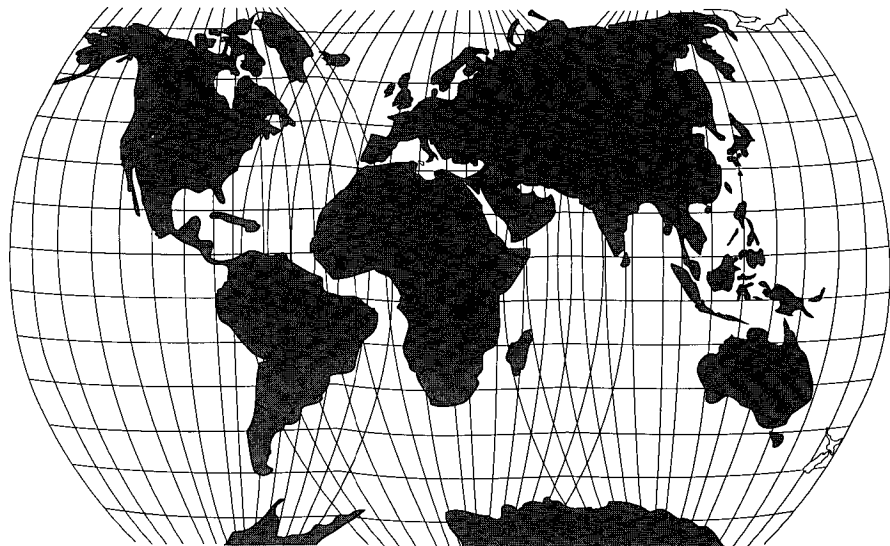


Alcohol Involvement in Fatal Crashes

**Comparisons
among Countries**



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Executive Summary

Much of the progress that has been made in impaired driving in the last decade or more has been facilitated by lessons learned from other countries. It is therefore both timely and appropriate for the National Highway Traffic Safety Administration to sponsor a systematic effort to gather information about impaired driving around the world. In particular, this report summarizes information gathered on the measurement of alcohol involvement in countries around the world. This report is a follow-up to a previous phase of this effort. The report for that phase is entitled *Literature Review of DWI Laws in Other Countries* (NHTSA 2000). That project collected information on laws and policies related to drinking and driving in industrialized countries. The intent of this entire effort is to contribute to our understanding of impaired driving countermeasures and their impact and of how the current situation in the United States compares to other countries. The parameters of the report are described below.

Countries Included

The primary purpose of this project is to provide comparisons with the United States, and therefore possible guidance in the development and implementation of impaired driving policies in this country. Therefore, the main focus of data collection was on countries that would be considered most directly comparable to the United States, economically and demographically, as well as those countries with which we have the most direct dealings. These countries include:

- Members of the European Union, including Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden, and the United Kingdom
- Other western European countries, including Norway and Switzerland
- Canada
- Australia
- New Zealand

Methodology

Most of the information for this report was gathered through inquiries from key informants identified in each of the countries of interest. Most informants were from government transportation agencies. Some informants were from relevant university departments. In some cases, available information was collected from other published or unpublished sources. Appendix A indicates the source(s) of information for each country. Some countries did not respond despite repeated requests for information.

Results

The results of the inquiry indicate that the definitions used in the United States to track alcohol involvement in fatal crashes are not shared by other developed countries. The initial goal of the project was to compare the rates of fatal crashes involving alcohol from country to country. It was hoped that information about variations in laws and policies could be correlated with variations in the alcohol involved crash rates and thus provide some guidance regarding the effectiveness of impaired driving countermeasures. It was found, however, that the data reporting and collection methodologies, definitions of alcohol involvement, and data reliability and validity were so variable as to make comparisons impossible. Several key issues were identified regarding data comparability. These include:

- The definition of alcohol-involvement in crashes
- The definition of fatality
- The conditions under which alcohol testing occurs
- The percent of drivers in fatal crashes who are tested for alcohol
- The percent of pedestrians in fatal crashes who are tested for alcohol
- The availability and utilization of autopsy results

In addition to methodological and definitional differences, questions remain concerning the accuracy of reported rates in many countries.

Until a methodology can be developed to adjust for differences in reporting, meaningful comparisons of rates or conclusions about the effects of legal differences from country to country cannot be made.

Background and Introduction

Much of the progress that has been made in impaired driving in the last decade or more has been facilitated by lessons learned from other countries. For example, the United States drew valuable lessons regarding deterrence from analyzing the results of the British Road Safety Act of 1967. Similarly, we have learned about alcohol policy and serious enforcement and penalties from some of the Scandinavian countries. The Australian experience with random breath testing has influenced some of our own enforcement efforts. It is therefore both timely and appropriate for the National Highway Traffic Safety Administration to sponsor a systematic effort to gather information about impaired driving in countries around the world. In particular, this report summarizes information gathered on the measurement of alcohol involvement in countries around the world. This report is a follow-up to a previous phase of this effort. The report for that phase is entitled *Literature Review of DWI Laws in Other Countries* (NHTSA 2000). That project collected information on laws and policies related to drinking and driving in countries around the world. The intent of this entire effort is to contribute to our understanding of impaired driving countermeasures and their impact and of how the current situation in the United States compares to other countries.

Previous work has pointed out the difficulties of making comparisons internationally. Ross (1993) compared roadside surveys and fatal crash studies in various countries, but noted the methodological and definitional difficulties. Voas (1993) pointed out that while national crash record systems appear to provide an attractive method of comparing the effectiveness of traffic safety programs, differences in definitions, data collection methods, and file structure impair the ability to make meaningful analyses.

