DECLINE IN DRINK DRIVING AND ALCOHOL RELATED FATAL CRASHES IN AUSTRALIA

A.J. McLean, NHMRC Road Accident Research Unit, University of Adelaide, Australia

ABSTRACT

In this paper, trends in road accident fatalities in Australia are presented in terms of both numbers and rates for the period from 1981 to 1992. The data for Australia as a whole in 1990 are then compared with similar data for certain other countries and for selected states and territories within Australia. Trends in fatalities by type of road user are also noted. Data for the past 11 years on the percentage of driver and rider fatalities with a blood alcohol concentration (BAC) above the legal limit are then presented for Australia and for selected regions. Particular attention is paid to the state of South Australia because roadside breath alcohol survey data are available over the period from 1979 to 1993 for the Adelaide metropolitan area. Such trends that are apparent in the percentage of fatally injured drivers and motorcycle riders with a BAC above 0.08 in that area are compared with changes in the percentage of non-accident involved drivers above 0.08 over the same period and considered in relation to various interventions which were intended to modify drink driving behaviour. The paper concludes with a discussion of the likely importance of these interventions.

INTRODUCTION

The largest number of persons to have died in one year on Australian roads was 3,798 in 1970. Since then there has been a reduction of 48 per cent to 1,977 deaths in 1992. (1) Most of this reduction (39 per cent) occurred in the last 10 years and more than half (29 per cent) since 1989, a period of depressed economic activity in Australia as in many other countries.

The fatality reductions have varied by type of road user. From 1981 to 1992 they were greatest for pedestrians (56 per cent) and motorcyclists (53 per cent) followed by pedal cyclists (44 per cent). The reduction in fatalities for vehicle occupants was the same for drivers as for passengers, at 36 per cent. (1)

The percentage reductions in both population based and distance travelled death rates have been greater than those based on numbers of fatalities alone. In 1970 there were 30.4 deaths per 100,000 population; in 1992 this rate was 11.2, a reduction of 63 per cent. (1) The earliest year for which distance travelled rates are available is 1976, when there were 3.6 fatalities per 100 million vehicle kilometres travelled; in 1992 this figure was 1.3, a reduction of 64 per cent. Figure 1 shows that the changes in these two rates since 1981 have been very similar.

These rates for Australia are placed in an international perspective in Table 1 (1). It can been seen that the population-based rate for Australia in 1990 was lower than that for the United States, similar to that for Germany and higher than those for Sweden and the United Kingdom. There was less difference in the distance travelled-based rates, with Germany being the highest at 1.7 deaths per 100 million vehicle kilometres travelled followed by Australia at 1.5 and Sweden the lowest of these five countries at 1.2.

Within Australia these two rates for some of the states and territories differ greatly from the national average. The Australian Capital Territory (ACT), which includes Canberra, had population and distance travelled based death rates of 9.0 deaths per 100 thousand population and 1.0 deaths per 100 million vehicle kilometres travelled, respectively, in 1990, whereas the corresponding rates for the Northern Territory were 42.9 and 7.2. These differences in road accident fatality rates can be attributed to a large degree to considerable geographic and demographic differences between the two territories. Canberra has been developed as a planned city and a high proportion of the population is employed by the Federal Government. The Northern Territory is one of the most sparsely populated regions in the world, with many of the demographic characteristics commonly associated with such regions. The two main highways are the only roads which have a sealed, all weather, surface and there is no open road speed limit.

