Centre for
Automotive Safety Research

Annual performance indicators of enforced driver behaviours in South Australia, 2003

LN Wundersitz, MRJ Baldock, JE Woolley, AJ McLean

CASR REPORT SERIES

CASR030

MARCH 2007

THE UNIVERSITY OF ADELAIDE
AUSTRALIA

Report documentation

REPORT NO.	DATE	PAGES	ISBN	ISSN
CASR030	March 2007	65	978 1 920947 29 3	1449-2237

TITLE

Annual performance indicators of enforced driver behaviours in South Australia, 2003

AUTHORS

LN Wundersitz, MRJ Baldock, JE Woolley, AJ McLean

PERFORMING ORGANISATION

Centre for Automotive Safety Research
The University of Adelaide
South Australia 5005
AUSTRALIA

SPONSORED BY

Department for Transport, Energy and Infrastructure
Post Office Box 1
Walkerville SA 5081
AUSTRALIA

AVAILABLE FROM

Centre for Automotive Safety Research
http://casr.adelaide.edu.au/reports

ABSTRACT

The Centre for Automotive Safety Research at the University of Adelaide was commissioned by the Department for Transport, Energy and Infrastructure to produce a report quantifying performance indicators for selected enforced driver behaviours (drink driving, speeding, restraint use) in South Australia for the calendar year 2003. The total number of breath tests conducted in South Australia in 2003 was 11 percent lower than the level in 2002. However, mobile RBT was introduced for the first time, late in the year, and was found to be a better means of detecting drink drivers than static RBT. Also, spending on anti-drink driving publicity increased markedly in 2003. The year 2003 was significant for the reductions in speed limits introduced in South Australia. Total hours of speed detection decreased by 11 percent, however, due to a marked decrease in the hours of operation of speed cameras in the metropolitan area. The reduction in the use of highly efficient speed cameras was the likely explanation for a 27 percent reduction in the number of drivers charged with speeding offences in 2003. An evaluation of the effect of the reduction in the default urban speed limit revealed that speeds decreased on all roads affected by the change but also, by a smaller magnitude, on arterial roads on which the 60 km/h limit was maintained. Restraint offences increased slightly in 2003 but there were no observational surveys conducted to provide an indication of restraint wearing rates, and so the slight increase in offences could have been due to differences in enforcement. Males were again over-represented in restraint offences and in non-restrained vehicle occupants injured in crashes. The amount of money spent on publicity for restraint use in 2003 was significantly greater than previous years.

KEYWORDS

Law enforcement, Performance indicators, Driver behaviour, Drink driving, Restraint usage, Speeding.

Summary

The Centre for Automotive Safety Research at the University of Adelaide was commissioned by the Department for Transport, Energy and Infrastructure to produce a report quantifying the performance indicators for selected enforced driver behaviours (drink driving, speeding and restraint use) in South Australia for the calendar year 2003.

For each of the driver behaviours, information was collected on: the current levels of police enforcement operations, current levels of the involvement of the specific driver behaviour in fatal and serious casualty crashes, and the extent of any publicity and advertising during the year. Additionally, any information available from on-road surveys was examined.

The establishment of consistent performance indicators for drink driving, speeding and restraint use enforcement practices will assist in optimising enforcement operations and related publicity, and may consequently further reduce road trauma on South Australian roads. Providing a consistent framework to collect and evaluate this information will help in achieving these aims.

The main findings from performance indicators for each enforced behaviour in 2003 are summarised below.

DRINK DRIVING

In 2003, the number of random breath tests conducted in South Australia decreased by 11 percent from the number in 2002. Although the level of RBT in 2002 was a record and the 2003 level was still above the target of 600,000 tests per year, any further declines in RBT should be discouraged.

An important change in enforcement methods in 2003 occurred with the introduction of mobile RBT. Although South Australia, unlike other states, only implemented mobile testing during special 'prescribed periods', it still meant an enhanced ability to detect drinking drivers who used back streets to evade static RBT. Supporting this suggestion, detection rates from mobile RBT were considerably higher than detection rates associated with static RBT for both metropolitan and rural areas. It would be useful if the requirement that mobile RBT only be conducted during 'prescribed periods' be abolished, in order to extend the specific deterrence offered by mobile testing. It is worth noting that mobile RBT was only introduced in September. The usefulness of mobile RBT should be more apparent after a full year of testing

There was a decrease in the involvement of alcohol in fatal crashes in 2003 but the BAC of drivers was unknown for a sizeable percentage (37%) of serious injury crashes, as has been the case in previous years, which makes it difficult to draw conclusions about the level of alcohol involvement in crashes in South Australia. Improving the matching process of blood samples with the TARS database would create a more complete and reliable database, and make it simpler to determine whether current enforcement methods are having the desired effect on drink driving behaviour.

In 2003, expenditure on anti-drink driving publicity increased substantially. The campaign encompassed both metropolitan and rural regions and used a variety of media.

SPEEDING

A number of significant legislative changes occurred in 2003 that were relevant to speed limit enforcement. The default urban speed limit reduced from 60 to 50 km/h; the speed limit on many rural roads reduced from 110 to 100 km/h; and, late in the year, red light cameras started operating in dual purpose mode, also detecting and photographing vehicles exceeding the speed limit.

The number of hours spent on speed detection in South Australia fell by 11 percent in 2003, with the decrease occurring entirely within the metropolitan area (a decrease of 26% compared to a 5% rise in rural areas). These changes are related to a decrease in the hours of operation of speed cameras, which are predominantly used in the metropolitan area, and an increase in the use of non-camera devices, which are used more commonly in rural regions. Although the trend for increased enforcement in rural regions is promising, further declines in the hours of speed detection in the

metropolitan area should be discouraged, especially given the need to enforce the new default urban speed limit that was introduced in 2003.