Other researchers have examined the accuracy of national data systems. For example, Oestrom and colleagues (1993) compared police assessment of alcohol impairment with blood alcohol analysis on a large sample of driver fatalities in Sweden. Alcohol was detected in twice the proportion of fatally injured drivers as had been identified by police. The authors recommended that Sweden change its national traffic crash record system to reflect blood alcohol analysis rather than police assessment only. To date, the system has not been changed.

This report provides an updated analysis of these and other issues. The parameters of the report are described below.

Countries Included

The primary purpose of this project is to provide comparisons with the United States, and therefore possible guidance in the development and implementation of impaired driving policies in this country. Therefore, the main focus of data collection was on countries that would be considered most directly comparable to the United States, economically and demographically, as well as those countries with which we have the most direct dealings. These countries include:

- Members of the European Union, including Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden, and the United Kingdom
- Other western European countries, including Norway and Switzerland
- Canada
- Australia
- New Zealand

Methodology

Most of the information for this report was gathered through inquiries from key informants identified in each of the countries of interest. Most informants were from government transportation agencies. Some informants were from relevant university departments. In some cases, available information was collected from other published or unpublished sources. Some countries did not respond despite repeated requests for information. Appendix A indicates the source(s) of information for each country.

Comparison of Measurement Methodologies for Alcohol Involvement in Fatal Crashes

Several parameters enter into the measurement of alcohol involvement in fatal crashes. Appendix B displays these parameters for each of the countries in the study. Key parameters are described below.

The definition of alcohol involvement

Countries vary in their definition of what constitutes an alcohol-involved traffic crash. In some countries, a crash is defined as "alcohol-involved" if any alcohol is

detected in a driver¹. In some countries, this definition is extended to include alcohol detected in a pedestrian involved in a crash. The National Highway Traffic Safety Administration (NHTSA) in the U.S. defines a fatal crash as alcohol-related if either a driver or a non-motorist had a measurable or estimated BAC of 0.01 g/dl or above. Other countries define a crash as alcohol-involved if a driver has a blood alcohol content (BAC) over the illegal limit for that country. Of course, illegal limits vary from country to country. In some cases, this definition is extended to include alcohol over the illegal limit for drivers in a pedestrian² involved in a crash. That is, though there is not a legal BAC limit for pedestrians, if a pedestrian involved in a crash has a BAC over the legal limit for drivers (e.g., .08 or .05, depending on the country), the crash would be considered alcohol related.

In some countries, alcohol involvement is not defined by actual measurement of the presence of alcohol, but rather on police reports that alcohol was involved. NHTSA uses this definition for nonfatal crashes. These reports may be based on police suspicion due to a variety of cues or circumstances.

Definition of Fatality

There is some variation in how fatalities are defined. Most countries define a time limit following a crash during which a death must occur in order for the fatality to be considered caused by the crash. Thirty days is the most common limit. France has a time limit of eight days and Canada's limit is 12 months. Some countries do not have a specific time limit. Obviously, the longer the time limit, the more deaths will be included, although it is unknown how significant the resulting differences would be.

Time limits on alcohol testing

In cases where blood tests are taken on drivers or pedestrians who are still living, the BAC changes as alcohol is digested and metabolized. Clearly, the amount of time that passes after a crash before the driver or pedestrian is tested will have an effect on the accuracy of the test in determining the extent to which alcohol impairment played a role in the crash. Countries surveyed do not report having specific time limits for testing.

¹ The definition of "driver" usually includes the operator of any motor vehicle, including motorcycles.

² The definition of "pedestrian" sometimes includes bicyclists.

Percent of Drivers Tested

Clearly, the accuracy of estimates of alcohol involvement in fatal crashes is dependent on the degree to which reports of alcohol involvement are free of bias. In general, the higher the proportion of drivers (and pedestrians) tested, the less bias will be present. When only a small proportion of drivers are tested, the chance that bias will be introduced is significant. Frequently, for example, living drivers involved in fatal crashes are difficult to test because conditions at the crash site are dangerous and the primary concern is safety and the swift treatment of injuries. Many surviving drivers are not tested because of these difficulties, because they are taken to the hospital, or for other logistical reasons. It is also the case that some countries may not commonly test fatally injured drivers because there is no legal reason for testing, since they are beyond legal reach. In some countries, testing occurs only when police suspect the presence of alcohol. In this case, certain types of drivers may be less likely to be tested (e.g., women or the elderly), thus introducing bias into the estimates of alcohol involvement.

Rates of testing vary significantly from country to country in this study. Some countries were unable to report testing rates. The lowest reported testing rate for drivers was Spain, which reported that 17.5 percent of drivers were tested in 1998. The highest rates were reported in Canada (83.1%) and France (approximately 90%). Approximately 63% of fatally injured drivers are tested in the United States. This rate, however, varies greatly from state to state.

Utilization of Autopsy Results

In some countries, autopsies or post-mortems are routinely performed on a significant proportion of people killed in traffic crashes. In two of the countries studied (Norway and the United Kingdom), the results of these examinations are reported to traffic safety agencies and used in the calculation of alcohol involvement in fatal crashes. In other countries (e.g., Australia and Sweden), while autopsies are performed on 90% or more of fatally injured drivers or pedestrians, these results are not used in the calculation of official statistics.

Reported Rates of Alcohol Involvement in Fatal Crashes

Table 1 summarizes the reported rates of alcohol involvement in fatal crashes as well as several parameters for measurement. As can be seen from the table, reported alcohol involvement in fatal crashes varies widely. Five countries report alcohol involvement rates of less than 10 percent (based on either illegal alcohol levels or the detection of any alcohol). By contrast, five countries report alcohol involvement rates hovering between 27 and 41 percent. This variation does not fit any easily discernable pattern. It appears, however, that some of the lowest alcohol involvement figures are in

countries with very low or unknown testing rates (i.e., Austria, Belgium), whereas some of the highest alcohol involvement figures are found in countries with relatively high testing rates (e.g., Australia, Canada, New Zealand, and the United States).

