RANDOM BREATH TESTING IN SOUTH AUSTRALIA:

EFFECTS ON DRINK-DRIVING, ACCIDENTS AND CASUALTIES

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ABSTRACT : Random breath alcohol testing (RBT) by the police was introduced in South Australia in October 1981 for a trial period of three years. Changes in attitudes to drink-driving, in blood alcohol concentrations (BACs) of the general driving population, in the characteristics of accidents and the BACs of road accident casualties were measured to determine the effectiveness of the RBT programme in the Adelaide metropolitan area.

30,000 drivers were sampled in three roadside breath alcohol surveys conducted in early 1981, 1982 and 1983. There was an initial reduction in the proportion of drivers above the legal BAC limit of 0.08 after RBT started. A year later this effect was no longer obvious. The proportion of drivers who had been drinking was also reduced initially, and was still low a year later.

The attitudes of drivers to drink-driving were consistent with their self-reported drinking behaviour but were not good predictors of their actual drink-driving behaviour. No adequate information was available on the involvement of alcohol in accidents. RBT units were located on main roads. The proportion of late night single vehicle crashes on back streets doubled after the introduction of RBT.

The BAC distribution of all road accident casualties was constant from 1979 through 1983, with the exception of 1981 when there was a reduction in the proportion of drivers having a BAC below 0.15. This change was most marked at the end of 1981, after RBT had started.

* Non IRRD Keywords

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1. INTRODUCTION

This Unit was asked by the State Government in November 1980 to plan an evaluation of random breath testing (RBT) by the police. This enabled us to collect information on the extent of drink-driving in the general driving population before a law authorizing the police to conduct RBT for a three-year period was passed by Parliament in June 1981. RBT operations commenced on 15 October 1981.

In this report we describe how we conducted the evaluation and what the results were. Chapter 2 is a summary of the main findings and our recommendations. Chapter 3 deals with our surveys of the blood alcohol concentrations (BACs) of the general (non-accident-involved) driving population and of attitudes to drinking and driving. Chapter 4 reports on the effect of RBT on accidents and casualties. The last Chapter, 5, discusses apparent differences between some of our results and those obtained by the police RBT units.

2. SUMMARY AND RECOMMENDATIONS

The main findings from our evaluation of the effects of random breath testing (RBT) in South Australia are summarized here. The summary is followed by recommendations for action based on the findings.

2.1 THE EFFECT OF RBT ON DRINK DRIVING

2.1.1 Overall Effect of RBT on Drink Driving

For every 100 drivers who were above the legal limit of 0.08 seven months before RBT started, there were only 86 a year later. A year after that, when RBT had been operating for 17 months, the proportion of drivers above 0.08 had returned to the pre-RBT figure (2.7 per cent).

Seven months before RBT started, 19.1 per cent of drivers had been drinking. For every 100 of these drinking drivers, there were only 86 five months after RBT had been introduced. A year later this number had increased to 90, still well below the pre-RBT level.

These findings mean that the initial effect of RBT on all drinking drivers was of the same order as its effect on those drivers above 0.08. A year later, in 1983, the residual effect was concentrated among light drinkers, some of whom gave up drinking altogether before driving.

2.1.2 Male and Female Drivers

We found that male drivers were more than twice as likely to have been drinking than were female drivers, and about four times as likely to have been above 0.08. The effects of RBT noted above were confined almost entirely to males; there was almost no direct effect on the drink-driving behaviour of female drivers. Nevertheless we did find that RBT has resulted in females being more likely to drive their male companions home late at night than was the case some years earlier.

2.1.3 Young Drivers

Young drivers were less likely to have been drinking and less likely to be above 0.08 than were older (over 20 years of age) drivers. However RBT appeared to have no effect on drink-driving in general by young drivers, although it may have reduced, temporarily, the percentage who were above 0.08.

2.1.4 Time of Day and Day of Week

The level of drink-driving increases late at night and late in the week. Such effect that RBT had in reducing the percentage of drivers above 0.08 was most marked at these times.

2.1.5 Regions of the Metropolitan Area

We divided the inner metropolitan area into four regions: South-East, South-West, North-East and North-West. There were no consistent differences in drink-driving behaviour between these regions at any stage.

2.1.6 Comparison with Police RBT Data

We consistently recorded a higher percentage of drivers above 0.08 than did the police RBT stations. Most of this difference was due to drivers deliberately avoiding the police units.

2.2 RBT AND ATTITUDES TO DRINKING AND DRIVING

2.2.1 Reported Drinking Behaviour

Drivers as a whole slightly increased their reported frequency of drinking over the period of our evaluation. RBT appeared to reduce the reported number of drinks per session initially, but a year later drivers reported consuming more drinks per session than before RBT started.

Young drivers' (under 21 years of age) reported frequency of drinking did not change, but their reported number of drinks per session increased steadily, despite the introduction of RBT.

2.2.2 Likelihood of Driving When Above 0.08

Most drivers reported that they were less likely to drive if they thought that they were above 0.08 after RBT began. This change dissipated a little with time but not entirely.

Drinking drivers under 21 years of age differed from other drivers in that their reported likelihood of driving with a BAC above 0.08 increased over the period of our evaluation.

2.2.3 Likelihood of Being Caught if Driving When Above 0.08

In 1982, after RBT had been introduced, most drivers thought that they were a little more likely to be caught by the police if they drove when they were above 0.08 than they had thought in 1981. This assessment of the risk of apprehension did not change over the following twelve months.

Once again, young drinking drivers went against the general trend. They thought that the risk of being caught was decreasing.

2.2.4 Do Attitudes Determine Drink-Driving Behaviour?

We found that changes in attitudes to drink-driving, as we were able to measure them, were not closely related to changes in drink-driving behaviour.

2.3 THE EFFECT OF RBT ON ACCIDENTS AND CASUALTIES

2.3.1 Fatal and Casualty Accidents

Fatal accidents decreased in 1981, mostly in country areas. There was a reduction in casualty accidents in 1980 which was sustained in 1981, again primarily in the rural part of the State. RBT may have played a role in these changes, or in sustaining them, but it is not clear from these data that it did.

2.3.2 BACs of Accident-Involved Drivers

There is very little reliable information on the BACs of accident-involved drivers. The police do not attend all casualty accidents and they do not breath test all uninjured drivers when they do attend. Only a very small fraction of the BACs that are obtained from police breath tests or from the analysis of hospital blood samples eventually appear in official accident statistics.

In the absence of reasonably complete and reliable information we have not been able to assess the effect of RBT on the BACs of accident-involved drivers.

2.3.3 Alcohol-Related Crashes

Accidents which occur late at night, particularly those involving only one vehicle, are known to be strongly alcohol-related.

There was a short-lived reduction in late-night casualty accidents, including single vehicle crashes, in the metropolitan area following the introduction of RBT. There were no similar reductions in country areas.

2.3.4 Accidents on Main Roads and Back Streets

The proportion of late-night casualty accidents which occurred on back streets rather than on main roads in the metropolitan area increased by over 20 per cent in the first year of RBT operations. At weekends the increase in the proportion was 50 percent, despite a net decrease in late-night casualty accidents.

As noted above, alcohol is known to play a major role in single vehicle crashes, particularly those which occur late at night. The proportion of this type of accident on back streets doubled after RBT was introduced (although the total number of these crashes decreased).

These findings are consistent with our observation of driver behaviour approaching RBT stations (Section 2.1.6) and with anecdotal evidence that many drinking drivers now avoid using main roads late at night.

2.3.5 BACs of Casualties Treated at Hospital

The recorded information on the BACs of road accident casualties who are treated at hospital is remarkably complete but it does not distinguish between drivers/riders and other road users. We have assumed that the proportion of drivers/riders among these casualties has remained reasonably constant over the past five years.

The initial effect of RBT in the metropolitan area was to reduce both the involvement of alcohol among road accident casualties and the BACs of many of the casualties who had been drinking. This effect was no longer apparent in 1983. Apart from late 1981 there was virtually no change in the BAC distributions for these casualties from 1979 through 1983.

The difference between the BAC distributions for these casualties and those for the non-accident-involved drivers in our roadside surveys was very large. About 14 percent of casualties had a BAC above 0.10 whereas only about 2 per cent of the non-accident-involved drivers were above that level. There was a relatively small difference in the percentage with a BAC greater than zero in the two groups: about 21 percent for the casualties and about 17 percent for the non-accident-involved drivers. This is consistent with the recognized increase in risk of being involved in a casualty accident as the driver's BAC increases.

2.4 RECOMMENDATIONS

2.4.1 RBT Operations

There is a clear need to increase both the actual and the perceived risk of the driver who is above 0.08 being apprehended by the police.

Far greater flexibility is needed in police RBT operations, including the authority to stop drivers on back streets as well as on main roads.

RBT operations should be most obvious late at night and at weekends, and uniformly distributed throughout major regions of the metropolitan area as at present.

2.4.2 Evaluating the Effectiveness of RBT

The approach to evaluating the effectiveness of RBT that was recommended by the first Legislative Council Select Committee on Random Breath Testing was highly commendable. We recommend that it be included in all new legislative countermeasures relating to road accidents.

Information on drivers' BACs collected during RBT operations reflects the way in which those operations are conducted as well as the BACs of the general driving population. The evaluation of the effectiveness of RBT should therefore not be based solely on information collected during enforcement activities.

Attitudes to drinking and driving do not correlate closely with actual drink-driving behaviour. The use of measurements of attitude change may therefore give a misleading indication of the effectiveness of educational or publicity campaigns in modifying such behaviour.

Much better information is urgently needed on the BACs of drivers who are involved in accidents. To continue with RBT without ensuring that its effectiveness can be monitored accurately from routinely-collected information would be false economy.

2.4.3 Understanding the Drinking Driver

The response to RBT of young drivers and drivers with high BACs differs from that of other drivers. The reasons for these differences should be more clearly understood so that appropriate changes can be made to improve the effectiveness of RBT.

3. ROADSIDE SURVEYS OF BLOOD ALCOHOL CONCENTRATIONS OF DRIVERS

3.1 INTRODUCTION

The NH&MRC Road Accident Research Unit roadside surveys had two primary aims. These were:

(1) to collect information on the drink-driving behaviour of the general driving population;

(2) to assess the attitudes of the general driving population to drinking and driving.

Blood alcohol concentrations (BACs) of random samples of drivers were measured in 1981, 1982 and 1983, following a procedure developed in 1979 (McLean, Holubowycz and Sandow, 1980). Some other information, such as the estimated age and sex of the driver, was also recorded. The results of these surveys are presented in this chapter and analysed to show the immediate and longer-term effects of random breath testing on drinking and driving patterns in Adelaide.

3.2 PROCEDURE

3.2.1 Testing Procedure

The NH&MRC Road Accident Research Unit neither had nor requested any legal authority to require a driver to stop and allow his BAC to be measured. The police were in no way involved, and there was no chance of prosecution of an intoxicated driver. The unobtrusive testing procedure was developed for use in a study in 1979, as described by McLean, Holubowycz and Sandow (1980).

The survey was conducted at 20 intersections controlled by traffic lights in the Adelaide metropolitan area. The investigators worked in teams of two, each team comprising one male and one female. One of the investigators approached the driver of the first car to stop at a red light, and told him/her that they were from the University Road Accident Research Unit, that they were not the police, and that they were measuring breath alcohol levels of drivers as part of a study on drinking and driving in Adelaide. The driver was asked to blow through a tube attached to a hand-held breath alcohol meter, and was then handed a reply-paid mail questionnaire on drinking and driving. The entire procedure, including the time taken to walk out to the stationary vehicle and to walk back to the side of the road, required about 25 seconds.

The second investigator, stationed at the side of the road, wrote down the following information which was obtained by the first investigator: the BAC reading, estimated age group (under 21, 21-29, 30-50 or over 50 years of age) and sex of the driver; the estimated age group and sex of the front passenger; the total number of occupants; and a subjective assessment of whether the driver had been drinking. If the first investigator had any reason to doubt the validity of the BAC reading (for example, if the driver was observed to be drinking in the car), that was recorded. The second investigator also watched for the traffic lights to change and blew a warning whistle if the investigator taking the BAC reading was still on the carriageway.

Drivers of commercial vehicles and riders of motorcycles were not approached, mainly because of the difficulties involved in communicating with the drivers of some commercial vehicles or riders wearing full-face protective helmets. In this report, the term "car" refers to private vehicles, station wagons, panel vans and utilities.

3.2.2 Measurement of Blood Alcohol Concentration

The breath alcohol meter used was the Lion Laboratories Alcolmeter S-D2. The meter has a three digit display, which presents the BAC reading in intervals of 0.005 grams of alcohol per 100 mls of blood. The meters were calibrated regularly against an alcohol vapour standard equivalent to a BAC of 0.08 gm/100 ml.

3.2.3 Measurement of Attitudes Toward Drinking and Driving

As noted above, each driver who was approached in the survey was handed a reply-paid mail questionnaire. The questionnaire contained seven questions, five of which asked the drivers to record their age, sex, frequency of drinking, quantity drunk in a session, and whether or not they had ever been charged with a drink-driving offence.

The other two questions were about the drivers' attitudes towards drinking and driving. One question asked them how likely they were to drive if they thought had a BAC above 0.08; the other asked them how likely they were to be caught by the police if they were to drive with a BAC over 0.08.

The questionnaires were numbered sequentially. This was done to encourage drinking drivers to return the questionnaire. A note adjacent to the number told the driver that, when the completed questionnaire was returned to the Unit, his BAC and the questionnaire number would be published in the morning newspaper on the following Saturday. Each driver approached in the survey was identified in the recorded information solely by the questionnaire number. This ensured that the survey was conducted in a way that was both confidential and anonymous.

A copy of the questionnaire is presented in Figures 3.1 and 3.2.

3.2.4 Sampling Technique

The inner metropolitan area of Adelaide was divided into four regions and five sites were selected in each region, along with a specified direction of travel at each site. The aim of these selections was to obtain a sample of drivers which was not unduly biased by location or direction of travel, and hence reasonably representative of the car traffic operating in the metropolitan area during the times of the survey. Care was taken to ensure that none of the sites was close to an hotel or other licensed premises. This was done to reduce the likelihood of a driver having had a drink only a few minutes before being breath tested.

Drivers were tested between 5.00 p.m. and 3.00 a.m. on each day of the week for each region. Ten sites were worked during this ten hour period. Although each sampling session was nominally one hour long, this included the time needed to travel between sites. The actual time spent sampling BACs was therefore about 40 minutes at each site.

Information on traffic volume was also collected for each site, so that the data could be appropriately weighted according to the sampling fraction. This was necessary in order to ensure that a constant proportion of traffic volume for all sites at all times was represented in the data. For example, at a given site, 700 cars might pass through the intersection between 5.00 and 6.00 p.m., of which the drivers of 28 cars might be approached by the research team, giving a sampling fraction of 4 per cent. At the same site between 1.00 and 2.00 a.m., only 20 cars might pass through the intersection, of which the drivers of 8 cars might be

ROAD ACCIDENT RESEARCH UNIT

Please answer the following questions:

How often do you drink alcohol?

- ☐ never, or almost never
- ☐ about once a month
- ☐ about once a week
- ☐ a few times a week
- ☐ almost every day

How many drinks do you usually have?

- ☐ one or two drinks
- ☐ 3, 4 or 5
- ☐ 6, 7 or 8
- ☐ 9 or more

e.g.: schooner, glass of wine, nip of spirits (*brandy and dry*)

If you thought that you could be over the .08 blood alcohol limit would you drive?

- ☐ yes
- ☐ almost every time
- ☐ often
- ☐ occasionally
- ☐ rarely
- ☐ no

If you were driving with a blood alcohol level over .08 would you be caught by the police?

- ☐ yes
- ☐ almost every time
- ☐ often
- ☐ occasionally
- ☐ rarely
- ☐ no

Have you ever been charged with a drink-driving offence? ☐yes ☐no

How old are you? .... Sex: ☐Male ☐Female

Tear here and keep this piece (please see other side).

PLEASE POST THE CARD BACK TO US AS SOON AS POSSIBLE
(no stamp needed).

THANK YOU FOR YOUR HELP.

FIGURE 3.1: REPLY-PAID MAIL QUESTIONNAIRE

No postage stamp required
if posted in Australia

BUSINESS REPLY POST
PERMIT NO. 1137 — ADELAIDE
Postage and fee will be paid on delivery to

ROAD ACCIDENT RESEARCH UNIT
THE UNIVERSITY OF ADELAIDE
G.P.O. BOX 498,
ADELAIDE, S.A. 5001.

№ 47675

№ 47675

When you fill in and return the card you can find out what your blood alcohol level was (if it was above zero) by looking up this number in the back of Saturday's *The Advertiser*.

FOR RESEARCH PURPOSES ONLY: No names or other numbers are recorded.

FIGURE 3.2: REPLY-PAID MAIL QUESTIONNAIRE (REVERSE SIDE)

approached, representing a sampling fraction of 40 per cent. By comparison with the later period, the drivers tested between 5.00 and 6.00 p.m. would be under-represented in the combined data. The object of weighting the data by the sampling fraction was to counter this imbalance. A traffic counter was placed at each site for a week, in order to record the number of cars through the intersection (on the relevant approach) for every hour on each day of the week. Using this information, it was possible to calculate a weight for each site, at each hour of each day. The formula to calculate this weight was W = C/V, where W is the weight, C is the number of cars counted at the site in that hour, and V is the number of vehicles approached in the sampling session. The weight was then multiplied by 2/3 to take account of the fact that sampling normally took place for 40 minutes rather than a full hour. This factor of 2/3 was not strictly necessary for this evaluation, but was needed for a comparison of the results of this survey with those of similar surveys in Canada and the U.S.A. (McLean, Holubowycz, Wolfe and Lawson, 1984).

It is clear from the foregoing discussion that the validity of the design of this study rests in part on the assumption that the first driver to stop at a red light is representative of those drivers passing through the intersection, with respect to BAC. This assumption might be questioned by arguing, for example, that drivers with elevated BACs might travel at a higher, or lower, speed than drivers with low or zero BACs. If so, the intoxicated driver might be at the front of a platoon of traffic and hence have an above average chance of being the first driver to be stopped by a red light. Alternatively, if travelling unusually slowly, that driver would be less likely to be the first car to be stopped. Either way, our sampling method could have yielded an unrepresentative sample.

While this argument cannot be directly refuted, it can be shown to be implausible. This study tested drivers at 20 sites throughout metropolitan Adelaide. The distance to the site from the preceding set of traffic lights varied from as little as 200 metres to over 2 kilometres. There is no evidence which suggests that, on average, the time at which a light will change to red is meaningfully related to the speed at which a driver approaches the light, or the distance he must travel from the previous lights. (Area control of traffic signals was not relevant to the sites selected for this survey). It thus seems unlikely that a driver's probability of being stopped at a light is determined by the speed at which he approaches it. There is hence no reason to believe that the first driver to stop at the light is unrepresentative of the traffic operating at that intersection at that time.

3.2.5 Correction for Refusal Bias

As mentioned in Section 3.2.1, the interviewers made a subjective assessment of whether each driver they approached had been drinking. This was rated on a three-point scale as follows: (1) appears sober; (2) had been drinking - not obviously intoxicated; (3) appears intoxicated. Interviewers were instructed to use rating (2) when a driver smelt of alcohol, but was not obviously affected, whereas rating (3) was used when a driver smelt of alcohol and was obviously affected. The subjective assessments were made so as to provide a way of estimating the BACs of drivers who refused to give a breath sample.

A problem inherent in any roadside survey which relies on the voluntary participation of drivers is the potential for bias due to the refusal of some drivers to cooperate. As, in the present context, the BACs of these drivers are unknown, statistics based solely on the tested drivers may not provide unbiased estimates of BACs of all drivers. Two main methods have been developed in order to cope with this problem of refusal bias, one by Carlson (Wolfe, 1973) and the other by Hurst and Darwin (1977). The validity of the latter method has been challenged by Carlson (1979) on mathematical grounds, and therefore the former method has been used in this evaluation.

3.2.6 Statistical Analysis

Much of the statistical analysis performed in this study was concerned with the comparison of percentages (usually the percentage of drivers with a BAC above a specified level). This is usually a completely straightforward procedure, yielding a value which may be referred to the normal distribution (or the t distribution in the case of small samples) to test the statistical significance of the comparison.

The matter was somewhat complicated here by the fact that most of the percentages being compared had been corrected for refusal bias, a procedure which introduces additional variance into the resultant percentage. Consequently, a statistical technique was developed which took account of these extra sources of variance, and gave an estimate of the variance of the corrected percentage. The standard procedure for testing statistical significance was then applied.

The choice of a statistical technique for testing for change in questionnaire responses over time was not a simple one. For each question, the responses were measured at the ordinal level only, and not on an interval scale. This precludes the use of the t test family of statistical techniques, unless one is prepared to make some highly debatable assumptions; equally, although the chi-square family of methods are useable, they can only indicate that a statistically significant change has, or has not, occurred. The direction of any change has to be determined by some post hoc examination of the data.

In order to counter these problems, Bross (1958) proposed a technique which he called ridit analysis. It has been adopted here as most appropriate to these data. The procedure is very simple, and operates as follows. If one is comparing responses for two different years on an attitude question, for example, data for one year are selected to be a reference group (it is preferable to use the larger group). For each category in this reference group, a score or "ridit" is derived, as follows: the ridit is the percentile rank of a given category in the reference group, and is equal to the number of subjects in all lower categories plus half the number of subjects in that category, all divided by the population size. Once the ridits for each category have been calculated, they define the values of a dependent variable for the other (comparison) group, and the usual parametric family of techniques may then be applied. With samples of reasonable size, the distribution of mean ridits will be approximately normal.

The interpretation of the mean ridit for the comparison group is straight forward and intuitive. If a subject X is selected at random from the reference group, and a subject Y is selected at random from the comparison group, then the mean ridit provides an estimate of the probability that subject X had a score that was equal to or less than that of subject Y. This probability estimate can be expressed as an odds ratio, which is calculated simply by dividing the mean ridit by one minus the mean ridit.

The odds ratio is interpreted in much the same way as the mean ridit. This may best be illustrated by an example. If we calculated a mean ridit of 0.6, then, as explained above, this would mean that the probability of subject X having a score that was equal to or less than that of subject Y was 0.6. The corresponding odds ratio is 0.6 divided by 1 minus 0.6, or 0.4. This gives an odds ratio of 1.5, meaning that the odds of subject X having a lower or equal score than subject Y were 1.5 to 1.

It was also of interest to examine the extent to which responses to the questionnaire were related to each other and to BAC for the three years of the survey. The statistical measure used to assess these relationships was Kendall's Tau, a measure of association which is appropriate when data have been measured on an ordinal scale. Tau comes in two slightly different forms: Tau B is used when both variables have the same number of categories, while Tau C is appropriate when the number of categories is different. Whether Tau B or Tau C is used, the resulting statistic takes a value between -1 and +1, which is interpreted in exactly the same way as a correlation coefficient.

3.2.7 Data Collection

Roadside surveys were conducted in 1981, 1982 and 1983 using the procedures described in the preceding sections.

Each year the survey was scheduled to run for 12 weeks. However, no data were collected on the public holidays which fell during the sampling period (such as Easter and Anzac Day), and in 1982 there was no data collection during the biennial Adelaide Festival of Arts. If, for some reason, a sampling session was cancelled (for example, due to extreme weather conditions or sickness), it was made up later in a catch-up session. Data from a session were not entered into the computer file if less than three drivers were tested. Extra sessions were conducted to make up for such cancellations, etc. With these extra sessions, in 1981 the survey ran from 27 January to 31 May (before the introduction of random breath testing); in 1982 from 2 February to 19 June; and in 1983 from 8 February to 6 June. The same approximate period was used in each year in an attempt to avoid the possibility of any seasonal variation in traffic flow or drinking patterns.

3.3 RESULTS AND DISCUSSION

3.3.1 Sample Characteristics

In 1981, a total of 8641 drivers were approached, of whom 7815 consented to a breath test, the refusal rate being 9.56%; in 1982, breath tests were obtained from 10402 of the 11027 drivers who were approached, with a refusal rate of 5.67%; in 1983, 9970 of 10392 drivers complied with the request for a breath test, giving a refusal rate of 4.06 per cent.

The age and sex distributions of the drivers approached for each of the three years are shown in Tables 3.1 and 3.2. As can be seen from Table 3.1, most of the drivers were in the 21-29 and 30-50 age ranges, with 75-80% of drivers being in these ranges for all three years. It is clear from Table 3.2 that there were many more male than female drivers in all three years of the study, males comprising just over 75% of the sample in each year. The percentages sampled in all age and sex categories remained fairly constant across the three years of the study. The only exception to this was the statistically significant increase (10.4% to 15.3%) in the proportion sampled in the over-50 age range. It is possible, of course,

TABLE 3.1: NUMBER OF CARS APPROACHED BY AGE OF DRIVER: 1981-83

Age Group	1981	1982	1983
< 21	761[1] (8.8%)[2] 52[3] (6.8%)[4]	965 (8.8%) 33 (3.4%)	937 (9.0%) 28 (3.0%)
21-29	3159 (36.6%) 233 (7.4%)	3897 (35.3%) 156 (4.0%)	3601 (34.6%) 103 (2.9%)
30-50	3817 (44.2%) 400 (10.5%)	4616 (41.9%) 269 (5.8%)	4268 (41.1%) 186 (4.4%)
> 50	904 (10.4%) 142 (15.7%)	1549 (14.0%) 167 (10.8%)	1586 (15.3%) 104 (6.6%)
TOTAL	8641 (100%) 827 (9.6%)	11027 (100%) 625 (5.7%)	10392 (100%) 421 (4.1%)

[1] The total number of drivers approached in this age range

[2] The number of drivers approached in this age range as a percentage of the total number of drivers approached in all age ranges.