Speed detection hours are concentrated during the day and are balanced across the week. This provides a good balance between operation during high traffic periods (weekdays) and high speeding days (weekends). However, enforcement practices should be altered to prevent the drop in speed camera detection hours during the lunch period (12-2pm).

Speed detection rates (vehicles detected per hour) in 2003 were considerably lower than those from 2000, which is most likely to be due to the increasing proportion of speed enforcement that is being undertaken using non-camera devices rather than the more efficient speed cameras. There was also a drop in the total number of drivers detected speeding (down 27% from the number in 2002), again most likely to be due to the reduction in the use of speed cameras. These reductions should be reversed in order to produce greater deterrence of speeding.

As was the case for previous years, 'excessive speed' was seriously underestimated as an apparent driver error in the TARS database. Consequently, meaningful analysis of serious injury and fatal crashes was limited due to under-reporting bias.

On-road travel speed surveys are not conducted in a systematic manner in urban areas but surveys undertaken specifically to assess the effects of the speed limit change in 2003 found reductions on roads on which the speed limit changed but also found reductions, of a smaller magnitude, on arterial roads on which the speed limit remained at 60 km/h. In rural areas, a similar, small reduction in travel speeds on roads zoned at 60 km/h was observed.

Publicity related to speed limit enforcement increased considerably (39%) from 2002. This was very necessary, given the need to emphasis the changes in speed limits that occurred in 2003. Advertising campaigns should focus on male drivers, as almost all speed-related crashes involved male drivers and male drivers were two and a half times as likely as females to have been detected by non-camera devices (data by sex for camera detections are not able to be provided).

RESTRAINT USE

Determining the effectiveness of restraint use enforcement was very difficult because no specific restraint enforcement campaigns were undertaken. The number of restraint offences provides some indication of the level of enforcement. In 2003, restraint offences increased slightly from 2002.

Unfortunately, there were no observational surveys in 2003 to provide data that could be used to determine the effectiveness of restraint use enforcement. Wearing rates for vehicle occupants involved in crashes are difficult to interpret because of the confounding nature of the relationship between crash injury and wearing rates in crashes (wearing restraints reduces injury). Furthermore, better records of restraint use for all vehicle occupants in serious and fatal crashes need to be kept to improve database reliability and accuracy.

Although overall restraint usage rates in 2003 are unknown, the higher likelihood of males being charged with restraint offences and of being unrestrained in fatal and serious injury crashes indicates that males remain an important target for restraint enforcement. Publicity designed to promote restraint use should also be aimed at males.

The amount of money spent on publicity in 2003 was significantly greater than previous years and was focused on the consequences of not wearing restraints, rather than on enforcement. The effectiveness of the increase in publicity was not formally evaluated.

Contents

1 Introduction

Performance indicators assist in the identification of driver behaviour trends and enable the assessment of the effectiveness of enforcement measures. The Centre for Automotive Safety Research at the University of Adelaide was commissioned by the Department for Transport, Energy and Infrastructure to examine the annual performance indicators of selected enforced driver behaviours in South Australia.

The specific aim of this study was to assess performance indicators related to drink driving, speeding and restraint use in South Australia for the calendar year 2003. The findings from this report are important for the evaluation and planning of future enforcement operations concerned with drink driving, speeding and restraint use.

For each of the driver behaviours, information was collected on the current levels of police enforcement operations, current levels of the involvement of the specific driver behaviour in fatal and serious casualty crashes, and the extent of any publicity and advertising during the year. Additionally, any information available from on-road surveys was examined.

Section 2 of the report, examining drink driving, continues on from other regular annual reports detailing the operations and effectiveness of RBT (Baldock & White, 1997; Hubbard, 1999; Wundersitz & McLean, 2002). In this report, data are presented from 1993 to 2003. The two other major enforceable behaviours included in this report are speeding and restraint use, as occurred in Wundersitz and McLean (2004). Data are included for the years 2000 to 2003 to analyse short-term trends.

2 Drink driving and random breath testing

This Section describes the operation and effectiveness of random breath testing (RBT) in South Australia for the calendar year 2003 in terms of the number of tests, the percentage of licensed drivers tested, detection rates, and alcohol involvement in serious and fatal road crashes. The results for mobile RBT are examined separately. In addition, anti-drink driving publicity during the same time period is reviewed.

2.1 RBT practices and methods of operation

Random breath testing (RBT) is primarily an enforcement strategy designed to deter drivers from driving with an illegal blood alcohol concentration (BAC) (i.e. general deterrence). A secondary aim is the detection of drink drivers (i.e specific deterrence). Homel (1990) argued that for RBT to be successful, it must increase a driver's perceived likelihood of detection when drinking and driving, the perceived certainty of punishment if detected, and the perceived speed of punishment once detected. Based on general behaviour modification principles and Homel's (1990) deterrence model, the effectiveness of RBT can be improved by high visibility, strategic enforcement, sustained high levels of testing, sufficiently severe penalties and supportive publicity.

Information about the police operation of RBT has been provided by the Traffic Intelligence Section of the SA Police. In South Australia, amendments to legislation in June 1981 first enabled RBT to operate. RBT operations are conducted using the block testing method or by single car operations. When block testing, many vehicles are pulled over at a time and the drivers tested. Single vehicle operations involve one police car and two police officers per RBT site, enabling the testing of up to two drivers at one time.

All general patrol and traffic vehicles are equipped with a preliminary breath testing device (866 available in 2003). Drivers who register a blood alcohol level over the prescribed limit on the screening test are required to submit to a further test on more accurate apparatus to determine an 'evidentiary' BAC level to be used in prosecution. This must be completed within two hours of the last known time of driving. Those found to be over the prescribed limit in the evidentiary test are officially recorded as having exceeded the prescribed concentration of alcohol. There were 110 evidentiary breath testing instruments available for use in South Australia in 2003.