Table 1. Alcohol Involvement in Fatal Crashes

| Country | Percent of Alcohol Involvement | Definition of Alcohol-Involved ³ | % of Drivers Tested | % of Pedestrians Tested |
|------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------|
| Australia | 28% of all drivers and motorcyclists killed at .05 or higher; 37% of pedestrians 16 and older at .05 or higher (1997) | <input type="checkbox"/> Any Alcohol in Driver <input type="checkbox"/> Any Alcohol in Pedestrian <input type="checkbox"/> Police Suspicion <input checked="" type="checkbox"/> Illegal BAC for Driver <input type="checkbox"/> Illegal BAC for Pedestrian <input type="checkbox"/> Alcohol Measure Only for Driver Fatality <input type="checkbox"/> Alcohol Measure for All Drivers | 75% of all drivers or motorcyclists involved in fatal crashes; 90% of those fatally injured | 88% of fatally injured pedestrians |
| Austria | 8.5% at .05 or higher (1998) | <input type="checkbox"/> Any Alcohol in Driver <input type="checkbox"/> Any Alcohol in Pedestrian <input type="checkbox"/> Police Suspicion <input checked="" type="checkbox"/> Illegal BAC for Driver <input checked="" type="checkbox"/> Illegal BAC for Pedestrian <input type="checkbox"/> Alcohol Measure Only for Driver Fatality <input type="checkbox"/> Alcohol Measure for All Drivers | unknown -- no systematic testing of drivers | unknown |
| Belgium | 8.9% had any alcohol (1998). Illegal BAC is .05 | <input checked="" type="checkbox"/> Any Alcohol in Driver <input checked="" type="checkbox"/> Any Alcohol in Pedestrian <input type="checkbox"/> Police Suspicion <input type="checkbox"/> Illegal BAC for Driver <input type="checkbox"/> Illegal BAC for Pedestrian <input type="checkbox"/> Alcohol Measure Only for Driver Fatality <input type="checkbox"/> Alcohol Measure for All Drivers | 24.7% of drivers and pedestrians total | |

³ More than one category may apply and may be reported in different circumstances.

| Country | Percent of Alcohol Involvement | Definition of Alcohol-Involved ³ | % of Drivers Tested | % of Pedestrians Tested |
|----------------|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Canada | 38.6% (1997) had any alcohol. Illegal BAC is .08 | <input checked="" type="checkbox"/> Any Alcohol in Driver <input checked="" type="checkbox"/> Any Alcohol in Pedestrian <input type="checkbox"/> Police Suspicion <input type="checkbox"/> Illegal BAC for Driver <input type="checkbox"/> Illegal BAC for Pedestrian <input type="checkbox"/> Alcohol Measure Only for Driver Fatality <input type="checkbox"/> Alcohol Measure for All Drivers | 83.1% | 59.3% |
| Denmark | 20.2% (1995) at .05 or higher | <input type="checkbox"/> Any Alcohol in Driver <input type="checkbox"/> Any Alcohol in Pedestrian <input type="checkbox"/> Police Suspicion <input checked="" type="checkbox"/> Illegal BAC for Driver <input type="checkbox"/> Illegal BAC for Pedestrian <input type="checkbox"/> Alcohol Measure Only for Driver Fatality <input type="checkbox"/> Alcohol Measure for All Drivers | 49% of drivers in fatal accidents (1996 data); 75% of fatally injured drivers | 47% of pedestrians in fatal accidents ; 49% of fatally injured pedestrians. 28% of cyclists in fatal crashes; 31% of fatally injured cyclists |
| Finland | 24% of fatally injured drivers at .05 or higher | <input type="checkbox"/> Any Alcohol in Driver <input type="checkbox"/> Any Alcohol in Pedestrian <input type="checkbox"/> Police Suspicion <input checked="" type="checkbox"/> Illegal BAC for Driver <input type="checkbox"/> Illegal BAC for Pedestrian <input checked="" type="checkbox"/> Alcohol Measure Only for Driver Fatality <input checked="" type="checkbox"/> Alcohol Measure for All Drivers | compulsory | |

| Country | Percent of Alcohol Involvement | Definition of Alcohol-Involved ³ | % of Drivers Tested | % of Pedestrians Tested |
|--------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| France | 19% at .05 or higher (1998) | <input type="checkbox"/> Any Alcohol in Driver <input type="checkbox"/> Any Alcohol in Pedestrian <input type="checkbox"/> Police Suspicion <input checked="" type="checkbox"/> Illegal BAC for Driver <input type="checkbox"/> Illegal BAC for Pedestrian <input type="checkbox"/> Alcohol Measure Only for Driver Fatality <input checked="" type="checkbox"/> Alcohol Measure for All Drivers | approx. 90% | approx. 0% |
| Germany | 17% at .03 or higher (1997) The illegal BAC is .05. | <input type="checkbox"/> Any Alcohol in Driver <input type="checkbox"/> Any Alcohol in Pedestrian <input type="checkbox"/> Police Suspicion <input type="checkbox"/> Illegal BAC for Driver <input type="checkbox"/> Illegal BAC for Pedestrian <input type="checkbox"/> Alcohol Measure Only for Driver Fatality <input checked="" type="checkbox"/> Alcohol Measure for All Drivers | Unknown - each State may determine testing rules. Testing only takes place if alcohol is suspected by police. | unknown - not obligatory, State may determine |
| Netherlands | 7.8% had any alcohol (1998) Illegal BAC is .05. | <input checked="" type="checkbox"/> Any Alcohol in Driver <input type="checkbox"/> Any Alcohol in Pedestrian <input type="checkbox"/> Police Suspicion <input type="checkbox"/> Illegal BAC for Driver <input type="checkbox"/> Illegal BAC for Pedestrian <input type="checkbox"/> Alcohol Measure Only for Driver Fatality <input checked="" type="checkbox"/> Alcohol Measure for All Drivers | 68.3% (mostly non-injured drivers, some injured drivers, very few dead drivers) | few cyclists; no pedestrians |