[3] The number of drivers in this age range who refused to give a breath sample.

[4] The number of drivers in this age range who refused to give a breath sample, as a percentage of the number of drivers approached in this age range.

that this increase could have arisen by chance, despite the result obtained from the statistical test.

Tables 3.3, 3.4 and 3.5 all deal with the passengers of the cars approached. As all of these tables demonstrate, approximately half of the cars approached in each year had at least one passenger. The reason for the slight difference between the number of cars with one occupant (meaning driver only, from Table 3.5) and the number of cars with no front passenger (from Tables 3.3 and 3.4) is that a few cars had back-seat passengers but no front seat passenger. Again, the proportions in each category (both age

TABLE 3.2: NUMBER OF CARS APPROACHED BY SEX OF DRIVER: 1981-83

Sex	1981		1982		1983	
Male	6691[1]	(77.4%)[2]	8308	(75.3%)	7859	(75.6%)
	638[3]	(9.5%)[4]	442	(5.3%)	287	(3.7%)
Female	1950	(22.6%)	2719	(24.7%)	2533	(24.4%)
	189	(9.7%)	183	(6.7%)	134	(5.3%)
TOTAL	8641	(100%)	11027	(100%)	10392	(100%)
	827	(9.6%)	625	(5.7%)	421	(4.1%)

[1] The total number of drivers approached of this sex.

[2] The number of drivers approached of this sex as a percentage of the total number of drivers approached of both sexes.

[3] The number of drivers of this sex who refused to give a breath sample.

[4] The number of drivers of this sex who refused to give a breath sample, as a percentage of the number of drivers approached of this sex.

TABLE 3.3: NUMBER OF CARS APPROACHED BY AGE OF FRONT PASSENGER: 1981-83

Age Group	1981		1982		1983	
< 21	736[1]	(8.5%)[2]	957	(8.7%)	962	(9.3%)
21-29	1509	(17.5%)	1998	(18.1%)	1671	(16.1%)
30-50	1495	(17.3%)	1728	(15.7%)	1629	(15.7%)
> 50	481	(5.6%)	753	(6.8%)	753	(7.1%)
No front passenger	4420	(51.1%)	5591	(50.7%)	5377	(51.8%)
TOTAL	8641		11027		10392	

[1] Number of cars approached with a front passenger of this age.

[2] Number of cars approached with a front passenger of this age as a percentage of the total number of cars approached.

TABLE 3.4: NUMBER OF CARS APPROACHED BY SEX OF FRONT PASSENGER: 1981-83

Sex	1981		1982		1983	
Male	1260[1]	(14.6%)[2]	1666	(15.1%)	1641	(15.8%)
Female	2961	(34.3%)	3770	(34.2%)	3372	(32.4%)
No front passenger	4420	(51.1%)	5591	(50.7%)	5377	(51.8%)
TOTAL	8641		11027		10392	

1 Number of cars approached with a front passenger of this sex.

2 Number of cars approached with a front passenger of this sex as a percentage of the total number of cars approached.

TABLE 3.5: NUMBER OF CARS APPROACHED AND NUMBER OF OCCUPANTS PER CAR: 1981-83

Number of occupants	1981		1982		1983	
1[1]	4305[2]	(49.8%)[3]	5497	(49.9%)	5285	(50.9%)
2	2833	(32.8%)	3642	(33.0%)	3458	(33.3%)
3	823	(9.5%)	935	(8.5%)	854	(8.2%)
4	492	(5.7%)	645	(5.8%)	537	(5.2%)
⩾ 5	188	(2.2%)	308	(2.8%)	258	(2.4%)
TOTAL	8641		11027		10392	

1 One occupant means driver only.

2 Number of cars approached with this number of occupants per car.

3 Number of cars approached with this number of occupants per car as a percentage of total number of cars approached.

seat passenger. Again, the proportions in each category (both age and sex, and number of occupants) were remarkably constant for the three years of the study.

The area chosen for the study approximates to the Adelaide inner metropolitan area. The boundaries of this area (Grand Junction Road, the base of the foothills and the coast) were those used in two previous studies: an in-depth study of accidents in the Adelaide area (McLean and Robinson, 1979), and a study of alcohol involvement in road accidents (McLean, Holubowycz and Sandow, 1980). By defining the area of interest for the current study in this way, it was hoped that the results obtained could be meaningfully compared with those of the two above studies.

As noted above, the study area was divided into four regions, referred to here as south-east, south-west, north-west and north-east. These regions were defined by north-south and east-west lines through the city centre. Within each region, five sites were selected for data collection. Table 3.6 shows the number of vehicles approached at each region and site for the three years of the study. As this table demonstrates, the proportion sampled within each region and at each site remained relatively constant across the three years. In each year there was also little divergence from the theoretical ideal of 5% of the sample at each site - the standard deviation of the percentages sampled at each site was about 0.5% for each year.

In each year, testing was carried out on all days of the week, and at each hourly period from 5.00 p.m. to 3.00 a.m. Thursday, Friday and Saturday nights were sampled twice as often as other days, as an earlier study in 1979 had revealed that drink-driving was most prevalent on the days late in

TABLE 3.6: NUMBER OF CARS APPROACHED AT EACH REGION AND SITE: 1981-83

Region and Site	1981		1982		1983	
South-East	2219[1]	(25.7%)[2]	2768	(25.1%)	2654	(25.5%)
Site 1	479[3]	(5.5%)[4]	540	(4.9%)	546	(5.3%)
Site 2	379	(4.4%)	552	(5.0%)	502	(4.8%)
Site 3	480	(5.6%)	558	(5.1%)	526	(5.1%)
Site 4	457	(5.3%)	531	(4.8%)	509	(4.9%)
Site 5	424	(4.9%)	587	(5.3%)	571	(5.5%)
South-West	2211	(25.6%)	2862	(26.0%)	2779	(26.8%)
Site 1	540	(6.2%)	590	(5.4%)	579	(5.6%)
Site 2	430	(5.0%)	616	(5.6%)	598	(5.8%)
Site 3	412	(4.8%)	495	(4.5%)	476	(4.6%)
Site 4	416	(4.8%)	583	(5.3%)	560	(5.4%)
Site 5	413	(4.8%)	578	(5.2%)	566	(5.4%)
North-West	2003	(23.2%)	2597	(23.5%)	2456	(23.6%)
Site 1	404	(4.7%)	455	(4.1%)	447	(4.3%)
Site 2	399	(4.6%)	591	(5.4%)	549	(5.3%)
Site 3	475	(5.5%)	463	(4.2%)	452	(4.3%)
Site 4	347	(4.0%)	622	(5.6%)	561	(5.4%)
Site 5	378	(4.4%)	466	(4.2%)	447	(4.3%)
North-East	2208	(25.6%)	2800	(25.4%)	2503	(24.1%)
Site 1	506	(5.9%)	595	(5.4%)	537	(5.2%)
Site 2	420	(4.9%)	558	(5.1%)	430	(4.1%)
Site 3	416	(4.8%)	560	(5.1%)	520	(5.0%)
Site 4	471	(5.5%)	623	(5.6%)	492	(4.7%)
Site 5	395	(4.5%)	464	(4.2%)	524	(5.0%)
TOTAL	8641		11027		10392	

[1] Number of cars approached in this region.

[2] Number of cars approached in this region as a percentage of the total number of cars approached.

[3] Number of cars approached at this site.

[4] Number of cars approached at this site as a percentage of the total number of cars approached.

TABLE 3.6 (CONTINUED):

KEY TO SITES:

South-East	
Site 1	East on Greenhill Road at Portrush Road
Site 2	South on Hutt Street at Pirie Street
Site 3	South on Unley Road at Greenhill Road
Site 4	West on Cross Road at Unley Road
Site 5	South East on Glen Osmond Road at Portrush Road/Cross Road
South-West	
Site 1	South on Goodwood Road at Cross Road
Site 2	South West on Anzac Highway at Marion Road
Site 3	North on Marion Road at Oaklands Road
Site 4	West on Currie Street at West Terrace
Site 5	South West on South Road at Ayliffes Road
North-West	
Site 1	North West on Torrens Road at South Road
Site 2	South on Tapley's Hill Road at Grange Road
Site 3	North West on Port Road at South Road
Site 4	East on Regency Road at Main North Road
Site 5	North East on Main North Road at Fitzroy Terrace/Robe Terrace
North-East	
Site 1	North East on Main North East Road at Grand Junction Road
Site 2	North on Hampstead Road at Regency Road
Site 3	North East on Payneham Road at Portrush Road
Site 4	North on Dequetteville Terrace at Rundle Road
Site 5	East on Magill Road at Portrush Road

the week. Table 3.7 shows the number of cars approached on each day of the week, while Table 3.8 shows this number for each hour of the day at which sampling took place. The proportion of drivers sampled on each day and in each hour remained fairly constant across the three years. Unlike the sampling across sites, there was no reason here to expect a flat distribution of percentages sampled on each day or at each time. Apart from the double sampling of Thursday, Friday and Saturday nights, the variation in the proportion of drivers sampled at each hour or on each day largely reflects variation in traffic volume, and hence the number of drivers available for testing.

TABLE 3.7: NUMBER OF CARS APPROACHED BY DAY OF WEEK: 1981-83

	1981		1982		1983	
Monday	794[1]	(9.2%)[2]	1180	(10.7%)	937	(9.0%)
Tuesday	842	(9.7%)	1117	(10.1%)	1017	(9.8%)
Wednesday	804	(9.3%)	1033	(9.4%)	1016	(9.8%)
Thursday	1635	(18.9%)	2087	(18.9%)	2020	(19.4%)
Friday	1862	(21.6%)	2325	(21.1%)	2284	(22.0%)
Saturday	2086	(24.1%)	2342	(21.2%)	2212	(21.3%)
Sunday	618	(7.2%)	943	(8.6%)	906	(8.7%)
TOTAL	8641		11027		10392	

[1] Number of cars approached on this day.

[2] Number of cars approached on this day as a percentage of total number of cars approached.

3.3.2 Blood Alcohol Concentrations

3.3.2.1 BAC levels used

Three different BAC levels were selected as the basis for statistical analysis. The first was the South Australian legal limit of 0.08 gm of alcohol per 100 mls of blood. As one of the intentions of random breath testing was to reduce the percentage of drivers operating at or above this level, it was clearly important to establish whether or not changes had occurred in the proportion of drivers who had a BAC greater than or equal to 0.08. The second BAC level of interest was 0.05, which is the legal limit in New South Wales, Victoria, Queensland and Tasmania. Analyses of the proportion of drivers at or above the 0.05 level were therefore

TABLE 3.8: NUMBER OF CARS APPROACHED BY HOUR OF DAY: 1981-83

Hour of Day	1981		1982		1983	
1700 - 1759	1161[1]	(13.4%)[2]	1478	(13.4%)	1355	(13.0%)
1800 - 1859	1182	(13.7%)	1419	(12.9%)	1272	(12.2%)
1900 - 1959	1083	(12.5%)	1374	(12.5%)	1264	(12.2%)
2000 - 2059	991	(11.5%)	1246	(11.3%)	1204	(11.6%)
2100 - 2159	988	(11.4%)	1199	(10.9%)	1145	(11.0%)
2200 - 2259	1010	(11.7%)	1231	(11.2%)	1181	(11.4%)
2300 - 2359	799	(9.2%)	1046	(9.5%)	1046	(10.1%)
0000 - 0059	629	(7.3%)	883	(8.0%)	847	(8.2%)
0100 - 0159	465	(5.4%)	628	(5.7%)	628	(6.0%)
0200 - 0259	333	(3.9%)	523	(4.7%)	450	(4.3%)
TOTAL	8641		11027		10392	

[1] Number of cars approached in this time period.

[2] Number of cars approached in this time period as a percentage of total number of cars approached.

relevant in the light of any move to lower the legal limit in S.A. A third BAC level which was used was zero, in order to determine if random breath testing had affected the proportion of drivers who had drunk any alcohol at all. It was hoped that an examination of these three levels in conjunction would give a picture of any changes in the overall distribution of BACs, as well as any changes in the proportion above a given level.

3.3.2.2 Changes in BAC for all drivers

Table 3.9 shows the proportion of all drivers who had BACs above or equal to 0.08, 0.05, and above zero. For the percentages above both 0.08 and

TABLE 3.9: PERCENTAGES OF ALL DRIVERS WITH A BAC ⩾ 0.08, ⩾ 0.05, > 0: 1981-83

Driver's BAC	1981		1982		1983	
⩾ 0.08	2.68%	(1.78-3.57)[1]	2.30%	(1.66-2.94)	2.69%	(2.19-3.19)
⩾ 0.05	5.70%	(4.83-6.56)	5.06%	(4.44-5.68)	5.85%	(5.37-6.33)
> 0	19.07%	(18.31-19.83)	16.44%	(15.89-17.00)	17.08%	(16.65-17.51)

[1] 95% confidence limits

0.05, there was a slight but not statistically significant decrease in 1982, followed by a return in 1983 to a figure close to that of 1981. Taken by themselves, these results would suggest that random breath testing had no real effect on the drinking behaviour of drivers. However, an examination of the percentage of drivers with positive BACs in each of those three years reveals this not to be the case. The percentage of drivers with positive BACs in 1982 was less than that in 1981 ($z = 5.48$, $p < 0.001$) and although the percentage rose somewhat in 1983 from its 1982 level, this increase was not statistically significant. Further, the percentage of drivers who had been drinking in 1983 was still less than the 1981 figure ($z = 4.47$, $p < 0.001$).

Bearing these results in mind, it was of interest to make a similar set of comparisons based only on the group of drivers with positive BACs. This group may be taken to represent drinking drivers. Since it was primarily this group whose behaviour random breath testing legislation was designed to affect, it was reasonable to see if changes had occurred in the drink-driving behaviour of this group following the introduction of random breath testing. The percentages above or equal to 0.08 and 0.05 are shown for this group in Table 3.10. As is immediately apparent, there was no decrease in the percentages after 1981. If anything, there was a gradual increase, although the increase was probably due to chance variation.

TABLE 3.10: PERCENTAGE OF DRIVERS WHO HAD BEEN DRINKING[1] WITH BACs ⩾ 0.08, ⩾ 0.05, 1981-83

Driver's BAC	1981		1982		1983	
⩾ 0.08	12.94%	(9.54-16.35)[2]	13.56%	(10.65-16.46)	15.49%	(13.28-17.70)
⩾ 0.05	28.72%	(25.80-31.63)	30.15%	(27.66-32.64)	33.86%	(32.01-35.70)

[1] Refers to drivers who had some alcohol in their breath

[2] 95% confidence limits

An alternative way of looking for the effect of random breath testing is to look at changes in the mean BAC of drivers tested in the three years. Table 3.11 shows the mean BAC of all drivers in 1981, 1982 and 1983, and also the mean BAC of drivers who had been drinking. An examination of these two sets of means provides an interesting contrast. Firstly, in 1982 the mean BAC dropped below its 1981 level ($z = 2.15$, $p < 0.05$); however, in 1983 it showed an increase from the 1982 figure ($z = 7.28$, $p < 0.001$) to a level which was also higher than that of 1981 ($z = 4.82$, $p < 0.001$).

Taken collectively, the implications of these data may be considered. The first point is that random breath testing appears to have failed in one of its primary aims: that is, to reduce the proportion of drivers on the road with illegally high BACs. This fact is demonstrated by the absence of a

TABLE 3.11: MEAN BAC OF ALL DRIVERS AND OF DRIVERS WHO HAD BEEN DRINKING: 1981-83

	1981	1982	1983
All Drivers	0.0072[1] (0.0067-0.0077)[2]	0.0065 (0.0061-0.0069)	0.0089 (0.0084-0.0094)
Drivers with BAC > 0	0.0389 (0.0373-0.0407)	0.0397 (0.0380-0.0414)	0.0444 (0.0426-0.0461)

[1] Mean BAC

[2] 95% confidence limits

statistically significant decrease in the proportion of drivers at or above the legal limit of 0.08. If those drivers with positive BACs are considered to be the drink-driving part of the population, then random breath testing also had no effect on their willingness to drive whilst above the legal BAC limit. Together with the absence of any statistically significant decreases in the corresponding percentages at or above the 0.05 level, these results suggest that random breath testing had relatively little effect on the driver who is a moderate to heavy drinker.

However, as shown by Table 3.11, there was a statistically significant decrease in mean BAC in 1982, after the introduction of random breath testing. This can only be explained by the corresponding decrease in the proportion of drivers with positive BACs. What this suggests is that the group of drivers who were most affected by random breath testing were those who were only relatively light or occasional drinkers in the first place. It appears that many of these drivers simply stopped combining drinking and driving altogether, thus leading in 1982 to a reduction in the proportion of drivers with positive BACs and to a reduction in mean BAC. This leads to the somewhat paradoxical situation where random breath testing may have had very little effect on the driver who is a moderate to heavy drinker, yet appears to have had a considerable influence on the light drinker who probably posed a relatively small hazard on the road.

The above argument notwithstanding, proportions of drivers at all BAC levels showed a slight dip in 1982, although for only the proportion of drivers with BACs above zero was this reduction statistically significant. This was followed in 1983 by a slight increase back toward the 1981 levels. This implies that, if random breath testing had an effect, it was relatively short-lived. There are two possible reasons for this. One may be that drivers gradually became accustomed to the fairly low level of enforcement of random breath testing by the police. When they realized that their probability of being tested was low, random breath testing lost its moderating effect on drivers' drinking. Another possibility is that the initial effect of random breath testing may have been as much due to the publicity surrounding its introduction as its enforcement. As the publicity waned, and drivers became more aware of the low level of enforcement, random breath testing may have become less mysterious and less of a threat to most drinking drivers.

3.3.2.3 Changes in BAC for male and female drivers

Having established what effect random breath testing had on the driving population as a whole, we may now look at how various sub-groups were influenced. Table 3.12 shows the percentages in each BAC category separately for male and for female drivers, while Table 3.13 presents this information for drivers with positive BACs only.

TABLE 3.12: BLOOD ALCOHOL LEVEL BY SEX OF DRIVER: 1981-1983

Sex	BAC	1981	1982	1983
Males				
	≥ 0.08	3.30% (2.30-4.31)[1]	2.81% (2.10-3.51)	3.25% (2.71-3.80)
	≥ 0.05	6.98% (6.01-7.95)	6.22% (5.54-6.90)	6.94% (6.42-7.46)
	> 0	22.13% (21.30-22.97)	19.04% (18.44-19.64)	19.70% (19.24-20.16)
Females				
	≥ 0.08	0.51% (0-2.42)	0.79% (0-2.22)	0.92% (0-2.10)
	≥ 0.05	1.29% (0-3.18)	1.59% (0.17-3.00)	2.43% (1.28-3.59)
	> 0	8.56% (6.79-10.32)	8.64% (7.32-9.96)	8.92% (7.84-10.00)

[1] 95% confidence limits

Two points are immediately apparent from inspection of these data. The first is that males had higher percentages in all BAC categories than did females. For the data shown in Table 3.12, this difference was statistically significant ($p < 0.02$) for all comparisons. For the data on positive BACs only, shown in Table 3.13, in no year were there statistically significant sex differences for BACs at or above the 0.08 level, but in every year, the proportion of males at or above the 0.05 BAC level was greater than the corresponding proportion of females ($p < 0.05$).

The second important point is that the pattern of BACs obtained for males was quite different from that obtained for females. In the 0.08 and 0.05

TABLE 3.13: BLOOD ALCOHOL LEVELS BY SEX OF DRINKING DRIVER[1]: 1981-83

Sex	BAC	1981	1982	1983
Males				
	⩾ 0.08	14.04% (10.65-17.43)[2]	14.43% (11.58-17.28)	16.29% (14.15-18.43)
	⩾ 0.05	30.67% (27.79-33.54)	32.17% (29.75-34.59)	34.96% (33.18-36.74)
Females				
	⩾ 0.08	4.46% (0-18.71)	9.05% (0-19.90)	9.96% (1.14-18.78)
	⩾ 0.05	13.08% (0-26.19)	17.54% (7.50-27.58)	27.09% (19.62-34.55)

[1] Refers to drivers who had some alcohol in their breath

[2] 95% confidence limits

categories, the males showed a slight (but not statistically significant) drop in 1982, followed in 1983 by a return to 1981 levels. Further, the proportion of males with BACs greater than zero decreased from 1981 to 1982 ($z = 5.88$, $p < 0.001$), and in 1983 remained lower than the 1981 level ($z = 4.98$, $p < 0.001$). Females, on the other hand, showed no sign of any moderating effect which might be attributed to random breath testing. Although their levels were lower than those of males throughout, there was a slight (but not statistically significant) upward drift in the percentages at all BAC levels across the three years of the study.

The implication of this analysis is that such effects on drink-driving as random breath testing had were almost exclusively on males rather than females, who showed themselves to be remarkably immune from its influence.

The fact that males comprised the majority of the sample in each year (see Table 3.2) allowed their results to swamp those of the female drivers. It should therefore be borne in mind that the effect of random breath testing was a largely male phenomenon, and reasons for the apparent lack of effect on females should be sought.

3.3.2.4 Changes in BAC for drivers of different ages

Tables 3.14 and 3.15 show the samples obtained in the three years subdivided according to the age of the driver. Table 3.14 shows the percentages in each BAC category for the four age groups, and Table 3.15 shows this information for drivers with positive BACs only.

As Table 3.14 shows, the age group with the consistently highest percentages was the over-50 group, while the lowest percentages were to be found in the under-21 age group. It was, however, the 21-29 and the 30-50 age groups which comprised the bulk of the samples (see Table 3.1), and it was their results which contributed most to the results of the group as a whole. An examination of the results for these two age groups reveals a familiar pattern. Above both the 0.08 and 0.05 BAC levels, the percentages showed a statistically non-significant decline in 1982, followed by a return in 1983 to a figure close to that of 1981. For both the 21-29 and the 30-50 age groups, however, the proportion of drivers above zero decreased in 1982 ($p < 0.01$), a decline which was maintained in 1983 ($p < 0.01$).

The pattern of BACs found in the under-21 and over-50 age groups was rather different. No statistically significant differences at all were found for the under-21 age group, although this is likely to be due to the relatively small size of the group. However, the proportion of this age group with

TABLE 3.14: BLOOD ALCOHOL LEVEL BY AGE OF DRIVER: 1981-1983

Age	BAC	1981	1982	1983
< 21				
	⩾ 0.08	2.11% (0-4.61)[1]	1.33% (0-3.31)	1.76% (0.28-3.23)
	⩾ 0.05	4.24% (1.79-6.69)	3.12% (1.17-5.07)	5.33% (3.91-6.75)
	> 0	14.60% (12.39-16.81)	15.08% (13.35-16.81)	14.85% (13.57-16.14)
21-29				
	⩾ 0.08	2.51% (1.27-3.74)	2.36% (1.48-3.25)	2.67% (1.96-3.39)
	⩾ 0.05	5.90% (4.71-7.09)	4.92% (4.07-5.77)	5.44% (4.75-6.13)
	> 0	19.88% (18.83-20.92)	16.68% (15.91-17.45)	15.96% (15.34-16.58)
30-50				
	⩾ 0.08	2.67% (1.27-4.08)	2.35% (1.36-3.34)	2.74% (1.95-3.53)
	⩾ 0.05	5.64% (4.27-7.00)	5.37% (4.42-6.33)	5.74% (4.97-6.50)
	> 0	19.04% (17.84-20.24)	16.70% (15.85-17.56)	17.60% (16.92-18.28)
> 50				
	⩾ 0.08	3.91% (0.14-7.68)	2.62% (0.30-4.93)	2.94% (1.29-4.60)
	⩾ 0.05	6.53% (2.84-10.21)	5.64% (3.39-7.90)	7.30% (5.74-8.86)
	> 0	19.90% (16.66-23.14)	15.89% (13.85-17.92)	19.14% (17.75-20.53)

[1] 95% confidence limits

TABLE 3.15: BLOOD ALCOHOL LEVEL BY AGE OF DRINKING DRIVER[1]: 1981-1983

Age	BAC	1981	1982	1983
< 21				
	⩾ 0.08	13.63% (1.42-25.85)[2]	8.48% (0-19.59)	11.97% (4.57-19.38)
	⩾ 0.05	28.60% (18.43-38.77)	20.73% (10.94-30.51)	35.34% (29.35-41.33)
21-29				
	⩾ 0.08	11.94% (7.30-16.59)	13.93% (9.87-18.00)	16.55% (13.31-19.78)
	⩾ 0.05	28.90% (24.94-32.86)	29.15% (25.64-32.65)	33.82% (31.11-36.54)
30-50				
	⩾ 0.08	12.86% (7.56-18.17)	13.63% (9.24-18.02)	15.30% (11.85-18.75)
	⩾ 0.05	28.49% (23.97-33.02)	31.64% (27.94-35.34)	32.32% (29.43-35.22)
> 50				
	⩾ 0.08	16.64% (3.20-30.08)	14.73% (4.29-25.18)	14.96% (8.18-21.74)
	⩾ 0.05	28.07% (15.62-40.51)	32.75% (23.79-41.72)	36.86% (31.30-42.43)

1 Refers to drivers with some alcohol in their breath

2 95% confidence limits

positive BACs remained more or less constant, unlike the 21-29 and 30-50 age ranges. The over-50 group showed no statistically significant change at the 0.08 and 0.05 BAC levels. There was a decrease in 1982 in the proportion of drivers with positive BACs ($p < 0.05$), but in 1983 this figure returned to a value close to the 1981 level.