In South Australia, the prescribed BAC limit has been 0.05 g/100mL since July 1991. If apprehended with a BAC level of 0.05 to 0.079, the fully licensed driver incurs a Traffic Infringement Notice (TIN), an expiation fee, and a penalty of three demerit points. If detained with a BAC level of 0.08 or higher, the driver incurs an expiation fee, is required to make a court appearance and incurs a licence suspension. The amount of the fine and length of licence disqualification is dependent on the actual BAC level and previous offences, if any. In December 2003, penalties for exceeding the prescribed BAC limit increased. Drivers detected with a BAC level between 0.05 and 0.079 and convicted of a second or subsequent drink driving offence, now receive a licence suspension for a minimum of three months. Fines were also increased.

The coordination of RBT activities was decentralised in 2000. Drink drive detection is now the responsibility of the 14 Local Service Areas (LSAs) in South Australia (5 metropolitan, 9 rural). Each LSA Commander has the responsibility of ensuring targets are met and that the operations are efficient and effective.

In most states in Australia, RBT operations may either be 'static', whereby an RBT station is set up on a road, or 'mobile', which allows any mobile police vehicle to stop vehicles at random and breath test the driver. Mobile RBT was first introduced in New South Wales in late 1987 and has subsequently been introduced into all Australian states. South Australian Parliament passed a Bill in June 2003 legislating the use of mobile testing during 'prescribed periods'. The 'prescribed periods' include long weekends, school holidays and four other periods during the year not exceeding 48 hours. The additional 48 hour periods are determined by the Minister for Police and must be advertised to the public at least two days prior to the commencement of each period. The intention of this amendment was to widen the powers of police to require drivers to submit to a breath test during holiday periods when there was a potential increase in the risk of crashes. However, no other Australian states restrict mobile testing to 'prescribed periods'. Actual mobile RBT testing commenced in South Australia in September 2003.

2.1.1 Number of tests performed

The following data represent a combination of both static and mobile testing to give a complete picture of the operation and effectiveness of RBT in South Australia. Data for the four months of mobile testing only are given in a separate Section.

Table 2.1 and Figure 2.1 summarise the changes in the number of random breath tests conducted from 1993 to 2003 for the metropolitan and rural areas. Rural testing refers to testing conducted outside the Adelaide metropolitan area and includes regional cities such as Mount Gambier and Port Augusta.

Table 2.1
Number of random breath tests in South Australia, 1993-2003

Year	Metro	Rural	Total	% difference from previous year
1993	188,266	51,966	240,232	-9.7
1994	192,079	49,748	241,827	0.7
1995	176,038	43,993	220,031	-9.0
1996	241,732	81,484	323,216	46.9
1997	431,784	185,721	617,505	91.1
1998	369,882	211,044	580,933*	-5.9
1999	357,556	204,490	562,046	-3.3
2000	326,168	208,405	534,573	-4.9
2001	290,853	250,282	541,115	1.2
2002	387,867	294,664	682,531	26.1
2003	334,338	274,331	608,649	-10.8

*NB: The total for 1998 does not equal the sum of metro and rural random breath tests as there were some unknown locations which contribute to the total but can not be identified as metro or rural.

A consultancy report in 1996 recommended that the South Australian 1995 RBT numbers be doubled (Vulcan, Cameron, Mullan & Dyte, 1996). Funding was then increased to enable the police to purchase more equipment, and increase police overtime hours to operate additional RBT activities. In addition, a testing target of 500,000 breath tests per year in South Australia was set by SAPOL in 1997. As a result, in 1997 the number of tests increased by 91 percent over the previous year, and exceeded the target level. The testing target was increased to 600,000 tests per year in 1999 and remains unchanged. This current testing target is intended to test an average of one in every two licensed drivers in South Australia.

The total number of tests (608,531) performed in 2003 exceeded the target of 600,000. This level of testing was 11 percent lower than in 2002, the year with the highest number of tests on record. The decrease in testing was proportionally greater in the metropolitan area (14%) than in rural regions (7%). The number of tests conducted in rural areas increased each year from 1999 to 2002, and is gradually comprising a greater proportion of the total RBT conducted in South Australia.

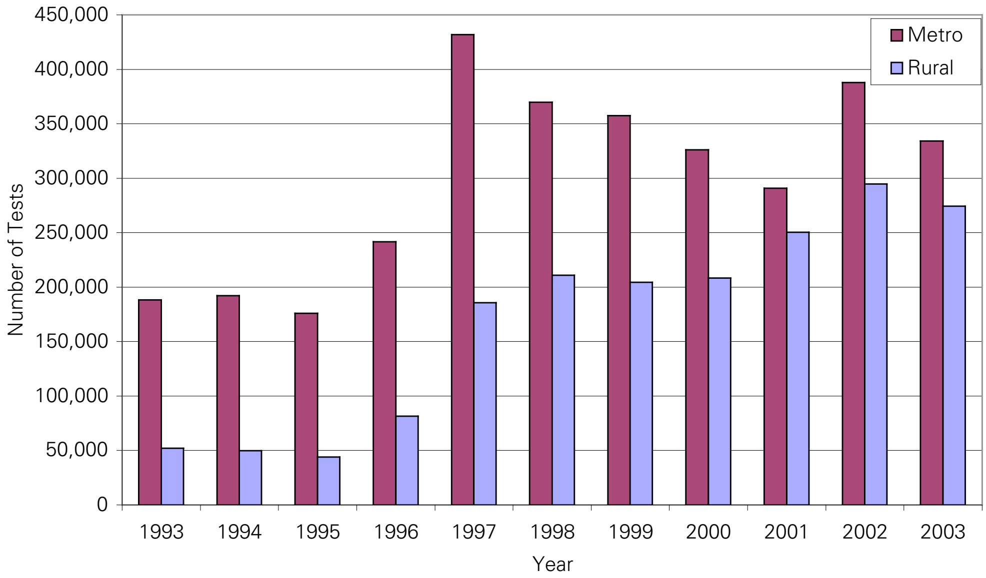

Figure 2.1
Number of random breath tests in South Australia, 1993-2003

DAY OF WEEK

Table 2.2 shows the number of random breath tests performed on each day of the week, as a percentage of all tests in a year, for the years 1993 to 2003. Similar to previous years, the greatest percentage of tests was conducted on Fridays, Saturdays and Sundays, with fewer tests conducted on Tuesdays and Wednesdays.

