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Alcohol in Fatal Road Crashes in Ireland in 2003

Population Health Directorate
Health Service Executive
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Contents

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Alcohol in Fatal Road Crashes in Ireland in 2003

Executive Summary

Introduction

Alcohol has been recognised as a major factor in road crashes. However, no official data are provided in Ireland to indicate what proportion of the deaths on Irish roads have alcohol as a contributory factor. Irish drivers do drink alcohol and drive. The Government's strategy for road safety admits that the extent of the problem of drink driving has not diminished and includes legislation to implement random breath testing. The aim of this study was to identify the contribution alcohol makes to fatal road crashes in Ireland.

Methods

The National Traffic Bureau of the Garda Síochána gather data on all fatal road crashes and individual paper files are compiled and kept on each fatal crash. Initial data from the scene of the crash are recorded on a form (CT68/PC.16) and further information from the Garda Síochána investigations are added to the file. Also included in the files are reports from coroners and pathologists which may or may not contain test results on the presence or absence of alcohol in blood and urine of the deceased. If available blood and urine tests taken by the Gardaí on drivers not killed in these crashes are also documented in the files. It may take some considerable time for the files to be completed and it was considered at the time of field work for this study that 2003 was the latest year where sufficient data were available in the files to complete the study. The files were examined in the offices of the National Traffic Bureau by two of the authors.

The legal limit for alcohol in blood samples for driving in Ireland is 80 mg/100ml, for urine it is 107mg/100ml. The legal limit for breath testing for alcohol undertaken by the Garda Síochána is 35ug/100ml of breath. International research indicates that a person's ability to drive is effected by alcohol if there is a level of alcohol in the blood of 20mg/100 ml or greater. In this study a crash was considered to be alcohol related if the blood alcohol concentration (BAC) was ≥20mg/100ml (or the equivalent in urine and breath tests) in a driver. Whether alcohol was considered to be a contributing factor in a pedestrian or cyclist death was based on their circumstances of the crash and a BAC level of 20mg/100ml or higher. The fact that a crash may be alcohol related does not indicate that other factors were not also relevant (e.g. speeding).

Results

There were 301 fatal crashes in 2003 killing 335 persons. The results of the analysis shall be described under two separate headings. Firstly, there will be a profile of the 301 crashes and a description of the role of alcohol in these crashes. This will be followed by a profile of those killed in the crashes and their alcohol levels.

1. Profile of the crashes and the role of alcohol

- 156 (51.8%) of the crashes were single vehicle crashes.
- 166 (49.6%) of persons killed were killed in single vehicle crashes, 155(46.3%) in two vehicle crashes and 14(4.2%) in three vehicle crashes.
- Cars were involved in 203(67.4%) of the fatal road crashes, motor cycles in 53(17.6%), lorries in 45(15.0%), vans in 27(9.0%), jeeps in 17(5.6%), pedal cycles in 12(4.0) and other vehicles in 23(7.6%).
- Over half (188, 56.1%) of those killed were drivers (this includes those driving motor cycles), 70(20.9%) were passengers, 63(18.8%) were pedestrians, 12(3.6%) were cyclists with 2(0.6%) classified as unknown/other.

Crashes where alcohol was a factor

Alcohol was a factor in 110 (36.5%) of fatal crashes and not a factor in 191(63.5%) as summarised in Table 1.

Table 1. The role of alcohol in fatal road crashes

	No	%
Alcohol not a factor	191	63.5
Driver alcohol	85	28.2
Pedestrian alcohol	22	7.3
Pedestrian and driver alcohol	2	0.7
Other alcohol	1	0.3
Total	301	100

Table 2 outlines the number of persons who were tested positive for alcohol (BAC ≥20mg/100ml or equivalent levels in urine or breath samples) or were above the drink driving legal limit in the 110 alcohol related fatal crashes. As seen in the table, in 72 (23.9%) of crashes a driver (64 who were killed and 8 who were not killed) was above the legal limit.

Table 2. The number of drivers and pedestrians positive for alcohol* and with levels of alcohol above the legal limit in the 110 alcohol related crashes

	Blood	Urine	Breath	Total
	No	No	No	No
Killed drivers				
*Alcohol positive but below legal limit	13	1	-	14
Alcohol level above legal limit	62	2	-	64
Sub-Total	*75*	*3*	-	*78*
Drivers not killed				
*Alcohol positive but below legal limit	-	-	1	1
Alcohol level above legal limit	4	3	1	8
Sub-Total	*4*	*3*	*2*	*9*
Killed Pedestrians				
*Alcohol positive but below legal limit	3	-	-	3
Alcohol level above legal limit	21	-	-	21
Sub-Total	*24*	-	-	*24*
Other				
*Alcohol positive but below legal limit	1	-	-	1
Alcohol level above legal limit	-	-	-	-
Sub-Total	*1*	-	-	*1*
Total	**104**	**6**	**2**	**112****

**In 2 of the 110 crashes, alcohol was a factor for both drivers and pedestrians, therefore total =112 and not 110. * Alcohol positive = Where BAC is ≥ 20 mg/100ml or equivalent level in urine or breath samples.

- Of the 87 drivers (78 killed, 9 not killed) whose alcohol was a contributory factor, 78 (89.7%) were male and 9 (10.3%) were female.
- Of the 301 crashes, 63(20.9%) were single vehicle, single occupant crashes which involved no other parties (e.g. no pedestrians or no passengers) other than the

driver. Males were more likely to be involved in these crashes ($p<0.01$). In 39(61.9%) of these, driver alcohol was a factor.