It is apparent then, that random breath testing had its greatest effect on the 21-29 and 30-50 age groups, although the difference between the ages was not as dramatic as the sex differences noted earlier. On the basis of those sex differences, one would expect the major contribution to the pattern of change found in the two middle age groups to have been made by the males of those groups. This is shown to be the case in Tables 3.16, 3.17 and 3.18, where BAC is categorized by both age and sex. As these tables demonstrate once more, in each group where random breath testing had a discernible effect, it was the males who were influenced rather than the females.

TABLE 3.16: BLOOD ALCOHOL LEVEL BY AGE AND SEX OF DRIVER, BAC $\geqslant$ 0.08: 1981-83

Age/Sex Group	1981	1982	1983
Male < 21	2.94% (0.08-5.80)[1]	1.39% (0-3.47)	2.16% (0.85-3.48)
Female < 21	0.10% (0-5.15)	1.26% (0-6.06)	0.74% (0-5.12)
Male 21-29	3.13% (1.79-4.48)	2.82% (1.86-3.78)	3.10% (2.42-3.77)
Female 21-29	0.72% (0-3.61)	1.30% (0-3.22)	1.68% (0-3.52)
Male 30-50	3.30% (1.71-4.88)	2.94% (1.87-4.02)	3.42% (2.51-4.33)
Female 30-50	0.32% (0-3.33)	0.34% (0-2.70)	0.33% (0-2.12)
Male > 50	4.30% (0.16-8.44)	3.18% (0-5.69)	3.46% (1.69-5.22)
Female > 50	1.33% (0-10.58)	0%	0.43% (0-5.07)

[1] 95% confidence limits

TABLE 3.17: BLOOD ALCOHOL LEVEL BY AGE AND SEX OF DRIVER, BAC ≥ 0.05: 1981-83

Age/Sex Group	1981	1982	1983
Male < 21	5.79% (3.00-8.57)[1]	3.60% (1.57-5.63)	6.61% (5.36-7.87)
Female < 21	0.45% (0-5.49)	1.84% (0-6.62)	1.56% (0-5.94)
Male 21-29	7.29% (6.01-8.58)	6.07% (5.14-7.00)	6.50% (5.85-7.15)
Female 21-29	1.73% (0-4.58)	2.25% (0.35-4.15)	2.89% (1.08-4.70)
Male 30-50	6.85% (5.32-8.38)	6.68% (5.64-7.71)	6.82% (5.94-7.69)
Female 30-50	1.10% (0-4.08)	0.95% (0-3.31)	1.86% (0.10-3.63)
Male > 50	7.40% (3.38-11.41)	6.64% (4.21-9.07)	8.33% (6.70-9.96)
Female > 50	1.62% (0-10.84)	1.02% (0-6.95)	2.75% (0-7.30)

[1] 95% confidence limits.

3.3.2.5 Changes in BAC for each day of the week

The proportions of drivers at or above each BAC level were also examined for each day of the week. Table 3.19 shows this information for all drivers, while Tables 3.20 and 3.21 present these proportions separately for males and females. (The period from 5.00 p.m. Saturday to 3.00 a.m. Sunday, for example, is referred to in this report as "Saturday").

Table 3.19 shows the percentage of drivers at or above 0.08 by day of week, for the three years of the study. The pattern of percentages in 1982 was

TABLE 3.18: BLOOD ALCOHOL LEVEL BY AGE AND SEX OF DRIVER, BAC > 0: 1981-83

Age/Sex Group	1981	1982	1983
Male < 21	17.58% (15.09-20.06)[1]	16.81% (15.03-18.59)	17.11% (15.98-18.25)
Female < 21	7.12% (2.41-11.83)	10.41% (6.03-14.79)	8.22% (4.14-12.29)
Male 21-29	22.88% (21.78-23.98)	19.49% (18.68-20.31)	18.92% (18.35-19.49)
Female 21-29	10.79% (8.16-13.41)	10.14% (8.39-11.90)	8.84% (7.15-10.53)
Male 30-50	22.10% (20.77-23.43)	19.77% (18.86-20.69)	19.97% (19.21-20.74)
Female 30-50	7.59% (4.81-10.38)	6.31% (4.08-8.55)	9.30% (7.86-10.74)
Male > 50	22.93% (19.47-26.39)	17.16% (14.97-19.35)	21.58% (20.15-23.02)
Female > 50	3.69% (0-12.72)	9.94% (4.52-15.35)	8.41% (4.12-12.71)

[1] 95% confidence limits.

quite different from that in 1981. In particular, the high peak found on Saturday in 1981 was dramatically lowered in 1982 ($p < 0.05$). Also the rather odd high Tuesday reading was lowered, ($p < 0.10$), although the high reading in 1981 may have been due to chance. In general, the 1982 figures suggest less variation from day to day in the amount of drinking done by drivers.

In 1983, however, the percentages returned to a pattern similar to that of 1981, although the readings for Sunday, Monday and Tuesday were close to those found in 1982. The Saturday reading was once again dominant.

TABLE 3.19: BLOOD ALCOHOL LEVELS OF DRIVERS BY DAY OF WEEK: 1981-83

BAC	Day	1981		1982		1983	
≥ 0.08	Mon	2.3%	(0-5.2)[1]	1.5%	(0-2.9)	1.1%	(0-2.9)
	Tue	2.7%	(0-5.5)	1.7%	(0-3.6)	1.2%	(0-2.9)
	Wed	1.9%	(0-4.7)	2.4%	(0.1-4.7)	2.4%	(0.6-4.1)
	Thu	2.2%	(0.1-4.3)	2.1%	(0.7-3.5)	2.7%	(1.7-3.7)
	Fri	2.5%	(0.6-4.3)	2.8%	(1.3-4.2)	2.8%	(1.7-3.8)
	Sat	4.3%	(2.3-6.2)	2.3%	(0.9-3.8)	4.3%	(3.2-5.4)
	Sun	1.3%	(0-4.6)	2.1%	(0-4.4)	2.3%	(0.5-4.0)
≥ 0.05	Mon	3.1%	(0.2-6.1)	2.5%	(1.0-3.9)	2.1%	(0.3-3.9)
	Tue	6.2%	(3.6-8.8)	3.5%	(1.6-5.4)	3.7%	(2.1-5.3)
	Wed	4.5%	(1.8-7.1)	5.0%	(2.8-7.3)	6.1%	(4.5-7.8)
	Thu	4.9%	(2.9-6.9)	4.6%	(3.2-6.0)	5.5%	(4.5-6.5)
	Fri	6.2%	(4.4-8.0)	6.1%	(4.7-7.5)	6.9%	(5.9-7.9)
	Sat	8.0%	(6.1-9.9)	6.2%	(4.9-7.6)	7.6%	(6.6-8.7)
	Sun	3.3%	(0.1-6.5)	4.2%	(2.0-6.5)	4.7%	(3.0-6.4)
> 0	Mon	14.9%	(12.2-17.5)	11.2%	(9.9-12.5)	9.7%	(8.0-11.3)
	Tue	17.7%	(15.4-20.0)	11.8%	(10.1-13.5)	13.6%	(12.2-15.0)
	Wed	15.1%	(12.7-17.6)	14.1%	(12.0-16.1)	15.8%	(14.3-17.3)
	Thu	14.8%	(12.9-16.6)	13.7%	(12.4-14.9)	15.3%	(14.4-16.2)
	Fri	23.2%	(21.6-24.7)	19.5%	(18.3-20.8)	19.9%	(19.0-20.8)
	Sat	24.0%	(22.4-25.7)	22.2%	(21.0-23.4)	22.9%	(22.0-23.8)
	Sun	13.6%	(10.8-16.5)	14.2%	(12.2-16.3)	12.2%	(10.6-13.8)

[1] 95% confidence limits

Tables 3.20 and 3.21 show this information separately for males and females. It is again clear that random breath testing had a much greater effect on males than on females. At no BAC level were the percentages for females affected by random breath testing.

It was noted earlier that the percentage of drivers with positive BACs dropped significantly in 1982 and stayed down in 1983. This change is reflected in the data shown in Table 3.19. In 1982, there was a decrease in the percentage of drivers with positive BACs on Mondays, Tuesdays, Fridays and Saturdays ($p < 0.05$). For Mondays, Tuesdays and Fridays, this decrease was maintained in 1983. Table 3.20 confirms that this trend was

TABLE 3.20: BLOOD ALCOHOL LEVELS OF MALE DRIVERS BY DAY OF WEEK: 1981-83

BAC	Day	1981		1982		1983	
≥ 0.08	Mon	3.0%	(0-6.3)[1]	1.7%	(0.1-3.3)	1.6%	(0-3.7)
	Tue	3.6%	(0.4-6.7)	2.1%	(0-4.2)	1.6%	(0-3.4)
	Wed	2.3%	(0-5.5)	3.0%	(0.3-5.8)	2.9%	(0.8-4.9)
	Thu	2.8%	(0.4-5.1)	2.7%	(1.2-4.2)	3.3%	(2.2-4.3)
	Fri	3.1%	(1.0-5.3)	3.4%	(1.8-5.0)	3.3%	(2.3-4.4)
	Sat	5.0%	(2.8-7.1)	2.6%	(0.9-4.2)	4.9%	(3.7-6.1)
	Sun	1.5%	(0-5.0)	2.6%	(0-5.2)	2.7%	(0.8-4.7)
≥ 0.05	Mon	4.1%	(0.8-7.4)	2.9%	(1.3-4.5)	3.0%	(0.9-5.1)
	Tue	7.8%	(4.9-10.8)	4.4%	(2.3-6.4)	4.7%	(2.9-6.4)
	Wed	5.4%	(2.4-8.5)	6.6%	(4.0-9.2)	7.0%	(5.0-9.0)
	Thu	6.1%	(3.8-8.4)	5.9%	(4.4-7.3)	6.7%	(5.7-7.8)
	Fri	7.7%	(5.6-9.8)	7.6%	(6.1-9.1)	8.0%	(7.0-9.0)
	Sat	9.4%	(7.3-11.5)	7.2%	(5.7-8.8)	8.6%	(7.4-9.8)
	Sun	3.6%	(0.1-7.1)	4.8%	(2.2-7.4)	5.4%	(3.6-7.3)
> 0	Mon	18.1%	(15.2-21.0)	12.7%	(11.2-14.1)	12.5%	(10.5-14.4)
	Tue	21.7%	(19.3-24.2)	14.4%	(12.6-16.3)	17.2%	(15.8-18.6)
	Wed	17.6%	(14.8-20.3)	16.2%	(13.8-18.5)	18.1%	(16.3-19.9)
	Thu	17.2%	(15.2-19.3)	16.4%	(15.1-17.7)	17.8%	(16.9-18.7)
	Fri	26.4%	(24.7-28.2)	22.7%	(21.4-24.1)	22.1%	(21.2-22.9)
	Sat	27.3%	(25.5-29.1)	24.7%	(23.4-26.0)	25.6%	(24.6-26.6)
	Sun	15.4%	(12.4-18.4)	16.2%	(13.9-18.5)	13.5%	(11.8-15.3)

[1] 95% confidence limits

also evident for males. Once again, Table 3.21 demonstrates that females were relatively unaffected by random breath testing.

3.3.2.6 Changes in BAC by hour of day

Tables 3.22 to 3.24 show a corresponding set of percentages of drivers at or above each specified BAC level for each hour of the day. It is clear from these tables that random breath testing had little effect on the percentage of drivers with BACs at or above 0.08 or 0.05. For no hour of the day was the percentage of drivers with BACs at or above 0.08 statistically significantly less in 1982 than it was in 1981. With the

TABLE 3.21: BLOOD ALCOHOL LEVELS OF FEMALE DRIVERS BY DAY OF WEEK: 1981-83

BAC	Day	1981		1982		1983	
≥ 0.08	Mon	0%		0.8%	(0-3.9)	0.1%	(0-3.4)
	Tue	0.3%	(0-6.2)[1]	0.6%	(0-4.9)	0.1%	(0-4.1)
	Wed	0.3%	(0-5.7)	0.6%	(0-4.9)	0.6%	(0-3.9)
	Thu	0.5%	(0-4.7)	0.4%	(0-3.8)	1.1%	(0-3.6)
	Fri	0.1%	(0-3.8)	1.0%	(0-4.3)	0.9%	(0-3.8)
	Sat	1.6%	(0-6.3)	1.4%	(0-4.5)	2.2%	(0-4.7)
	Sun	0.2%	(0-8.9)	0.4%	(0-5.1)	0.7%	(0-4.7)
≥ 0.05	Mon	0%		1.0%	(0-4.1)	0.3%	(0-3.6)
	Tue	1.5%	(0-7.4)	1.1%	(0-5.4)	1.0%	(0-5.0)
	Wed	0.7%	(0-6.1)	0.7%	(0-4.9)	3.0%	(0-6.2)
	Thu	1.1%	(0-5.4)	1.1%	(0-4.5)	2.0%	(0-4.6)
	Fri	1.2%	(0-4.8)	1.9%	(0-5.2)	3.0%	(0.1-5.9)
	Sat	2.3%	(0-6.9)	2.7%	(0-5.8)	4.0%	(1.6-6.5)
	Sun	1.8%	(0-10.3)	2.3%	(0-6.8)	2.2%	(0-6.1)
> 0	Mon	4.0%	(0-10.2)	6.3%	(3.4-9.3)	3.6%	(0.4-6.7)
	Tue	6.1%	(0.5-11.6)	4.5%	(0.4-8.7)	4.3%	(0.6-7.9)
	Wed	5.9%	(0.7-11.0)	8.4%	(4.5-12.4)	7.7%	(4.6-10.9)
	Thu	7.7%	(3.8-11.6)	6.1%	(2.9-9.4)	7.9%	(5.5-10.3)
	Fri	11.6%	(8.3-14.9)	0.6%	(7.5-13.6)	12.3%	(9.6-14.9)
	Sat	11.2%	(7.0-15.4)	3.2%	(10.5-16.0)	13.1%	(10.9-15.4)
	Sun	5.7%	(0-13.9)	7.6%	(3.3-11.9)	7.5%	(3.8-11.3)

[1] 95% confidence limits

exception of the time period from 1.00 a.m. to 3.00 a.m. (which may well be chance variation), this pattern was repeated for the percentage of drivers with BACs at or above 0.05.

Rather more change occurred in the proportion of drivers who had been drinking at all. In 1982, there was a statistically significant decrease in the percentage of drinking drivers in the time periods from 5.00 p.m. to 8.00 p.m., 10.00 p.m. to 11.00 p.m. and 1.00 a.m. to 2.00 a.m. For the periods from 5.00 p.m. to 6.00 p.m., 10.00 p.m. to 11.00 p.m. and 1.00 a.m. to 2.00 a.m., this decline was maintained in 1983. These results are consistent with those found in the analysis of the data without respect to

TABLE 3.22: BLOOD ALCOHOL LEVELS OF DRIVERS BY HOUR OF DAY: 1981-83

BAC	Hour	1981		1982		1983	
≥ 0.08	1700-1759	1.8%	(0-4.0)[1]	1.2%	(0-3.0)	1.5%	(0.4-2.7)
	1800-1859	2.9%	(0.6-5.1)	2.3%	(0.5-4.1)	3.0%	(1.5-4.5)
	1900-1959	1.9%	(0-4.3)	1.9%	(0.3-3.5)	1.8%	(0.4-3.2)
	2000-2059	2.4%	(0-5.0)	3.0%	(1.2-4.9)	1.7%	(0.2-3.1)
	2100-2159	0.6%	(0-3.3)	1.5%	(0-3.5)	2.2%	(0.8-3.5)
	2200-2259	3.5%	(0.7-6.3)	1.7%	(0-3.5)	2.1%	(0.3-4.0)
	2300-2359	3.4%	(0-7.0)	3.7%	(1.8-5.6)	4.9%	(3.0-6.9)
	0000-0059	6.3%	(2.8-9.8)	5.0%	(1.9-8.1)	6.7%	(5.0-8.4)
	0100-0159	4.7%	(0-10.5)	6.3%	(3.2-9.3)	7.0%	(4.6-9.3)
	0200-0259	8.1%	(2.0-14.2)	4.4%	(1.2-7.5)	9.7%	(7.3-12.1)
≥ 0.05	1700-1759	3.7%	(1.6-5.7)	2.7%	(1.0-4.4)	3.3%	(2.1-4.4)
	1800-1859	5.9%	(3.7-8.1)	4.6%	(2.8-6.4)	7.0%	(5.6-8.5)
	1900-1959	3.9%	(1.5-6.3)	4.4%	(2.8-5.9)	4.6%	(3.2-5.9)
	2000-2059	4.8%	(2.3-7.4)	5.5%	(3.6-7.3)	4.9%	(3.5-6.3)
	2100-2159	2.6%	(0-5.3)	3.0%	(1.1-4.9)	5.3%	(4.0-6.6)
	2200-2259	6.5%	(3.8-9.2)	4.8%	(3.0-6.6)	5.0%	(3.2-6.8)
	2300-2359	7.2%	(3.7-10.7)	8.4%	(6.6-10.3)	8.3%	(6.4-10.2)
	0000-0059	13.1%	(9.8-16.4)	13.0%	(10.1-16.0)	12.7%	(11.1-14.3)
	0100-0159	17.4%	(12.5-22.4)	11.7%	(8.8-14.6)	13.1%	(10.9-15.3)
	0200-0259	17.3%	(11.8-22.8)	11.0%	(8.0-13.9)	17.6%	(15.4-19.9)
> 0	1700-1759	14.0%	(12.1-15.9)	9.1%	(7.6-10.7)	9.8%	(8.8-10.9)
	1800-1859	17.9%	(16.0-19.9)	14.8%	(13.1-16.4)	17.1%	(15.8-18.4)
	1900-1959	17.1%	(15.1-19.2)	14.4%	(13.0-15.8)	16.8%	(15.6-18.0)
	2000-2059	16.8%	(14.5-19.1)	15.2%	(13.6-16.9)	16.1%	(14.9-17.4)
	2100-2159	15.8%	(13.6-18.1)	14.5%	(12.8-16.2)	15.9%	(14.7-17.1)
	2200-2259	22.7%	(20.3-25.0)	19.7%	(18.2-21.2)	16.9%	(15.3-18.5)
	2300-2359	22.6%	(19.6-25.6)	24.7%	(23.1-26.2)	25.4%	(23.8-27.0)
	0000-0059	35.8%	(33.1-38.5)	38.6%	(36.1-41.1)	33.9%	(32.6-35.2)
	0100-0159	40.3%	(36.3-44.4)	34.2%	(31.9-36.6)	33.0%	(31.2-34.8)
	0200-0259	35.9%	(31.3-40.5)	32.9%	(30.5-35.3)	42.1%	(40.3-44.0)

[1] 95% confidence limits

time of day, where only minimal differences were found in the percentage of drivers at or above 0.08 and 0.05, but a reliable pattern of differences was found for the percentage of drivers with positive BACs.

As Table 3.23 demonstrates, the above trends were largely due to the male drivers in the sample, who showed exactly the same pattern of results as described above. Table 3.24 again shows the apparent lack of effect of random breath testing on females. Not a single statistically significant

TABLE 3.23: BLOOD ALCOHOL LEVELS OF MALE DRIVERS BY HOUR OF DAY: 1981-83

BAC	Hour	1981		1982		1983	
≥ 0.08	1700-1759	2.4%	(0-4.9)[1]	1.7%	(0-3.7)	1.9%	(0.5-3.4)
	1800-1859	3.3%	(0.8-5.9)	2.9%	(0.9-4.9)	3.9%	(2.4-5.4)
	1900-1959	2.5%	(0-5.2)	2.3%	(0.5-4.1)	2.2%	(0.6-3.8)
	2000-2059	3.0%	(0.1-5.8)	3.9%	(1.8-6.1)	2.0%	(0.4-3.7)
	2100-2159	0.8%	(0-3.9)	1.9%	(0-4.1)	2.6%	(1.2-4.1)
	2200-2259	4.3%	(1.0-7.5)	2.2%	(0-4.3)	2.7%	(0.8-4.7)
	2300-2359	4.3%	(0.3-8.4)	4.1%	(2.1-6.2)	5.8%	(4.0-7.7)
	0000-0059	7.4%	(3.7-11.2)	5.4%	(1.8-8.9)	7.1%	(5.1-9.1)
	0100-0159	5.6%	(0-11.9)	5.5%	(2.5-8.4)	7.3%	(5.1-9.4)
	0200-0259	9.4%	(3.3-15.6)	4.8%	(1.5-8.0)	9.4%	(6.6-12.2)
≥ 0.05	1700-1759	4.8%	(2.4-7.2)	3.8%	(1.8-5.7)	4.1%	(2.7-5.6)
	1800-1859	7.2%	(4.8-9.7)	6.0%	(4.1-7.9)	8.8%	(7.3-10.2)
	1900-1959	4.9%	(2.2-7.5)	5.3%	(3.5-7.0)	5.3%	(3.7-6.8)
	2000-2059	5.9%	(3.1-8.6)	7.1%	(5.0-9.1)	5.5%	(4.0-7.0)
	2100-2159	3.0%	(0-6.0)	3.6%	(1.5-5.8)	6.5%	(5.1-7.8)
	2200-2259	7.5%	(4.3-10.7)	6.0%	(3.9-8.1)	5.8%	(3.9-7.8)
	2300-2359	9.2%	(5.4-13.0)	9.3%	(7.4-11.3)	9.6%	(7.9-11.4)
	0000-0059	15.4%	(11.9-18.8)	14.0%	(10.6-17.5)	13.7%	(11.8-15.6)
	0100-0159	19.7%	(14.4-24.9)	11.8%	(9.0-14.6)	13.5%	(11.8-15.3)
	0200-0259	18.7%	(13.1-24.3)	13.1%	(10.1-16.1)	18.6%	(16.1-21.2)
> 0	1700-1759	17.1%	(14.9-19.2)	11.7%	(10.0-13.5)	11.6%	(10.3-13.0)
	1800-1859	21.9%	(19.7-24.0)	18.3%	(16.6-20.0)	20.3%	(19.0-21.5)
	1900-1959	20.4%	(18.1-22.7)	16.6%	(15.1-18.2)	18.9%	(17.6-20.3)
	2000-2059	19.3%	(17.0-21.7)	17.8%	(15.9-19.7)	18.9%	(17.6-20.3)
	2100-2159	17.6%	(15.0-20.1)	15.7%	(13.8-17.6)	19.4%	(18.2-20.6)
	2200-2259	25.8%	(23.1-28.5)	21.9%	(20.1-23.7)	18.8%	(17.1-20.4)
	2300-2359	25.5%	(22.2-28.8)	26.7%	(25.1-28.3)	28.8%	(27.3-30.2)
	0000-0059	38.9%	(36.0-41.7)	40.7%	(37.8-43.6)	36.6%	(35.1-38.1)
	0100-0159	40.7%	(36.3-45.0)	34.8%	(32.6-37.1)	35.5%	(34.0-36.9)
	0200-0259	36.4%	(31.7-41.1)	34.7%	(32.3-37.1)	42.8%	(40.7-44.9)

[1] 95% confidence limits

decrease was found for any time period at any BAC level for the females tested in the three years of the study.

Partly on the basis of the preceding information, it was possible to examine the following suggestion. It has been demonstrated that there was a greater proportion of males than females at each BAC level. It is

TABLE 3.24: BLOOD ALCOHOL LEVELS OF FEMALE DRIVERS BY HOUR OF DAY: 1981-83

BAC	Hour	1981		1982		1983	
≥ 0.08	1700-1759	0%		0%		0.3%	(0-2.2)
	1800-1859	1.2%	(0-5.9)[1]	0.5%	(0-4.7)	0%	
	1900-1959	0%		0.5%	(0-4.2)	0.5%	(0-3.4)
	2000-2059	0.3%	(0-6.7)	0.6%	(0-4.4)	0.4%	(0-3.7)
	2100-2159	0%		0.3%	(0-4.4)	0.9%	(0-2.3)
	2200-2259	1.0%	(0-6.2)	0.3%	(0-3.6)	0.5%	(0-4.9)
	2300-2359	0%		1.6%	(0-6.8)	1.0%	(0-6.9)
	0000-0059	1.0%	(0-10.6)	3.9%	(0-10.7)	5.2%	(2.5-8.0)
	0100-0159	0.3%	(0-15.4)	9.6%	(0.1-19.2)	6.1%	(0-15.0)
	0200-0259	5.1%	(0-22.0)	3.2%	(0-11.7)	10.4%	(5.2-15.6)
≥ 0.05	1700-1759	0%		0%		0.7%	(0-2.6)
	1800-1859	1.2%	(0-5.9)	0.5%	(0-4.7)	0.9%	(0-5.1)
	1900-1959	0.4%	(0-5.4)	1.4%	(0-5.0)	2.3%	(0-5.1)
	2000-2059	1.0%	(0-7.6)	1.1%	(0-4.9)	2.8%	(0-6.1)
	2100-2159	1.0%	(0-7.1)	0.8%	(0-4.9)	2.0%	(0-5.2)
	2200-2259	3.3%	(0-8.4)	1.4%	(0-4.7)	2.9%	(0-7.1)
	2300-2359	0%		4.8%	(0-9.8)	2.7%	(0-8.5)
	0000-0059	2.8%	(0-12.3)	9.8%	(3.3-16.3)	8.9%	(6.2-11.7)
	0100-0159	6.4%	(0-20.6)	11.1%	(1.7-20.5)	11.2%	(2.8-19.6)
	0200-0259	13.4%	(0-29.1)	3.2%	(0-11.7)	13.7%	(8.6-18.7)
> 0	1700-1759	4.4%	(0.6-8.1)	2.5%	(0-5.9)	4.5%	(2.8-6.3)
	1800-1859	4.1%	(0-8.7)	4.3%	(0.3-8.4)	6.1%	(2.2-10.0)
	1900-1959	5.2%	(0.4-10.0)	7.1%	(3.7-10.4)	10.1%	(7.4-12.7)
	2000-2059	7.5%	(1.4-13.7)	8.3%	(4.7-11.9)	7.0%	(3.9-10.0)
	2100-2159	9.5%	(4.3-14.7)	10.1%	(6.3-13.9)	6.7%	(3.6-9.7)
	2200-2259	12.8%	(8.2-17.5)	13.5%	(10.6-16.5)	12.1%	(8.2-16.0)
	2300-2359	11.5%	(3.7-19.3)	16.3%	(11.8-20.8)	12.9%	(7.7-18.2)
	0000-0059	22.6%	(14.9-30.3)	31.6%	(26.5-36.8)	23.8%	(21.4-26.1)
	0100-0159	38.0%	(27.2-48.8)	31.6%	(23.9-39.3)	22.1%	(14.6-29.6)
	0200-0259	34.4%	(21.7-47.2)	26.4%	(19.7-33.1)	39.5%	(35.7-43.4)

[1] 95% confidence limits

conceivable that males who want to go out and drink might well ask their more sober partner to drive home; in the wake of random breath testing, this seems particularly plausible as a means of staying within the law. This effect should reveal itself as an increasing proportion over time of female drivers of those vehicles with two front-seat occupants of the opposite sex, particularly late at night.