Table 2.2
Random breath tests performed by day of week, 1993-2003
(expressed as a percentage of total tests each year)

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1993	16.9	13.7	12.6	13.2	16.1	16.5	11.0
1994	16.8	12.8	12.6	13.1	15.4	18.2	11.2
1995	13.9	13.3	13.3	12.8	20.4	15.6	10.7
1996	11.8	11.9	10.4	9.9	33.9	13.4	8.7
1997	8.9	8.4	11.1	8.9	28.4	19.1	15.2
1998	9.8	6.8	8.8	17.0	27.1	15.9	14.5
1999	12.8	8.9	8.3	11.4	26.0	16.6	16.0
2000	13.0	9.1	7.4	10.1	23.4	18.8	18.1
2001	12.8	7.0	7.8	12.6	22.7	19.1	17.9
2002	12.0	9.8	9.1	12.4	20.1	19.1	17.6
2003	13.9	8.2	12.3	13.4	18.3	16.6	17.4

TIME OF DAY

The percentage of tests performed from 1993 to 2003 by the time of day is summarised in Table 2.3. In general, the percentage of tests by time of day in 2003 followed a similar pattern to the previous year. RBT was conducted most commonly between 2pm and midnight, with the greatest percentage of tests within a two hour period being conducted between 8 and 10pm (20.5%). There were relatively low levels of testing between midnight and 2pm. However, the percentage of tests conducted between 6am and 2pm was more than double the levels in years prior to 1999.

Table 2.3
Random breath tests performed by time of day, 1993-2003
(expressed as a percentage of total tests each year)

Year	12-2 AM	2-4 AM	4-6 AM	6 AM-2 PM	2-4 PM	4-6 PM	6-8 PM	8-10 PM	10-12 PM
1993	9.4	1.9	0.6	1.2	1.1	14.6	14.6	38.5	18.1
1994	11.5	2.4	0.7	1.6	1.0	12.9	14.6	36.3	18.9
1995	11.4	4.7	2.3	1.2	0.9	13.9	14.3	31.8	19.7
1996	10.7	3.5	1.6	6.7	2.1	12.2	10.6	38.6	13.9
1997	19.9	3.0	9.8	5.9	2.7	11.7	9.8	28.2	9.0
1998	9.1	2.5	5.8	9.4	4.9	10.5	12.5	33.4	11.9
1999	4.8	3.8	3.4	16.6	9.2	14.7	12.5	24.9	10.1
2000	3.9	3.1	1.8	18.9	9.9	13.9	13.1	24.9	10.5
2001	3.8	6.4	1.5	17.4	10.7	13.9	10.8	22.4	13.1
2002	4.0	2.5	2.2	20.6	11.4	15.0	11.3	22.2	10.8
2003	5.5	2.3	1.5	21.2	11.1	14.3	12.6	20.5	10.9

2.1.2 Percentage of licensed drivers tested

The number of licensed drivers and percentage of licensed drivers tested in South Australia for the years 1993 to 2003 can be seen in Table 2.4 and in Figure 2.2. The testing target level of 1 in 2 drivers has been exceeded since its inception in 1997 (Baldock and White, 1997). The percentage of licensed drivers tested in 2002 was the highest level on record at 65 percent. However, in 2003 the percentage of licensed drivers tested decreased to 58 percent.

Table 2.4
Number and percentage of licensed drivers tested in South Australia, 1993-2003

Year	Number of tests	Number of licensed drivers	% of licensed drivers tested
1993	240,232	947,134	25.4
1994	241,827	963,976	25.1
1995	220,031	974,756	22.6
1996	323,216	989,718	32.7
1997	617,505	994,719	62.1
1998	580,933	992,459	58.5
1999	562,046	1,043,581*	53.9
2000	534,573	1,028,083*	52.0
2001	541,115	1,045,077*	51.8
2002	682,531	1,046,878*	65.2
2003	608,649	1,052,030*	57.9

Source: Driver's Database, Registration and Licensing Section, Transport SA
* Licence information could only be extracted for the financial year to June 30.

