep-seated factor of alcohol, abuse of which may well be a consequence of a long history of drinking to excess and social background.

## Method

Fatal road accidents in New Zealand in the years 1994 to 1996 were studied using our In-depth Fatal Accident Database (2). This was created by combining data from a number of official sources, linking through name and date of birth, accident or death. Data sources used included:

- the official accident reports compiled by the Land Transport Safety Authority
- the quick response reports from the police
- blood alcohol data from post-mortem and hospital samples
- coroners' reports
- the criminal conviction histories of all the drivers involved
- the traffic conviction histories of all the drivers involved.

Data were extracted for the 647 of the 780 fatally injured drivers at fault in the years 1994 to 1996 for whom a full coroner's inquest was conducted. A driver was considered to be at fault if he/she had a driver cause code recorded in the database. The remaining drivers, where no inquest was held, were excluded because there was appreciably less information available for them.

Cluster calculations were performed with the computing package SPSS Version 8.0 (3) using the K-means option. Since the total number of drivers was only 647, the number of selected clusters was limited to four.

## Results

The cluster analysis divided the drivers into four clusters, two being exclusively drinking drivers and two being sober (or, for a few drivers, a BAC less than 100 mg/100 mL) drivers. Table 1 presents the percentage in each of the four clusters of fatally injured drivers at fault in 1994 to 1996 for those factors for which one percentage was 10% or over. There were a variety of other factors that did not have percentages of over 10% for at least one cluster.

**Table 1 Percentage of drivers in each cluster with specified factor**

<b>Cluster</b>	<b>Drinking 1</b>	<b>Drinking 2</b>	<b>Sober 1</b>	<b>Sober 2</b>
No. in cluster	163	111	78	426
	<b>Percentage</b>			
Aged 15-19	14	5	10	15
Aged 20-24	29	29	14	16
Aged 25-34	32	35	18	24
Aged 35-44	15	20	10	13
Aged 45-64	5	6	18	18
Aged 65+	3	2	10	13
Maori of ethnicity assigned	33	33	15	18
Female	11	6	17	25
BAC=1-50	0	0	4	10
BAC=51-80	6	0	1	3
BAC=81-100	10	0	1	0
BAC=101-150	44	0	0	0
BAC=151-200	41	15	0	0
BAC=201-250	0	58	0	0
BAC>250	0	27	0	0
Alcohol suspected	79	94	14	17
Hour=5am-6pm	23	17	76	70
Hour=6pm-9pm	12	14	13	15
Hour=9pm-mn	21	34	8	7
Hour=mn-5am	44	34	4	8
Week nights	27	38	15	15
Friday/Saturday nights	42	36	1	11
Riding motorcycle	19	12	26	17
At excess speed	60	54	39	38
Live in rural area	35	38	28	20
On state highway	51	46	51	63

<b>Cluster</b>	<b>Drinking 1</b>	<b>Drinking 2</b>	<b>Sober 1</b>	<b>Sober 2</b>
Single vehicle accident	55	53	26	24
Lost control on corner	47	52	30	24
Adverse weather	15	14	31	25
On curve	59	53	44	47
Vehicle over 15 years old	27	30	3	24
Truck involved	12	11	22	27
Drove into gravel	10	9	13	6
Unlicensed driver	11	7	12	7
Mechanical fault in vehicle	15	8	13	6
Tyre fault	10	14	13	14
Hit pole	17	13	4	8
Fell asleep	18	15	8	14
Medical factor	4	4	15	12
Inexperience	11	5	8	11
Inattention	6	3	10	6
Prior injury accidents	10	7	9	10
<b>Prior convictions:-</b>				
Criminal	40	53	24	22
Traffic	63	74	35	47
Anti-social behaviour	29	39	14	12
Drink driving	29	54	15	13
Speeding	39	46	22	32
Dangerous driving	10	16	3	4
Careless driving	17	23	9	17
Prior high speed conviction fine	28	29	15	22

The first drink-driving cluster contains drivers with blood alcohol concentrations (BACs) in the range 51 to 200 mg/100 mL, whereas the second drink-driving cluster contains drivers with BACs over 150 mg/100 mL. The latter cluster has an appreciably higher proportion (54%) of drink driving recidivists than the former (29%). The main differences between the two sober clusters are in the smaller percentage of females, the higher percentage riding motorcycles, and in some of the prior offending histories, in the smaller cluster.