Table 3.25 shows the results of this analysis. The percentages shown are women drivers as a proportion of all drivers who have a front passenger of the opposite sex. The percentages are given for the time periods 7.00 p.m. to 10.00 p.m., 10.00 p.m. to 12.00 p.m. and 12.00 p.m. to 3.00 a.m., for the three years of the study, and for 1979. As the table shows, the effect is a real one. For each of the last three years, the percentage of female drivers in the 12.00 p.m. to 3.00 a.m. time period was greater ($p < 0.001$) than it was in the 7.00 p.m. to 10.00 p.m. period, suggesting that, as the time of night became later, intoxicated males allowed their more sober female partners to drive them home.

TABLE 3.25: WOMEN DRIVERS AS A PERCENTAGE OF ALL DRIVERS IN CARS HAVING A DRIVER AND A FRONT PASSENGER OF OPPOSITE SEX, BY HOUR OF DAY: 1979, 1981-83

Time Period	1979	1981	1982	1983
1900 - 2159	10.68% (6.12-15.24)[1]	12.11% (10.22-14.00)	14.00% (12.22-15.78)	14.68% (12.74-16.62)
2200 - 2359	11.01% (4.99-17.03)	12.76% (10.24-15.28)	14.54% (12.15-16.93)	16.71% (14.11-19.31)
0000 - 0259	11.87% (4.18-19.56)	19.44% (15.54-23.34)	22.55% (19.06-26.04)	21.26% (17.86-24.66)

[1] 95% confidence limits

Although this interpretation is quite straightforward, there is a problem in attributing this effect to random breath testing. One way of looking at this is to argue that, if the effect was due to random breath testing, then it should have been found in 1982 and 1983, but not in 1981. However, the effect was quite visible in all three years. Another, perhaps more plausible explanation, is that the 1981 effect may have resulted from the publicity which was given to random breath testing prior to its introduction. In order to verify this account, data from a year pre-dating this publicity are required. If the effect did not exist at that time, then it would seem reasonable to attribute it to the introduction of random breath testing.

Fortunately, the Road Accident Research Unit collected data for a similar survey of drink-driving during 1979. These data are relevant here, and are also shown in Table 3.25. It is clear that in 1979 there was no increase in the percentage of female drivers late at night.

It therefore appears that the increase in the percentage of female drivers late at night which was found in 1981, 1982 and 1983 may be attributed to the introduction of random breath testing. The fact that this increase was manifest in 1981 (prior to the introduction of random breath testing) was probably due to the high level of media publicity which surrounded random breath testing before it was implemented.

3.3.2.7 BAC and number of car occupants

Table 3.26 shows another relationship between the drinking of drivers and car occupants. In this table, the percentage of drivers at each BAC level is shown cross-tabulated by the number of occupants, for each year. Although the numbers in each group were too small to provide statistically significant differences, there was an apparent decline in the proportion of drivers above the 0.08 and 0.05 levels as the number of occupants increased. In the absence of a statistically significant relationship it would be unwise to dwell on this for too long; however, it may be an issue worthy of further investigation.

TABLE 3.26: BLOOD ALCOHOL LEVELS OF DRIVERS BY NUMBER OF OCCUPANTS PER CAR: 1981-83

Year	No of Occupants	≥ 0.08	≥ 0.05	> 0
1981	1	2.70% (1.43-3.97)[1]	6.12% (4.89-7.35)	19.22% (18.13-21.58)
	2	3.20% (1.41-4.99)	6.00% (4.26-7.74)	20.06% (18.54-21.58)
	3	1.68% (0-4.66)	4.42% (1.52-7.33)	17.24% (14.63-19.84)
	4	0.87% (0-4.41)	2.11% (0-5.59)	15.77% (12.77-18.77)
	5	1.74% (0-8.60)	2.19% (0-9.05)	14.00% (7.82-20.18)
1982	1	2.64% (1.74-3.55)	5.31% (4.43-6.19)	15.50% (14.70-16.29)
	2	2.06% (0.92-3.20)	5.05% (3.94-6.15)	17.89% (16.91-18.87)
	3	2.12% (0-4.67)	4.24% (1.75-6.74)	16.90% (14.70-19.10)
	4	1.43% (0-4.28)	5.09% (2.36-7.83)	17.44% (15.03-19.85)
	5	0.75% (0-4.41)	2.86% (0-6.46)	13.25% (10.01-16.49)
1983	1	2.96% (2.28-3.64)	6.09% (5.43-6.74)	16.71% (16.12-17.30)
	2	2.50% (1.57-3.44)	5.89% (4.99-6.78)	18.04% (17.25-18.83)
	3	2.47% (0.70-4.23)	5.23% (3.51-6.95)	15.02% (13.46-16.58)
	4	2.02% (0-4.56)	4.73% (2.26-7.21)	16.36% (14.18-18.55)
	5	1.37% (0-4.90)	4.21% (0.77-7.64)	20.86% (17.95-23.78)

[1] 95% confidence limits

3.3.2.8 Differences in BAC between regions

For all of the analyses presented thus far, data from all four geographical regions have been combined. It is of more than empirical interest to know whether differences exist in drinking patterns between these regions, as such information may guide the placement of police random breath testing units. Table 3.27 shows the percentage in each BAC category for each region, for each year of the study. Although there was some apparent slight variation in these percentages, there were no statistically significant differences between any regions in a given year for BACs at or above 0.08, and only one at the 0.05 level (south-east versus south-west, 1983, $p < 0.05$). However, there was some statistically significant variation in the proportion of drivers above zero. In 1981, the north-west region had a higher percentage above zero than did both of the south-east and south-west regions ($p < 0.01$). In 1983, the percentage of drinking drivers in the south-east region was higher than that in both the south-west and the north-east regions ($p < 0.01$). It is clear that there is no consistent pattern to these regional differences, and it is quite likely that these differences may simply be attributed to chance variation.

Again, statistically significant effects of random breath testing were evident only in the above zero BAC category; even there, the decrease from 1981 to 1982 was apparent only for the north-west and north-east regions ($p < 0.05$), although this decrease was maintained in 1983 ($p < 0.05$).

In conclusion, there were no great differences between regions tested, particularly in the percentage of drivers above the legal limit of 0.08. Such differences as did exist were relatively minor, and were also not consistent from year to year.

TABLE 3.27: PERCENTAGE OF DRIVERS ⩾ 0.08, ⩾ 0.05 AND > 0 FOR EACH REGION, 1981-83

Region	⩾ 0.08	⩾ 0.05	> 0
1981 S-E	1.91% (0.21-3.61)[1]	4.85% (3.20-6.51)	18.54% (17.09-20.00)
S-W	3.07% (1.21-4.93)	5.60% (3.80-7.40)	17.66% (16.07-19.25)
N-W	2.99% (1.22-4.75)	6.26% (4.55-7.97)	20.25% (18.75-21.75)
N-E	2.57% (0.78-4.35)	5.85% (4.13-7.58)	19.55% (18.03-21.07)
1982 S-E	2.11% (0.87-3.36)	5.18% (3.98-6.39)	17.03% (15.96-18.10)
S-W	2.33% (1.12-3.53)	5.40% (4.23-6.57)	17.07% (16.03-18.11)
N-W	2.19% (0.81-3.57)	4.58% (3.23-5.93)	16.39% (15.19-17.59)
N-E	2.44% (1.16-3.72)	5.02% (3.78-6.26)	15.40% (14.28-16.52)
1983 S-E	2.68% (1.66-3.70)	6.48% (5.50-7.46)	19.89% (19.03-20.75)
S-W	2.57% (1.55-3.58)	5.20% (4.22-6.18)	15.14% (14.26-16.03)
N-W	2.88% (1.92-3.85)	5.90% (4.96-6.83)	18.16% (17.34-18.99)
N-E	2.63% (1.62-3.63)	6.01% (5.04-6.98)	16.06% (15.18-16.93)

[1] 95% confidence limits

3.3.3 Possible Sources of Bias

In surveys of this nature, there is always the danger that uncontrolled sources of bias may influence the results. It is thus important to be aware of all factors which could conceivably have an effect. One major possible source of bias has already been discussed - that due to a proportion of drivers refusing to provide a breath sample. Two other possible biasing factors are considered here.

3.3.3.1 Bias due to interviewers

There are two main ways in which interviewer performance can influence the results of the survey. First, if there were dramatic differences in their refusal rates, the correction for refusal bias could be affected. Table 3.28 shows the refusal rate for each interviewer for the three years of the study. In no year was there any statistically significant difference between the refusal rates of the interviewers.

The second way in which the interviewer performance can affect the results concerns the subjective assessment of whether the driver had been drinking, particularly in the case of drivers who refused to co-operate. If it were shown that some of the interviewers were assessing very few refusers as having been drinking (that is, subjective assessment categories 2 and 3, there would be grounds for suspecting that correcting for refusal bias might result in a slight underestimate of the true proportion of drivers with a BAC above a specified level. A comparison of the percentage of refusers who were assessed to have been drinking, for all interviewers, revealed no differences capable of having had a significant effect on the correction for refusal bias.

TABLE 3.28: NUMBER OF DRIVERS APPROACHED AND REFUSAL RATE FOR EACH INTERVIEWER: 1981-83

Interviewer[1]	Drivers Approached	Refusal Rate
1981		
1	2327	9.9%
2	1654	9.5%
3	2187	8.8%
4	2177	9.6%
5	259	12.4%
6	37	10.8%
1982		
1	2381	5.1%
2	1836	8.3%
7	1000	5.5%
8	544	5.0%
9	2267	4.5%
10	1135	6.3%
11	47	8.5%
12	623	5.1%
13	1194	5.0%
1983		
2	1832	5.1%
9	2440	3.5%
14	2142	5.4%
15	2879	3.3%
11	196	3.1%
16	34	2.9%
17	869	3.0%

[1] A total of 17 interviewers were used in the three years of the study. Where the same interviewer number appears in more than one year, it means that the interviewer concerned was used in more than one year. For example, interviewer number 2 worked in all three years of the study.

It therefore appears that differences between interviewers did not contribute any substantial bias to the results of this survey.

3.3.3.2 Bias due to meters

The survey results could also have been biased if the BAC meters used were not accurate. Although every attempt was made to maintain the accuracy of the meters by regular calibration against a standard, there is always the possibility that the calibration may have drifted, or that a meter may have developed a fault. Table 3.29 shows the mean BAC for each meter used in 1982 and 1983. The figures for 1981 are not available as meter numbers were not recorded in that year.

The first impression given by Table 3.29 is one of considerable variation between the meters. In both years, the mean for meter number 2 was rather low, and the mean for meter number 4 was rather high. However there is a simple explanation for these differences.

TABLE 3.29: MEAN BAC FOR EACH METER: 1982-83

Meter	1982	1983
1	0.0076	0.0069
2	0.0055	0.0049
3	0.0074	0.0063
4	0.0124	0.0126

Meter number 2 was used more than any other meter between 5.00 p.m. and 9.00 p.m. hours, and on days early in the week in both 1982 and 1983. These are times which have relatively low percentages of drinking-drivers, and it is thus reasonable that the mean BAC for meter number 2 should be relatively low. Conversely, meter number 4 was used more than any other meter late at night and late in the week, and it is also reasonable that its mean should be relatively high. Hence, there appear to be no grounds for concern about the meters used having biased the results.

3.3.4 Attitudes to Drink-Driving

As explained earlier, a questionnaire was handed to each driver who was approached in the survey. A copy of this questionnaire is shown in Figure 3.1.

3.3.4.1 Sample characteristics

The questionnaire sought a variety of information on drinking behaviour and attitudes to drinking and driving, as well as information on age and sex.

The first question was about the driver's frequency of drinking, while the second question sought information on the quantity drunk in a session. Neither of these questions were attitudinal: their purpose was simply to gain some insight into the drinking behaviour of the drivers in the sample.

The third and fourth questions, however, were attitudinal. The third question asked drivers to indicate how likely they would be to drive if they thought they might be over the 0.08 blood alcohol limit. The fourth question required drivers to estimate their risk of being caught by the police, if they were to drive with a BAC over 0.08.

The fifth question asked the drivers to indicate whether or not they had ever been charged with a drink-driving offence. The aim of this question was to examine the possibility that random breath testing may have had effects on drivers with a previous drink-driving charge which it did not have on drivers who had never been so charged.

The last two questions asked the motorist to indicate his or her age and sex. These questions were included largely to enable a check to be made on the accuracy of the estimates of age and sex made by the interviewers in the roadside survey.

As shown by Table 3.30, the response rate of the questionnaires was very stable at about 40 per cent for the three years of the study. Table 3.31 shows that there was a slight over-representation of females among those drivers who returned the questionnaire, but the difference was not statistically significant (Table 3.31 compared with Table 3.2).

TABLE 3.30: QUESTIONNAIRE RESPONSE RATE, 1981-83

	1981	1982	1983
Questionnaires handed to drivers	8641	11027	10392
Questionnaires returned by drivers	3350	4450	4185
Response rate	38.8%	40.4%	40.3%

Similarly, Table 3.32 shows the distribution of questionnaire respondents by age. A comparison with the corresponding distribution for all drivers (see Table 3.1) reveals that the proportion of returned questionnaires for each age group was very similar to the proportion in the whole group of drivers.

TABLE 3.31: QUESTIONNAIRE RESPONSE RATE BY SEX OF DRIVER: 1981-83

Sex of Driver	1981	1982	1983
Male	2526 (75.4%)[1] (37.8%)[2]	3242 (72.9%) (39.0%)	3070 (73.4%) (39.1%)
Female	824 (24.6%) (42.3%)	1208 (27.1%) (44.4%)	1115 (26.6%) (44.0%)
Total	3350	4450	4185

1 Percentage of total questionnaire respondents who were of this sex in the specified year.

2 Number of questionnaire respondents of this sex as a percentage of the number of drivers of this sex who were approached in the roadside survey in the specified year.

Table 3.33 shows a comparison of the self-reported age of questionnaire respondents with the age of those people as assessed by the interviewers in the roadside surveys. It is clear that the interviewers were reasonably accurate in their assessment of age for older drivers, but less so for younger drivers, the latter being grouped into narrower age ranges. It is also possible that the interviewers were more accurate than this table would suggest, as some respondents either did not give their age, or gave a patently ridiculous figure.

Tables 3.34 to 3.44 show the answers to the questions in the attitude survey. The results are shown separately for all drivers who returned the questionnaire and for those among them who had been drinking (i.e., had a positive BAC when tested). Because RBT is intended to change the behaviour of drinking drivers, any corresponding change in their attitudes is of particular interest.

TABLE 3.32: QUESTIONNAIRE RESPONSE RATE BY AGE OF DRIVER: 1981-83

Age of Driver	1981	1982	1983
< 21	366 (10.9%)[1] (48.1%)[2]	490 (11.0%) (50.8%)	409 (9.8%) (43.6%)
21 - 29	1079 (32.2%) (34.2%)	1391 (31.3%) (35.7%)	1269 (30.3%) (35.2%)
30 - 50	1421 (42.4%) (37.2%)	1913 (43.0%) (41.4%)	1823 (43.6%) (42.7%)
> 50	484 (14.5%) (53.5%)	656 (14.7%) (42.3%)	684 (16.3%) (43.1%)
Total	3350	4450	4185

[1] Percentage of total questionnaire respondents who were of this age in the specified year.

[2] Number of questionnaire respondents of this age as a percentage of the number of drivers of this age who were approached in the roadside survey in the specified year.

TABLE 3.33: COMPARISON OF SELF-REPORTED AGE OF QUESTIONNAIRE RESPONDENT AND INTERVIEWER-ASSESSED AGE: 1981-83

		Self-Reported Age				
		< 21	21-29	30-50	> 50	Total
Interviewer-Assessed Age	< 21	520	246	13	10	789
	21-29	704	2457	632	16	3809
	30-50	38	1027	3972	432	5469
	> 50	3	9	540	1366	1918
	Total	1265	3739	5157	1824	11985

The responses for the frequency of drinking question are shown in Tables 3.34 and 3.35. The majority of drivers indicated a frequency of drinking of once a week to a few times a week, while the frequency was a little higher for drivers who had positive BACs when tested.

TABLE 3.34: HOW OFTEN DO YOU DRINK ALCOHOL? ALL RESPONDENTS: 1981-83

Frequency of Drinking	1981	1982	1983
Never or almost never	653[1] (19.5%)[2]	786 (17.8%)	773 (18.6%)
About once a month	504 (15.1%)	642 (14.5%)	605 (14.5%)
About once a week	839 (25.1%)	1119 (25.3%)	935 (22.5%)
A few times a week	880 (26.3%)	1153 (26.1%)	1112 (26.7%)
Almost every day	471 (14.1%)	723 (16.3%)	737 (17.7%)
Total	3347 (100%)	4423 (100%)	4162 (100%)

[1] Number of drivers giving this response in the specified year.

[2] Number of drivers giving this response as a percentage of all drivers who answered this question in the specified year.

In the question on the quantity drunk in a session (see Tables 3.36 and 3.37), most drivers indicated that they had 1 or 2 drinks, or 3, 4 or 5 drinks. The majority of drinking drivers indicated that they had 3, 4 or 5 drinks in a session.

TABLE 3.35: HOW OFTEN DO YOU DRINK ALCOHOL? RESPONDENTS WITH BAC > 0 ONLY: 1981-83

Frequency of Drinking	1981	1982	1983
Never or almost never	24[1] (3.5%)[2]	16 (2.0%)	16 (1.9%)
About once a month	42 (6.2%)	54 (6.8%)	39 (4.6%)
About once a week	162 (23.9%)	157 (19.6%)	149 (17.4%)
A few times a week	265 (39.1%)	307 (38.4%)	350 (40.9%)
Almost every day	184 (27.2%)	265 (33.2%)	302 (35.3%)
Total	677	799	856

[1] Number of drivers giving this response in the specified year.

[2] Number of drivers giving this response as a percentage of all drivers who answered this question in the specified year.

In all 3 years of the study, the majority of drivers reported that they would not drive if they thought they had a BAC in excess of 0.08 (Tables 3.38 and 3.39). This was the case both for all respondents and for those with positive BACs when tested.

There was also little difference between all drivers and those who had been drinking in their responses to the question dealing with their perceived chances of being apprehended by the police if they drove with a BAC over 0.08 (Tables 3.40 and 3.41).

Table 3.42 shows the relative proportions of drivers who had previously been charged with a drink-driving offence. Table 3.43 shows this

TABLE 3.36: HOW MANY DRINKS DO YOU USUALLY HAVE? ALL RESPONDENTS: 1981-83

Number of Drinks per Session	1981	1982	1983
None	277[1] (8.3%)[2]	403 (9.1%)	236 (5.9%)
1 or 2 drinks	1509 (45.2%)	2071 (46.5%)	1905 (47.6%)
3, 4 or 5	1204 (36.0%)	1508 (33.9%)	1400 (35.0%)
6, 7 or 8	262 (7.8%)	337 (7.6%)	341 (8.5%)
9 or more	89 (2.7%)	131 (2.9%)	122 (3.0%)
Total	3341 (100%)	4450 (100%)	4004 (100%)

[1] Number of drivers giving this response in the specified year.

[2] Number of drivers giving this response as a percentage of all drivers who answered this question in the specified year.

information for respondents who had positive BACs when tested, while in Table 3.44 this information is presented for those respondents whose BACs were at or above 0.08 at the time of testing. By comparing these tables, it is clear that, while previously charged drivers comprise only a small proportion of all respondents, they are over-represented in both of the drinking groups shown in Tables 3.43 and 3.44. This is particularly evident in Table 3.44. Although previously charged drivers comprised only about 3% of all respondents, they represented over 20% of the respondents in 1981 who had a BAC of 0.08 or more, this figure dropping ($p < 0.05$) to 10.3% in 1982 and 1983.

TABLE 3.37: HOW MANY DRINKS DO YOU USUALLY HAVE? RESPONDENTS WITH BAC > 0 ONLY: 1981-83

Number of Drinks per Session	1981	1982	1983
None	5[1] (0.7%)[2]	18 (2.3%)	4 (0.5%)
1 or 2 drinks	171 (25.3%)	199 (25.1%)	231 (27.1%)
3, 4 or 5	358 (53.0%)	407 (51.3%)	426 (50.0%)
6, 7 or 8	111 (16.4%)	118 (14.9%)	133 (15.6%)
9 or more	31 (4.6%)	52 (6.5%)	58 (6.8%)
Total	676 (100%)	794 (100%)	852 (100%)

[1] Number of drivers giving this response in the specified year.

[2] Number of drivers giving this response as a percentage of all drivers who answered this question in the specified year.

3.3.4.2 Attitude change and random breath testing

The answers to the four multiple choice questions for 1981, 1982 and 1983 are summarised in Tables 3.34 to 3.41. Tables 3.45 to 3.48 present the results of a set of ridit analyses conducted to test the statistical significance of answers to the first four questions on the questionnaire. Results are shown for all respondents combined, for both sexes, and for all four age groups, and again in these categories for only those respondents who had positive BACs when tested.

The pattern of results obtained from the question dealing with the frequency of drinking (shown in Table 3.45) was quite consistent. There

TABLE 3.38: IF YOU THOUGHT THAT YOU COULD BE OVER THE 0.08 BLOOD ALCOHOL LIMIT WOULD YOU DRIVE? ALL RESPONDENTS: 1981-83

	1981	1982	1983
Yes	194[1] (6.0%)[2]	176 (4.1%)	170 (4.2%)
Almost every time	149 (4.6%)	123 (2.9%)	136 (3.4%)
Often	122 (3.7%)	118 (2.7%)	127 (3.1%)
Occasionally	501 (15.4%)	574 (13.3%)	620 (15.3%)
Rarely	749 (23.0%)	1032 (23.9%)	957 (23.6%)
No	1539 (47.3%)	2289 (53.1%)	2044 (50.4%)
Total	3254 (100%)	4312 (100%)	4054 (100%)

[1] Number of drivers giving this response in the specified year.

[2] Number of drivers giving this response as a percentage of all drivers who answered this question in the specified year.

was a general trend for the reported frequency of drinking to increase across the three years surveyed. This is highlighted by an examination of the comparison between the 1981 and 1983 responses, where it may be seen that the group as a whole reported an increase in its frequency of drinking. Of the various subgroups, only the responses of the under 21s did not show a statistically significant increase. The same set of comparisons made on drivers with positive BACs shows that all subgroups reported an increase in their frequency of drinking.

TABLE 3.39: IF YOU THOUGHT THAT YOU COULD BE OVER THE 0.08 BLOOD ALCOHOL LIMIT WOULD YOU DRIVE? RESPONDENTS WITH BAC > 0 ONLY: 1981-83

	1981	1982	1983
Yes	68[1] (10.1%)[2]	54 (6.8%)	44 (5.2%)
Almost every time	50 (7.4%)	41 (5.2%)	56 (6.6%)
Often	50 (7.4%)	44 (5.5%)	54 (6.3%)
Occasionally	160 (23.8%)	187 (23.6%)	213 (25.0%)
Rarely	170 (25.3%)	215 (27.1%)	237 (27.8%)
No	175 (26.0%)	253 (31.9%)	248 (29.1%)
Total	673 (100%)	794 (100%)	852 (100%)

[1] Number of drivers giving this response in the specified year.

[2] Number of drivers giving this response as a percentage of all drivers who answered this question in the specified year.

As Table 3.46 shows, the pattern of change for the reported number of drinks per session was not as consistent. The reported number of drinks per session decreased in 1982, and then increased in 1983 to a point where, for males and for the 30-50 age group, it was statistically significantly greater than in 1981 (and very nearly so for the group as a whole). This pattern parallels closely the pattern of change in BAC over the three years, as discussed earlier.

However, there are some notable exceptions to this general trend. First of all, while female respondents as a whole showed no significant change

TABLE 3.40: IF YOU WERE DRIVING WITH A BLOOD ALCOHOL LEVEL OVER 0.08 WOULD YOU BE CAUGHT BY THE POLICE? ALL RESPONDENTS: 1981-83

	1981	1982	1983
Yes	450[1] (15.8%)[2]	568 (15.2%)	552 (15.7%)
Almost every time	76 (2.7%)	101 (2.7%)	77 (2.2%)
Often	77 (2.7%)	96 (2.6%)	112 (3.2%)
Occasionally	356 (12.5%)	579 (15.5%)	510 (14.5%)
Rarely	901 (31.6%)	1319 (35.4%)	1333 (37.9%)
No	989 (34.7%)	1063 (28.5%)	930 (26.5%)
Total	2849 (100%)	3726 (100%)	3514 (100%)

[1] Number of drivers giving this reponse in the specified year.