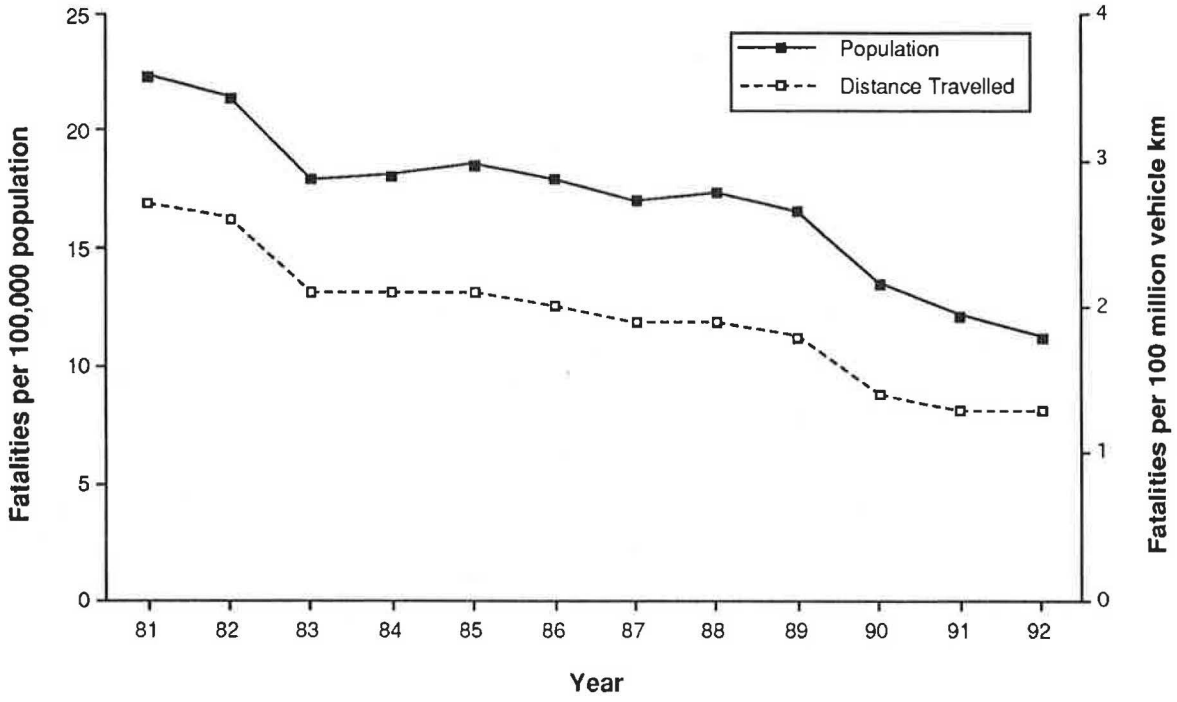

FIGURE 1 Fatality rates on a population and distance traveled basis, Australia; 1981 - 1992.

TABLE 1 Road crash fatality rates by country (1990)

	Fatality Rate	
Country	Population based [1]	Distance travelled based [2]
Australia	13.7	1.5
Germany	12.6	1.7
Sweden	9.0	1.2
UK	9.4	1.3
USA	17.9	1.3

Notes: [1] Deaths per 100,000 population per year
[2] Deaths per 100 million vehicle km travelled per year

Figure 2 shows the trend in the number of driver and motorcycle rider fatalities in the State of South Australia from 1979 to 1992. These data are also broken down into those fatalities that occurred in the Adelaide metropolitan area (population one million) and the remainder of the State (population 400,000). The total area of South Australia is greater than that of France and Germany combined and about 30 per cent greater than that of the State of Texas. As would be expected from the comparatively small population, the number of driver and rider fatalities has varied considerably from year to year since 1979. However, there has been a general reduction since 1985, a year in which there was a substantial increase in fatalities in the Adelaide metropolitan area compared to the preceding six years.

BLOOD ALCOHOL LEVELS: DRIVER AND RIDER FATALITIES

The percentage of Australian drivers and riders who had a blood alcohol concentration above the legal limit when they were fatally injured is shown for the past 11 years in Figure 3. (1) There has been a decrease from 44 per cent in 1981 to 30 per cent in 1992. It should be noted that these data refer to the legal blood alcohol limit for drivers in the state in which the fatality occurred. For most of this time period the more populous states had a limit of 0.05 g/100mL whereas the remaining states had a limit of 0.08.