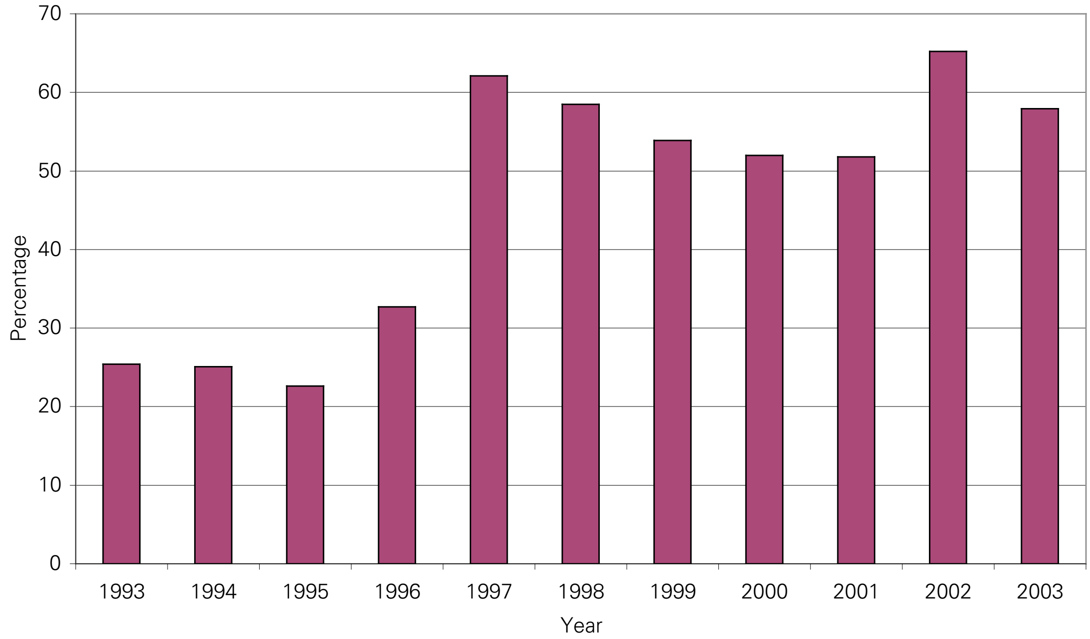

Figure 2.2
Percentage of licensed drivers tested, 1993-2003

2.2 Levels of drink driving

2.2.1 Drink driving detections

The number and percentage of drink driving detections by detection method from 2000 to 2003 are shown in Table 2.5. Drivers were most likely to be detected for drink driving when committing traffic offences in the year 2000. However, in the following years, more drivers were detected for drink driving by RBT than any other method. The proportion of drink driving detections that resulted from RBT increased by five percent in 2003.

Table 2.5
Drink driving detections by detection method, 2000-2003

Detection	2000		2001		2002		2003	
method	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)
Road crash	458	11.4	608	12.7	655	12.9	665	11.5
DUI	431	10.7	416	8.7	384	7.6	404	7.0
Traffic offence	1653	41.0	1761	36.8	1927	38.0	2008	34.6
RBT	1495	37.0	2002	41.8	2108	41.6	2725	47.0
Total	4037	100.0	4787	100.0	5074	100.0	5802	100.0

Table 2.6 summarises the method of drink driving detection for metropolitan and rural areas. In general, RBT is the predominant method for detecting drink drivers in the metropolitan area while in the rural regions, traffic offences are the main method. Drink driving detection by DUI is more common in rural areas than the metropolitan area but the reverse is true for road crashes. The proportion of drink driving detections that resulted from RBT increased by almost four percent in the metropolitan area and over eight percent in rural regions in 2003. The noted increases in RBT detections may be attributed to changes in RBT enforcement activities.

Table 2.6
Drink driving detections by detection method and region, 2000-2003

Detection method	2000		2001		2002		2003	
	Metro	Rural	Metro	Rural	Metro	Rural	Metro	Rural
Road crash	12.3	10.0	14.2	9.9	13.9	11.0	12.7	9.0
DUI	7.4	15.2	4.9	15.7	5.2	12.0	4.4	11.8
Traffic offence	35.6	48.4	30.8	48.0	33.9	45.6	32.2	39.3
RBT	44.7	26.5	50.1	26.5	46.9	31.4	50.7	39.8
Total (N)	2345	1692	3117	1670	3309	1765	3810	1992

2.2.2 RBT Detection Rates

The detection rates in the following Section refer to detection by RBT only. There is no single sufficient measure of the effectiveness of RBT operations but RBT detection rates and the percentage of drivers with illegal BACs involved in serious and fatal crashes provide some estimate of the effectiveness of RBT. A lower detection rate may indicate greater effectiveness of RBT and other drink driving countermeasures (i.e. greater deterrence effect), although it must be noted that detection rates are also affected by operational factors such as the locations, times and types of RBT used.

The RBT detection rates for the metropolitan and rural areas for the years 1993 to 2003 are presented in Table 2.7 and Figure 2.3 in terms of the number of drivers found to be over the legal limit per thousand tested. It can be seen that the detection rate in 2003 was the highest since 1998 for both the metropolitan and rural regions. It is possible that this may be due to the operation of mobile RBT in the latter part of the year. This possibility is investigated in the Section concerned with mobile RBT.

Table 2.7
RBT detection rates, 1993-2003
(number of drivers detected with an Illegal BAC per thousand tested)

Year	Metro	Rural	Total
1993	6.7	6.5	6.7
1994	7.1	5.3	6.8
1995	7.1	6.3	7.0
1996	6.2	4.7	5.8
1997	9.5	5.2	8.2
1998	6.8	3.7	5.7
1999	4.5	2.8	3.9
2000	3.2	2.1	2.8
2001	5.4	1.8	3.7
2002	4.0	1.9	3.1
2003	5.8	2.9	4.5