[2] Number of drivers giving this response as a percentage of all drivers who answered this question in the specified year.

across the three years, female drinkers (those with a BAC greater than zero) reported drinking significantly less in 1983 than in 1981. A similar pattern was also shown by the over-50 age group. There was also a statistically significant increase from 1981 to 1983 in the reported number of drinks per session for those respondents who had a positive BAC in the under 21 age group.

Table 3.47 shows the way in which drivers' attitudes changed with respect to their likelihood of driving if they thought they had a BAC of 0.08 or

TABLE 3.41: IF YOU WERE DRIVING WITH A BLOOD ALCOHOL LEVEL OVER 0.08 WOULD YOU BE CAUGHT BY THE POLICE? RESPONDENTS WITH BAC > 0 ONLY: 1981-83

	1981	1982	1983
Yes	46[1] (7.4%)[2]	65 (9.0%)	69 (8.8%)
Almost every time	17 (2.8%)	20 (2.8%)	14 (1.8%)
Often	20 (3.2%)	14 (1.9%)	28 (3.6%)
Occasionally	79 (12.8%)	108 (14.9%)	100 (12.8%)
Rarely	240 (38.8%)	316 (43.7%)	372 (47.5%)
No	216 (35.0%)	200 (27.7%)	200 (25.5%)
Total	618 (100%)	723 (100%)	783 (100%)

[1] Number of drivers giving this response in the specified year.

[2] Number of drivers giving this response as a percentage of all drivers who answered this question in the specified year.

above (i.e., above the legal limit). Once again, the general trend of the data shows a familiar pattern. Almost all of the drivers who completed the questionnaire reported that they were less likely to drive if they thought that their BAC was at or above 0.08 in 1982 than they were in 1981. However, in 1983 there was a consistent reversal of this trend, although drivers in 1983 still reported that they were less likely to drive with an illegal BAC than they were in 1981.

The primary exception to this trend was again those drivers under 21 years of age with positive BACs.

TABLE 3.42: HAVE YOU EVER BEEN CHARGED WITH A DRINK-DRIVING OFFENCE? ALL RESPONDENTS: 1981-83

Ever Charged	1981	1982	1983
Yes	106 (3.2%)	123 (2.8%)	150 (3.6%)
No	3234 (96.8%)	4306 (97.2%)	4014 (96.4%)
Total	3340 (100%)	4429 (100%)	4164 (100%)

TABLE 3.43: HAVE YOU EVER BEEN CHARGED WITH A DRINK-DRIVING OFFENCE? RESPONDENTS WITH BAC > 0 ONLY: 1981-83

Ever Charged	1981	1982	1983
Yes	50 (7.4%)	43 (5.4%)	45 (5.2%)
No	626 (92.6%)	758 (94.6%)	813 (94.8%)
Total	676 (100%)	801 (100%)	858 (100%)

TABLE 3.44: HAVE YOU EVER BEEN CHARGED WITH A DRINK-DRIVING OFFENCE? RESPONDENTS WITH BAC ≥ 0.08 ONLY: 1981-83

Ever Charged	1981	1982	1983
Yes	17 (20.7%)	10 (10.3%)	12 (10.3%)
No	65 (79.3%)	87 (89.7%)	104 (89.7%)
Total	82 (100%)	97 (100%)	116 (100%)

TABLE 3.45: CHANGE OVER TIME FOR REPORTED FREQUENCY OF DRINKING: 1981-83

Respondent Group	All Respondents			Respondents with BAC > 0		
	1981 v 1982	1982 v 1983	1981 v 1983	1981 v 1982	1982 v 1983	1981 v 1983
All	1.072[1] (< 0.001)[2]	1.020 (0.264)	1.093 (< 0.001)	1.168 (< 0.001)	1.101 (0.015)	1.289 (< 0.001)
Males	1.063 (0.002)	1.042 (0.049)	1.108 (< 0.001)	1.205 (< 0.001)	1.033 (0.443)	1.253 (< 0.001)
Females	1.161 (< 0.001)	0.943 (0.095)	1.092 (0.011)	1.185 (0.098)	1.469 (< 0.001)	1.747 (< 0.001)
< 21	0.970 (0.649)	1.130 (0.090)	1.098 (0.195)	1.328 (0.081)	1.092 (0.606)	1.539 (0.013)
21 - 29	1.074 (0.020)	1.003 (0.925)	1.077 (0.023)	1.156 (0.039)	1.179 (0.016)	1.372 (< 0.001)
30 - 50	1.059 (0.049)	1.024 (0.368)	1.074 (0.008)	1.053 (0.392)	1.068 (0.269)	1.124 (0.049)
> 50	1.172 (< 0.001)	0.986 (0.728)	1.154 (< 0.001)	1.489 (< 0.001)	0.925 (0.409)	1.390 (< 0.001)

[1] Odds ratio : the odds (e.g. 1.072 : 1.000) that a respondent randomly chosen from the second-named year reported a higher frequency of drinking than a randomly chosen respondent from the first-named year.

[2] Statistical significance of the difference in reported frequency of drinking for the two years. The difference tested is the odds ratio shown minus the null hypothesis odds ratio, which has the value 1.000.

Refer to Section 3.2.6 for more information.

All subgroups of the drinking drivers other than the under-21 years of age group reported that they were less likely in 1982 than in 1981 to drive witha high (BAC although the change was not statistically significant for the 21-29 group). For the under-21 group the change, which was not

TABLE 3.46: CHANGE OVER TIME FOR REPORTED NUMBER OF DRINKS: 1981-83

Respondent Group	All Respondents			Respondents with BAC > 0		
	1981 v 1982	1982 v 1983	1981 v 1983	1981 v 1982	1982 v 1983	1981 v 1983
All	0.959[1] (0.015)[2]	1.080 (< 0.001)	1.035 (0.062)	0.986 (0.726)	1.021 (0.606)	1.006 (0.877)
Males	0.962 (0.054)	1.089 (< 0.001)	1.048 (0.029)	1.051 (0.261)	1.008 (0.857)	1.059 (0.178)
Females	0.997 (0.938)	1.044 (0.232)	1.041 (0.258)	0.861 (0.143)	0.931 (0.495)	0.794 (0.029)
< 21	0.794 (< 0.001)	1.362 (< 0.001)	1.076 (0.324)	0.969 (0.846)	1.476 (0.024)	1.444 (0.033)
21 - 29	0.998 (0.942)	1.053 (0.113)	1.052 (0.123)	1.161 (0.033)	0.945 (0.414)	1.096 (0.183)
30 - 50	1.015 (0.561)	1.054 (0.053)	1.071 (0.012)	0.995 (0.940)	1.019 (0.748)	1.015 (0.805)
> 50	0.895 (0.010)	1.182 (< 0.001)	1.048 (0.278)	0.716 (0.003)	1.070 (0.473)	0.755 (0.003)

1 Odds ratio : the odds (e.g., 0.959 : 1.000) that a respondent randomly chosen from the second-named year reported having more drinks per session than a randomly chosen respondent from the first-named year.

2 Statistical significance of the difference in reported number of drinks per session for the two years (see note 2 to Table 3.45).

statistically significant, was in the opposite direction. Furthermore, in 1983 the under-21 group of drinking drivers reported a likelihood of driving with an illegal BAC which was higher than that reported in 1981 by a statistically significant amount. This trend was quite unlike that found in any other group.

Table 3.48 deals with the final attitudinal question, in which drivers were asked if they thought they would be caught by the police if they were to

TABLE 3.47: CHANGE OVER TIME IN PROBABILITY OF DRIVING IF BAC ≥ 0.08: 1981-83

Respondent Group	All Respondents 1981 v 1982	All Respondents 1982 v 1983	All Respondents 1981 v 1983	Respondents with BAC > 0 1981 v 1982	Respondents with BAC > 0 1982 v 1983	Respondents with BAC > 0 1981 v 1983
All	1.175[1] (< 0.001)[2]	0.936 (< 0.001)	1.101 (< 0.001)	1.235 (< 0.001)	0.949 (0.190)	1.180 (< 0.001)
Males	1.168 (< 0.001)	0.950 (0.015)	1.110 (< 0.001)	1.202 (< 0.001)	0.974 (0.542)	1.177 (< 0.001)
Females	1.145 (< 0.001)	0.911 (0.008)	1.045 (0.212)	1.306 (0.009)	0.844 (0.108)	1.104 (0.346)
< 21	1.275 (< 0.001)	0.821 (0.007)	1.043 (0.559)	0.830 (0.249)	0.879 (0.454)	0.710 (0.049)
21 - 29	1.156 (< 0.001)	0.963 (0.243)	1.120 (< 0.001)	1.111 (0.134)	1.132 (0.072)	1.273 (< 0.001)
30 - 50	1.150 (< 0.001)	0.906 (< 0.001)	1.045 (0.103)	1.362 (< 0.001)	0.815 (< 0.001)	1.126 (0.047)
> 50	1.161 (< 0.001)	0.939 (0.136)	1.085 (0.054)	1.267 (0.034)	0.902 (0.277)	1.141 (0.167)

[1] Odds ratio : the odds (e.g., 1.175 : 1.000) that a respondent randomly chosen from the second-named year reported being less likely to drive with a BAC ≥ 0.08 than a randomly chosen respondent from the first-named year.

[2] Statistical significance of the difference in likelihood of driving with a BAC ≥ 0.08 for the two years (see note 2 to Table 3.45).

drive with a BAC of 0.08 or above. In 1982 all groups except those under 21 thought that this was more likely than in 1981. Among those drivers with a positive BAC, respondents of both sexes and those of 30 or more years of age also thought that they would be more likely to be caught in 1982 than in 1981. In 1983, no subgroup of the whole sample showed a statistically significant difference from the 1982 perception of the risk of apprehension. However, the under-21 group of drinking drivers did show a statistically significant change; they thought that they were less likely

TABLE 3.48: CHANGE OVER TIME IN PERCEIVED RISK OF BEING CAUGHT IF DRIVING WITH BAC ≥ 0.08: 1981-83

Respondent Group	All Respondents 1981 v 1982	All Respondents 1982 v 1983	All Respondents 1981 v 1983	Respondents with BAC > 0 1981 v 1982	Respondents with BAC > 0 1982 v 1983	Respondents with BAC > 0 1981 v 1983
All	0.906[1] (< 0.001)[2]	0.974 (0.180)	0.881 (< 0.001)	0.871 (0.001)	0.989 (0.797)	0.859 (< 0.001)
Males	0.932 (0.001)	0.971 (0.199)	0.905 (< 0.001)	0.900 (0.023)	0.994 (0.884)	0.891 (0.010)
Females	0.846 (< 0.001)	0.971 (0.447)	0.821 (< 0.001)	0.668 (< 0.001)	0.970 (0.785)	0.645 (< 0.001)
< 21	0.979 (0.765)	1.053 (0.500)	1.026 (0.738)	0.989 (0.947)	1.421 (0.041)	1.346 (0.098)
21 - 29	0.907 (0.003)	0.966 (0.311)	0.876 (< 0.001)	0.965 (0.619)	0.859 (0.031)	0.833 (0.009)
30 - 50	0.902 (< 0.001)	0.994 (0.831)	0.894 (< 0.001)	0.837 (0.006)	1.059 (0.360)	0.882 (0.044)
> 50	0.906 (0.049)	0.944 (0.226)	0.854 (< 0.001)	0.710 (0.004)	1.005 (0.964)	0.699 (< 0.001)

[1] Odds ratio : the odds (e.g., 0.906 : 1.000) that a respondent randomly chosen from the second-named year reported a lower perceived risk of being caught than a randomly chosen respondent from the first-named year.

[2] Statistical significance of the difference in perceived risk of being caught for the two years (see note 2 to Table 45).

to be caught in 1983 than in 1982. In 1983, all subgroups of both the whole sample and of the drivers with positive BACs, except for the under-21 year olds, reported that they thought that they were more likely to be caught than the corresponding subgroups did in 1981. The perception of the risk of apprehension of the under-21 year old drivers did not change by a statistically significant amount. The under 21-year olds who had been drinking reported that they thought that they were less likely to be caught than in 1981. This change was statistically significant at the 10 per cent level.

3.3.4.3 Relationship between changes in attitudes and in drink-driving

We are now in a position to see whether the reported changes in attitudes to drinking and driving were consistent with the changes which occurred in drivers' blood alcohol levels following the introduction of random breath testing. This matter may best be prefaced by summarizing the general trends of change found for BACs and for attitudes.

The pattern of change in BACs for the whole group appears in Table 3.9, and was as follows. The proportion of drivers with a BAC at or above 0.08 dropped slightly below its 1981 level in 1982, but in 1983 returned to its 1981 level. The same trend was evident for the percentage of drivers with a BAC of 0.05 or above. Although in neither case was the 1982 decrease statistically significant, the consistency of this trend over varying subgroups of the sample leads to the belief that this decrease was real. That is, the 1982 decrease was meaningful, and did not simply represent chance variation.

The proportion of drivers with positive BACs decreased in 1982 by a statistically significant amount. This figure rose slightly in 1983, but remained well below its 1981 level.

The pattern of change in attitudes to drink-driving is shown in Tables 3.45 to 3.48. Table 3.45 shows that the group as a whole was reportedly drinking more frequently in 1982 than in 1981, and although there was not a statistically significant increase from 1982 to 1983, the group was reportedly drinking more frequently in 1983 than in 1981. Table 3.46 shows that the reported quantity of alcohol drunk in a session decreased from 1981 to 1982, but in 1983 increased to a level which was almost statistically significantly greater than that of 1981.

Taken by themselves, these results suggest that the following pattern should be found with BACs. First, there should be a higher proportion of drivers with positive BACs in 1982 and 1983 than there was in 1981, as the reported frequency of drinking increased in the second two years. Secondly, as the reported quantity drunk in a session decreased in 1982, there should also be a lower proportion of drivers at high BAC levels in that year than in 1981; as the reported quantity drunk then rose in 1983, the proportion of drivers with high BACs should then have risen. However, these suggestions are confounded by the results shown in Table 3.47, which demonstrate that drivers in both 1982 and 1983 reported that they were less prepared to drive with high BACs than they were in 1981.

We cannot assess the extent to which this change in attitude towards drink driving balances the apparent change in drinking. Indeed, if the relevant BAC figures are examined (see Table 3.9), we find that, far from an increase in the proportion of drivers with positive BACs in 1982 and 1983, there was a statistically significant decrease from the 1981 level in both years. However, there is some evidence for the predicted change in the proportion of drivers at high BACs. The proportion of drivers at or above 0.08 did drop in 1982 and rise again in 1983, but these changes were not statistically significant.

Without further information, we cannot weigh up the opposing forces of increases in frequency of drinking or quantity drunk per session and decreases in the probability of driving with a high BAC. To put this another way, it is difficult to look for changes in BACs which correspond to changes in attitudes when the changes in attitudes are not consistent with each other.

There was one subgroup whose questionnaire responses presented a sufficiently consistent pattern that a very clear set of predictions could be generated. If these predictions were not vindicated by the data, then it would seem that there was no simple relationship between attitudes to drink driving and actual drink driving behaviour. This group was the under-21 group of drivers with positive BACs. They were the only group of drinkers who showed a statistically significant increase from 1981 to 1983 in both the frequency of drinking and in the quantity drunk. Further, as shown by Tables 3.47 and 3.48, they reported in 1983 that they were more likely to drive with a BAC at or above 0.08 than they were in 1981 because they thought that they were less likely to be caught by the police. On the basis of these results, we would clearly expect to find an increase in the proportion of drivers in this group at or above 0.05 and 0.08 BAC, and an increase in the proportion of the under-21 group as a whole with positive BACs. As Table 3.14 shows, there was little change in the proportion of under-21 year old drivers with positive BACs. Although Table 3.15 shows what appears to be a large increase from 1981 to 1983 in the proportion of under-21 year olds who had been drinking and who were at or above 0.05, the difference was not statistically significant. Therefore, it seems that the self-reported increase in frequency and quantity of drinking by the drinking members of the under-21 year old age group was not accompanied by a corresponding increase in their drink driving.

We need to ask why the correspondence between changes in attitudes and changes in BAC does not seem to be particularly good. There are at least four possible explanations, any or all of which may be involved. First, it is possible that those drivers who returned the questionnaire were not representative of the whole group. This is always a problem in questionnaire surveys with incomplete returns, as it is not always clear whether the kind of person who returns the questionnaire differs from the rest of the sample in any important way.

By examining the pattern of BACs obtained from the sample of questionnaire respondents, it was possible to make a limited check on how representative of the whole group this sample was. The blood alcohol levels of the questionnaire respondents are shown in Tables 3.49 (all respondents), 3.50 (in sex groups) and 3.51 (in age groups). A comparison of these tables with the corresponding tables for all drivers tested (Tables 3.9, 3.12 and 3.14) reveals a number of statistically significant differences. For example, in 1983 the percentage of questionnaire respondents with a BAC at or above 0.08 was less than the corresponding percentage for all drivers; in 1981 the percentages of questionnaire respondents with BACs in excess of both 0.05 and zero were less than the corresponding percentages for all drivers. A number of similar differences were also found within age and sex groups. However, it should be noted that the pattern of change in BAC of questionnaire respondents across the three years of the study was very similar to that of the whole sample of drivers tested.

In general, there was a trend for the percentages at any given BAC level to be slightly lower for questionnaire respondents than for the group of all drivers tested. This finding, coupled with the fact that the questionnaire respondents were those drivers who were sufficiently co-operative to return the questionnaire, may indicate that respondents were rather more socially compliant than drivers at large. All of the above suggests that, at least with respect to BACs, questionnaire respondents may not have been representative of the general driving population.

TABLE 3.49: BLOOD ALCOHOL LEVELS OF ALL QUESTIONNAIRE RESPONDENTS: 1981-83

Driver's BAC	1981	1982	1983
≥ 0.08	2.12% (1.62-2.62)[1]	1.99% (1.51-2.46)	2.05% (1.72-2.38)
≥ 0.05	4.84% (4.36-5.33)	4.52% (4.06-4.99)	5.38% (5.06-5.69)
> 0	17.92% (17.49-18.35)	15.98% (15.57-16.40)	17.00% (16.71-17.29)

1 95% confidence limits

TABLE 3.50: BLOOD ALCOHOL LEVEL AND SEX OF QUESTIONNAIRE RESPONDENT: 1981-83

Sex	Driver's BAC	1981	1982	1983
Male				
	≥ 0.08	2.73 (2.20-3.26)[1]	2.37 (1.87-2.87)	2.52 (2.15-2.88)
	≥ 0.05	6.24 (5.73-6.75)	5.60 (5.12-6.08)	6.50 (6.15-6.85)
	> 0	21.53 (21.09-21.97)	18.63 (18.20-19.05)	20.23 (19.92-20.53)
Female				
	≥ 0.08	0.29 (0-1.5)	0.97 (0-2.10)	0.73 (0.01-1.45)
	≥ 0.05	0.65 (0-1.86)	1.65 (0.52-2.78)	2.16 (1.46-2.87)
	> 0	7.00 (5.86-8.14)	8.95 (7.90-10.00)	7.77 (7.10-8.44)

1 95% confidence limits

TABLE 3.51: BLOOD ALCOHOL LEVELS AND AGE OF QUESTIONNAIRE RESPONDENT: 1981-83

Age	Driver's BAC	1981	1982	1983
< 21	⩾ 0.08	2.20 (1.47-2.94)[1]	1.39 (0.12-2.65)	0.94 (0-1.91)
	⩾ 0.05	6.07 (5.36-6.77)	2.48 (1.23-3.74)	5.24 (4.31-6.18)
	> 0	17.56 (16.92-18.20)	17.86 (16.78-18.94)	12.05 (11.18-12.92)
21-29	⩾ 0.08	2.66 (1.74-3.58)	2.37 (1.65-3.09)	2.22 (1.79-2.65)
	⩾ 0.05	5.50 (4.61-6.39)	4.79 (4.09-5.49)	5.22 (4.79-5.64)
	> 0	17.83 (17.04-18.62)	15.43 (14.80-16.06)	16.85 (16.47-17.22)
30-50	⩾ 0.08	1.90 (1.19-2.60)	1.67 (0.97-2.38)	2.13 (1.57-2.70)
	⩾ 0.05	4.42 (3.73-5.10)	4.24 (3.55-4.93)	4.89 (4.34-5.44)
	> 0	17.70 (17.09-18.31)	15.92 (15.31-16.54)	16.86 (16.38-17.34)
> 50	⩾ 0.08	1.68 (0.05-3.30)	2.44 (0.90-3.99)	1.91 (1.10-2.71)
	⩾ 0.05	4.36 (2.79-5.93)	5.73 (4.22-7.24)	6.77 (6.00-7.54)
	> 0	19.27 (17.93-20.62)	16.35 (14.99-17.70)	18.88 (18.21-19.56)

[1] 95% confidence limits

A second possible explanation for the lack of correspondence between attitudes and BACs is that the responses to some questions may have been coloured by their social desirability. If respondents gave the answer which they perceived to be most socially acceptable, rather than the answer which most truly captured their beliefs, then results would inevitably be confounded. Even the idiosyncratic results of the under 21 year old drinkers may be explicable in these terms, as their responses may be socially desirable in the social milieu which they inhabit. The effect of social desirability, unless explicitly controlled by the insertion into the questionnaire of lie scales, can be a serious confounding factor in the results of any questionnaire which seeks to measure social attitudes.

A third explanation concerns the possibility of shortcomings or ambiguities in the questionnaire itself. If the questions were ambiguous, difficult to understand, or offered an inadequate range of responses, then the results would inevitably have been affected, and have given a misleading or incomplete picture.

A fourth possible explanation for the lack of congruency between changes in attitudes and changes in BACs involves questioning an assumption on which the search for such a correspondence was based. If we expect there to be a correspondence between driver behaviour (as measured by BACs) and driver attitudes (as measured by the questionnaire), then there was clearly involved an implicit assumption that behaviour and attitudes will change concurrently. However, a wealth of information from the social psychology literature (e.g. Secord and Backman, 1964; Aronson, 1976) indicates that this is often not the case. When a behavioural change is enforced, it is frequently later that attitudes change to come into line with the new behaviour. In the present context, it may be that changes in drink-driving behaviour brought about by random breath testing were not accompanied by concurrent changes in attitudes to drink-driving. This may explain some of the difficulties found in matching changes in BACs with changes in attitudes.

As noted earlier, all of these possible explanations are likely to be implicated, to varying extents, in the lack of correspondence between questionnaire and BAC data.

3.3.4.4 Differences in the questionnaire responses of males and females

Table 3.52 shows the results of a series of ridit analyses which were done to examine the extent to which the questionnaire responses of males and females differed. These results show what was, in the main, a very consistent pattern. For both all respondents and the subgroup with positive BACs, males were seen to drink more frequently, drink more alcohol in a session, and be more prepared to drive with a BAC over 0.08, than were females. All of these differences were highly statistically significant.

The responses to question 4, which dealt with the perceived likelihood of being apprehended by the police if the driver were to drive with a BAC over 0.08, were slightly more mixed. In 1981, there were no sex differences in the complete sample of questionnaire respondents; however, the female drivers with positive BACs thought that they were less likely to be caught by the police than did their male counterparts. For this group of drinking drivers however, there were no sex differences in 1982 and 1983, while for all respondents, males thought that they were less likely to be caught than did females for those two years.

TABLE 3.52: SEX DIFFERENCES IN QUESTIONNAIRE RESPONSES FOR ALL RESPONDENTS AND FOR THOSE WITH BAC > 0: 1981-83

Question	1981		1982		1983	
	All	BAC > 0	All	BAC > 0	All	BAC > 0
Question 1	0.62 (< 0.001)[1]	0.58 (< 0.001)	0.68 (< 0.001)	0.58 (< 0.001)	0.63 (< 0.001)	0.84 (0.090)
Question 2	0.66 (< 0.001)	0.75 (0.036)	0.69 (< 0.001)	0.63 (< 0.001)	0.64 (< 0.001)	0.57 (< 0.001)
Question 3	1.53 (< 0.001)	1.45 (0.007)	1.54 (< 0.001)	1.55 (< 0.001)	1.47 (< 0.001)	1.39 (0.002)
Question 4	0.98 (0.691)	1.37 (0.032)	0.86 (< 0.001)	0.99 (0.893)	0.86 (< 0.001)	0.96 (0.705)

Questions are in the same order as in the questionnaire, see Figure 3.1.

All analyses use males as the reference group; thus, an odds ratio less than 1 should be interpreted as follows. For question 1, this would mean that males reported a higher frequency of drinking. For question 2, it would mean that males reported having more drinks per session. For question 3, it would mean that males reported being less likely to drive if they though they had a BAC over 0.08. For question 4, it would mean that males reported a lower perceived risk of apprehension if they were to drive with a BAC over 0.08. All odds ratios greater than 1 should be given an interpretation opposite to those above.

[1] Statistical significance of the difference between questionnaire responses of males and females (see note 2 to Table 3.45).

These results largely confirm the impressions given by the BAC data. Males reportedly drank more frequently than did females, and consumed more drinks per drinking session. This was reflected in the finding that there was almost invariably a higher proportion of all male drivers above any given BAC level than was the case for female drivers. This bias towards male drivers at the higher BACs was probably accentuated by the fact that males were more prepared to drive with a BAC over 0.08, and (for 1982 and 1983) thought that they were less likely to be caught by the police if they did so. In other words, male drivers were more likely than females to be above the legal BAC limit, which may in part have been due to their having been more willing to drive if they thought that they were above that limit.