- Alcohol related fatal road crashes are three times more likely to occur on Saturday, Sunday or Monday compared to the other days of the week (odds ratio 3.0; CI: 1.8-5.1, $p<0.0001$). Of the crashes that occurred on Monday, 22(50.0%) occurred before 8AM. Of these 12(54.5%) were alcohol related.
- Alcohol related crashes were commonest late at night and early in the morning.

2. Profile of the those killed and their alcohol levels

Drivers

- 76(40.3%) of killed drivers had BACs ≥ 20 mg/100ml.
- 64(34.0%) of the killed drivers were over the legal limit.
- Males were more likely than females to be over the legal limit.
- The mean or average BAC level was 99.2 mg/100ml.
- The mean BAC for males was 107.0mg/100ml and for females was 50.7 mg/100ml.
- Age specific rates per 100,000 population for those with BAC levels ≥ 20 mg/100ml and those with BAC levels > 80mg/100ml (the legal limit for driving) were calculated. The rates in both categories were highest for those aged 19 to 34 years and lowest for those aged 60 to 69 years.
- Motorcycle drivers were no more likely or less likely than other killed drivers to be over the legal limit.

Pedestrians

- 63(18.8%) of those killed in 2003 were pedestrians, of whom 39(61.9%) were male and 24(38.1%) were female. The mean age was 50.0 years.
- Pedestrian alcohol was considered to be a contributory factor in 24(38.1%) of the fatal pedestrian road crashes or 8.0% of all fatal road crashes. Twenty (83.3 %) occurred between 8 PM and 8 AM.

- The mean BAC level was 143.2 (SD: 170.7) and the median 133mg/100ml. For adults (aged 18 years and over), males were more likely to have tested positive for alcohol than females.
- There were no tests positive for alcohol in respect of persons aged less than 18 years.

Passengers

- 70 (20.9%) of all those killed were passengers, 39(55.7%) of whom were male and 31(44.3%) were female. The mean age of the passengers was 29.1 years.
- The highest age specific mortality rate for passengers was in the 15-24 year age group.
- 14(20.0%) of passengers had BACs > 80mg/100ml.
- The mean BAC was 102.9mg/100ml.
- Male passengers were significantly more likely to be killed than female passengers in a crash where driver alcohol was a factor. Eighteen (46%) of the male passengers were killed in such crashes.
- 9 (47.4%) of the 19 passengers killed in driver alcohol related crashes died in crashes that occurred between midnight and 4 AM.
- In the age group "15-24", which had the highest mortality rate, driver alcohol was no more or no less likely to be a factor in the crash.

Conclusions

This study has provided a national picture of the role of alcohol in fatal road crashes. It can be used to measure the impact of road safety strategies. This study has shown that alcohol plays a major part in fatal road crashes with 36.5% of fatal road crashes being alcohol related in 2003. This figure is high when compared to Australia and Finland where alcohol is a factor in 25% of fatal crashes. Male drivers, particularly those aged 19-34, are most likely to be killed whilst under the influence of alcohol.

Ireland has a very serious problem with alcohol consumption. The more a population consumes the greater the harm that population suffers. The high level of alcohol related road crashes are just one of the manifestations of that harm. The level of harm can be reduced if the recommendations of the Strategic Task Force on Alcohol are implemented and we reduce our overall level of consumption and our pattern of binge drinking. Road deaths in particular can be reduced significantly as seen elsewhere by enforcing the legislation in regard to random breath testing in a highly visible and well publicised manner and by targeting young drivers through the introduction of a graduated licensing system.

Alcohol in fatal road crash deaths in Ireland in 2003

Introduction

Following a thirty year low in the number of deaths resulting from road crashes in Ireland in 2003 when 335 persons died, the number of deaths increased in the following two years rising to 399 in 2005[1]. Alcohol has been recognised as a major factor in road crashes. However, no official data are provided in Ireland to indicate what proportion of the deaths on Irish roads have alcohol as a contributory factor. Irish drivers do drink alcohol and drive. During 2003, in 57.1% of the samples of blood or urine taken from drivers on behalf of An Garda Síochána, the alcohol level was twice the legal limit[2]. The Government's strategy for road safety admits that the extent of the problem of drink driving has not diminished[3] and includes legislation to implement random breath testing.

The aim of this study was to identify the contribution alcohol makes to fatal road crashes in Ireland.

Methods

The National Traffic Bureau of An Garda Síochána gather data on all fatal road crashes and individual paper files are compiled and kept on each fatal crash. Initial data from the scene of the crash are recorded on a form (CT68/PC.16) and further information from the Garda Síochána investigations are added to the file including witness statements, technical evidence on the vehicles involved and reports from the courts if there is a case taken. Also included in the files are reports from coroners and from pathologists which may or may not contain test results on the presence or absence of alcohol and drugs in blood and urine of the deceased. If available, blood and urine tests taken by the Garda Síochána on drivers not killed in these crashes are also documented in the files.

Permission was sought and received from the Garda Commissioner to access all the fatal road crash files for 2003. As it takes some considerable time for the files to be completed it was considered at the time of field work for this study that 2003 was the latest year where sufficient data were available in the files to complete the study. The files were examined in the offices of the National Traffic Bureau by two of the authors. Data recorded from the files included day, date and time of crash, number of vehicles involved, number of killed and injured parties, circumstances of the crash, biographical information on the deceased and data on alcohol tests done as part of the post-mortems or Gardaí investigations. The anatomical site where the blood samples were taken for blood alcohol concentrations (BACs) was not collected as it was not recorded in the files in the vast majority of cases. Based on the information in the files the authors were able to attribute the major responsibility for a crash in most cases to one party (one of the drivers, a pedestrian, etc). The names or addresses of any person mentioned in the files were not recorded.