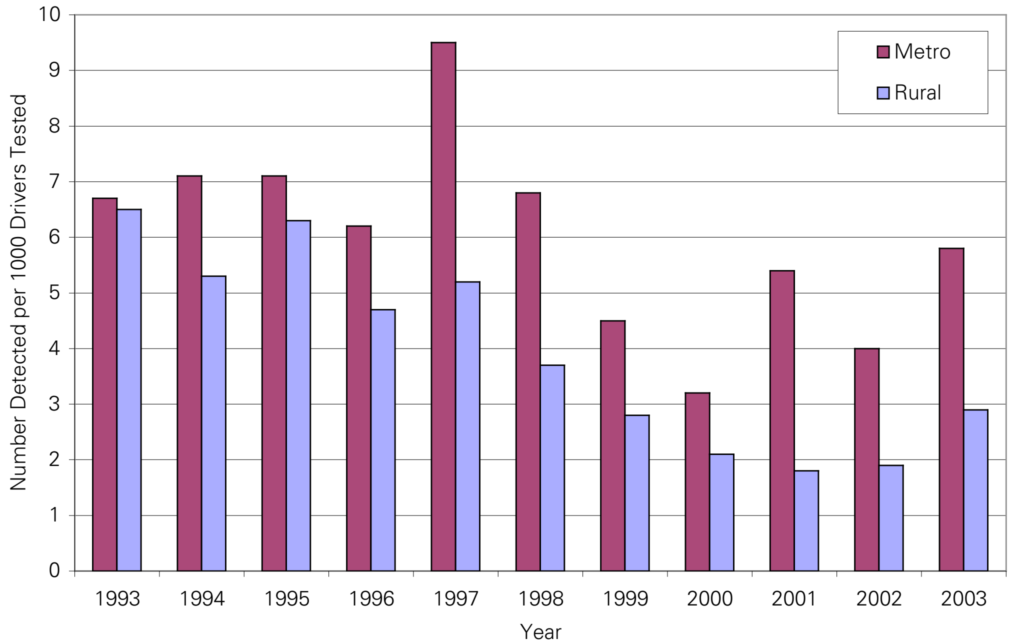

Figure 2.3
RBT detection rates per thousand tests, 1993-2003

TIME OF DAY

Table 2.8, showing RBT detection rates by time of day, indicates that the highest metropolitan detection rates were between midnight and 6am. However, the greatest increase in the detection rate from the previous year was recorded from 6pm to 10pm when the detection rate was almost ten times greater. The reason for this increase could be the introduction of mobile RBT in 2003, which, as is described in the mobile RBT Section, was associated with a higher detection rate than static RBT. However, the lack of data for mobile RBT tests by time of day makes it impossible to test this possibility.

The greatest increase in rural RBT detection rates in 2003 was from 4am to 6am and, to a lesser extent, from 6pm to midnight. The highest rural detection rates were after midnight, particularly from 2am to 4am when 48 drivers per 1000 tested were detected.

Overall, 2003 RBT detection rates increased during almost all hours of the day, particularly from 6pm to midnight. Detection rates were significantly higher from midnight to 6am although fewer drivers were tested at this time (see Table 2.3).

Table 2.8
RBT detection rates by time of day, 2000-2003
(number of drivers detected with an Illegal BAC per thousand tested)

Year	12-2 AM	2-4 AM	4-6 AM	6 AM-2 PM	2-4 PM	4-6 PM	6-8 PM	8-10 PM	10-12 PM
2000									
Metro	18.77	13.35	19.76	1.58	3.11	0.26	0.28	0.75	2.05
Rural	6.37	13.41	2.71	0.69	0.87	0.48	0.55	0.36	1.05
Total	13.71	13.36	15.19	1.23	1.87	0.38	0.36	0.53	1.39
2001									
Metro	32.49	9.14	60.47	3.62	4.61	1.64	0.48	0.73	2.16
Rural	8.34	15.98	0.00	0.70	2.03	0.21	0.55	0.28	1.23
Total	21.65	9.56	45.24	2.11	3.11	0.45	0.51	0.45	1.50
2002									
Metro	22.41	15.05	16.75	1.82	3.62	0.73	0.27	0.46	2.41
Rural	7.48	17.03	0.43	0.57	1.23	0.73	0.18	0.46	1.06
Total	16.87	15.28	14.18	1.31	2.60	0.73	0.23	0.46	1.52
2003									
Metro	23.57	20.20	24.30	2.28	1.10	2.56	2.59	4.60	4.64
Rural	13.13	48.09	13.77	0.81	0.50	1.62	3.17	2.81	7.93
Total	20.46	24.39	22.37	1.56	0.71	1.94	2.84	3.95	5.51

RBT DETECTION RATES BY SEX

Table 2.9 shows the detection rates for males and females from 1995 to 2003, based on the number of licensed drivers of each gender. The detection rate was expressed in terms of the number of licence holders because police do not record the sex of drivers tested who do not have an illegal BAC. Data were not available for 1993 or 1994. It should be noted that the sum of the number of male and female licence holders differs from the number of licence holders in Table 2.4, by an average of 1.5 percent, due to an altered method of data extraction and cases for which sex was unknown. However, the difference does not affect the pattern of drink driving activities evident in the data.

Table 2.9
Number of licence holders, RBT detection rate
and comparative ratio of detection rate by sex, 1995-2003

Year	Male			Female			
	Licence holders	Detected by RBT	RBT detection rate (per thousand licensed)	Licence holders	Detected by RBT	RBT detection rate (per thousand licensed)	Ratio of male to female RBT detection Rate
1995	512,840	1,186	2.31	440,780	288	0.65	3.55
1996	532,486	1,207	2.27	458,138	318	0.69	3.29
1997	543,017	3,254	5.99	467,155	1,051	2.25	2.66
1998	553,878	2,121	3.83	475,667	603	1.27	3.02
1999	556,399	1,740	3.13	482,038	464	0.96	3.26
2000	542,811	1,197	2.21	480,120	299	0.62	3.56
2001	553,141	1,561	2.82	486,509	441	0.91	3.10
2002	552,451	1,665	3.01	488,723	443	0.91	3.31
2003	553,702	2,170	3.92	492,448	555	1.13	3.47

The ratio of male to female drink drive detection rates in 2003 indicated that, on average, males were 3.5 times more likely to be detected than females. This reinforces the notion that drink driving continues to be a problem among male drivers. The overall increase in the detection rate (see Table 2.7) was evident among both male and female drivers.

RBT DETECTIONS BY BAC READING

The number of drink drivers detected by RBT in metropolitan and rural regions is displayed in Table 2.10 by BAC category from 2000 to 2003. A number of BAC readings were recorded in the range from zero to 0.049. These low readings may be attributed to drivers recording a higher BAC on the screening test and a lower evidentiary test reading after some time had elapsed. Additionally, some drivers have special licence conditions (i.e. truck, taxi, learner, provisional licence drivers) requiring a zero BAC. For these drivers, any positive BAC reading was regarded as illegal. Similar to previous years, in 2003, drivers detected in rural regions were more likely to have a high BAC, 0.100 or above, than those tested in the metropolitan area (42% vs. 29%).