3.3.4.5 Relationship between attitudes to drink-driving

Table 3.53 shows the extent to which answers to the various questions in the questionnaire were related to each other for the three years of the survey. As noted in Section 3.2.6, the strength of the association between questionnaire variables was assessed using Kendall's Tau. This is interpreted in the same way as a correlation co-efficient. For example, Table 3.53 shows that Kendall's Tau for the relationship between frequency of drinking and number of drinks per session was 0.39. This was highly statistically significant, indicating that those respondents who drank most frequently tended to have most drinks per session; conversely, it also indicated that those respondents who drank least frequently also tended to have least drinks per session.

As these relationships do not bear directly on the effect of random breath testing, they will not be dealt with at great length. However, one or two interesting points emerge. As indicated by Table 3.53, the degree of association between questionnaire variables remained very constant from year to year. It is, for instance, no surprise to learn that there was a strong relationship between the frequency of drinking and the quantity drunk, or that the more willing a driver was to drive with a BAC over 0.08, the less likely he felt he was to be caught by the police if he did so.

Drivers with a previous drink driving charge tended to drink more frequently and in larger quantities than those who had not been charged,

TABLE 3.53: RELATIONSHIPS BETWEEN QUESTIONNAIRE VARIABLES : 1981-83

	Quantity[2]	Drive ≥ 0.08[3]	Caught[4]	Charge[5]
1981				
Frequency[1]	0.39*[6]	0.34*	-0.11*	0.11*
Quantity		0.46*	-0.14*	0.13*
Drive ≥ 0.08			-0.22*	0.11*
Caught				0.01
1982				
Frequency	0.38*	0.32*	-0.07*	0.11*
Quantity		0.45*	-0.14*	0.16*
Drive ≥ 0.08			-0.19*	0.12*
Caught				0.01
1983				
Frequency	0.33*	0.31*	-0.09*	0.04*
Quantity		0.44*	-0.13*	0.12*
Drive ≥ 0.08			-0.20*	0.08*
Caught				0.01

[1] Frequency of drinking.

[2] Quantity drunk.

[3] Probability of driving with BAC ≥ 0.08

[4] Chances of being caught if drove with BAC ≥ 0.08.

[5] Whether or not had previous drink-driving charge.

[6] Number shown is Kendall's Tau (see text, section 3.3.4.5).

* indicates a statistically significant relationship of at least $p < 0.01$.

and they were still prepared to drive with a BAC over 0.08. However, there was no relationship between the perceived chances of being caught by the police if a driver chose to drive with a BAC above the legal limit and whether or not that driver had previously been charged with a drink driving offence. This suggests that the views of drivers who had been previously charged did not differ significantly in this respect from the views of those drivers who had not been charged.

3.3.4.6 Relationship between attitudes to drink-driving and actual drink-driving behaviour

Table 3.54 shows the degree to which questionnaire variables were related to variables obtained in the roadside surveys. The roadside survey variables of interest were the various groupings of BAC, subjective assessment of whether or not the driver had been drinking, and the age and sex of the driver. The measure of association used was again Kendall's Tau.

As Table 3.54 shows, reported frequency and quantity of drinking and the likelihood of driving if the driver thought that he had a BAC over 0.08 were related to all roadside survey variables in a consistent way for all three years. It is of interest to note that, for all years, the best predictor of both reported frequency and quantity of drinking was simply whether or not the driver had been drinking (that is, BAC greater than zero when tested). This was also the best predictor of the self-reported likelihood of that driver being willing to drive if his BAC was over 0.08. Although the other BAC indicators were statistically significantly related to these variables, they were not related as strongly.

Some relationships in these tables serve as further confirmation of earlier findings. The consistent association between age of driver and willingness to drive with an illegally high BAC again showed that it was the younger drivers who were most prepared to drive with a BAC over 0.08. Driver age was also one of the few variables to be consistently associated with the perceived risk of being caught by the police if the driver were to drive with a BAC above 0.08. The indication was again that it was the younger driver who rated lowest his risk of being caught.

TABLE 3.54: RELATIONSHIPS BETWEEN QUESTIONNAIRE VARIABLES AND ROADSIDE SURVEY VARIABLES: 1981-83

	Frequency	Quantity	Drive ≥ 0.08	Caught	Charge
1981					
BAC ≥ 0.08[1]	0.14*	0.16*	0.15*	-0.03	0.16*
BAC ≥ 0.05[2]	0.18*	0.22*	0.18*	-0.02	0.16*
BAC > 0[3]	0.28*	0.28*	0.22*	-0.06*	0.12*
Subj. Ass.[4]	0.15*	0.14*	0.11*	-0.02	0.08*
Sex Driver[5]	-0.16*	-0.16*	0.15*	0.01	-0.07*
Age Driver[6]	0.03*	-0.16*	0.16*	0.05*	0.01
1982					
BAC ≥ 0.08	0.14*	0.14*	0.14*	-0.05*	0.07*
BAC ≥ 0.05	0.19*	0.20*	0.19*	-0.03	0.07*
BAC > 0	0.28*	0.27*	0.21*	-0.06*	0.07*
Subj. Ass.	0.08*	0.08*	0.05*	-0.02	0.02
Sex Driver	-0.15*	-0.15*	-0.17*	0.05*	-0.08*
Age Driver	0.06*	-0.16*	-0.17*	0.07*	-0.02
1983					
BAC ≥ 0.08	0.13*	0.17*	0.14*	-0.05*	0.06*
BAC ≥ 0.05	0.20*	0.22*	0.18*	-0.05*	0.06*
BAC > 0	0.32*	0.27*	0.22*	-0.06*	0.05*
Subj. Ass.	0.05*	0.07*	0.08*	-0.03	0.03
Sex Driver	-0.18*	-0.17*	-0.14*	0.05*	-0.07*
Age Driver	0.05*	-0.18*	-0.18*	0.08*	-0.01

[1] Whether or not driver had a BAC ≥ 0.08.

[2] Whether or not driver had a BAC ≥ 0.05.

[3] Whether or not driver had a BAC > 0.

[4] Subjective assessment of drinking by driver (at time of roadside survey).

[5] Sex of driver (female coded higher than male).

[6] Age of driver.

* indicates a statistically significant relationship of at least $p < 0.01$

Drivers who reported previous drink-driving offences had higher BACs than did drivers without any such offence, although this relationship weakened somewhat over the three years. This finding is illustrated in a different way by the results shown in Table 3.44. This table shows that in 1981, drivers with a previous drink-driving charge constituted a disproportionately high percentage of questionnaire respondents with a BAC of 0.08 or above. While this figure dropped in 1982 and remained down in 1983, it was still relatively high. This perhaps indicates that the threat of random breath testing moderated the drink-driving of those with a previous charge more than it did the drink-driving of those who had never been charged.

4. RBT, ACCIDENTS AND CASUALTIES

4.1 INTRODUCTION

Random breath testing by the police is intended to reduce the frequency of accidents by reducing the frequency of driving with a blood alcohol concentration above the legal limit (0.08 gm/100 ml in South Australia).

We have shown in the previous chapter that random breath testing (RBT) had some effect on drink-driving, albeit a short-lived effect on driving with a blood alcohol concentration (BAC) above 0.08. Our task in this chapter is to show what the effect of RBT was on accidents, particularly those that were known to be alcohol-related.

For the purpose of this evaluation an "alcohol-related accident" is one in which at least one operator of a motor vehicle had a BAC at or above 0.08. This definition excludes some accidents in which a driver below 0.08 may have been seriously affected by alcohol (and includes some in which a driver above 0.08 may not have been seriously impaired). It also takes no account of the blood alcohol levels of accident-involved pedestrians and pedal cyclists, because they are not subject to random breath testing (although the BACs of all road accident casualties are reviewed at the end of the chapter).

4.2 SOURCES OF INFORMATION

Reports on road accidents are prepared by the South Australian Police. These reports are forwarded to the Highways Department of South Australia for coding and entry into a computer file.

Information on the involvement of alcohol in crashes comes from two main sources: analysis of blood samples taken from road accident victims treated at hospital, and from breath tests conducted by the police on uninjured drivers at the scene of the accident.

Any road accident resulting in injury or in property damage, the cost of which exceeds $300, is required to be reported to the police. In general, reports on non-injury crashes are made to the police by the drivers or riders involved. About 60 per cent of crashes resulting in injury or a fatality are investigated at the scene and reported on by the police. Unless the police attend the scene of a crash, uninjured drivers or riders are not breath tested. Injured drivers (and other casualties over 13 years of age) who are treated at a hospital are required by law to provide a blood sample which is then analysed for alcohol. This means that information on alcohol involvement in a crash is available only for some casualty accidents, with a few exceptions.

Even when the police attend the scene of an accident some uninjured drivers may not be breath tested. In the Adelaide in-depth study of accidents to which an ambulance was called in 1976-77 only 6.5 per cent of the uninjured drivers were breath tested by the police (McLean, Aust, Brewer and Sandow, 1981). However, from 1 October, 1981 police patrols attending accidents between 4.00 p.m. and 6.00 a.m. have been instructed to test all uninjured drivers. This has resulted in a marked increase, particularly since mid-1982, in the percentage of uninjured drivers breath tested by the police (Benson, 1984). Consequently, and coincidentally, a higher proportion of alcohol-related crashes may have been identified by the police since RBT was introduced on 15 October, 1981 even though many uninjured accident-involved drivers are still not breath tested.

Compliance with the requirement to take a blood sample is very high, at least in the major hospitals (McLean, Aust, Brewer and Sandow, 1981). The blood samples taken from road accident casualties at hospitals are analysed for alcohol at the State Forensic Science Centre. The results, in the form of BAC readings, are then forwarded to the police.

The Forensic Science Centre maintains a register which lists the name of the accident victim, the date on which the blood sample was received, the hospital where the sample was taken, and the BAC. In a small proportion of cases the blood sample received by the Centre is not suitable for analysis, and hence no BAC estimation can be made. Prior to July 1982, this proportion was a little over one per cent; since that time, the proportion of samples unsuitable for analysis has dropped to about 0.2 per cent, due to a change in the equipment used to determine the blood alcohol concentration.

Matching a BAC reading to an accident report is not a straightforward task. The police accident report contains the names of the drivers who were treated at a given hospital. The Forensic Science Centre BAC results contain the names of all casualties, not only drivers, who provided a blood sample at each hospital. The type of road user is not recorded in the Forensic Science information; no distinction is made between drivers, riders, passengers and pedestrians. Therefore, matching the two records involves looking for a BAC record for a person having the same name as that of a driver, or rider of a motorcycle, who is listed on the accident report and who was treated at the specified hospital soon after the time at which the accident occurred.

The Highways Department received the Forensic Science Centre's BAC information separately from and usually after the accident report, until September 1982. The matching of this BAC information to the police accident report was then performed by a member of the staff of the Road Traffic Board. We have been told that the results of police breath tests were not used for this purpose, but in some cases it is clear that they were, as will be shown below (Table 4.2). At the end of March 1981 the person doing this work was assigned to other duties and the matching of the BAC and accident records ceased. From September 1982 the police have been withholding the accident report until the BAC information becomes available from the Forensic Science Centre. They then perform the matching process themselves before forwarding the report, containing the BAC information, to the Highways Department. An attempt has since been made by staff of the Road Traffic Board to go back and match the two records for the period between March 1981 and the end of September 1982.

As will be shown below, information on alcohol involvement is available in the Highways Department computer file for only a very small percentage of all accidents reported to the police.

4.3 BAC READINGS IN POLICE ACCIDENT DATA

Computer files of coded data from the police accident reports were made available to the Unit by the Highways Department of South Australia, together with the subroutine packages required to retrieve information from these files.

Table 4.1 presents the BACs coded for accident-involved drivers or riders over the years 1979-1982. Whereas BAC information was coded for less than two per cent of drivers/riders involved in crashes during 1979 and 1981, and less than five per cent in 1982, this information was apparently available in 64 per cent of cases in 1980. This discrepancy can be attributed solely to the much higher number of vehicle operators assigned to the "zero", rather than to the "unknown", BAC category in 1980. (The same pattern of coding was evident in a similar table generated for casualty accidents alone.)

TABLE 4.1: BACs RECORDED FOR DRIVERS/RIDERS INVOLVED IN ACCIDENTS REPORTED TO THE POLICE, SOUTH AUSTRALIA, 1979-82

BAC of Driver/Rider	Year			
	1979	1980	1981	1982
Zero	12	36404	79	4
$0 < BAC \leq 0.08$	239	211	183	155
$BAC > 0.08$	1314	1008	719	995
Total BAC known	1565 (1.7%)	37623 (64.2%)	981 (1.7%)	1154 (4.3%)
BAC unknown	89461 (98.3%)	20937 (35.8%)	55596 (98.3%)	25666 (95.7%)
Total drivers/ riders	91026 (100.0%)	58560 (100.0%)	56577 (100.0%)	26820 (100.0%)
Total accidents	48495	31552	30574	15425

A zero BAC code would normally be interpreted as meaning that a breath or blood alcohol test had been performed, and that the test had yielded a negative result. There is no evidence that this happened more often in 1980 than in the other years. The high percentage of drivers/riders reported as having a zero BAC in 1980 appears to be purely the result of an unplanned change in coding practice. We say "appears to be" because none of the coding staff was aware that the 1980 data were coded differently from those of the other years.

The introduction of RBT in October, 1981 also coincided approximately with a change in the official instructions for police attending vehicle accidents. As noted above, police were instructed to breath test all uninjured drivers/riders at accidents which they attended between 4.00 p.m. and 6.00 a.m. Table 4.2 shows the BACs coded by the Highways Department for uninjured drivers/riders who were involved in casualty accidents from 1979-1982. Ignoring 1980, a very slight increase in the proportion of vehicle operators with a recorded BAC is evident for 1982 compared with earlier years. This may be due to an increase in police surveillance at accident sites. However, if the police were carrying out this directive in 1982 and, if their attendance at casualty accidents was similar to that in 1979 and 1980 (see Table 4.3), then the proportion of uninjured drivers/riders with a recorded BAC (2.2 per cent) seems very low. Clearly, much of the information collected by the police on the alcohol involvement of uninjured drivers/riders in vehicle accidents has not found its way into the Highways Department file.

Although some zero BACs were coded in the Highways Department file, they comprised a very small percentage of the total number of coded BACs. About 95 per cent of all accident-involved motor vehicle operators had an unknown BAC, either because they were not tested, or because the result of the test was not coded. This comment applies equally to both injury and non-injury producing crashes.

TABLE 4.2: BACs FOR UNINJURED DRIVERS/RIDERS INVOLVED IN CASUALTY ACCIDENTS, 1979-82

BAC of Driver/Rider	Year 1979	1980	1981	1982[1]
Zero	1	3983	6	1
0 < BAC ≤ 0.08	11	17	16	24
BAC > 0.08	101	82	65	125
Total BAC known	113 (1.5%)	4082 (62.6%)	87 (1.3%)	150 (2.1%)
BAC unknown	7527 (98.5%)	2434 (37.4%)	6422 (98.7%)	6843 (97.9%)
Total drivers/ riders	7640 (100.0%)	6516 (100.0%)	6509 (100.0%)	6993 (100.0%)

1 Tow-away or casualty accidents only.

TABLE 4.3: POLICE ATTENDANCE AT CASUALTY ACCIDENTS IN 1979 AND 1980[1]

Police Attended	1979		1980	
Yes	4984	(59.6%)	4406	(60.1%)
No	3375	(40.4%)	2930	(39.9%)
Total Casualty Accidents	8359	(100.0%)	7336	(100.0%)

1 Police attendance at casualty accidents was not coded by the Highways Department of South Australia after 1980.

In one further attempt to look for changes in the BAC distributions among the drivers/riders involved in accidents, we turned to records held by the Police Traffic Intelligence Centre. These records cover fatal crashes from 1979 onwards. However, interpretation of these data again presented difficulties. BAC information was available only for about 60 per cent of fatal accidents. Furthermore, BAC readings were not necessarily available for all drivers or riders involved in these fatal crashes. Since we do not know what factors determine the availability or otherwise of BACs for the road users involved, we could not use these data with any confidence.

Given the lack of complete or reliable BAC data, we were unable to obtain a direct indication of the effectiveness of RBT from the extent of the concurrent change (if any) in alcohol-related crashes measured as a proportion of all crashes. We therefore turned to less direct measures of the impact of RBT on crashes and casualties. These are examined in the following sections.

4.4 OVERALL TRENDS IN FATAL AND CASUALTY ACCIDENTS, 1972-1983

One such indirect measure might be a change in the overall accident frequency following the introduction of RBT. However, the frequency of crashes can be subject to many factors other than alcohol intoxication. It is difficult to interpret any relatively small changes in overall fatal/casualty accident data because these changes may result partly from chance variation and partly from factors other than the presence or absence of an RBT program.

General trends for fatalities and casualties and for fatal and casualty accidents in S.A. by year, from 1972 to 1983, are presented in Figures 4.1 to 4.4. It is clear that there has been a trend, albeit fluctuating, towards fewer accidents and casualties in both the metropolitan and rural areas over the past 10 years.

There was a marked decline in the number of fatal accidents for the whole State in 1981 (see Figure 4.1), but most of this reduction occurred in country areas (Figure 4.2). Similarly, there was a reduction in casualty accidents in 1980 which was sustained in 1981, again primarily in the rural part of the State (Figures 4.3 and 4.4). Given that RBT did not start until 15 October, 1981 and that there was only one RBT unit operating in the country areas at that time, it is most unlikely that this reduction was related to the introduction of RBT.

4.5 TRENDS IN THE PROPORTIONS OF HIGH-ALCOHOL-INVOLVEMENT TYPES OF ACCIDENTS

4.5.1 Types of accidents known to be alcohol-related

A more satisfactory, but still indirect, measure of alcohol involvement in crashes is based on the knowledge that alcohol is particularly likely to be associated with certain types of accidents. For example, most single vehicle crashes at night are alcohol-related (McLean, Offler and Sandow, 1980). Any change in the frequency of night-time single vehicle crashes expressed as a proportion of all crashes, could provide some indication that there has been a corresponding change in the frequency of alcohol-related crashes.

The "high-alcohol-involvement" crash types used here were: (1) single vehicle crashes, e.g., roll overs, impacts with fixed roadside objects, and crashes involving loss of control; (2) crashes occurring late at night, i.e., between the hours of 10.00 p.m. and 3.00 a.m., particularly on weekends; and (3) combinations of the above. We examined temporal trends in such crashes over the four years 1979-1982.