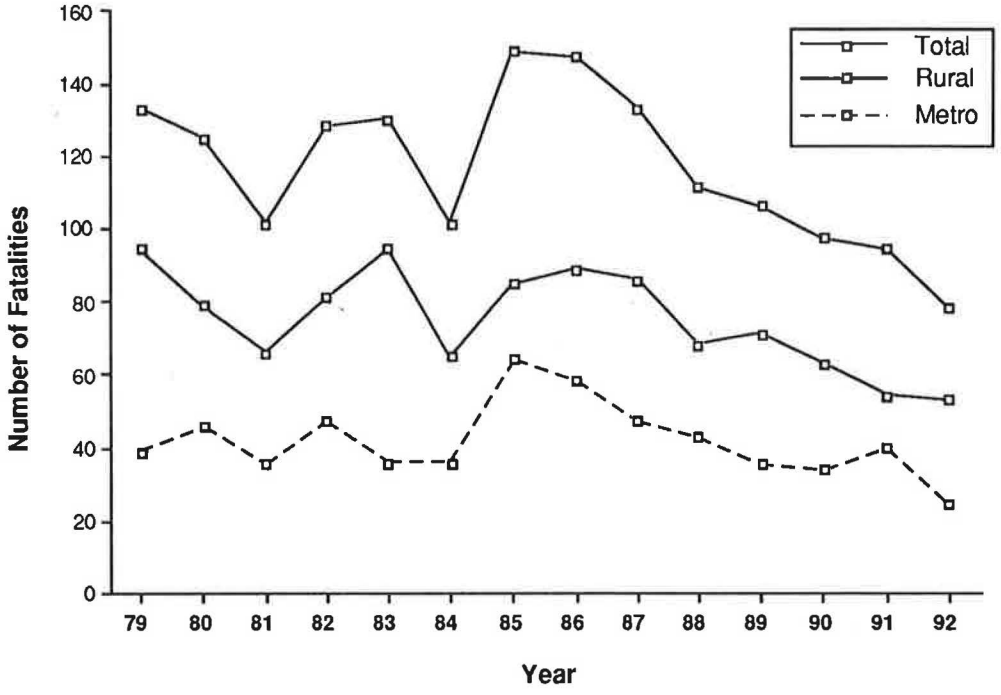

FIGURE 2 Number of driver and rider fatalities, South Australia; 1979 - 1992.

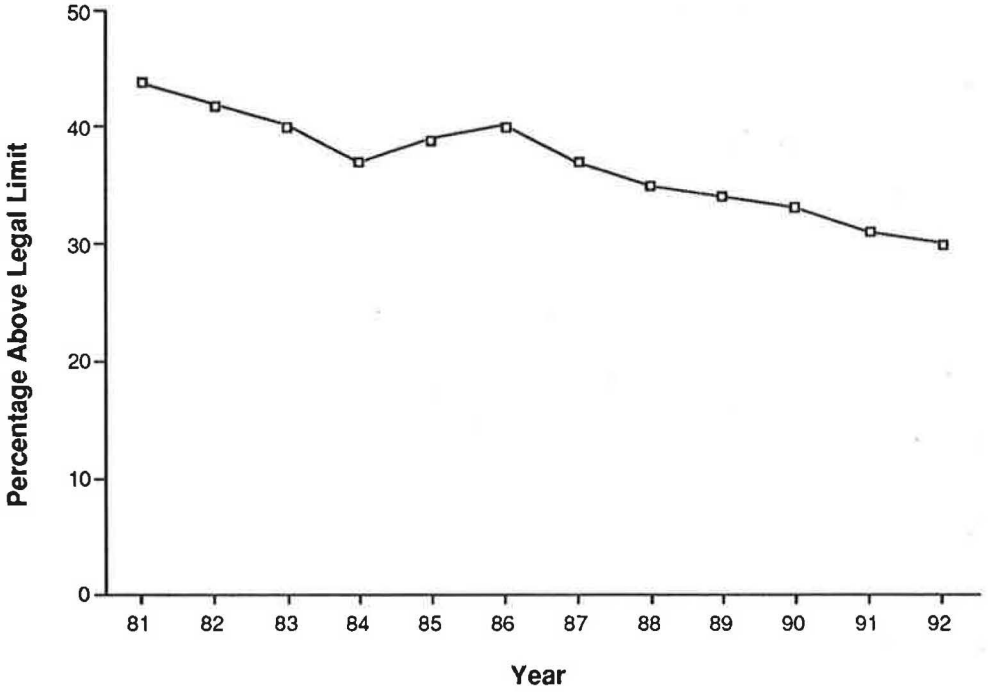

FIGURE 3 Driver and rider fatalities with BAC above legal limit, Australia; 1991 - 1992.

As with the data on fatality rates, the percentage of fatally injured drivers above the legal limit varies markedly between some of the states and territories. In Figure 4 it can be seen that the trend for the State of New South Wales (NSW) is similar to that for Australia as a whole, as shown in Figure 3. (1) However, the corresponding data for the Northern Territory ranges from 71 per cent of drivers and motorcycle riders with a blood alcohol

concentration above the legal limit in 1981 to 33 per cent in 1988, returning to 58 per cent in 1992. The considerable variability from year to year in these percentages for the Northern Territory reflects the comparatively small number of fatalities. For the same reason, the data for the Australian Capital Territory vary widely from a peak of 57 per cent in 1983 to zero for 1990 and 1991 (these data were not available for 1992). (The total number of driver and motorcycle rider fatalities in the ACT in 1992 was eleven.)