Table 2.10
Number of drivers detected by RBT by BAC category and region, 2000-2003

	RBT BAC readings (mg/L)								
Year	Zero	0.001-0.049	0.050-0.079	0.080-0.099	0.100-0.199	0.200-0.299	.300+	Refused	Total
2000									
Metro	0	46	422	217	345	16	1	0	1047
Rural	0	26	155	83	167	17	0	0	448
2001									
Metro	2	83	596	328	522	29	0	0	1560
Rural	2	34	139	85	166	16	0	0	442
2002									
Metro	8	115	624	306	472	16	4	8	1553
Rural	7	50	176	112	187	17	1	6	555
2003									
Metro	11	182	817	339	521	34	0	28	1932
Rural	8	57	218	154	296	33	3	24	793

Figure 2.4 shows that the proportion of all drivers in each BAC category remained reasonably consistent over the four year period. The mean BAC level recorded in 2003 (*M*=0.091, *SD*=0.052) was the same as in 2002 (*M*=0.091, *SD*=0.045). The number of drivers refusing to give a breath sample increased considerably in 2003, yet was still less than two percent of cases.

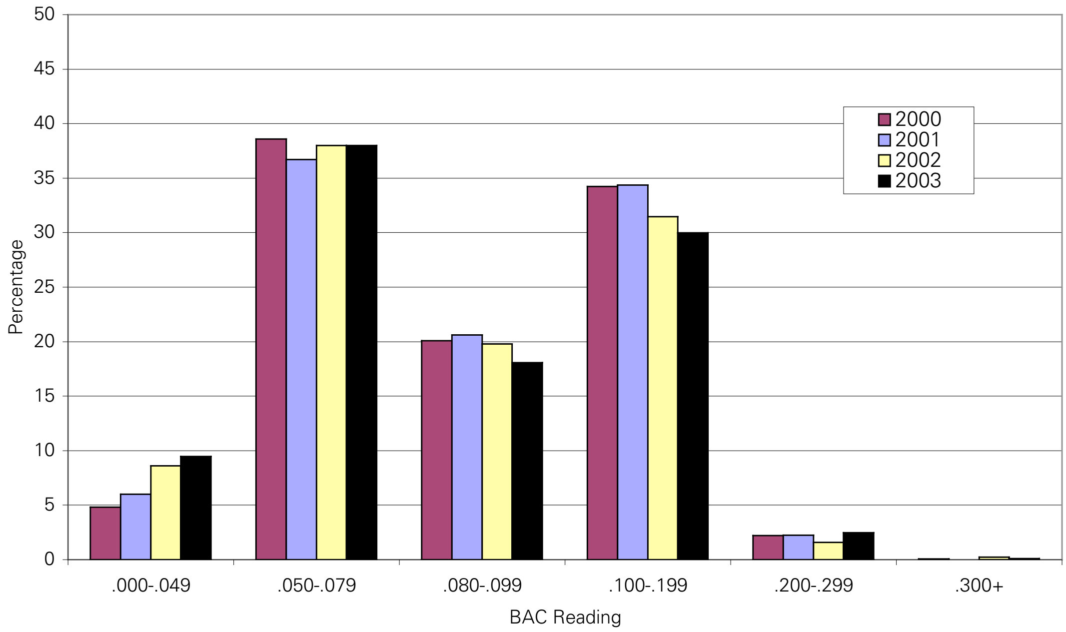

Figure 2.4
Percentage of drivers detected by RBT by BAC category, 2000-2003

2.2.3 Mobile RBT testing

The number of tests, number of detections and RBT detection rates for static and mobile methods in 2003 are presented in Table 2.11, for the Adelaide metropolitan area and rural regions. All RBT detection rates are expressed as the number of drivers detected with an illegal BAC per thousand tested. In general, mobile RBT detection rates were almost ten times higher than static detection rates, suggesting that mobile methods were more effective in detecting drivers with an illegal BAC. The greatest difference between detection rates was found in rural areas where mobile RBT methods detected nineteen times more drivers than static RBT methods. The rural detection rate for static RBT of 1.8 drivers per thousand tested was similar to levels in previous years, so the introduction of mobile testing would have played a major role in the overall 2003 rural detection rate of 2.9. Regardless of which RBT detection method was used, detection rates were higher in the metropolitan area than rural regions.

Table 2.11
Static and mobile RBT detection rates by region in 2003
(number of drivers detected with an Illegal BAC per thousand tested)

Method	No. of tests	No. of detections	Detection rate
Static			
Metro	330,105	1,713	5.2
Rural	265,353	484	1.8
Total	595,458	2,197	3.7
Mobile			
Metro	4,233	219	51.7
Rural	8,958	309	34.5
Total	13,191	528	40.0

The effectiveness of mobile RBT operations with regard to detecting drinking drivers is likely to be at least partly responsible for the increase in RBT detection rates in 2003. Monthly RBT detection rates were examined to determine whether there was any change (increase) in the detection rate when mobile testing was introduced in September. Table 2.12 shows that there was little change in the detection rate in September but that the rate subsequently increased in October and remained at a higher level for the rest of the year.

Table 2.12
RBT detection rates by month and region in 2003
(number of drivers detected with an Illegal BAC per thousand tested)

Month	Metro	Rural	Total	% difference from previous month
January	5.30	1.63	3.09	
February	5.94	2.27	4.26	37.9
March	5.22	2.06	3.65	-14.3
April	4.40	1.33	2.53	-30.7
May	6.70	3.68	5.63	122.5
June	3.49	2.81	3.31	-41.2
July	3.33	1.30	2.70	-18.4
August	4.82	2.24	3.76	39.3
September	4.71	2.46	3.79	**0.8**
October	6.61	4.21	5.61	**48.0**
November	8.80	4.34	7.02	**25.1**
December	7.44	6.11	6.89	**-1.9**

To investigate whether the increase in the RBT detection rate from September to December 2003 was the product of seasonal variation or the introduction of mobile RBT, the detection rate during these months was compared to the detection rate during the same months in previous years (2000-2002) (see Figure 2.5). From October to December, the 2003 RBT detection rate exceeded the rate of all previous years recorded. The difference was greatest in November and December. This finding is consistent with the suggestion that the introduction of mobile RBT was at least partly responsible for the increase in the detection rate in 2003.