| Country | Percent of Alcohol Involvement | Definition of Alcohol-Involved ³ | % of Drivers Tested | % of Pedestrians Tested |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------|
| New Zealand | 27% had any alcohol or drugs (1998). Illegal BAC is .08 | <input type="checkbox"/> Any Alcohol in Driver <input type="checkbox"/> Any Alcohol in Pedestrian <input checked="" type="checkbox"/> Police Suspicion <input checked="" type="checkbox"/> Illegal BAC for Driver <input type="checkbox"/> Illegal BAC for Pedestrian <input type="checkbox"/> Alcohol Measure Only for Driver Fatality <input type="checkbox"/> Alcohol Measure for All Drivers | 70-75% killed in fatal crashes, Approximately 33% of all drivers in fatal crashes | Approximately 33% of pedestrians and cyclists over 15 years of age |
| Norway | 8.8% - multi-vehicle; 32.9% - single-vehicle at .05 or higher (1990 - more recent data not available because of privacy restrictions) | <input type="checkbox"/> Any Alcohol in Driver <input type="checkbox"/> Any Alcohol in Pedestrian <input type="checkbox"/> Police Suspicion <input checked="" type="checkbox"/> Illegal BAC for Driver <input type="checkbox"/> Illegal BAC for Pedestrian <input type="checkbox"/> Alcohol Measure Only for Driver Fatality <input type="checkbox"/> Alcohol Measure for All Drivers | < 60% (from autopsies) | unknown |
| Spain | 41% had any alcohol. 29% over illegal limit (.08) (Jan. and Feb. 1998) | <input checked="" type="checkbox"/> Any Alcohol in Driver <input checked="" type="checkbox"/> Any Alcohol in Pedestrian <input type="checkbox"/> Police Suspicion <input checked="" type="checkbox"/> Illegal BAC for Driver <input checked="" type="checkbox"/> Illegal BAC for Pedestrian <input checked="" type="checkbox"/> Alcohol Measure Only for Driver Fatality <input type="checkbox"/> Alcohol Measure for All Drivers | 17.5% | unknown |

| Country | Percent of Alcohol Involvement | Definition of Alcohol-Involved ³ | % of Drivers Tested | % of Pedestrians Tested |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------|
| Sweden | 3.3% were suspected by police of alcohol involvement (official statistic). 18% had alcohol based on fatally injured drivers autopsied (1998) | <input type="checkbox"/> Any Alcohol in Driver <input type="checkbox"/> Any Alcohol in Pedestrian <input checked="" type="checkbox"/> Police Suspicion <input type="checkbox"/> Illegal BAC for Driver <input type="checkbox"/> Illegal BAC for Pedestrian <input checked="" type="checkbox"/> Alcohol Measure Only for Driver Fatality <input type="checkbox"/> Alcohol Measure for All Drivers | > 90% autopsied. Official statistics based on police suspicion only | > 90% |
| United Kingdom | 10% of motorcyclists; 19% of cars and other motor vehicles at .08 or higher (1998) | <input type="checkbox"/> Any Alcohol in Driver <input type="checkbox"/> Any Alcohol in Pedestrian <input type="checkbox"/> Police Suspicion <input checked="" type="checkbox"/> Illegal BAC for Driver <input type="checkbox"/> Illegal BAC for Pedestrian <input type="checkbox"/> Alcohol Measure Only for Driver Fatality <input type="checkbox"/> Alcohol Measure for All Drivers | 68% (48% by police, 20% by coroner's courts) | 39% of pedestrians; 39% of cyclists |
| United States | 38.6% at .01 or higher, 30% at .10 or higher. Illegal BAC .08 or .10, depending on state. (1998) | <input checked="" type="checkbox"/> Any Alcohol in Driver <input checked="" type="checkbox"/> Any Alcohol in Pedestrian <input type="checkbox"/> Police Suspicion <input checked="" type="checkbox"/> Illegal BAC for Driver <input checked="" type="checkbox"/> Illegal BAC for Pedestrian <input type="checkbox"/> Alcohol Measure Only for Driver Fatality <input type="checkbox"/> Alcohol Measure for All Drivers | Testing rate varies from State to State. Nationwide, 63% of fatally injured drivers were tested in 1998. | Unknown |

Concerns about Accuracy

Inconsistencies in measurement and reporting parameters impair our ability to make comparisons from country to country regarding alcohol involvement in fatal crashes. In addition, the accuracy of reports, even within the definitional and measurement parameters provided, is questionable. The DG VII Working Group on Alcohol, Drugs and Medicines of the European Union has addressed the issue of accuracy among member countries. In its current report (in press), it points out that the number of recorded traffic crashes in national databases does not reflect the true level of alcohol related crashes because in each member country there is an element of underreporting. Under-reporting can be very high in some southern European member countries where the results of police breath tests or blood tests undertaken by the appropriate authorities are only partially recorded in national databases and where the level of enforcement is relatively low.

Only one member country, Great Britain, makes any statistical adjustments to correct for under-recording. Several countries do not publish any statistics on alcohol involvement at all.