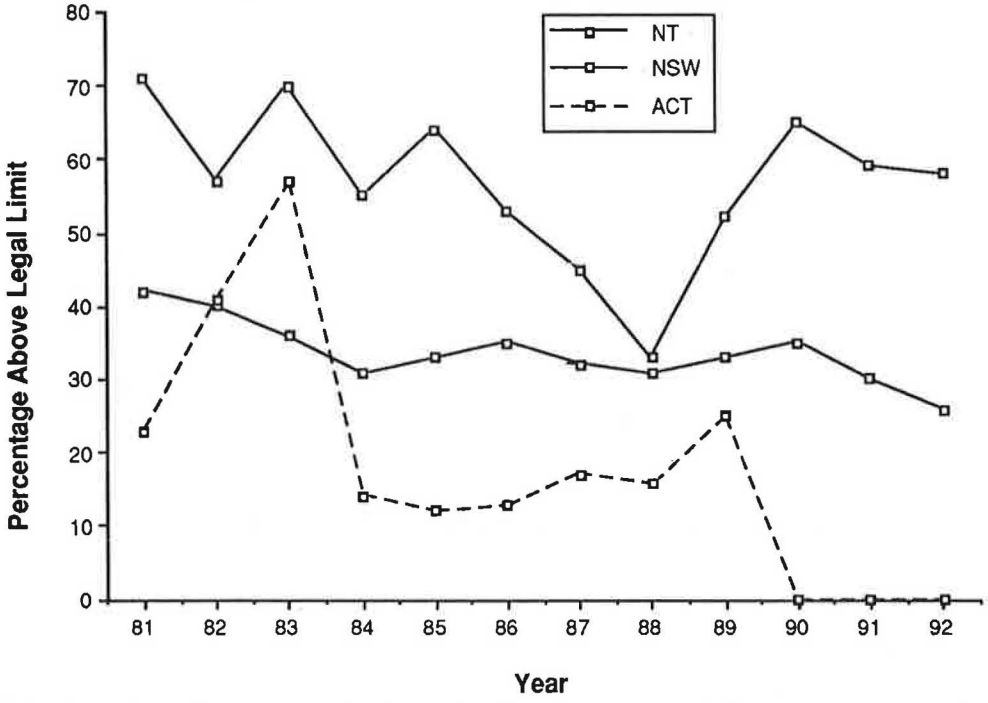

FIGURE 4 Driver and rider fatalities with BAC above legal limit.

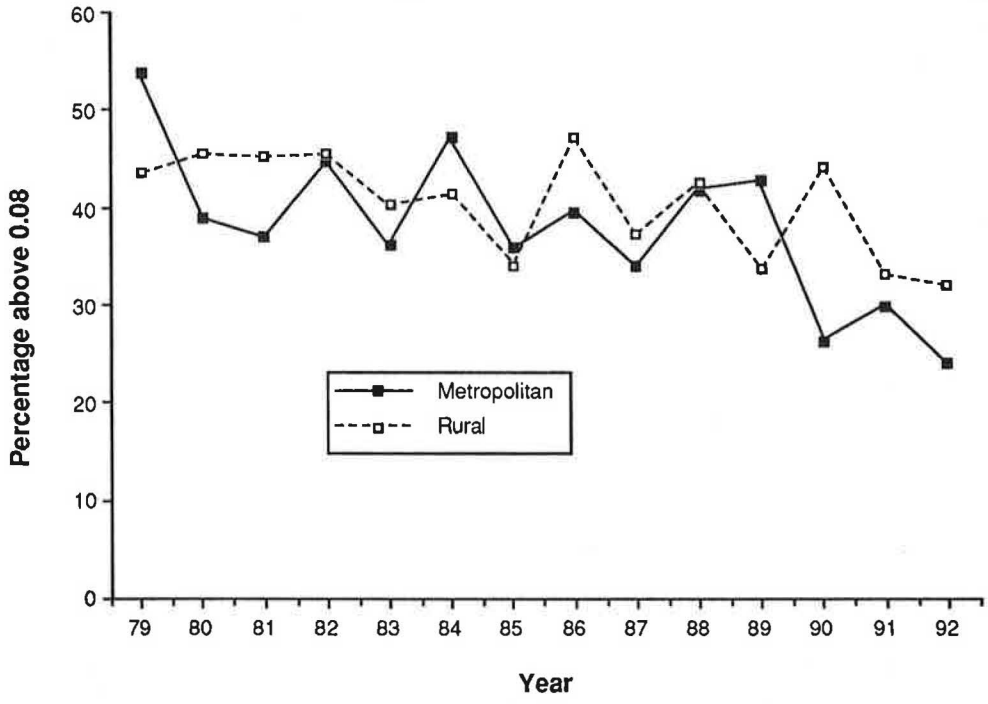

FIGURE 5 Driver and rider fatalities BAC above 0.08, South Australia; 1979 - 1992.

The percentage of fatally injured drivers and motorcycle riders with a blood alcohol concentration above 0.08 is shown in Figure 5, for urban and rural areas of South Australia. Once again there has been considerable variation from year to year. Nevertheless, in the Adelaide metropolitan area there was a marked reduction from 1979 to 1980 and 81 and a similarly marked reduction from 1989 to 1990-2. Overall, from 1979 to 1992 the percentage of fatally injured drivers and motorcycle riders who had a BAC above 0.08 decreased by more than 50 per cent.