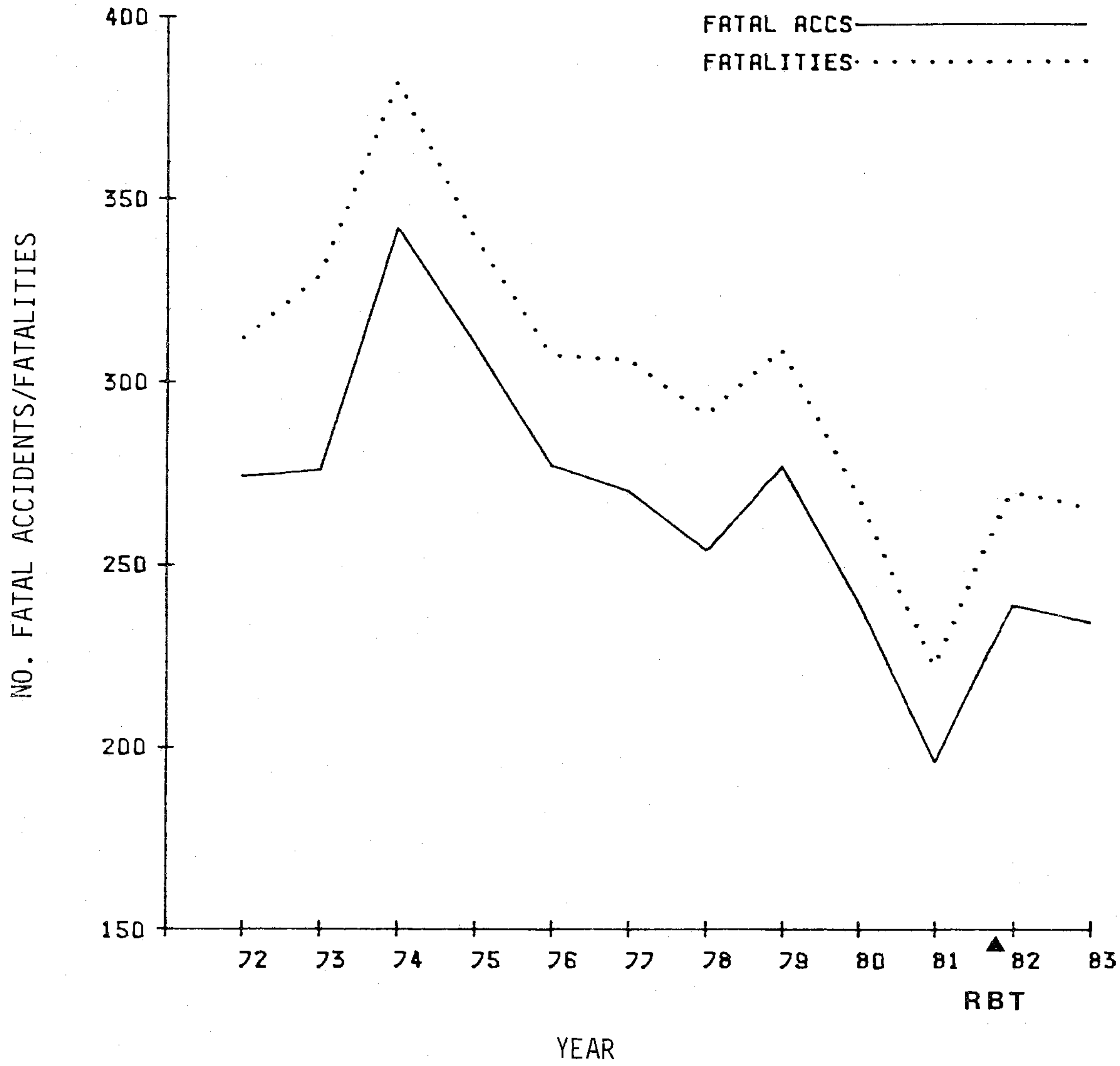

FIGURE 4.1: FATAL ACCIDENTS AND FATALITIES, SOUTH AUSTRALIA, 1972-83

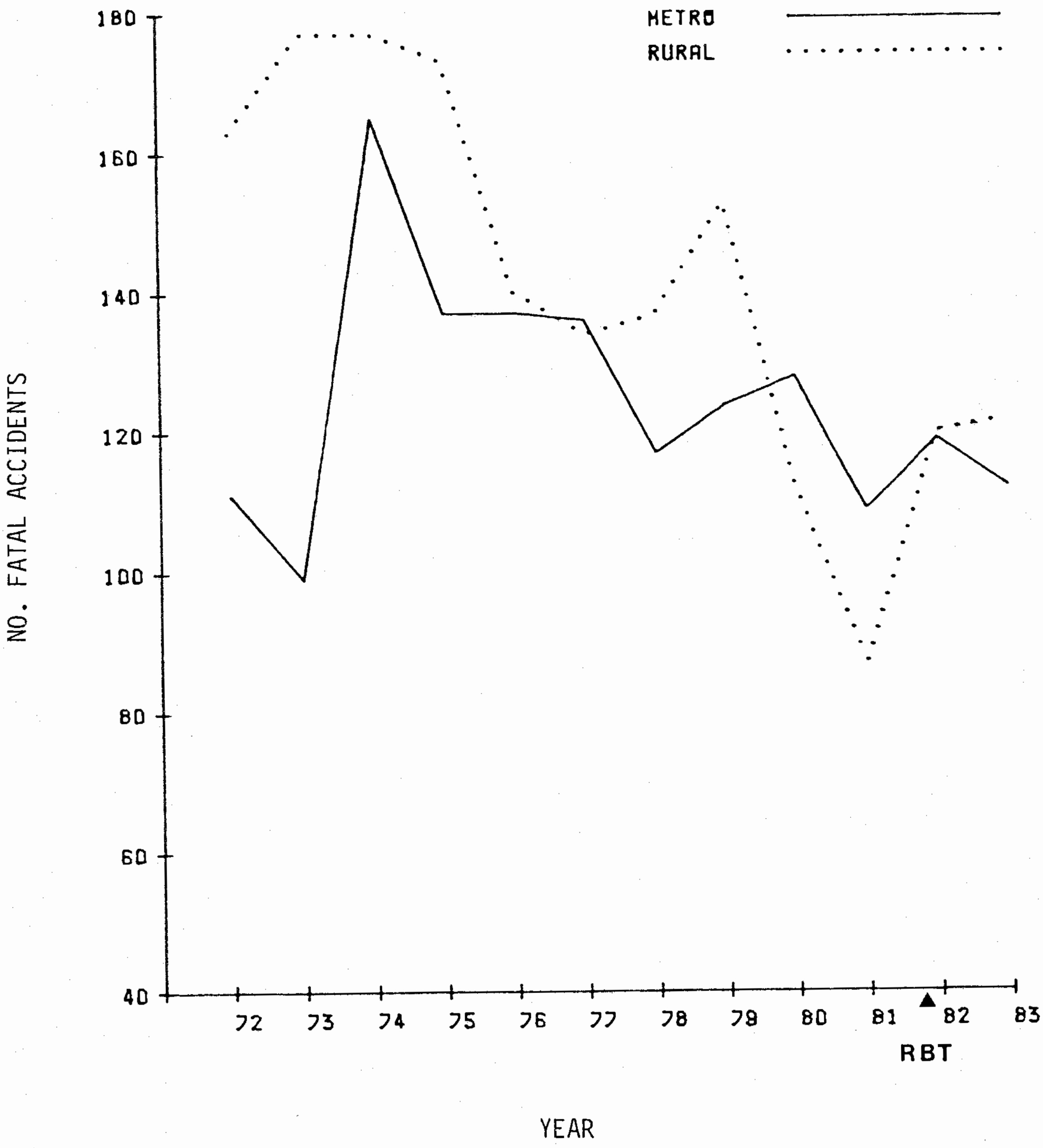

FIGURE 4.2: FATAL ACCIDENTS IN METROPOLITAN AND RURAL AREAS, SOUTH AUSTRALIA, 1972-83

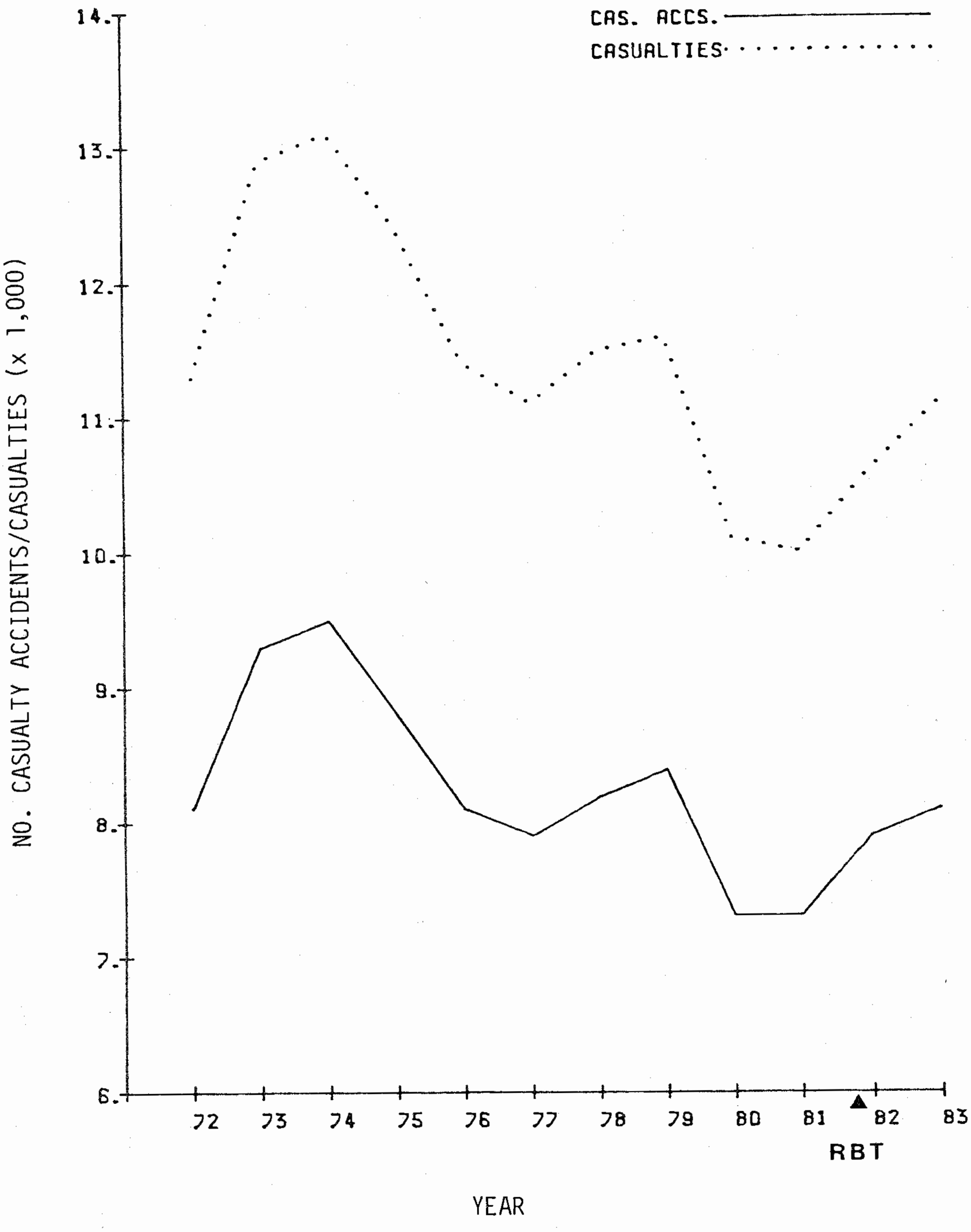

FIGURE 4.3: CASUALTY ACCIDENTS AND CASUALTIES (PERSONS KILLED OR INJURED), SOUTH AUSTRALIA, 1972-83

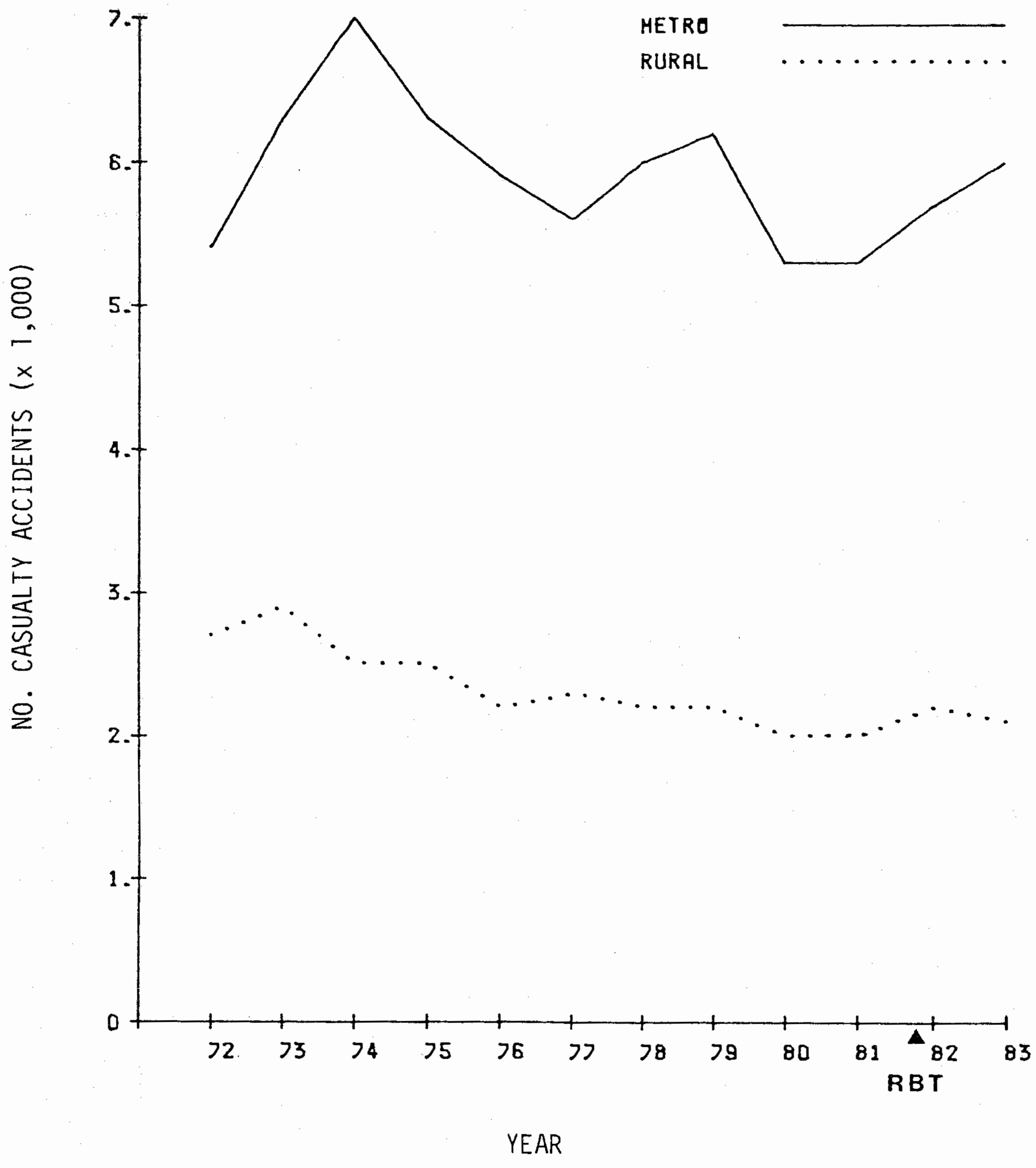

FIGURE 4.4: CASUALTY ACCIDENTS IN METROPOLITAN AND RURAL AREAS OF SOUTH AUSTRALIA, 1972-83

To overcome any bias due to seasonal effects, we divided the data for each year into two periods, namely: January to September, and October to December. The decision to break each year into these unequal parts was based on the assumption that any effect of RBT was likely to be greatest during the first few months of operation. We decided also to examine the metropolitan and rural areas of the State separately. There was only one breath testing unit available for use in the metropolitan area and one in the rural part of the State during the first 18 months of RBT. We reasoned that there might be a discernible difference between the metropolitan and rural regions in their responses to the introduction of random breath testing simply because of the much greater area to be covered by the rural breath testing unit.

4.5.2 Casualty accidents late at night

Tables 4.4 and 4.5 show, for the metropolitan and rural areas of the State respectively, the trends in the proportion of casualty accidents which occurred between the hours of 10.00 p.m. and 3.00 a.m. These, and all subsequent tables in this section, are based on casualty accidents only, as the criteria for inclusion of these crashes in the Highways Department file did not change between 1979 and 1982. On the other hand, non-tow-away or non-casualty accidents reported on by the police after 1981 were not coded by the Highways Department.

Although there is the suggestion of a short-lived reduction in the occurrence of late-night casualty accidents in the metropolitan area during the latter part of 1981 (Table 4.4), no such effect was evident in rural areas (Table 4.5). The lack of any apparent change in country areas may be due to the crudeness of the measure we were obliged to use - i.e., "late-night crashes" as a proxy for alcohol-related crashes. For example, some

TABLE 4.4: PROPORTION OF CASUALTY ACCIDENTS OCCURRING BETWEEN 10.00 P.M. AND 3.00 A.M. IN THE METROPOLITAN AREA : JANUARY TO SEPTEMBER AND OCTOBER TO DECEMBER, 1979-82.

JANUARY - SEPTEMBER

Time Period	Year 1979	1980	1981	1982
10.00 p.m. - 3.00 a.m.	643 (14%)	484 (12%)	468 (12%)	515 (12%)
3.00 a.m. - 10.00 p.m.	3916 (86%)	3481 (88%)	3436 (88%)	3714 (88%)
All hours	4569 (100%)	3965 (100%)	3904 (100%)	4229 (100%)
Relative Odds[1] (base year = 1979)	1.00	0.85	0.83	0.84
90% Confidence Interval[2]	-	0.76-0.94	0.75-0.92	0.76-0.94

OCTOBER - DECEMBER

Time Period	Year 1979	1980	1981	1982
10.00 p.m. - 3.00 a.m.	227 (14%)	193 (14%)	129 (9%)	173 (12%)
3.00 a.m. - 10.00 p.m.	1365 (86%)	1171 (86%)	1256 (91%)	1296 (88%)
All hours	1592 (100%)	1364 (100%)	1385 (100%)	1469 (100%)
Relative Odds[1] (base year = 1979)	1.00	0.99	0.62	0.80
90% Confidence Interval[2]	-	0.83-1.18	0.51-0.75	0.67-0.96

1 Relative Odds = odds that a casualty accident occurred between 10.00 p.m. and 3.00 a.m. rather than between 3.00 a.m. and 10.00 p.m. in the specified year/corresponding odds in 1979.

2 90% confidence intervals for the relative odds, calculated using the method described by Gart (1962).

TABLE 4.5: PROPORTION OF CASUALTY ACCIDENTS OCCURRING BETWEEN 10.00 P.M. AND 3.00 A.M. IN RURAL AREAS: JANUARY TO SEPTEMBER AND OCTOBER TO DECEMBER, 1979-82

JANUARY - SEPTEMBER				
Time Period	Year 1979	1980	1981	1982
10.00 p.m. - 3.00 a.m.	351 (22%)	223 (16%)	238 (17%)	342 (21%)
3.00 a.m. - 10.00 p.m.	1283 (78%)	1206 (84%)	1185 (83%)	1300 (79%)
All hours	1634 (100%)	1429 (100%)	1423 (100%)	1642 (100%)
Relative Odds[1] (base year = 1979)	1.00	0.68	0.73	0.96
90% Confidence Interval[2]	-	0.58-0.79	0.63-0.86	0.84-1.11

OCTOBER - DECEMBER				
Time Period	Year 1979	1980	1981	1982
10.00 p.m. - 3.00 a.m.	104 (18%)	113 (20%)	115 (19%)	109 (21%)
3.00 a.m. - 10.00 p.m.	460 (82%)	465 (80%)	490 (81%)	424 (79%)
All hours	564 (100%)	578 (100%)	605 (100%)	533 (100%)
Relative Odds[1] (base year = 1979)	1.00	1.07	1.04	1.14
90% Confidence Interval[2]	-	0.84-1.38	0.81-1.33	0.89-1.46

1 Relative Odds = odds that a casualty accident occurred between 10.00 p.m. and 3.00 a.m. rather than between 3.00 a.m. and 10.00 p.m. in the specified year/corresponding odds in 1979.

2 90% confidence intervals for the relative odds, calculated using the method described by Gart (1962).

late-night crashes no doubt result from drivers falling asleep at the wheel, without any alcohol involvement, and this may be relatively more common in rural areas than in the metropolitan area. Furthermore, random fluctuations in the numbers of such crashes from year to year in rural areas could easily mask a small reduction in alcohol-related crashes following the introduction of RBT. Alternatively, this observation of "no-effect" in country areas may be real, and perhaps could be interpreted as indicating that one RBT unit does not provide sufficient deterrent effect over a wide geographic area.

The relatively large reduction in the proportion of accidents late at night in metropolitan areas during October-December was statistically significant. However, once again, there may have been factors other than RBT operating to bring this about. We investigated this possibility by refining the comparison to include only single vehicle crashes which, as we noted above, are known to be alcohol-related, particularly late at night.

4.5.3 Single vehicle casualty accidents late at night

Somewhat surprisingly we found that the relative odds of a late-night crash involving only one vehicle did not decrease in the metropolitan area during the first few months after RBT commenced, compared to the corresponding period in 1980. When compared to 1979 there was even an increase in the relative odds (Table 4.6).

However we have thus far been looking at a change in single vehicle crashes as a proportion of all crashes. Immediately after RBT was introduced (October-December, 1981) there was a net reduction in the number of crashes

TABLE 4.6: PROPORTION OF SINGLE VEHICLE CASUALTY ACCIDENTS OCCURRING BETWEEN 10.00 P.M. AND 3.00 A.M. IN THE METROPOLITAN AREA, JANUARY TO SEPTEMBER AND OCTOBER TO DECEMBER, 1979-82

JANUARY - SEPTEMBER

Accident Category	Year 1979	1980	1981	1982
Single vehicle[3]	261 (41%)	179 (37%)	211 (45%)	208 (40%)
Other types	382 (59%)	305 (63%)	257 (55%)	307 (60%)
All types (10.00 p.m.-3.00 a.m.)	643 (100%)	484 (100%)	468 (100%)	515 (100%)
Relative Odds[1] (base year = 1979)	1.00	0.86	1.20	0.99
90% Confidence Interval[2]	-	0.70-1.05	0.98-1.47	0.81-1.21

OCTOBER - DECEMBER

Accident Category	Year 1979	1980	1981	1982
Single Vehicle[3]	75 (33%)	77 (40%)	54 (42%)	73 (42%)
Other types	152 (67%)	116 (60%)	75 (58%)	100 (58%)
All types (10.00 p.m.- 3.00 a.m.)	227 (100%)	193 (100%)	129 (100%)	173 (100%)
Relative Odds[1] (base year = 1979)	1.00	1.35	1.46	1.48
90% Confidence Interval[2]	-	0.96-1.88	1.00-2.12	1.05-2.08

1 Relative odds = odds that a casualty accident occurred between 10.00 p.m. and 3.00 a.m. rather than between 3.00 a.m. and 10.00 p.m. in the specified year/corresponding odds in 1979. (Note 1 refers to single vehicle casualty accidents in this context).

2 90% confidence intervals for the relative odds, calculated using the method described by Gart (1962).

3 Includes crashes occurring between 10.00 p.m. and 2.59 a.m., of the following types: collision with fixed roadside object or parked car, left road out of control, and roll-over.

of all types late at night in the metropolitan area, including a reduction in the number of single vehicle crashes (Table 4.6). There was no corresponding change in rural areas (Table 4.7).

One possible reason why the number of single vehicle crashes did not decrease at the same rate as the number of other types of crashes is presented later, in Section 4.6, in the discussion of the change in the proportion of single vehicle crashes on back streets. Another possible reason, apart from chance variation, could be that the heavily intoxicated driver is particularly likely to be involved in a single vehicle crash and less likely to be deterred by RBT than a driver with a BAC, say, of 0.10. There is some evidence to support this latter possibility in both the results of our roadside survey, presented in Chapter 3, and in our analysis of the blood alcohol levels of road accident casualties (Section 4.8).

In rural areas the proportion of single vehicle accidents amongst all late-night accidents has remained virtually constant from 1979 to 1982, adding weight to our earlier speculation that RBT may have had no real effect in the rural part of the State.

4.6 CHANGES IN THE PROPORTION OF CASUALTY ACCIDENTS ON BACK STREETS

There is at least anecdotal evidence that once it became known that RBT stations were located only on relatively major roads in the metropolitan area some drivers chose to travel mainly on minor roads and back streets after they had been drinking. If this has happened there should also have been an increase in the frequency of casualty accidents on minor roads, when measured as a proportion of all casualty accidents. The results of

TABLE 4.7: PROPORTION OF SINGLE VEHICLE CASUALTY ACCIDENTS OCCURRING BETWEEN 10.00 P.M. AND 3.00 A.M. IN RURAL AREAS, JANUARY TO SEPTEMBER AND OCTOBER TO DECEMBER, 1979-82

Accident Category	1979	1980	1981	1982
JANUARY - SEPTEMBER				
Single vehicle[3]	242 (69%)	151 (68%)	168 (71%)	232 (68%)
Other types	109 (31%)	72 (32%)	70 (29%)	110 (32%)
All types (10.00 p.m.-3.00 a.m.)	351 (100%)	223 (100%)	238 (100%)	342 (100%)
Relative Odds[1] (base year = 1979)	1.00	0.94	1.08	0.95
90% Confidence Interval[2]	-	0.70-1.28	0.80-1.46	0.73-1.24
OCTOBER - DECEMBER				
Single vehicle[3]	74 (71%)	82 (73%)	82 (71%)	74 (68%)
Other types	30 (29%)	31 (27%)	33 (29%)	35 (32%)
All types (10.00 p.m.-3.00 a.m.)	104 (100%)	113 (100%)	115 (100%)	109 (100%)
Relative Odds [1] (base year = 1979)	1.00	1.07	1.00	0.86
90% Confidence Interval[2]	-	0.65-1.76	0.62-1.64	0.53-1.40

1 Relative Odds = odds that a casualty accident occurred between 10.00 p.m. and 3.00 a.m. rather than between 3.00 a.m. and 10.00 p.m. in the specified year/corresponding odds in 1979. (Note 1 refers to single vehicle casualty accidents in this context).

2 90% confidence intervals for the relative odds, calculated using the method described by Gart (1962).

3 Includes crashes occurring between 10.00 p.m. and 2.59 a.m., of the following types: collision with fixed roadside object or parked car, left road out of control, and roll-over.

our analyses to test this hypothesis (based on casualty accidents occurring between 10.00 p.m. and 3.00 a.m. in the metropolitan area) are presented in Tables 4.8 and 4.9.

As can be seen from Table 4.8, there was a statistically significant increase of 30 per cent in the proportion of back street casualty accidents late at night in the 12 months following the introduction of RBT, when compared to the base year 1979/80. Most of this increase can be attributed to a rise of over 40 per cent in the proportion of back street accidents taking place at night on weekends (i.e., Friday, Saturday and Sunday nights).

When this comparison was repeated on the basis of single vehicle casualty accidents alone (Table 4.9), the increase in the proportion of such crashes on back streets became far more pronounced. In fact, for accidents occurring throughout the week, this proportion almost doubled from 1980-81 to 1981-82 following the introduction of RBT (Relative odds = 1.94, 90% confidence limits 1.42 - 2.67).

As noted earlier, the unexpected increase in the proportion (even though there was a decrease in the actual number) of single vehicle crashes among casualty accidents occurring late at night after the introduction of RBT may have been partly due to this change in the distribution of accidents between back streets and main roads. This is because single vehicle crashes account for a higher proportion of all types of casualty accidents on back streets than they do on main roads.

TABLE 4.8: PROPORTION OF CASUALTY ACCIDENTS OCCURRING ON BACK STREETS RATHER THAN MAIN ROADS BETWEEN 10.00 P.M. AND 3.00 A.M. IN THE METROPOLITAN AREA BY TIME OF WEEK, 1979-82

Time of Week	Road Type	Year: Oct 79-Sep 80	Oct 80-Sep 81	Oct 81-Sep 82
MON to THURS	Back Street	70 (26%)	77 (30%)	73 (28%)
	Main Road	203 (74%)	180 (70%)	186 (72%)
	Total	273 (100%)	257 (100%)	259 (100%)
Relative Odds[1] (base year = 79/80)		1.00	1.24	1.14
90% Confidence Interval[2]		-	0.90-1.71	0.83-1.57
FRI to SUN	Back Street	100 (24%)	91 (23%)	118 (31%)
	Main Road	312 (76%)	302 (77%)	258 (69%)
	Total	412 (100%)	393 (100%)	376 (100%)
Relative Odds[1] (base year = 79/80)		1.00	0.94	1.43
90% Confidence Interval[2]		-	0.72-1.23	1.09-1.85
ALL DAYS	Back Street	170 (25%)	168 (26%)	191 (30%)
	Main Road	515 (75%)	482 (74%)	444 (70%)
	Total[3]	685 (100%)	650 (100%)	635 (100%)
Relative Odds[1] (base year = 79/80)		1.00	1.06	1.30
90% Confidence Interval[2]		-	0.86-1.30	1.06-1.60

1 Relative odds = odds that a casualty accident occurred on a back street rather than on a main road in the specified year, divided by the corresponding odds for 1979-80.

2 90% confidence intervals for the relative odds, calculated using the method described by Gart (1962).

3 Totals differ from those of Table 4.4 because some accidents could not readily be classified into back street or main road.

TABLE 4.9: PROPORTION OF SINGLE VEHICLE CASUALTY ACCIDENTS OCCURRING ON BACK STREETS RATHER THAN MAIN ROADS BETWEEN 10.00 P.M. AND 3.00 A.M. IN THE METROPOLITAN AREA, 1979-82

Road Type	Year Oct 79-Sep 80	Oct 80-Sep 81	Oct 81-Sep 82
Back Street	69 (33%)	75 (30%)	102 (46%)
Main Road	142 (67%)	173 (70%)	121 (54%)
Total[3]	211 (100%)	248 (100%)	223 (100%)
Relative Odds[1] (base year 1979/80	1.00	0.89	1.73
90% Confidence Interval[2]	-	0.60-1.32	1.17-2.56

1 Relative odds = odds that a single vehicle casualty accident occurred on a back street rather than on a main road in the specified year, divided by the corresponding odds for 1979-80.

2 90% confidence intervals for the relative odds, calculated using the method described by Gart (1962).

3 Totals differ from those of Table 4.6 because some accidents could not readily be classified into back street or main road.

From the data in Tables 4.8 and 4.9 it can be calculated that the odds of a crash on a back street involving only one vehicle compared to the odds of a main road crash being a single vehicle accident were 1.47 in 1979-80, 1.24 in 1980-81 and 1.96 after RBT was introduced in 1981-82.

In summary, therefore we can say that, although late-night accidents decreased in number following the introduction of RBT, there was a marked shift in the location of these accidents from main roads to back streets. This shift was accompanied by an increase in the proportion of crashes that involved only one vehicle. This, in turn, was probably due to two factors.

First, there is a greater likelihood of a crash being of this type on a back street than on a main road. Secondly, those drivers who chose to use the back streets were more likely to have been intoxicated, and hence trying to avoid the risk of encountering an RBT unit.

4.7 PROPORTION OF FEMALE DRIVERS IN CASUALTY ACCIDENTS

In our roadside breath alcohol surveys we found that, when there was a male and a female in the front seat of a car, the female was more likely to be the driver late at night than earlier in the evening after RBT was introduced (See Section 3.3.2.6). This suggests that there should have been an accompanying increase in the proportion of female drivers involved in crashes late at night.

There is no information recorded on uninjured passengers and so we had no reliable information on the sex of the front seat passenger, if any, accompanying the accident-involved driver. However, there was no meaningful change in the proportion of female drivers in crashes between 10.00 p.m. and 3.00 a.m. after RBT was introduced.

4.8 BACs OF CASUALTIES: FORENSIC SCIENCE CENTRE DATA

If a person injured in a motor vehicle accident presents at a proclaimed hospital in S.A. within eight hours of the accident, a blood sample is required to be taken for subsequent alcohol analysis at the Forensic Science Centre (FSC). Children under 14 years of age are excluded from this requirement. The Forensic Science Centre register includes the name of the injured person, the name of the hospital where the blood sample was taken, the date on which the blood sample was analyzed and, of course, the blood alcohol concentration. There is no information on the category of road user. This means that it is not possible to distinguish between drivers and passengers, or even pedestrians.

For the purpose of this evaluation of RBT we therefore had to make the assumption that the proportion of drivers among the casualties treated at hospital, and who thereby had a blood sample taken, remained reasonably constant from, say, 1979 through 1983. It is possible to argue that this assumption may not be correct; that the proportion of drivers among the casualties might increase, or decrease, with the introduction of RBT. We have considered these arguments, but we believe that our assumption is probably valid for an evaluation of this type. As we show later in this section there is an almost astonishing stability in the BAC distributions from year to year. This stability in itself suggests that underlying factors, such as the proportion of drivers among the casualties, have remained stable.