Comparability of Statistics

The EU Working Group report makes several suggestions for increasing the comparability of statistics among EU member countries. Many of these same suggestions could apply to worldwide comparisons. Suggestions include:

- A maximum legal BAC limit of .05 percent
- Increasing the proportion of alcohol test results recorded in national databases
- Working towards common adjustment procedures for missing data values
- Acceptance of a common definition of drinking and driving

Other conditions that would improve the ability to make international comparisons worldwide include reliance on testing rather than police suspicion to establish alcohol involvement, a higher proportion of testing in fatal crashes, and common definitions of fatalities.

Other Research Needed

Comparisons among countries with regard to the level of alcohol involvement in fatal crashes are not simple or straightforward. Officially reported alcohol related crash rates are subject to major differences in measurement and reporting methodology, which can make comparisons inaccurate. The reported rates are also prone to error. It is highly unlikely that some of these reported rates are accurate reflections of what the rates would be if measured using methods similar to those used in the United States. For example, the officially reported rate in Sweden of 3.3% is based on police reports of alcohol involvement. Because of the nature of duties of police officers at the scene of fatal crashes, they frequently are not in a position to judge or may not have the knowledge or experience to determine whether alcohol was involved. Autopsies carried out on all fatally injured drivers in Sweden find a rate of 18% alcohol involvement (Laurell 1999). This discrepancy illustrates some of the serious reporting and measurement problems that may distort alcohol-related fatality rates and make comparisons across countries difficult and possibly misleading.

Further work is needed to collect and interpret information on laws, alcohol-related crashes, and data quality. It is possible that a computational algorithm could be constructed to correct for some of the differences in definitions of alcohol-related fatalities. This sort of correction, however, probably would not overcome some of the error and underreporting that undoubtedly occurs.

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Appendix A

| Country | Information Source |
|-----------------------|-------------------------------------------------------------------|
| Australia | Federal Office of Road Safety* |
| Austria | Kuratorium für Verkehrssicherheit** |
| Belgium | Ministere Communications et Infrastructure* |
| Canada | Canadian Council of Motor Transport Administrators* |
| Denmark | Danish Council of Road Safety Research** |
| Finland | European Union Report |
| France | Centre d'Etudes et de Recherches en Medecine du Traffic* |
| Germany | Bundesanstalt für Strassenwesen* |
| Netherlands | Min. Verkeer en Waterstaat* |
| New Zealand | Land Transport Safety Agency* |
| Norway | National Institute of Forensic Toxicology** |
| Spain | Dept. Farmacologia y Terapeutica, Universidad Valladolid** |
| Sweden | Swedish National Road Safety Administration* |
| United Kingdom | Dept. of Environment, Transport, and Regions* |
| United States | National Highway Traffic Safety Administration* |

*government agency

**research organization

Appendix B:
Methodology for Measurement of
Alcohol Involvement in Fatal Crashes

Country: Australia

Percent of Alcohol Involvement: 28% of all drivers and motorcyclists killed at .05 or higher;
37% of pedestrians 16 and older at .05 or higher (1997)

How is Alcohol Involvement Calculated? *Check all that apply*

- Any Alcohol in Driver Any Alcohol in Pedestrian Police Suspicion
Illegal BAC for Driver Illegal BAC for Pedestrian Alcohol Measure for All Drivers
Alcohol Measure Only for Driver Fatality

Percent of Drivers Tested: 75% of all drivers or motorcyclists involved in fatal crashes; 90% of those fatally injured

Percent of Pedestrians Tested: 88% of fatally injured pedestrians

Autopsies

Percent of Drivers Autopsied: 99% of persons (drivers/riders/pedestrians) will receive an autopsy. Some not done for religious reasons or age.

Driver Autopsies Reported: Not routinely reported. If a coroner's inquest is required, the Australian Transport Safety Bureau will receive a copy of the coroner's report, which usually contains the autopsy and BAC results.

Percent of Pedestrians Autopsied: see driver response

Pedestrian Autopsies Reported: see driver response

Time of Death After Crash for Fatality: 30 days

Time of Alcohol Test after Crash for Alcohol Involvement: Rely on State/Territorial data

Calculations to Adjust Data:

Details: Unknown BACs are excluded

Any Additional Sources of Data:

Details: Australian Transport Safety Bureau maintains a Fatality Crash Database, coded from coroners' reports.

Data Concerns:

Too Few Drivers Tested Alcohol Underreported by Police

Too Few Pedestrians Tested BAC Not Accurate

Other **Explain Other:** Using percentage of known BAC only will result in overestimate of alcohol involvement; Using percentage of all drivers will result in underestimate of alcohol involvement

Country: Austria

Percent of Alcohol Involvement: 8.5% at .05 or higher (1998)

How is Alcohol Involvement Calculated? *Check all that apply*

Any Alcohol in Driver

Any Alcohol in Pedestrian

Police Suspicion

Illegal BAC for Driver

Illegal BAC for Pedestrian

Alcohol Measure for All Drivers

Alcohol Measure Only for Driver Fatality

Percent of Drivers Tested: unknown -- no systematic testing of drivers

Percent of Pedestrians Tested: unknown

Autopsies

Percent of Drivers Autopsied: unknown

Driver Autopsies Reported: No

Percent of Pedestrians Autopsied: unknown

Pedestrian Autopsies Reported: No

Time of Death After Crash for Fatality: 30 days

Time of Alcohol Test after Crash for Alcohol Involvement: Usually tested at scene or within a few hours at the hospital

Calculations to Adjust Data:

Details:

Any Additional Sources of Data:

Details: Hospital statistics, but cannot be used with accident statistics (use different cues for location).

Data Concerns:

Too Few Drivers Tested

Alcohol Underreported by Police

Too Few Pedestrians Tested

BAC Not Accurate

Other **Explain Other:** Dead drivers are not tested.