BLOOD ALCOHOL LEVELS: DRIVERS NOT IN ACCIDENTS

Since 1979, the Road Accident Research Unit at the University of Adelaide has been conducting roadside breath alcohol surveys in the Adelaide metropolitan area, mostly between the hours of 10 pm to 3 am. Figure 6 shows the distribution of BACs for drinking drivers as measured in these surveys in three categories: greater than zero, above .05, and above .08. (2 to 5) It can be seen that, with the exception of the early 1980s, there has been a steady decrease in drink driving in all of the three BAC categories; the change in the percentage of drivers above 0.08 largely mirroring the positive It should be noted that the sample size for the 10 pm to 3 am period in the 1979 roadside survey, which was designed to sample 24 hours a day, seven days a week, is small compared to that of subsequent years when each survey covered about seven thousand drivers. Consequently the confidence band of the estimate of the percentage of drivers who were above 0.08 is comparatively wide for the 1979 survey. Nevertheless the consistency in the trend of positive BAC's from 1979 to the early 1980s, suggests that the percentage above 0.08 shown for the 1979 survey is unlikely to be misleading.

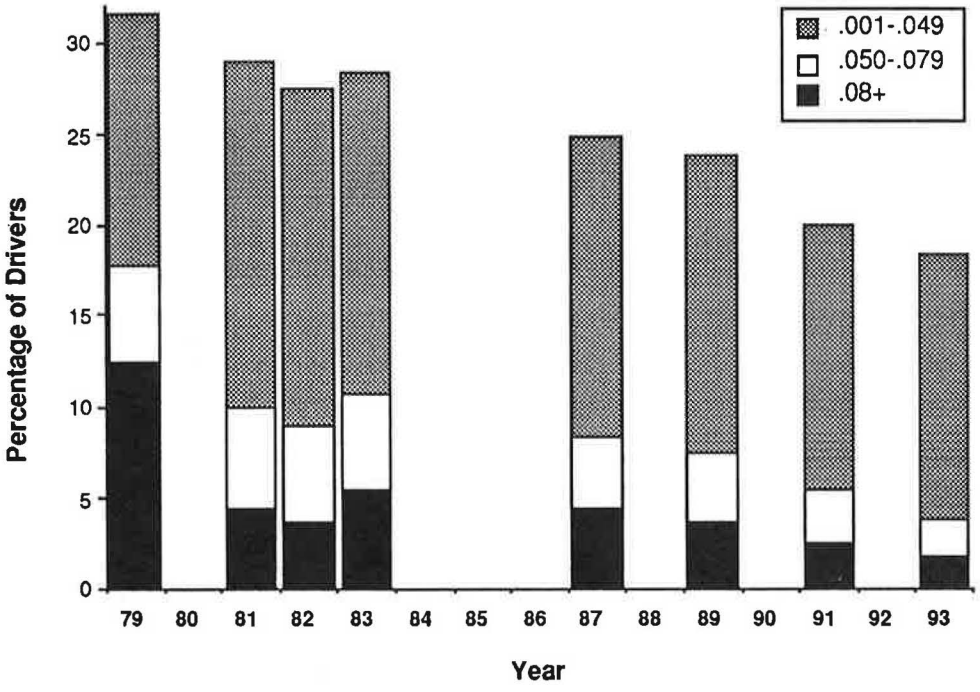

FIGURE 6 Night time drink driving by year 10 p.m. - 3 p.m.; Adelaide, South Australia.

In Figure 7, the percentage of drivers above 0.08 in these roadside surveys is plotted by year, together with the percentage of fatally injured drivers and riders who were above the same BAC level in the Adelaide metropolitan area from 1979 to 1992. There is considerable variability from year to year in the fatality data, and many of these fatalities would have occurred outside the hours of 10pm to 3am when the roadside surveys were conducted. Nevertheless, there is a general correspondence between the decrease in fatalities and the decrease in the percentage of drivers above 0.08 from 1979 to 1992.

DRIVER AND RIDER FATALITY BACs AND ROADSIDE SURVEY

In Figure 8 the data which were shown in Figures 6 and 7 for the percentage of drivers in the roadside surveys who were above 0.08 are reproduced, together with annotations on the timing of various interventions. These interventions comprised the introduction of random breath alcohol testing (RBT) by the police, a widely publicised increase in the level of enforcement of RBT, a publicity campaign, and a reduction in the legal blood alcohol limit for drivers from 0.08 to 0.05.

The introduction of random breath testing in 1981 was preceded by vigorous public debate extending over a period of more than a year. (3) It is thought likely that the media publicity engendered by this debate resulted in a considerable reduction in the level of illegal drink driving. If this surmise is correct, it could provide some explanation for the comparatively small reduction in illegal drink driving observed in the six months following the introduction of random breath testing.