A cluster analysis was done of a subset involving 315 fatally injured drivers involved in a study of the role of cannabis (the active ingredient of which is THC) in fatally injured drivers in the years 1995 to 1996 (unpublished research). Of the 47 in a cluster which included nearly half with a prior drink driving conviction and all with BACs over 150 mg /100 mL, 40% had detectable THC levels. In the cluster of 52 with BAC levels between 51 and 200 mg/100 mL and no prior drink driving convictions, only 23% had detectable THC levels. In the larger cluster of 178 sober drivers, 13% had detectable THC, whereas in the small sober cluster of 32, of whom 38% were riding motorcycles, 22% had detectable THC levels.

## **Discussion**

The cluster analysis shows the wide range of factors involved in fatal accidents for drinking drivers. Many of these are also found for those sober drivers at fault in fatal accidents. Some factors may receive more attention in the investigation of sober drivers than of drinking drivers, in that some police and coroners investigating fatal road accidents seem to consider

that, if a driver is found to have a high blood alcohol level, other factors do not need to be investigated.

Alcohol, excessive speed and not wearing seatbelts are the three factors that are promoted by the New Zealand Government as the reason for fatal accidents. (The data on seat belt wearing from different sources are contradictory and were excluded from the analysis.) However, this study shows that other factors are about the same magnitude as the big three including the involvement of trucks, falling asleep at the wheel, and the simultaneous presence of cannabis. These three differ in magnitude between the drink driving and the sober clusters.

Excessive speed is more important in drink driving than sober accidents, but is of similar magnitude within the two drink driving clusters and within the two sober at fault clusters. However, the available data leading to an assignment of excessive speed are not of good quality. A drinking driver losing control on a corner is often attributed to excessive speed. Loss of control could have been due to failure to recognize the approaching corner, inattention, or simply falling asleep. These factors could be addressed scientifically if black boxes were fitted to all vehicles.

In New Zealand, trucks, especially the very large ones, are much more common on state highways than other roads. For multi-vehicle accidents on state highways, accidents for 40% of the 105 sober drivers and 36% of the 62 drink drivers involved a truck. Large trucks have a vastly greater weight than a car or motorcycle. Also, many truck drivers in New Zealand are observed to exceed their speed limit on the open road. Consequently, a collision with a truck often has fatal consequences for the car or motorcycle occupants. We have previously (4) noted that the road toll in New Zealand could be reduced substantially if most freight was carried by rail rather than road. There are railways covering the same routes as most state highways. Prior to a decision by the Government in the late 1980s, most long distance freight in New Zealand was carried by rail.

Information about drivers falling asleep is rather subjective. We suspect that the real figures are somewhat higher than shown in the Table. Falling asleep is more common for drinking drivers than sober drivers, probably because a much higher percentage of drink driving fatalities occur in the early hours of the morning, a time when drivers are most likely to fall asleep. Falling asleep was less of a factor for the smaller sober group with a large proportion of motorcyclists, possibly because a small percentage of accidents in this group are in the early morning and because of the effect of the wind on the motorcyclists' faces.

Cannabis is an important factor for the drink driving cluster with high BACs and many with a prior conviction for drinking and driving, but less so for the cluster with lower BACs and without a prior conviction for drinking and driving. Although the large sober cluster does not involve cannabis much, the small sober cluster with a high proportion of motorcyclists has a similar proportion with THC to that for the non-recidivistic drinking drivers. A high proportion of the fatally injured drivers with THC but no alcohol, who were not described as being at fault in the fatal accident, were also motorcyclists. It would appear that the high BAC and recidivistic drinking drivers have a problem of poly-drug abuse rather than just alcohol abuse. This needs further research.