Country: Belgium

Percent of Alcohol Involvement: 8.9% had any alcohol (1998). Illegal BAC is .05

How is Alcohol Involvement Calculated? *Check all that apply*

Any Alcohol in Driver

Any Alcohol in Pedestrian

Police Suspicion

Illegal BAC for Driver

Illegal BAC for Pedestrian

Alcohol Measure for All Drivers

Alcohol Measure Only for Driver Fatality

Percent of Drivers Tested: 24.7% of drivers and pedestrians total

Percent of Pedestrians Tested:

Autopsies

Percent of Drivers Autopsied: not given

Driver Autopsies Reported: not given

Percent of Pedestrians Autopsied: not given

Pedestrian Autopsies Reported: not given

Time of Death After Crash for Fatality: not given

Time of Alcohol Test after Crash for Alcohol Involvement: not given

Calculations to Adjust Data:

Details:

Any Additional Sources of Data:

Details: Belgian Toxicology and Trauma Study.

Data Concerns:

Too Few Drivers Tested

Alcohol Underreported by Police

Too Few Pedestrians Tested

BAC Not Accurate

Other Explain Other:

Country: Canada

Percent of Alcohol Involvement: 38.6% (1997) had any alcohol. Illegal BAC is .08

How is Alcohol Involvement Calculated? *Check all that apply*

Any Alcohol in Driver

Any Alcohol in Pedestrian

Police Suspicion

Illegal BAC for Driver

Illegal BAC for Pedestrian

Alcohol Measure for All Drivers

Alcohol Measure Only for Driver Fatality

Percent of Drivers Tested: 83.1%

Percent of Pedestrians Tested: 59.3%

Autopsies

Percent of Drivers Autopsied: not reported

Driver Autopsies Reported: not reported

Percent of Pedestrians Autopsied: not reported

Pedestrian Autopsies Reported: not reported

Time of Death After Crash for Fatality: 12 months

Time of Alcohol Test after Crash for Alcohol Involvement: not reported

Calculations to Adjust Data:

Details: No specific calculations provided but several cautions about interpreting data from Quebec due to coding inconsistencies

Any Additional Sources of Data:

Details:

Data Concerns:

Too Few Drivers Tested

Alcohol Underreported by Police

Too Few Pedestrians Tested

BAC Not Accurate

Other Explain Other:

Country: Denmark

Percent of Alcohol Involvement: 20.2% (1995) at .05 or higher

How is Alcohol Involvement Calculated? *Check all that apply*

Any Alcohol in Driver

Any Alcohol in Pedestrian

Police Suspicion

Illegal BAC for Driver

Illegal BAC for Pedestrian

Alcohol Measure for All Drivers

Alcohol Measure Only for Driver Fatality

Percent of Drivers Tested: 49% of drivers in fatal accidents (1996 data); 75% of fatally injured drivers

Percent of Pedestrians Tested: 47% of pedestrians in fatal accidents ; 49% of fatally injured pedestrians. 28% of cyclists in fatal crashes; 31% of fatally injured cyclists

Autopsies

Percent of Drivers Autopsied: unknown

Driver Autopsies Reported: no

Percent of Pedestrians Autopsied: unknown

Pedestrian Autopsies Reported: no

Time of Death After Crash for Fatality: no time limit

Time of Alcohol Test after Crash for Alcohol Involvement: no time limit

Calculations to Adjust Data:

Details: Blood alcohol level is always the mean value of two independent tests minus .01%

Any Additional Sources of Data:

Details: Occasional statistics from local hospitals

Data Concerns:

Too Few Drivers Tested

Alcohol Underreported by Police

Too Few Pedestrians Tested

BAC Not Accurate

Other Explain Other:

Country: Finland

Percent of Alcohol Involvement: 24% of fatally injured drivers at .05 or higher

How is Alcohol Involvement Calculated? *Check all that apply*

Any Alcohol in Driver

Any Alcohol in Pedestrian

Police Suspicion

Illegal BAC for Driver

Illegal BAC for Pedestrian

Alcohol Measure for All Drivers

Alcohol Measure Only for Driver Fatality

Percent of Drivers Tested: compulsory

Percent of Pedestrians Tested:

Autopsies

Percent of Drivers Autopsied:

Driver Autopsies Reported:

Percent of Pedestrians Autopsied:

Pedestrian Autopsies Reported:

Time of Death After Crash for Fatality:

Time of Alcohol Test after Crash for Alcohol Involvement:

Calculations to Adjust Data:

Details:

Any Additional Sources of Data:

Details:

Data Concerns:

Too Few Drivers Tested

Alcohol Underreported by Police

Too Few Pedestrians Tested

BAC Not Accurate

Other Explain Other:

Country: France

Percent of Alcohol Involvement: 19% at .05 or higher (1998)

How is Alcohol Involvement Calculated? *Check all that apply*

- Any Alcohol in Driver Any Alcohol in Pedestrian Police Suspicion
Illegal BAC for Driver Illegal BAC for Pedestrian Alcohol Measure for All Drivers
Alcohol Measure Only for Driver Fatality

Percent of Drivers Tested: approx. 90%

Percent of Pedestrians Tested: approx. 0%

Autopsies

Percent of Drivers Autopsied: approx. 10%

Driver Autopsies Reported: No

Percent of Pedestrians Autopsied: approx. 20%

Pedestrian Autopsies Reported: No

Time of Death After Crash for Fatality: 8 days

Time of Alcohol Test after Crash for Alcohol Involvement: Any reasonable time

Calculations to Adjust Data:

Details: Regarding time of death after crash: A theoretical coefficient is applied to give a one month result (# x 1.057)

Any Additional Sources of Data:

Details: Some local statistics in hospitals

Data Concerns:

- Too Few Drivers Tested Alcohol Underreported by Police
Too Few Pedestrians Tested BAC Not Accurate
Other **Explain Other:** Not enough autopsies; alcohol is only considered if there is a biological result (e.g., blood test), but impairment is not taken into account; lack of research of drugs

Country: Germany

Percent of Alcohol Involvement: 17% at .03 or higher (1997) The illegal BAC is .05 .