The legal limit for alcohol in blood samples for driving in Ireland is 80 mg/100ml, for urine it is 107mg/100ml. The legal limit for breath testing for alcohol undertaken by the Garda Síochána in Ireland is 35ug/100ml of breath.

International research indicates that a persons ability to drive is effected by alcohol if there is a level of alcohol in the blood of 20mg/100 ml or greater[4,5,6]. In this study a crash was considered to be alcohol related if the blood alcohol concentration (BAC) was 20mg/100ml or greater (or the equivalent in urine and breath tests) in a driver. Whether alcohol was considered to be a contributing factor in a pedestrian or cyclist death was based on their circumstances of the crash and a BAC level of 20mg/100ml or higher. The fact that a crash may be alcohol related does not indicate that other factors were not also relevant (e.g. speeding).

In several files, witness statements indicated that a driver involved in a fatal crash had consumed significant amounts of alcohol prior to driving. These crashes were not included in those considered to be alcohol related unless there were blood, urine or breath tests available as outlined above.

The data collected was analysed using SPSS, JMP and EPI-info, statistical software packages. Age specific population rates were calculated using denominator data for 2003 in the Public Health Information System (PHIS v8).

Ethical approval was given by the Healthcare Research Advisory Committee in the Health Service Executive (Dublin North East).

Results

There were 301 fatal crashes in 2003 killing 335 persons. The results of the analysis shall be described under two separate headings. Firstly, there will be a profile of the 301 crashes and a description of the role of alcohol in these crashes. This will be followed by a profile of those killed in the crashes and their alcohol levels.

1. Profile of the crashes and the role of alcohol

Table 1 outlines the number of vehicles, the number killed in the 301 fatal car crashes. As seen in the table, 156(51.8%) of the crashes were single vehicle crashes.

Table 1. The number of vehicles involved in fatal crashes and the number killed by number of vehicles involved in crashes.

Number of vehicles involved	Number of crashes	One person killed in crash	Two persons killed in crash	Three persons killed in crash	Total Killed
One	156	148	6	2	166
Two	133	114	16	3	155
Three	12	10	2	0	14
Total	301	272	24	5	335

Table 2 outlines the vehicles involved in the crashes. As seen in the table, cars were involved in two- thirds of all crashes, 55.1% of single vehicle crashes and in 81.4% of multiple vehicle crashes.

Table 2. Type of vehicle involved in fatal road crashes.

	Single vehicle crash		Multiple vehicle crash		Total	
	No (n=156)	% of single-vehicle crashes	No (n=145)	% of multi-vehicle crashes	No (n=301)	% of all crashes
Cars	86	55.1	118	81.4	203	67.4
Motor Cycles	19	12.2	34	23.4	53	17.6
Lorries	19	12.2	26	17.9	45	15.0
Vans	13	8.3	14	9.7	27	9.0
Jeeps	8	5.1	9	6.2	17	5.6
Pedal cycles	0	0	12	8.3	12	4.0
Other	11	7.1	12	8.3	23	7.6
Total	156	100	NA*	NA*	NA*	NA**

NA* = Not applicable as totals greater than 145 and 301 due to the involvement of multiple vehicles in crashes

NA** = Not applicable as percentage greater than 100 due to the involvement of multiple vehicles in crashes

Table 3 outlines the number of persons killed in the crashes. Over half (188, 56.1%) of those killed were drivers.

Table 3. Status of the deceased

	No	%
Driver*	188	56.1
Passenger	70	20.9
Pedestrian	63	18.8
Cyclist	12	3.6
Unknown/other	2	0.6
Total	335	100

**Includes drivers of motor cycles*

Crashes where alcohol was a factor

Alcohol was a factor in 110 (36.5%) of fatal crashes and not a factor in 191(63.5%) as summarised in Table 4.

Table 4. The role of alcohol in fatal road crashes

	No	%
Alcohol not a factor	191	63.5
Driver alcohol	85	28.2
Pedestrian alcohol	22	7.3
Pedestrian and driver alcohol	2	0.7
Other alcohol	1	0.3
Total	301	100

Table 5 outlines the number of persons who were tested positive for alcohol (BAC ≥20 mg/100ml or equivalent levels in urine or breath samples) or were above the drink driving legal limit in the 110 alcohol related fatal crashes. As seen in the table, in 72 (23.9%) of crashes a driver (64 who were killed and 8 who were not killed) was above the legal limit.

Table 5. The number of drivers and pedestrians positive for alcohol* and with levels of alcohol above the legal limit in the 110 alcohol related crashes

	Blood	Urine	Breath	Total
	No	No	No	No
Killed drivers				
*Alcohol positive but below legal limit	13	1	-	14
Alcohol level above legal limit	62	2	-	64
Sub-Total	*75*	*3*	-	*78*
Drivers not killed				
*Alcohol positive but below legal limit	-	-	1	1
Alcohol level above legal limit	4	3	1	8
Sub-Total	*4*	*3*	*2*	*9*
Killed Pedestrians				
*Alcohol positive but below legal limit	3	-	-	3
Alcohol level above legal limit	21	-	-	21
Sub-Total	*24*	-	-	*24*
Other				
*Alcohol positive but below legal limit	1	-	-	1
Alcohol level above legal limit	-	-	-	-
Sub-Total	*1*	-	-	*1*
Total	**104**	**6**	**2**	**112****

**In 2 of the 110 crashes, alcohol was a factor for both drivers and pedestrians, therefore total =112 and not 110. * Alcohol positive = Where BAC is ≥20 mg/100ml or equivalent level in urine or breath samples.