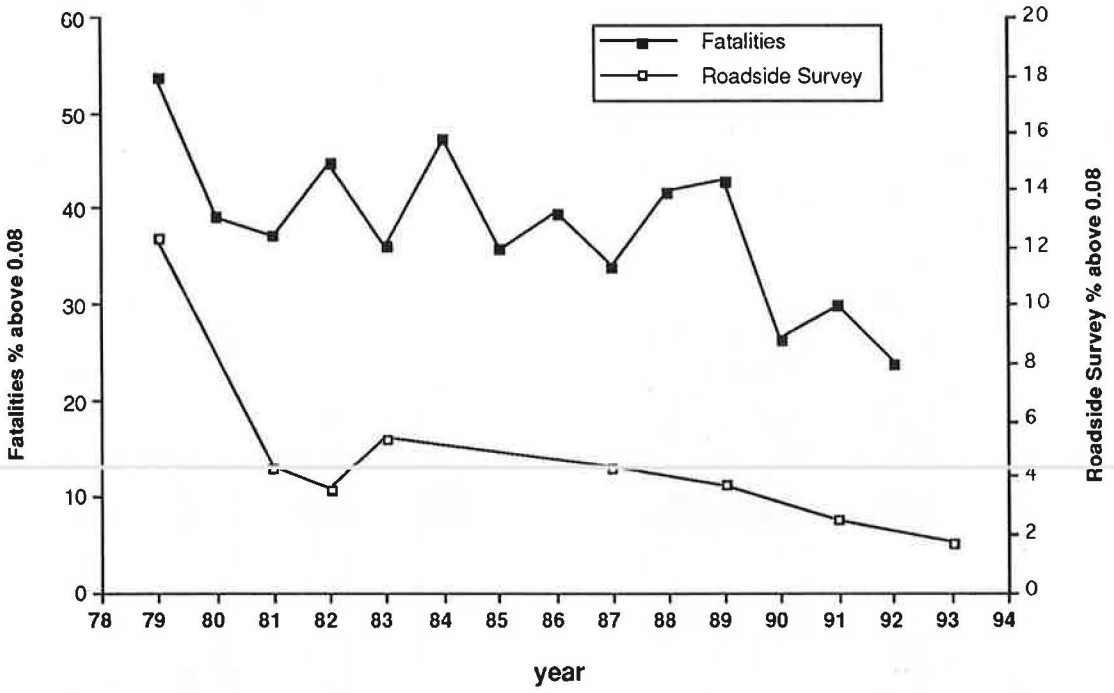

FIGURE 7 Driver and rider fatality BACs and roadside survey BACs, metropolitan area, South Australia; 1979 - 1993.

For largely political reasons, when random breath testing was introduced in South Australia, it was conducted at a minimal level, with only one unit operating in the Adelaide metropolitan area. The police were also constrained by the legislation of the time to operate only on major arterial roads. Consequently, police random breath testing operations were able to be seen from some distance away on the long straight roads which are characteristic of the Adelaide area. It therefore soon became known to drivers that it was possible to see the police RBT check points in time to avoid them.

At the NHMRC Road Accident Research Unit, we were able to demonstrate that this was the case. (6) Prompted by the finding that in our roadside surveys we were detecting three times the percentage of drivers above the legal limit as were the police, we stationed an observer in an unmarked car one block before the random breath testing check points and recorded the proportion of vehicles which changed direction, or sometimes simply stopped and waited, to avoid passing the check point. A week later we returned to the same site when the police were not there and conducted similar counts of vehicles changing direction, and so on. In this way we were able to show that the difference in percentages from the police data to our roadside survey data could be entirely accounted for by this phenomenon.