How is Alcohol Involvement Calculated? *Check all that apply*

- Any Alcohol in Driver Any Alcohol in Pedestrian Police Suspicion
Illegal BAC for Driver Illegal BAC for Pedestrian Alcohol Measure for All Drivers
Alcohol Measure Only for Driver Fatality

Percent of Drivers Tested: unknown - each State may determine testing rules. Testing only takes place if alcohol is suspected by police.

Percent of Pedestrians Tested: unknown - not obligatory, State may determine

Autopsies

Percent of Drivers Autopsied: unknown

Driver Autopsies Reported: No

Percent of Pedestrians Autopsied: unknown

Pedestrian Autopsies Reported: No

Time of Death After Crash for Fatality: 30 days

Time of Alcohol Test after Crash for Alcohol Involvement: No strict limit; blood tests after crash registered by police

Calculations to Adjust Data:

Details:

Any Additional Sources of Data:

Details:

Data Concerns:

- Too Few Drivers Tested Alcohol Underreported by Police
Too Few Pedestrians Tested BAC Not Accurate
Other Explain Other:

Country: Netherlands

Percent of Alcohol Involvement: 7.8% had any alcohol (1998) Illegal BAC is .05.

How is Alcohol Involvement Calculated? *Check all that apply*

Any Alcohol in Driver

Any Alcohol in Pedestrian

Police Suspicion

Illegal BAC for Driver

Illegal BAC for Pedestrian

Alcohol Measure for All Drivers

Alcohol Measure Only for Driver Fatality

Percent of Drivers Tested: 68.3% (mostly non-injured drivers, some injured drivers, very few dead drivers)

Percent of Pedestrians Tested: few cyclists; no pedestrians

Autopsies

Percent of Drivers Autopsied: annual average of less than 1 driver

Driver Autopsies Reported:

Percent of Pedestrians Autopsied:

Pedestrian Autopsies Reported:

Time of Death After Crash for Fatality: 30 days

Time of Alcohol Test after Crash for Alcohol Involvement: no fixed time

Calculations to Adjust Data:

Details:

Any Additional Sources of Data:

Details:

Data Concerns:

Too Few Drivers Tested

Alcohol Underreported by Police

Too Few Pedestrians Tested

BAC Not Accurate

Other Explain Other:

Country: New Zealand

Percent of Alcohol Involvement: 27% had any alcohol or drugs (1998). Illegal BAC is .08

How is Alcohol Involvement Calculated? *Check all that apply*

Any Alcohol in Driver Any Alcohol in Pedestrian Police Suspicion
Illegal BAC for Driver Illegal BAC for Pedestrian Alcohol Measure for All Drivers
Alcohol Measure Only for Driver Fatality

Percent of Drivers Tested: 70-75% killed in fatal crashes, Approximately 33% of all drivers in fatal crashes

Percent of Pedestrians Tested: Approximately 33% of pedestrians and cyclists over 15 years of age

Autopsies

Percent of Drivers Autopsied: 70-75% of drivers killed have post mortem blood test

Driver Autopsies Reported: Results of post mortem drug tests reported

Percent of Pedestrians Autopsied: unknown

Pedestrian Autopsies Reported: No

Time of Death After Crash for Fatality: 30 days

Time of Alcohol Test after Crash for Alcohol Involvement: unknown

Calculations to Adjust Data:

Details: Estimates applied for drivers not tested

Any Additional Sources of Data:

Details:

Data Concerns:

Too Few Drivers Tested Alcohol Underreported by Police

Too Few Pedestrians Tested BAC Not Accurate

Other **Explain Other:** While the current testing rate of 70-75% is high, ideally, would like to improve the alcohol testing rate of drivers killed.

Country: Norway

Percent of Alcohol Involvement: 8.8% - multi-vehicle; 32.9% - single-vehicle at .05 or higher
(1990 - more recent data not available because of privacy restrictions)

How is Alcohol Involvement Calculated? *Check all that apply*

Any Alcohol in Driver Any Alcohol in Pedestrian Police Suspicion
Illegal BAC for Driver Illegal BAC for Pedestrian Alcohol Measure for All Drivers
Alcohol Measure Only for Driver Fatality

Percent of Drivers Tested: < 60% (from autopsies)

Percent of Pedestrians Tested: unknown

Autopsies

Percent of Drivers Autopsied: < 60%

Driver Autopsies Reported: yes

Percent of Pedestrians Autopsied: not reported

Pedestrian Autopsies Reported: not reported

Time of Death After Crash for Fatality: 30 days

Time of Alcohol Test after Crash for Alcohol Involvement: unknown

Calculations to Adjust Data:

Details:

Any Additional Sources of Data:

Details:

Data Concerns:

Too Few Drivers Tested Alcohol Underreported by Police
Too Few Pedestrians Tested BAC Not Accurate
Other Explain Other:

Country: Spain

Percent of Alcohol Involvement: 41% had any alcohol. 29% over legal limit (.08) (Jan. and Feb. 1998)

How is Alcohol Involvement Calculated? *Check all that apply*

- Any Alcohol in Driver Any Alcohol in Pedestrian Police Suspicion
Illegal BAC for Driver Illegal BAC for Pedestrian Alcohol Measure for All Drivers
Alcohol Measure Only for Driver Fatality

Percent of Drivers Tested: 17.5%

Percent of Pedestrians Tested: unknown

Autopsies

Percent of Drivers Autopsied: unknown

Driver Autopsies Reported: No - autopsies reported to courts.