Of the 87 drivers whose alcohol was a contributory factor, 78 (89.7%) were male and 9 (10.3%) were female. Of the 301 crashes, 63(20.9%) were single vehicle, single occupant crashes which involved no other parties (e.g. no pedestrians or no passengers) other than the driver. Males were more likely to be involved in these crashes ($p<0.01$). In 39(61.9%) of these driver alcohol was a factor. Drivers under the influence of alcohol were 6.1 times more likely to be involved in this type of crash compared to drivers who had no alcohol detected (odds ratio: 6.1, CI: 3.2 -11.8; $p<0.00001$). Whether the driver was under the influence of alcohol or not was not related to the number of persons killed.

Month, day and time of crashes

Figure 1 outlines the month of occurrence of alcohol related and non alcohol related fatal road crashes. The months with the lowest fatalities were January and September and the months with the highest fatalities were May, June and October. No trend was demonstrated in regard to month and alcohol.

Figure 1. Month of fatal crashes (alcohol and non alcohol related)

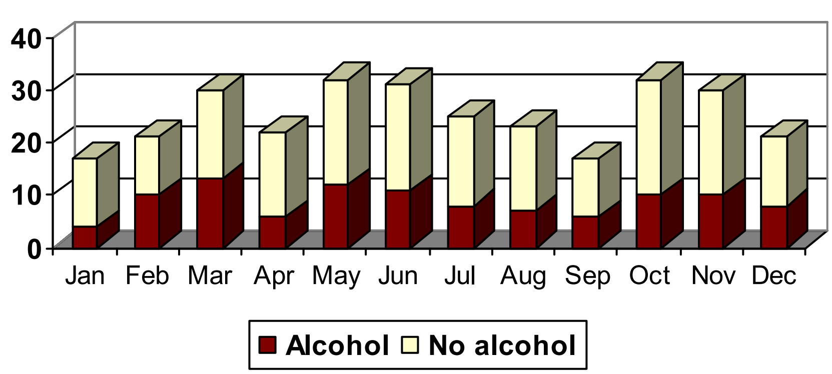


Figure 2 outlines the day of occurrence of alcohol related and non alcohol related fatal road crashes. As seen the number of crashes rise from Thursday and peaks on Sunday. There is a clear rise in the proportion of crashes that are alcohol related as the week progresses. Alcohol related fatal road crashes are 3 times more likely to occur on Saturday, Sunday or Monday compared to the other days of the week (odds ratio 3.0; CI: 1.8-5.1, $p<0.0001$). Of the crashes that occurred on Monday, 22(50.0%) occurred before 8AM. Of these 12(54.5%) were alcohol related.

Figure 2. Day of fatal crashes (alcohol and non alcohol related)

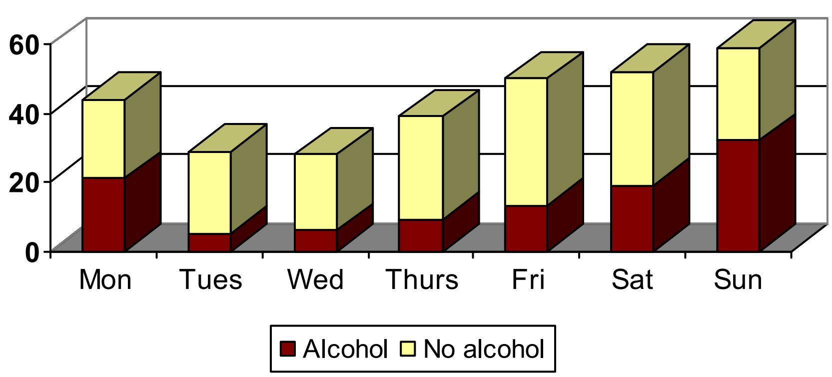
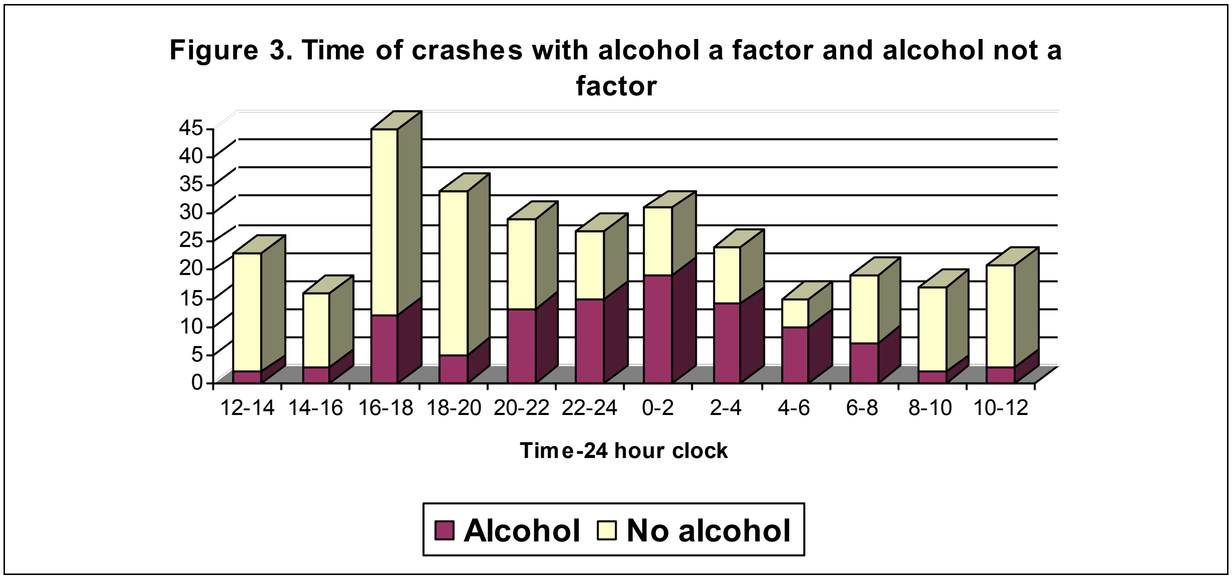