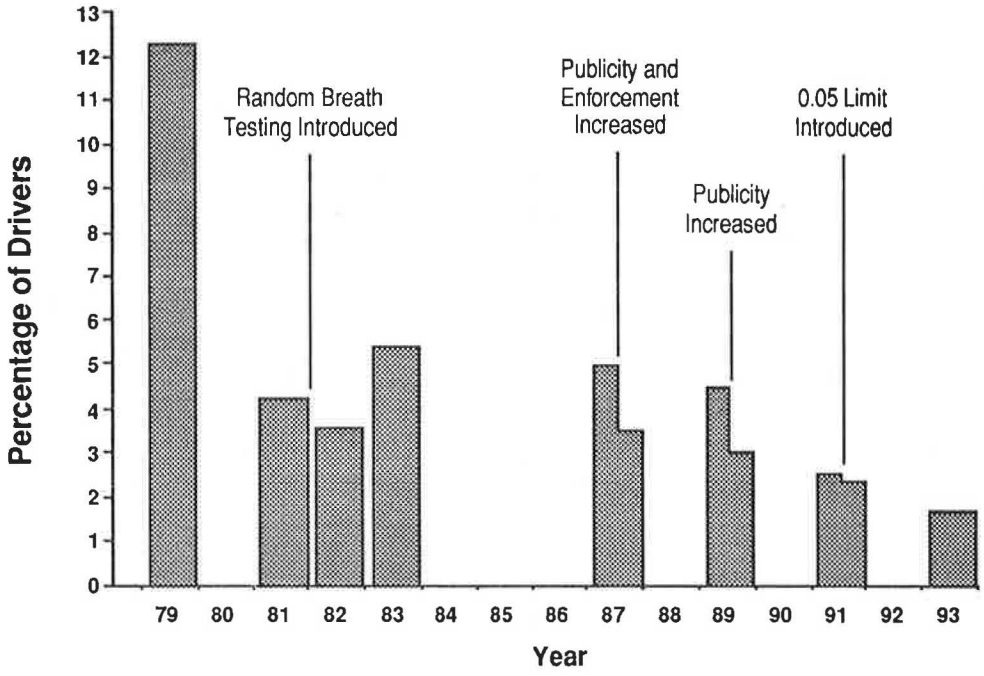

FIGURE 8 Percentage of drivers above 0.08 by various interventions, 10 p.m. - 3 a.m., Adelaide, South Australia.

We also found that in the 18 months following the introduction of random breath testing there was no reduction in late night single vehicle casualty crashes in Adelaide. However, there was a substantial shift in the location of these accidents from arterial roads to the back streets where random breath testing was not conducted. (6) It seems that many drivers soon came to realise that the risk of encountering a police RBT check point was minimal and that even if they did it was easy to avoid. It was therefore not surprising that the decrease in illegal drink driving which followed the introduction of RBT was short lived. By 1983 the level of illegal drink driving was greater than that which had existed during the debate two years earlier on whether or not to approve random breath alcohol testing by the police. (3)

No further surveys were conducted until 1987, when we were advised that resources had been made available for the police to increase the level of random breath testing to approximate that in operation in the State of New South Wales which, on average, meant that one driver in three would be tested each year. This change was not publicised in advance but was accompanied by, in South Australian terms, a major publicity campaign. The 1987 roadside survey was designed to evaluate the effect of these changes. As can be seen in Figure 8 there was indeed a substantial reduction in illegal drink driving. (4)

Two years later another survey was conducted at the same time of the year. We found that the level of illegal drink driving had increased during the intervening two years from 1987 and that, once again, there was a substantial decrease following, on this occasion, a publicity campaign. (5)

In 1991 the legal blood alcohol limit for drivers was reduced from 0.08 to 0.05 g/100mL in South Australia. As with the introduction of random breath testing, this change was preceded by considerable public debate which may have contributed to a reduction in the level of illegal drink driving which we observed in a roadside survey we conducted before the lower limit was actually introduced. Immediately following the introduction of the limit we conducted a second roadside survey, again over a three month period. In the first half of that survey we observed a reduction of more than 27 per cent in the proportion of drivers who were above 0.08. However, in the second half, the residual reduction was about six per cent.

Figures 6 to 8 also show that in the most recent survey, conducted earlier this year, the percentage of drivers who were above 0.08 was the lowest yet. (This blood alcohol level is referred to here for consistency in the assessment of time trends in drink driving, even though it is no longer the legal limit for drivers in South Australia.)

TRENDS IN ALCOHOL CONSUMPTION

The observed decline in drink driving has been accompanied by a decline in alcohol consumption. The apparent annual consumption of absolute alcohol per person aged 15 years and over in Australia decreased by 26 per cent from a peak of 12.7 litres in 1981-83 to 10.1 litres in 1991. The consumption of beer, which is by far the alcoholic beverage most likely to be associated with illegal drink driving, decreased by 22 per cent. (7,8)

There has been a marked change in beer drinking from the mid 1980s. Low alcohol beer (about 2.4 per cent alcohol by volume compared to about 4.8 per cent for regular beer) has assumed an increasing proportion of beer sales. Consequently the per capita consumption of alcohol in the form of beer by persons over 14 years of age has decreased by 29 per cent from 1980 to 1991. There are indications that this trend towards the consumption of "light" beer in preference to regular beer is accelerating. A recent survey in the Northern Territory concluded that light beer accounted for 52 per cent of the beer consumed in 1992, up from 27 per cent in 1991. (9) These changes, and a longer duration trend towards the sale of packaged beer rather than by the drink, are consistent with the decline in drink driving but they obviously do not in themselves provide an explanation for the reduction in either drinking or drink driving behaviour.