Percent of Pedestrians Autopsied: unknown

Pedestrian Autopsies Reported: No - autopsies reported to courts

Time of Death After Crash for Fatality: 30 days

Time of Alcohol Test after Crash for Alcohol Involvement: unknown

Calculations to Adjust Data:

Details:

Any Additional Sources of Data:

Details:

Data Concerns:

- Too Few Drivers Tested Alcohol Underreported by Police
Too Few Pedestrians Tested BAC Not Accurate
Other Explain Other:

Country: Sweden

Percent of Alcohol Involvement: 3.3% were suspected by police of alcohol involvement (official statistic). 18% had alcohol based on fatally injured drivers autopsied (1998)

How is Alcohol Involvement Calculated? *Check all that apply*

Any Alcohol in Driver Any Alcohol in Pedestrian Police Suspicion
Illegal BAC for Driver Illegal BAC for Pedestrian Alcohol Measure for All Drivers
Alcohol Measure Only for Driver Fatality

Percent of Drivers Tested: > 90% autopsied. Official statistics based on police suspicion only

Percent of Pedestrians Tested: > 90%

Autopsies

Percent of Drivers Autopsied: > 90%

Driver Autopsies Reported: No

Percent of Pedestrians Autopsied: > 90%

Pedestrian Autopsies Reported: No

Time of Death After Crash for Fatality: 30 days

Time of Alcohol Test after Crash for Alcohol Involvement: Official statistics based on police suspicion

Calculations to Adjust Data:

Details:

Any Additional Sources of Data:

Details: Road Administration collects police and autopsy data and combines them

Data Concerns:

Too Few Drivers Tested Alcohol Underreported by Police
Too Few Pedestrians Tested BAC Not Accurate
Other **Explain Other:** Police must have reasonable suspicion before a test can be performed. In many injury accidents they don't get a chance to form this suspicion. Law needs to be changed.

Country: United Kingdom

Percent of Alcohol Involvement: 10% of motorcyclists; 19% of cars and other motor vehicles at .08 or higher (1998)

How is Alcohol Involvement Calculated? *Check all that apply*

- Any Alcohol in Driver Any Alcohol in Pedestrian Police Suspicion
Illegal BAC for Driver Illegal BAC for Pedestrian Alcohol Measure for All Drivers
Alcohol Measure Only for Driver Fatality

Percent of Drivers Tested: 68% (48% by police, 20% by coroners courts)

Percent of Pedestrians Tested: 39% of pedestrians; 39% of cyclists

Autopsies

Percent of Drivers Autopsied: A post mortem should be carried out in all cases, though a blood alcohol test may not be performed

Driver Autopsies Reported: All police accident reports on fatal accidents (which include Coroner's report) are forwarded to Transport Research Laboratory

Percent of Pedestrians Autopsied: A post mortem should be carried out in all cases, though a blood alcohol test may not be done

Pedestrian Autopsies Reported: All police accident reports on fatal accidents (which include Coroner's report) are forwarded to Transport Research Laboratory

Time of Death After Crash for Fatality: 30 days

Time of Alcohol Test after Crash for Alcohol Involvement: no precise limit

Calculations to Adjust Data:

Details: Method is described in detail in "Road Accidents Great Britain" (1989). Number of fatal accidents where a driver or rider died with illegal BAC is estimated from Coroners' and Procurators' Fiscal Data; number of accidents where surviving driver or rider had illegal BAC is estimated from data, based on a calculation of the proportion of these alcohol-related accidents that can be identified from the STATS 19 breath test data.

Also, the number of fatal accidents where a driver with an illegal BAC dies are multiplied by a scaling factor based on the proportion of dead drivers for whom a BAC is known. In recent years this scaling factor has been around 1.6 to 1.7.

The number of fatal accidents where a driver with an illegal BAC survives is scaled up to allow for hit and run accidents where a driver is not traced. In recent years this scaling factor has been 1.1 to 1.2.

Any Additional Sources of Data:

Details: More detailed accident investigation studies carried out by Transport Research Laboratory. A variety of sources are available relating to background levels of drinking and driving from Home Office and DETR research.

Data Concerns:

- Too Few Drivers Tested Alcohol Underreported by Police
Too Few Pedestrians Tested BAC Not Accurate
Other Explain Other: Time lag in collating data.

Country: United States

Percent of Alcohol Involvement: 38.6% at .01 or higher, 30% at .10 or higher. Illegal BAC .08 or .10, depending on state.

How is Alcohol Involvement Calculated? *Check all that apply*

Any Alcohol in Driver

Any Alcohol in Pedestrian

Police Suspicion

Illegal BAC for Driver

Illegal BAC for Pedestrian

Alcohol Measure for All Drivers

Alcohol Measure Only for Driver Fatality

Percent of Drivers Tested: 63% of fatally injured drivers

Percent of Pedestrians Tested:

Autopsies

Percent of Drivers Autopsied:

Driver Autopsies Reported:

Percent of Pedestrians Autopsied:

Pedestrian Autopsies Reported:

Time of Death After Crash for Fatality: 30 days

Time of Alcohol Test after Crash for Alcohol Involvement: no time limit

Calculations to Adjust Data:

Details: Methodology can be obtained from National Highway Traffic Safety Administration

Any Additional Sources of Data:

Details:

Data Concerns:

Too Few Drivers Tested

Alcohol Underreported by Police

Too Few Pedestrians Tested

BAC Not Accurate

Other **Explain Other:** Reporting rates vary from State to State

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