Two factors that again may be of greater importance than shown by the values in the Table are mechanical faults and tyre defects, since a vehicle inspector's report of the vehicles involved is not included in all coroners' inquests. Even without this missing information, the

values quoted are disturbing. New Zealand has an annual or six monthly (depending on the age of the vehicle) warrant of fitness inspection requirement for all vehicles. We are surprised that so many mechanical faults and tyre defects show up in the vehicle inspections following fatal accidents.

Many of the vehicles in all but the largest sober cluster were over 15 years old. Thus, old vehicles are much more common among the drinking drivers than the sober drivers at fault in fatal accidents. This may be partly a socioeconomic factor, but may also be related to poorer safety features and more mechanical faults in the older vehicles.

An appreciably higher percentage of the drinking drivers lived in remote rural areas. This may be a consequence of the fact that roads in these areas are of poorer quality and have a higher speed limit.

Maori (the indigenous people of New Zealand) are more heavily involved in drink driving than sober accidents. This may well be a socioeconomic factor as Maori are more likely to be unemployed or in the lower socioeconomic groups.

Adverse weather (rain, strong wind or ice) is appreciably more important for the sober at fault drivers than for the drinking drivers. This should not be a consequence of lack of thorough investigation of the drink driving accidents as weather factors are reported for every accident.

Half of the drivers had their accidents on a curve. This is partly a result of the hilly terrain in New Zealand. In recent years, there has been a major increase in the installation of advisory speed signs before bad corners. Yet, some drivers in fatal accidents still had their accidents on corners marked with an advisory speed sign, probably because they ignored or did not see the sign.

About half of the fatal accidents occurred on state highways. These roads account for only a small percentage of total road length in New Zealand. In recent years, much effort has gone into improving localized roading features on state highways, but more is required.

A factor that is probably under-reported is the percentage of accidents involving getting into gravel at the side of the road. Such gravel edges are characteristic of New Zealand's roads and account for a disturbing proportion of accidents. In some places, the gravel edges have been sealed, and the accident rate has dropped markedly.

Medical factors are more important for the two sober clusters than the drink driving ones. This is largely a consequence of the much higher proportion of older drivers in the sober clusters, but may also be due to the lack of thorough investigation of the drink driving accidents.

The data on prior convictions show that the drinking drivers are much more likely to have a prior criminal conviction and/or, to a slightly lesser extent, a prior traffic conviction. Note that traffic convictions do not include cases that do not go to court, such as the larger number of traffic infringements issued, particularly for speeding offences. These are not readily accessible for analysis in the same way as court convictions. The drinking drivers were much more likely to have a prior conviction for anti-social behaviour, mainly for cannabis use not as a traffic offence. The drinking drivers appear to be more dangerous drivers than the sober drivers are, although the total numbers are not great. (We have not yet studied whether the

prior convictions for dangerous driving were at the same time as the drinking and driving convictions.) In contrast, the larger sober cluster has about the same percentage of prior convictions for careless driving as do the two drink driving clusters.

All four clusters have large percentages of drivers with high fines for prior speeding convictions. We do not know how this compares with data for a random sample of the driving population. This aspect needs further research.

Sober drivers are involved in prior accidents at about the same rate as drinking drivers. This is quite different from the data on prior convictions. This is another area for more research.

Factors such as inexperience and inattention are probably grossly under reported. To some extent, they are probably a consequence of the relatively poor standard of driving in New Zealand. This is probably associated with inadequate driver training.

Clearly there are many factors other than a high blood alcohol in fatal drink driving accidents. We believe that many of these may be more easily tackled than alcohol and speed.

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