Figure 3 outlines the time of day of occurrence of alcohol related and non alcohol related fatal road crashes. Late afternoon to early evening was the commonest time for all fatal road crashes. Alcohol related crashes were commonest late at night and early in the morning ($p<0.001$).



Alcohol related fatal crashes are 2.3 times more likely to occur from 10 PM on Friday night to 8AM on Monday morning than during the rest of the week (odds ratio =2.3; CI 1.4-3.8, p=0.001).

2. Profile of those killed and their alcohol levels

In the 301 crashes 335 persons were killed as outlined in Table 6.

Table 6. Status of the deceased

	No	%
Driver	188	56.1
Passenger	70	20.9
Pedestrian	63	18.8
Cyclist	12	3.6
Unknown/other	2	0.6
Total	335	100

Drivers

One hundred and sixty one (85.6%) of the drivers (drivers include those who were riding motorbikes) killed were male, 27(14.4%) were female. The mean age of male drivers was 35.4 years (SD: 15.9) and the median was 30.0 years with a mortality rate per 100,000 population age 15 years and over of 10.4 /100,000. The mean age of males was significantly lower than that of females (p<0.001). The mean age of female drivers was

49.0 years (SD: 22.7) and the median was 44.0 years with a mortality rate per 100,000 population aged 15 years and over of 1.7 /100,000. Table 7 and Figure 4 outline the age distribution of the deceased male drivers and the age specific death rates.

Table 7. Age distribution of deceased male drivers and rate per/100,000 population.

	No	%	Rate /100,000 population
15-19	15	9.3	9.6
20-24	33	20.5	19.6
25-29	26	16.1	16.3
30-34	26	16.1	16.5
35-39	11	6.8	7.5
40-44	14	8.7	10.1
45-49	10	6.2	7.9
50-64	14	8.7	4.6
65+	12	7.5	6.2
All ages 15+	161	100	10.4

Figure 4. Mortality rate per 100,000 population for male drivers

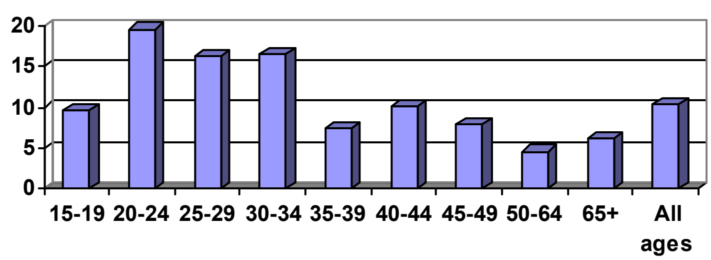


Table 8 outlines the age distribution of the female drivers. Due to the smaller numbers broader age categories are only available.

Table 8. Age distribution of killed female drivers and rate per/100,000 population.

	No	%	Rate /100,000 population
15-29	7	25.9	1.5
30-49	8	29.6	1.4
50+	12	44.4	2.2
All ages 15+	27	100	1.7

Alcohol levels of killed drivers

Overall for all drivers killed (188), 63(33.5%) were over the legal limit. For those drivers who had a BAC recorded and available (138, 73.4%), 61(44.2%) were over the legal limit. The mean alcohol level for those who had BACs recorded and available was 99.2 mg/100ml (SD: 109.9) and a median of 54.0 mg/100ml. In two other cases where BACs were not done or available, urine alcohol levels were above the legal limit (>107mg/100ml).

BACs were available for 119 (73.9%) of the killed male drivers and 19 (77.8%) of the killed female drivers. Table 9 outlines the various BAC levels. As can be seen from the table, 56(34.8%) of the males killed were over the legal limit and 5(18.5%) of the killed female drivers were over the legal limit. Seventy-five (39.9%) of the killed drivers had BAC levels ≥20mg/100ml.