THE RELEVANCE OF RANDOM BREATH TESTING

The South Australian experience of random breath testing by the police in some ways provides more information on the relevance of RBT than does the initially more successful program in New South Wales. This is not simply because roadside survey data are available for the period before and following the introduction of RBT in South Australia but rather because the program clearly did not achieve the aim of reducing road accident fatalities during the first few years. When the level of enforcement was increased to about the level which had existed from the inception of RBT in NSW, there were clear signs of an effect on illegal drink driving and an accompanying reduction in fatalities. This does not mean that RBT was the only factor influencing drinking drivers. It is almost certain that publicity, both formal and informal, about drink driving and its possible consequences, is of comparable importance. Nevertheless, most of the drink driving publicity seen in South Australia since 1980 has been associated with RBT.

There are, of course, other approaches to influencing the behaviour of the drinking driver. In NSW, when RBT was introduced there was an almost immediate reduction of about one quarter in the road accident fatality rate, stabilising to a reduction of about one fifth four years later. In the State of Queensland, which did not introduce RBT at that time, there was a similar reduction of one fifth in the fatality rate over the same four year period (10). However the police in Queensland had a little publicised program known informally as "target testing". A plain clothed police officer in an unmarked car parked in a hotel car park would radio to a patrol car to watch for a particular vehicle leaving the hotel, based on the behaviour of the driver as he or she "walked" to their car (11). Queensland now has an RBT program, but the above comparison suggests that there are obvious benefits in both random and specific testing (for a thorough and detailed dissertation on general and specific deterrence of drink driving in Australia, see reference 10).

CHANGES IN THE RISK OF ACCIDENT AND INJURY

Finally, when attempting to relate drink driving countermeasures to changes in fatality rates over a long period, it is appropriate to note that there have been many other changes, unrelated to drink driving, which have reduced the road accident fatality risk. In Australia, seat belt wearing rates, at least in urban areas, are now close to 100 per cent. Older cars, which were not fitted with seat belts, are rarely seen on the roads. In addition to vehicle safety measures, the safety of the road and traffic system has also improved. It is possible that these changes may have been of particular benefit to the drinking driver, if one accepts a positive association between such drivers and older, and hence cheaper, cars and the well established link with single vehicle crashes.

REFERENCES

1. Federal Office of Road Safety. Road fatality statistics Australia: monthly report. Canberra: Department of Transport and Communications, 1993.

2. McLean AJ, Holubowycz OT, Sandow BL. Alcohol and crashes: identification of relevant factors in this association. Adelaide: Road Accident Research Unit, University of Adelaide; 1980.

3. McLean AJ, Clark MS, Dorsch MM, Holubowycz OT, McCaul KA. Random breath testing in South Australia: effects on drink-driving, accidents and casualties. Adelaide: NH&MRC Road Accident Research Unit, University of Adelaide; 1984.

4. McCaul KA, McLean AJ. Effectiveness of random breath testing related to enforcement level and publicity. In: Perrine MWB, editor. Proceedings of the International Conference on Alcohol, Drugs and Traffic Safety. Chicago: National Safety Council, 1990:721-727.

5. McLean AJ, Kloeden CN, McCaul KA. Drink-driving in the general night-time driving population: Adelaide, 1989. Aust J Public Health 1991;1 5:190-193.

6. McLean AJ, Holubowycz OT. Side effects of random breath testing by the police. In: Noordzij PC, Roszbach R, editors. Alcohol, Drugs and Traffic Safety - T86. Amsterdam: Elsevier Science Publishers (Biomedical Division) 1987: 441-442.

7. Commonwealth Department of Community Services and Health. Statistics on drug abuse in Australia 1989: an information document for use in association with the National Campaign Against Drug Abuse. Canberra: Australian Government Publishing Service, 1990.

8. Department of Health, Housing and Community Services. Statistics on drug abuse in Australia 1992: an information document for use in association with the National Campaign Against Drug Abuse. Canberra: Australian Government Publishing Service, 1992.

9. d'Abbs P. Alcohol use in the Northern Territory February-March 1992: report on a survey conducted by the Alcohol Policy Unit, Department of the Chief Minister. Darwin: Menzies School of Health Research, 1992.

10. Homel R. Policing and punishing the drinking driver: a study of general and specific deterrence. New York: Springer-Verlag, 1988.

11. McLean AJ. Alcohol, drugs and road accidents. Med J Aust 1983;1:596-597.

ACKNOWLEDGEMENTS

The assistance of Craig Kloeden and Vivienne Moore in the preparation of this paper is gratefully acknowledged, as is the support of the Australian National Health and Medical Research Council and the Office of Road Safety of the South Australian Department of Transport.