Much of the preceding work in this chapter has been based on crashes in the metropolitan area, largely because we think that any influence of RBT is most likely to be seen in that area rather than in the widely-dispersed country districts. For the same reason we based our analysis of the FSC data on samples taken at the three major public hospitals in the metropolitan area: the Royal Adelaide Hospital, the Queen Elizabeth Hospital and Flinders Medical Centre.

Figure 4.5 shows the cumulative frequency distributions of the BACs of road accident casualties who were treated at those three hospitals for each of the five years from 1979 through 1983. It is apparent that the

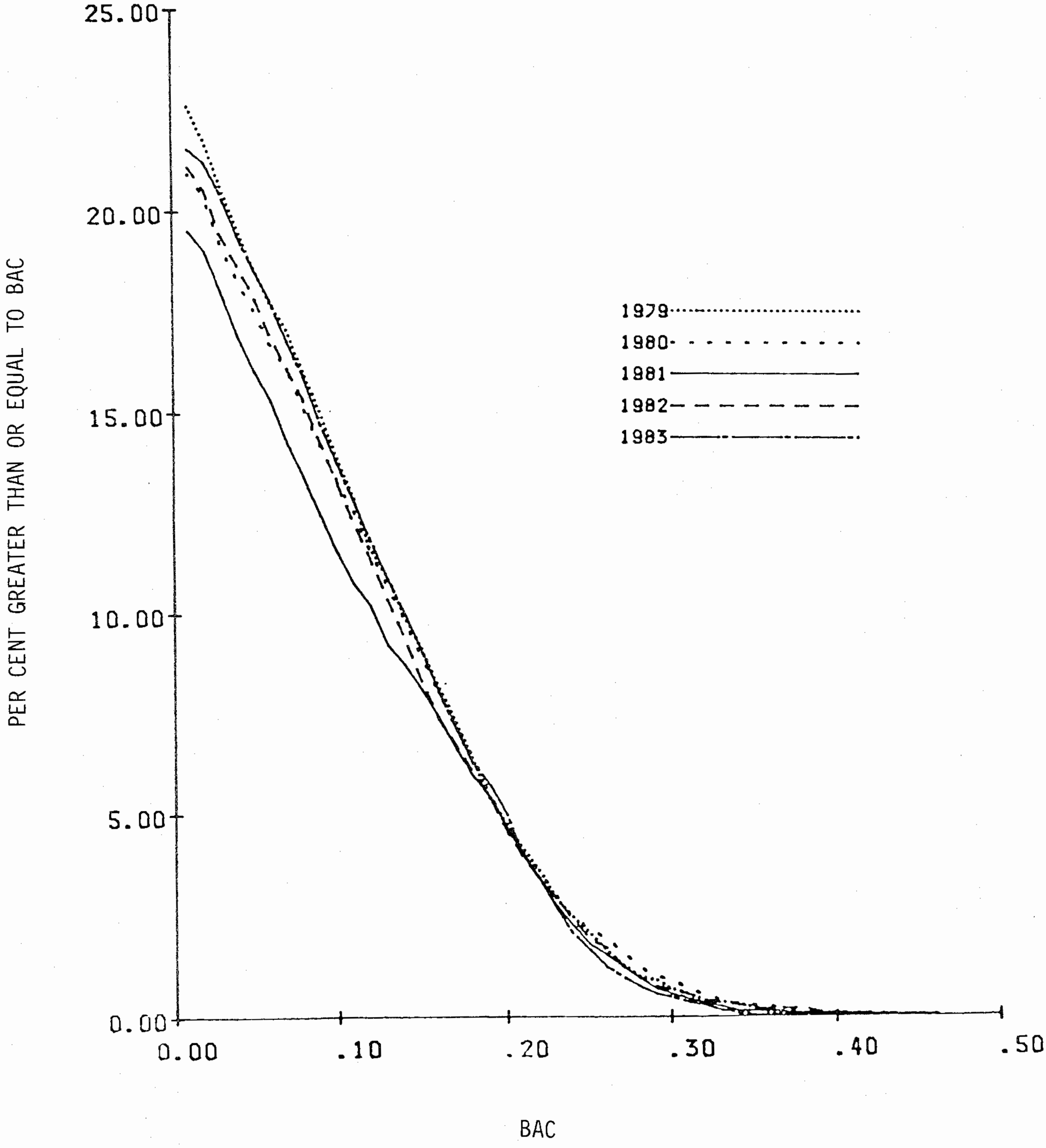

FIGURE 4.5: FORENSIC SCIENCE CENTRE DATA, WHOLE YEAR 1979-83

distributions for the years 1979, 1980, 1982 and 1983 are very similar; in fact they are virtually superimposed on each other. The distribution for 1981, however, is slightly different. A smaller percentage of casualties had a positive BAC (i.e. greater than zero) in 1981 and the curve for that year does not merge with the curves for the other years until a BAC of about 0.16. In other words, the BACs of road accident victims appear to have been lower in 1981 - the year of the introduction of RBT - than in the two years before and after.

We then looked at the BACs of casualties that occurred between 15 October and 31 December. RBT came into effect on 15 October 1981, and so this period represents the first 11 weeks that it was operating. The same period was chosen from other years to assess the initial impact of RBT, and also to see if the difference observed in Figure 4.5 could be attributed to RBT.

The BAC distributions for this time period are shown in Figure 4.6. It is clear that, for this period, 1981 is even more divergent than it was in Figure 4.5. This suggests that the difference observed in Figure 4.5 was largely due to the initial impact of RBT. In other words, the initial effect of RBT was to reduce both the involvement of alcohol among road accident casualties and the BACs of many of the casualties who had been drinking. This is consistent with the marked reduction in the number of casualty accidents late at night in the last three months of 1981 (Tables 4.4 and 4.6). However, the fact that the BAC distributions for 1982 and 1983 (both for the whole year and for the 11 week period at the end of the year) are very similar to those of 1979 and 1980, shows that this effect did not last for long.

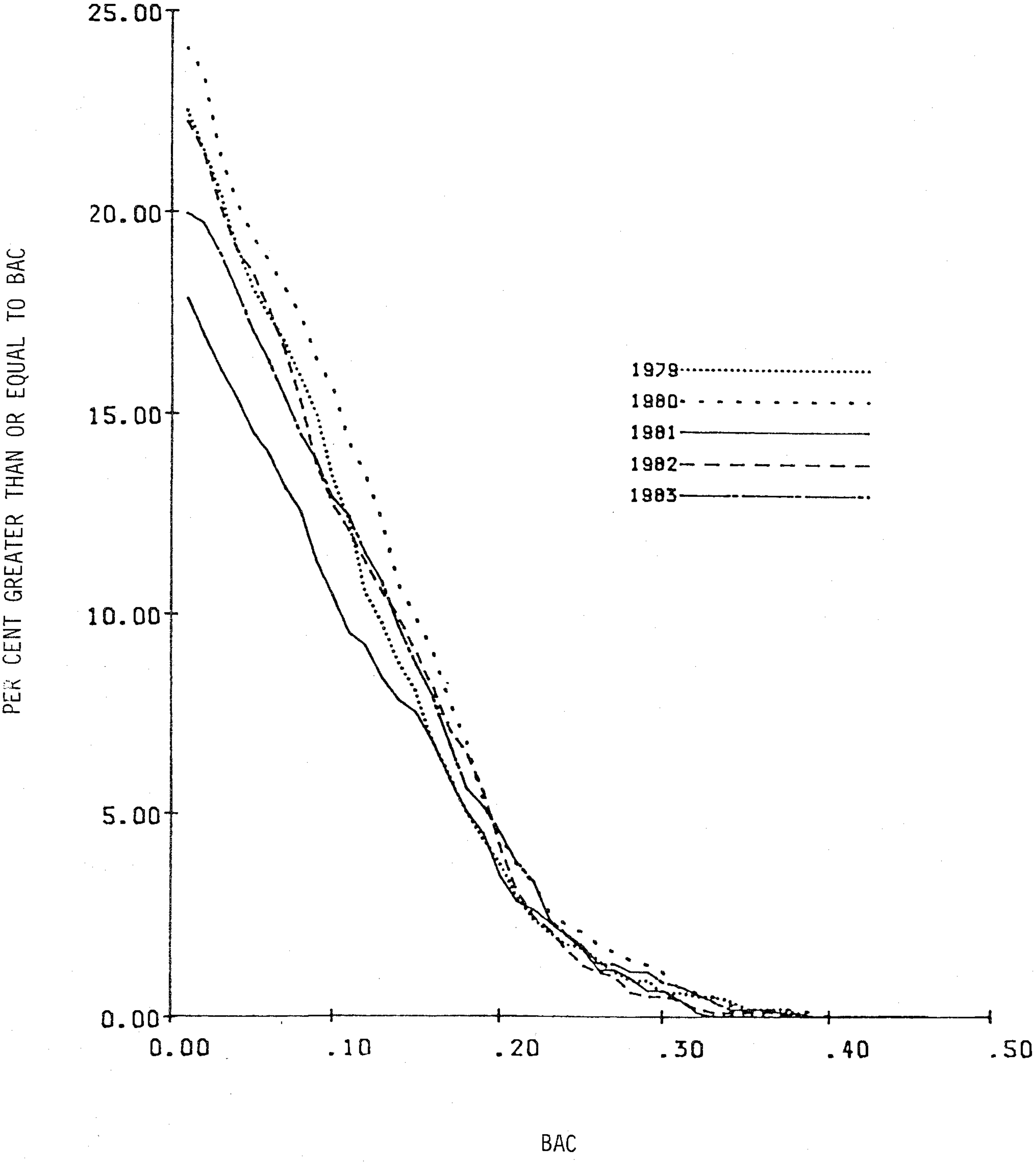

FIGURE 4.6: FORENSIC SCIENCE CENTRE DATA, 17 OCTOBER TO 31 DECEMBER, 1979-83

4.9 COMPARISON OF BACs OF CASUALTIES AND NON-ACCIDENT-INVOLVED DRIVERS: 1981-83

When extracting the BAC data on road accident casualties from the Forensic Science Centre register we identified those readings which related to the dates on which we had conducted our roadside breath alcohol surveys in 1981, 1982 and 1983. The BAC data for the casualties includes all cases on those dates whereas our roadside surveys were conducted between 5.00 p.m. and 3.00 a.m. This has the effect of reducing the size of any difference between the BAC distributions for casualties and those for non-accident-involved drivers because the latter refer only to those hours of the day when drinking and driving is most common. Even so, the difference between the distributions is very large (Figure 4.7).

For example, about 14 per cent of casualties had a BAC at or above 0.10 whereas only about 2 per cent of non-accident-involved drivers were above that level. There was a relatively small difference in the percentage with a BAC > zero in the two groups: about 21 per cent for the casualties and about 17 per cent for the non-accident-involved drivers.

This is consistent with the results of the case-control study which the Unit conducted in 1979. That study compared the BACs of drivers involved in a representative sample of casualty accidents with those of a matched sample of non-accident-involved drivers (McLean, Holubowycz and Sandow, 1980). Both that study and the present comparison emphasise the importance of alcohol intoxication as a cause of casualty accidents.

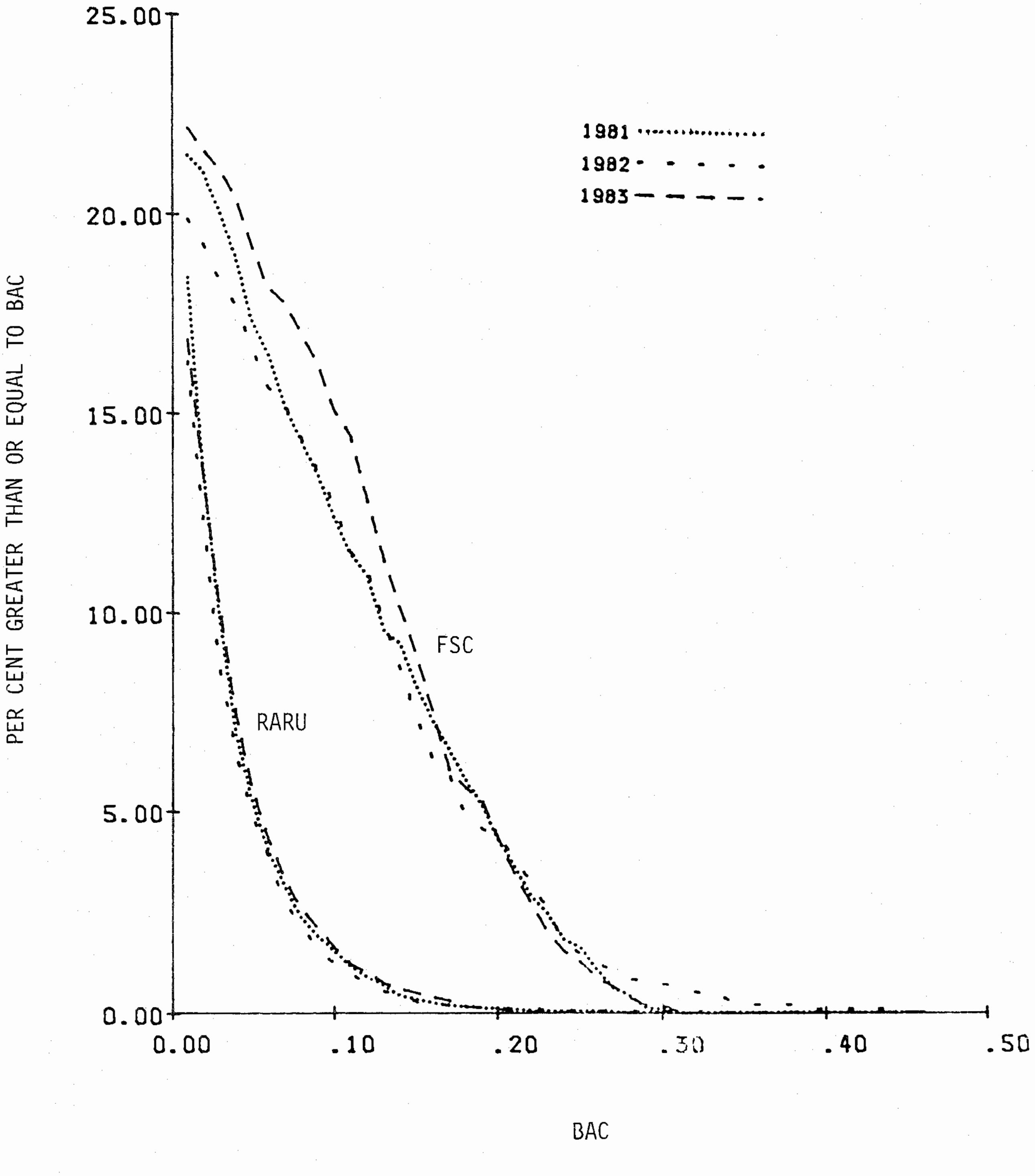

FIGURE 4.7: FORENSIC SCIENCE CENTRE DATA, 1981-83

5. COMPARISON BETWEEN ROAD ACCIDENT RESEARCH UNIT ROADSIDE SURVEY AND POLICE RBT DATA

5.1 INTRODUCTION

Early in 1982 it became obvious that there were considerable differences between the results obtained in our roadside survey and those obtained by the police random breath testing units. The percentage of drivers found to be above the legal limit of 0.08 was consistently greater in the roadside surveys than in RBT operations. The purpose of this chapter is to investigate possible reasons for this discrepancy, which became even greater in 1983.

5.2 BACs OF DRIVERS TESTED BY RBT UNITS AND IN THE ROADSIDE SURVEY

The first step in this comparison was to select data from the police RBT operations in the metropolitan area which were conducted on the same dates as the roadside survey conducted by this Unit (Commissioner of Police, 1982 and 1983). The numbers of drivers involved are shown by day of week for both RBT operations and the roadside survey in 1982 and 1983 in Tables 5.1 and 5.2. No information is presented for Sundays in either year for the reasons noted beneath the tables. It can be seen that the distribution by day of week for the number of drivers tested by police RBT operations is very similar to that for the roadside survey in each year.

In 1982, virtually identical percentages of drivers were found to have been drinking (BAC greater than zero) in both RBT operations and in our roadside survey. However the results of the screening tests conducted by the police

TABLE 5.1: NUMBER OF DRIVERS APPROACHED BY DAY OF WEEK DURING THE ROAD ACCIDENT RESEARCH UNIT (RARU) ROADSIDE SURVEY PERIOD, 1982

	Police RBT		RARU Roadside Survey	
Day of Week	No.	%	No.	%
Monday	920	10.5%	1180	11.7%
Tuesday	925	10.6%	1117	11.1%
Wednesday	1043	11.9%	1033	10.2%
Thursday	1665	19.0%	2087	20.7%
Friday	1971	22.5%	2325	23.1%
Saturday	2235	25.5%	2342	23.2%
Sunday[1]	-	-	-	-
Total	8759	100.0%	1084	100.0%

[1] The police conducted no random breath testing in the metropolitan area on Sundays in 1982. Consequently the Road Accident Research Unit roadside survey data for Sundays have been deleted for the purpose of this comparison.

yielded 1.6% of drivers above the legal limit of 0.08 compared to 2.6% for the roadside survey data. This difference became even greater when the results of police Breathalyzer testing, which follows a screening test when the result is above the legal limit, are considered. The Breathalyzer test yielded less than 1% of drivers above the legal limit (Table 5.3).

In 1983 the discrepancy between the percentage of drivers above the legal limit from RBT operations and in the roadside survey increased. There was also a substantial difference between the percentage of drivers who were found to have been drinking, with the roadside survey yielding a figure

TABLE 5.2: NUMBER OF DRIVERS APPROACHED BY DAY OF WEEK DURING THE ROAD ACCIDENT RESEARCH UNIT (RARU) ROADSIDE SURVEY PERIOD, 1983

	Police RBT		RARU Roadside Survey	
Day of Week	No.	%	No.	%
Monday	901	6.1%	937	9.9%
Tuesday	1527	10.3%	1017	10.7%
Wednesday	1324	8.9%	1016	10.7%
Thursday	3222	21.7%	2020	21.3%
Friday	3689	24.8%	2284	24.1%
Saturday	4195	28.2%	2212	23.3%
Sunday[1]	-	-	-	-
Total	14858	100.0%	9486	100.0%

[1] The police conducted a small number of random breath tests on Sundays in 1983. These tests have been ignored here to make the data comparable with the data for 1982 (Table 5.1). Similarly, no data are presented for Sundays from the roadside survey.

TABLE 5.3: BACs OF DRIVERS FROM POLICE RBT AND ROAD ACCIDENT RESEARCH UNIT (RARU) ROADSIDE SURVEY, 1982

BAC	Police RBT	RARU Roadside Survey
≥ 0.08	1.6%[1], 0.9%[2]	2.6%[3]
> 0	19.4%[1]	19.3%[3]

[1] Drager 7310 breath analysis meter.

[2] Breathalyzer.

[3] Alcolmeter SD-2.

very similar to 1982, whereas the RBT operations gave a figure of just under 13% of drivers with a positive BAC, compared to over 19% in 1982. In Table 5.5 we present the percentage of drinking drivers above the legal limit for the two sources of data and the two years. It can be seen that this percentage decreased slightly in police RBT operations and increased in the roadside survey data.

Tables 5.3 and 5.4 show that the results from one breath alcohol meter intended for use as a screening device do not correspond well with the results from an evidential test device such as the Breathalyzer. We therefore had to consider whether the results obtained by the use of the hand-held Alcolmeter during our roadside surveys might not have exaggerated the true percentage of drivers above the legal limit.

TABLE 5.4: BACs OF DRIVERS FROM POLICE RBT AND ROAD ACCIDENT RESEARCH UNIT (RARU) ROADSIDE SURVEY, 1983

BAC	Police RBT	RARU Roadside Survey
$\geqslant 0.08$	0.9%[1], 0.5%[2]	3.6%[3]
> 0	12.9%[1]	20.9%[3]

[1] Drager 7310 breath analysis meter.

[2] Breathalyzer.

[3] Alcolmeter SD-2.

It should be noted at this stage that the percentages listed in Tables 5.3 and 5.4 for drivers who were identified from police random breath testing

TABLE 5.5: PERCENTAGE OF DRINKING DRIVERS ABOVE THE LEGAL LIMIT, POLICE RBT AND ROAD ACCIDENT RESEARCH UNIT (RARU) ROADSIDE SURVEYS, 1982 AND 1983

Year	Police RBT	RARU Roadside Survey
1982	8%	13%
1983	7%	17%

as having been drinking (BAC greater than zero) may not be reliable. There are a number of reasons why this might be so, but the most obvious one is that in 1982 the police were still using the Alcotest puff-bag screening device during the time which corresponded with the first month of our roadside survey. This screening device is intended to yield information on whether or not a driver is above the legal BAC limit. If no such indication is given as a result of the test the fact that the driver may nevertheless have been drinking may not always have been recorded, thereby resulting in an underestimate of the percentage of drivers who had been drinking. In 1983, the Alcotest was used primarily as a backup device for the Drager screening device. The Drager provides a digital readout of a driver's BAC, which facilitates the identification and recording of drivers having a positive blood alcohol level below the legal limit. But this change from the Alcotest to the Drager should have increased, not decreased the number of drivers who were recorded by the police as having been drinking.

For several reasons we believe that the breath alcohol meter used by us in the roadside surveys yielded a reasonably accurate measure of a driver's BAC. We therefore decided to look elsewhere for a possible explanation for the difference between the BAC results from police random breath testing and those from our roadside survey.

5.3 DRIVER BEHAVIOUR IN THE VICINITY OF POLICE RBT STATIONS

It occurred to us that one possible explanation of the lower percentage of drivers above the legal limit detected by police RBT operations compared to our roadside surveys could be that some drivers were deliberately avoiding the RBT stations.

During November and December of 1983, with the cooperation of the police, we placed observers in a parked car one or two blocks before a police random breath testing station. This was done at 26 sites throughout the metropolitan area. The observers were instructed to count the number of vehicles approaching the RBT station, the number of vehicles which turned left, made a u-turn, stopped, or otherwise avoided continuing on past the RBT station. They also counted those vehicles which stopped for a change of driver before continuing on past the station. The number of vehicles stopped by the police at the RBT station was also recorded. Our observers then returned to the same location one week later at the same time of day and recorded the same counts as before, with the exception, of course, of cars being stopped by the police RBT station which was no longer there.

The results of this investigation are presented in Table 5.6 where it can be seen that when the RBT station was present the proportion of drivers who did not proceed straight ahead was two to three times greater than it was when the police were not present. This difference was most unlikely to have been due to chance, being based on very large sample sizes (Chi square = 90.7, $p < 0.0001$). Had the percentage of drivers who did not proceed straight ahead during the control period applied to the period when the RBT station was present we would have expected only 124 drivers to have turned off before passing the RBT station. This means that 192 drivers

TABLE 5.6: DRIVER BEHAVIOUR APPROACHING RBT STATIONS, 1983

Driver Behaviour	RBT Period	Control Period
Proceeded straight ahead	5610 (94.7%)	6294 (97.9%)
Did not proceed straight ahead	316 (5.3%)	135 (2.1%)
Total	5926 (100.0%)	6429 (100.0%)

appeared to have decided to turn off or to change drivers because they had seen that the police RBT station was just ahead.

From the counts made by our observers we have found that 11.8% of those drivers who proceeded straight ahead were stopped and breath tested by the police. Of those drivers who were breath tested, the police records show that 1.86% of them were above the legal limit of 0.08 as measured by the screening test device, or 0.93% when tested on the Breathalyzer.

It is reasonable to assume that if the 192 drivers who took avoiding action had actually driven past the RBT station about 11.8% of them would have been breath tested. It further seems reasonable to believe that most of these 192 drivers had been drinking, otherwise there was no reason for them to have attempted, successfully, to avoid the RBT unit.

It is difficult to predict accurately how many of the drivers who did not pass the RBT station were at or above the legal BAC limit. We have estimated the likely proportion above 0.08 by calculating the proportion of drivers known to have had BACs above 0.08 during similar times of day and days of week in a sample drawn from our roadside survey of drivers who also had a BAC which was at or above 0.04. The level of 0.04 was chosen because drivers at or above that level might think that they could possibly be above 0.08 and hence be tempted to take avoiding action.

We found that about 1/3 of drivers with BACs at or above 0.04 had a BAC of 0.08 or greater in our 1983 survey. Using this proportion, we predicted that seven of the 23 drivers (23 being 11.8% of 192) who would potentially have been stopped by the RBT unit would have been over the legal limit.

When the percentage of drivers with a BAC at or above 0.08, as measured by the police screening device, is corrected to allow for the above effect, the reported figure of 1.86% would have been increased to 2.46%. Similarly when the figure of 0.93% recorded by the Breathalyzer is corrected by the same factor, the result is a figure of 1.55% of drivers at or above 0.08.

It can be seen that this could account for much of the difference between the BAC figures from police RBT operations and the corresponding figures from our roadside surveys. It is possible that the remainder of the discrepancy may result from drivers who choose to drive mainly on back streets rather than main roads late at night, if those drivers are more likely to venture on to a main road in the vicinity of traffic signals, where our surveys were conducted, than on mid-block sections where police RBT units tend to be located.

These results from our observations of driver behaviour in the vicinity of RBT stations have some obvious implications for the way in which RBT is conducted. Our purpose here, however, has been to draw attention to the fact that the BAC statistics derived from enforcement activities are influenced by those enforcement activities themselves and as such may not accurately represent the true extent of drinking and driving in the general driving population.

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