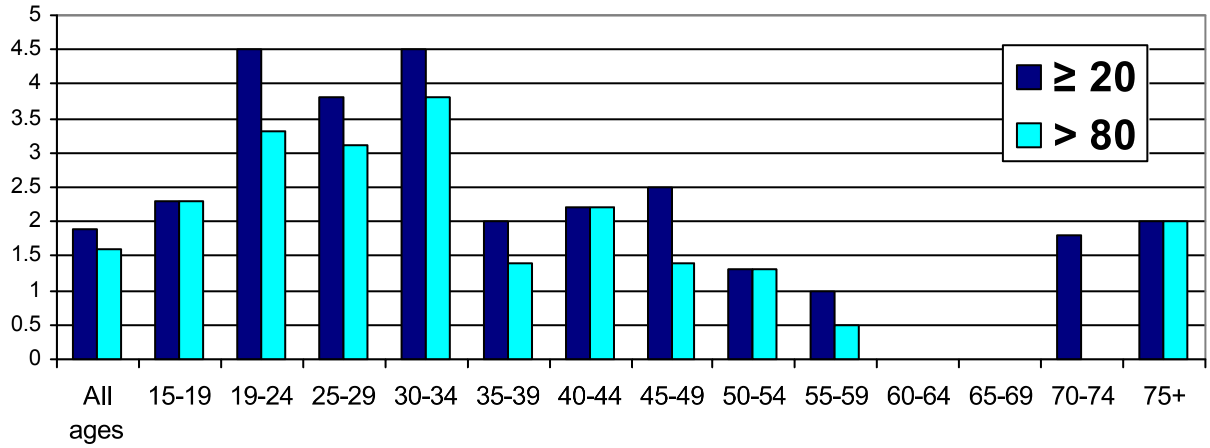
Table 9. BAC levels on killed drivers

	Male		Female		Total	
	No	%	No	%	No	%
Zero	49	30.4	10	37.0	59	31.4
Not recorded as done/not available	42	26.1	8	29.6	50	26.6
1-19	2	1.2	2	7.4	4	2.1
20-49	4	2.5	2	7.4	6	3.2
50-79	8	5.0	0	0	8	4.2
80-159	11	6.8	2	7.4	13	6.9
160-239	29	18.0	2	7.4	31	16.5
240+	16	9.9	1	3.7	17	9.0
Total	161	100	27	100	188	100

The mean BAC for males was 107.0mg/100ml (SD: 111.7) and the median was 72.0 mg/100ml. The mean level of the BACs for females was 50.7 mg/100ml (SD: 85.6). This was significantly lower than the male level ($p<0.02$).

Figure 5 outlines the age specific rates per 100,000 population for those with BAC levels ≥20mg/100ml and those with BAC levels above 80mg/100ml or over (the legal limit for driving). The rates are highest for those aged 19 to 34 years and lowest for those aged 60 to 69 years.

Figure 5. Rate per 100,000 population for drivers with BAC ≥20mg/100ml and >80 mg/100ml



Urine alcohol levels

In the case of 3 drivers where there were no BACs available, urine alcohol levels were available with a mean of 156.3mg/100ml (SD: 101.7) ranging from 44 mg/100ml to 242 mg/100ml, with 2 of whom over the legal limit of 107 mg/100ml.

Combining the BACs and these urine sample results, the overall number of killed drivers whose alcohol was a factor (BAC≥20mg/100ml or equivalent in urine) was 78(41.5%). As stated above 63(33.5%) were over the legal limit for driving.

Vehicle type

Table 10 outlines the vehicles the drivers were driving. As seen in the table over a quarter of all killed were on motorbikes.

Table 10. Vehicles driven by the deceased drivers

	No	%
Car	107	56.9
Motorbike	51	27.1
Jeep	7	3.7
Lorry	7	3.7
Van	9	4.8
Other	7	3.7
Total	188	100

Females were more likely to be the driver of a car than any other vehicle when compared to males ($p<0.001$) and males were more likely to be riding a motorbike ($p<0.01$) compared to females. The mean age of motorbike drivers (31.4, SD: 9.5) who were killed was significantly lower than the drivers of all other vehicles (37.1, SD 17.7, $p<0.01$). Motorbike drivers were no more likely or less likely than other killed drivers to be over the legal limit.

Pedestrians

Sixty- three (18.8%) of those killed in 2003 were pedestrians, of whom 39(61.9%) were male and 24(38.1%) were female. The mean age was 50.0 (SD: 25.6) and the median 53.0 years. There was no statistically significant difference in the mean age of males and females. Table 11 and Figure 5 outline the age distribution of the killed pedestrians which shows that the mortality rate per 100,000 population increases with age, being highest in those aged 85 and over.

Table 11. Age distribution of killed pedestrians

	No	%	Rate /100,000 population
< 15	7	11.11	0.8
15-24	6	9.52	0.9
25-34	6	9.52	1.0
35-44	6	9.52	1.1
45-54	9	14.3	1.8
55-64	8	12.70	2.2
65-74	7	11.10	2.8
75-84	9	14.30	6.0
85+	5	7.90	11.7
Total	63	100	1.6

Figure 5. Mortality rate per 100,000 population for pedestrians

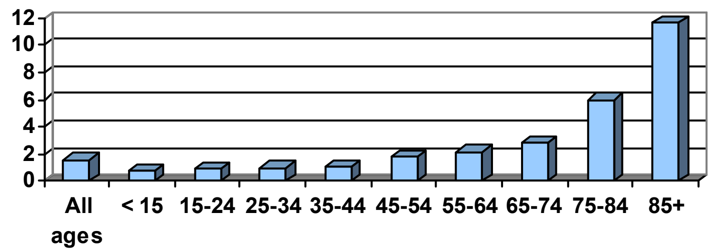


Table 12 outlines the BAC levels of the killed pedestrians. The mean level was 143.2 (SD: 170.7) and the median 133mg/100ml. For adults (aged 18 years and over), males were more likely to have tested positive for alcohol than females ($p<0.01$). There were no tests positive for alcohol in respect of persons aged less than 18 years.

Table 12. BACs in pedestrians.

	No	%
Zero	22	34.9
1-19	0	0
20-79	3	4.8
80-159	6	9.5
160-239	8	12.7
240+	7	11.1
Not recorded as being done	12	19.0
Not available	5	7.9
Total	63	100

Pedestrians with positive blood alcohol levels (≥ 20mg/100ml) were 7.8 times more likely to be killed from 10 PM on Friday night to 8AM on Monday morning than during the rest of the week (Odds ratio =7.8; CI 2.2-29.4, p=0.001).

From the circumstances of the crashes as outlined in the Garda Síochána files and the BACs of the deceased pedestrians, pedestrian alcohol was considered to be a contributory factor in 24(38.1%) of the fatal pedestrian road crashes or 8.0% of all fatal road crashes. Twenty (83.3%) occurred between 8PM and 8 AM. Five of the pedestrians were reported to be lying on the road when they were hit by a vehicle. All five had BACs over 80mg/100ml with a mean BAC of 254.8mg/100ml.

Passengers

Seventy (20.9%) of all those killed were passengers, 39(55.7%) of whom were male and 31(44.3%) were female. The mean age of the passengers was 29.1(SD: 19.5) and the median age was 22.0 years. Table 13 and Figure 6 outline the age distribution and the mortality rate per 100,000 population. As seen in the table and the figure there is a very high rate for those aged 15-24.

Table 13. Age distribution of killed passengers

Age	No	%	Rate /100,000 population
< 15	7	10.0	0.8
15-24	35	50.0	5.4
25-34	9	12.9	1.4
35-44	7	10.0	1.2
45-54	5	7.1	1.0
55-64	0	0	0
65-74	3	4.3	1.2
75+	4	5.7	2.1
Total	70	100	1.8

Figure 6. Mortality rate per 100,000 population for passengers

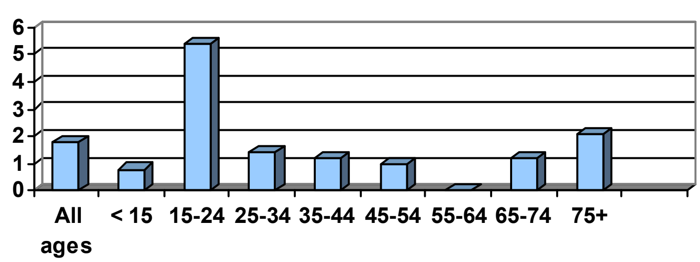


Table 14 outlines the BACs of passengers killed. The mean BAC was 102.9mg/100ml (SD: 16.3) and the median was 40.2 mg/100ml. BACs were either not done or not available in those aged less than 16 years. No passenger with a negative BAC for alcohol tested positive for alcohol in a urine sample.

Table 14. BACs in passengers.

	No	%
Zero	12	17.1
1-79	4	5.7
80-159	5	7.1
160-239	4	5.7
240+	5	7.1
No recorded as being done	34	48.6
Not available	6	8.6
Total	70	100

Male passengers are significantly more likely to be killed than female passengers in a crash where driver alcohol was a factor ($p<0.001$). Eighteen (46%) of the male passengers were killed in such crashes. Nine (47.4%) of the 19 passengers killed in driver alcohol related crashes died in crashes that occurred between midnight and 4 AM.

Seven of the 9 passengers with BACs at 160mg/100ml or greater were aged thirty years or over. All 9 were males.

In the age group “15-24”, which had the highest mortality rate, driver alcohol was no more or no less likely to be a factor in the crash.

Discussion and Conclusions

The European Union has set itself a target of halving the number of people killed in road traffic accidents between 2000 and 2010 through harmonisation of penalties and the promotion of new technologies[7]. Despite this, the number of fatalities on the Irish roads has risen since 2003, after years of decline. Ireland ranks poorly at seventh place out of the EU – 15 countries (excluding the former accession countries) with a mortality rate on the roads of 8.4 per 100,000 population. Sweden (5.9), United Kingdom (6.1) and the Netherlands (6.4) have the lowest rates[8].

The primary goal of the Government's road safety strategy is to reduce road fatalities by 25% by the end of 2006 with particular emphasis on speeding, use of seat belts and drink driving[3]. The strategy accepts that there is no clear level of the extent of intoxicated driving in Ireland. There is a lack of information or evidence in Ireland on the number of deaths or fatal crashes that can be attributed at least in part to alcohol. The "Road to Safety", the national strategy from 1998-2003[9] used the number of collisions occurring between 9PM and 3AM as a proxy measure. In 2003 the number of fatal crashes that occurred during this time increased on the number in 2002. The National Roads Authority, who publish a report on road collisions each year based on data obtained by the Garda Síochána, do not report on the number of crashes that are alcohol related. Two studies provided regional information on the role of alcohol in fatal crashes [10,11], but information nationally is lacking. This study provides evidence of the role alcohol plays in fatal road crashes nationwide.

This study has shown that alcohol plays a major part in fatal road crashes with 36.5% of fatal road crashes being alcohol related in 2003. The fact that a crash was alcohol related does not mean that other factors such as speeding were not also involved. This figure is high when compared to Australia [12] and Finland [13] where alcohol is a factor in 25% of fatal crashes.

Drivers and pedestrians contribute to the alcohol related road crashes. Drivers under the influence of alcohol are responsible for almost a third of all fatal crashes (28.9%). Male Irish drivers have stated that the fear of being caught by the Gardaí is the only deterrent to drink driving, not their own or other persons safety[14]. However, enforcement in Ireland is low compared to other countries and Irish drivers have the lowest expectation in Europe of thinking that they will be checked for drink driving while on a typical journey with only 0.9% of Irish drivers thinking they would be checked compared to a European average of 9.0%[15]. It is generally accepted that drivers' perception of being caught is more important than the actual level of enforcement. Therefore it is vital that enforcement is highly visible and well publicised so that drivers think there is a risk of being caught.

There is now evidence of a commitment to reduce the alcohol related fatalities on the roads with a total of 7,863 drink driving offences being detected for the first six months of 2006, an increase of 23% on the same period for 2005[16]. In addition random breath testing was introduced in July 2006[17]. Random breath testing has been shown to be effective in different populations in the USA and Australia with reductions in alcohol related deaths ranging from 8% to 71%[18]. The vast majority of the population are in favour of the introduction of random breath testing[19] including those living in rural counties where public transport is lacking. The levels of alcohol related fatal crashes identified in this study can be used as a benchmark to evaluate the impact random breath testing has in reducing alcohol related road deaths.

Forty percent of the drivers killed in this study were under the influence of alcohol (BAC $\geq$ 20mg/100ml) with a third over the legal limit (80mg/100ml). This is higher than in Sweden[20] (which has a low road fatality rate) and France[21] (which has a high motor fatality rate) but similar to the level found in killed Spanish drivers[22] (Spain has a high motor fatality rate). Male drivers, particularly those aged 19-34 are most likely to be killed whilst under the influence of alcohol. Research elsewhere has shown that younger drivers are at much greater risk. At BAC levels of 80-100 mg/100ml, the relative risk of a fatal single-vehicle crash injury varied between 11.4 (drivers 35 and older) and 51.9 (male drivers, 16-20)[23]. Given the extremely high mortality rate for young males in road crashes, specific targeted interventions are required. Targeted interventions to reduce alcohol road deaths do work with young drivers. Research into fatal road crashes in the USA indicate that the largest decrease in alcohol-related fatal crashes during the twenty year period 1982-2001 was among drivers aged less than 21 years, who have been the target of several interventions to reduce alcohol-impaired driving[24]. Serious consideration needs to be given to the introduction of a graduated licensing system for young drivers. These have been shown to be effective in reducing crash rates for young drivers[25].

In addition to lower limits for alcohol, there is also evidence to support a restriction on the number of passengers carried by younger drivers. Chen et al demonstrated that the risk of fatal injury for a 16- or 17-year-old driver increases with the number of passengers carried[26]. Compared with drivers of the same age without passengers, the relative risk of death was 1.5 (95% CI, 1.4-1.6) for 17-year-old drivers with one passenger, 2.6 (95% CI, 2.2-3.0) for those with two passengers, and 3.1 (95% CI, 2.5-3.8) for those with three or more passengers. The risk of death increased significantly for drivers transporting passengers irrespective of the time of day or sex of the driver, although male drivers were at greater risk. However, a study in Spain showed that there was a protective effect from the presence of passengers. This protective effect was higher for drivers aged more than 45 years and lower for the youngest drivers (<24 years old). The strongest association was observed for female passengers who accompanied male drivers[27].

Whilst it appears reasonable to target young male drivers in particular given their high risk, it should not be forgotten that older drivers are also putting themselves and others at risk. As seen in the data a considerable number of the killed drivers with high BACs were aged in their forties, fifties and even seventies. Many of these may have considered themselves to be moderate drinkers. However, even at BACs below the legal limit, driving is impaired and the risk of being involved in a crash increases. Drivers need to be educated that any drinking even if BAC levels remain below the legal limit still carries a significant risk of a crash. Consideration should also be given to reducing the legal limit to 50mg/100ml. Having a high legal limit gives the impression to drivers that it is safe to drink what they consider moderate amounts and then drive. A lower limit as recommended by the Strategic Task Force on Alcohol[28] may discourage drivers from drinking any alcohol before driving.

Pedestrians are at increased risk with increasing age irrespective of alcohol consumption and initiatives that include awareness campaigns aimed at drivers and pedestrians and improvements to the environment in regard to lighting, footpaths and safe areas for crossing roads are required. Pedestrian alcohol was considered to be a contributory factor in 20(31.7%) of the fatal pedestrian road crashes. Eighteen (90.0%) occurred between 8PM and 8 AM. Males are at particular risk, especially at week ends. Other factors may also have contributed to these alcohol related crashes including darkness, lack of footpaths and driver error. However, the very high BACs in many of the deceased pedestrians are just a consequence of the high alcohol consumption in Ireland. The fact that five pedestrians were lying on the road before they were hit by a vehicle, and all with very high BACs, is a reflection on the high level of binge drinking in Ireland and a tragic example of the consequences of such drinking.

The high BAC levels in passengers also reflect the high level of alcohol consumption and binge drinking. Whilst young people are often singled out as being the ones who overindulge, it is worth noting that 7 of the 9 passengers killed with BACs at 160mg/100ml or greater were aged thirty years or over. Strategies to reduce alcohol related harm need to cover the whole population and not just teenagers and young adults.

This study has provided a national picture of the role of alcohol in fatal road crashes. It can be used to measure the impact of road safety strategies. However, the figures provided in this study are an underestimate of the problem given that BACs were not available for all killed drivers and pedestrians and that many of the surviving drivers involved in these crashes were not tested for alcohol. Consideration needs to be given to testing all drivers involved in fatal road crashes.

Ireland has a very serious problem with alcohol consumption. The more a population consumes the greater the harm that population suffers. The high level of alcohol related road crashes are just one of the manifestations of that harm. The level of harm can be reduced if the recommendations of the Strategic Task Force on Alcohol[28] are implemented and we reduce our overall level of consumption and our pattern of binge drinking. Road deaths in particular can be reduced significantly as seen elsewhere by enforcing the legislation in regard to random breath testing in a highly visible and well publicised manner and by targeting young drivers through the introduction of a graduated licensing system.

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