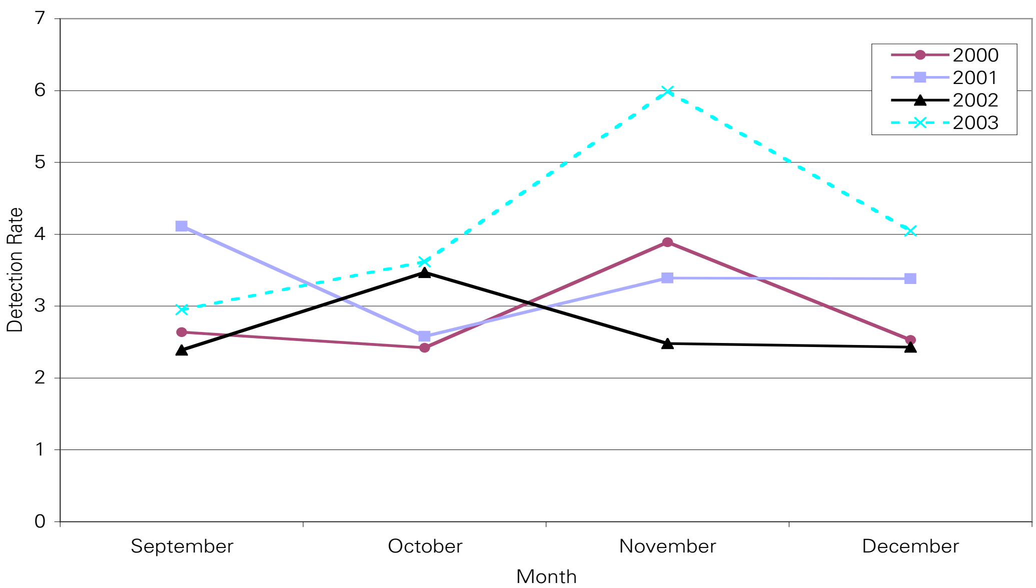

Figure 2.5
RBT detection rate (per 1000 drivers tested) from September to December, 2000-2003

Unlike static RBT, the gender of drivers tested by mobile RBT is recorded. Table 2.13 shows 2003 mobile detection rates by sex for drivers in the metropolitan and rural areas. Males were 1.7 times more likely to be detected by mobile RBT than females, with the over-representation of males occurring in both metropolitan and rural areas.

Table 2.13
Mobile RBT detection rates by sex, 2003
(number of drivers detected with an Illegal BAC per thousand tested)

Sex	Metro	Rural	Total
Male	59.5	40.2	46.6
Female	30.1	25.7	27.1

Mobile RBT detection rates by day of week and region in 2003 are presented in Table 2.14. In general, mobile detection rates were highest on Sundays. In the metropolitan areas, detection rates were also high on Friday. The overall higher detection rate in the metropolitan area (see Table 2.11) was consistent across the days of the week, with only Tuesday being anomalous.

Table 2.14
Mobile RBT detection rates by day of week, 2003
(number of drivers detected with an Illegal BAC per thousand tested)

Region	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Metro	47.1	35.7	36.6	39.7	57.9	49.2	73.6
Rural	29.2	40.3	21.2	30.0	26.8	35.1	50.6
Total	36.0	38.6	25.5	34.7	35.9	39.1	58.0

Table 2.15 shows considerable variation in mobile detection rates by time of day in metropolitan and rural regions. In both regions, mobile detection rates were highest in the early hours of the morning from midnight to 6 am and lowest during the day from 2 to 4 pm.

Table 2.15
Mobile RBT detection rates by time of day, 2003
(number of drivers detected with an Illegal BAC per thousand tested)

Region	12-2 AM	2-4 AM	4-6 AM	6 AM-2 PM	2-4 PM	4-6 PM	6-8 PM	8-10 PM	10-12 PM
Metro	87.2	184.5	220.8	18.2	5.0	14.0	28.3	49.0	52.3
Rural	53.9	169.2	154.4	10.0	6.7	23.5	18.5	19.1	35.6
Total	66.2	173.8	177.0	13.2	6.3	20.2	21.3	27.7	40.6

The number of positive mobile RBT detections by BAC category are shown in Table 2.16. Some BAC readings below 0.050 were recorded for the same reasons as stated for Table 2.10. Of the drivers with a known BAC reading, drivers detected by mobile RBT in rural regions were more likely to have a BAC of 0.100 or greater than drivers detected in metropolitan areas (55% vs. 40%). Again, this is consistent with the overall RBT figures in Table 2.10.

Table 2.16
Number of positive mobile RBT detections by BAC category, 2003

	RBT BAC readings (mg/L)								
Region	Zero	0.001-0.049	0.050-0.079	0.080-0.099	0.100-0.199	0.200-0.299	.300+	Refused /No sample	Total
Metro	1	21	63	42	73	11	0	8	219
Rural	4	18	65	46	141	20	2	13	309
Total	5	39	128	88	214	31	2	21	528

The BAC levels of drivers detected by static and mobile methods are compared in Figure 2.6. The distributions show that drivers detected by mobile RBT had a higher BAC level than drivers detected by static RBT. Almost 49 percent of drivers detected by mobile RBT had a BAC reading of 0.100 or greater compared to 30 percent detected by static RBT. Note that 31 drivers detected by static RBT and 21 detected by mobile RBT either refused to provide a sample or no sample was recorded.

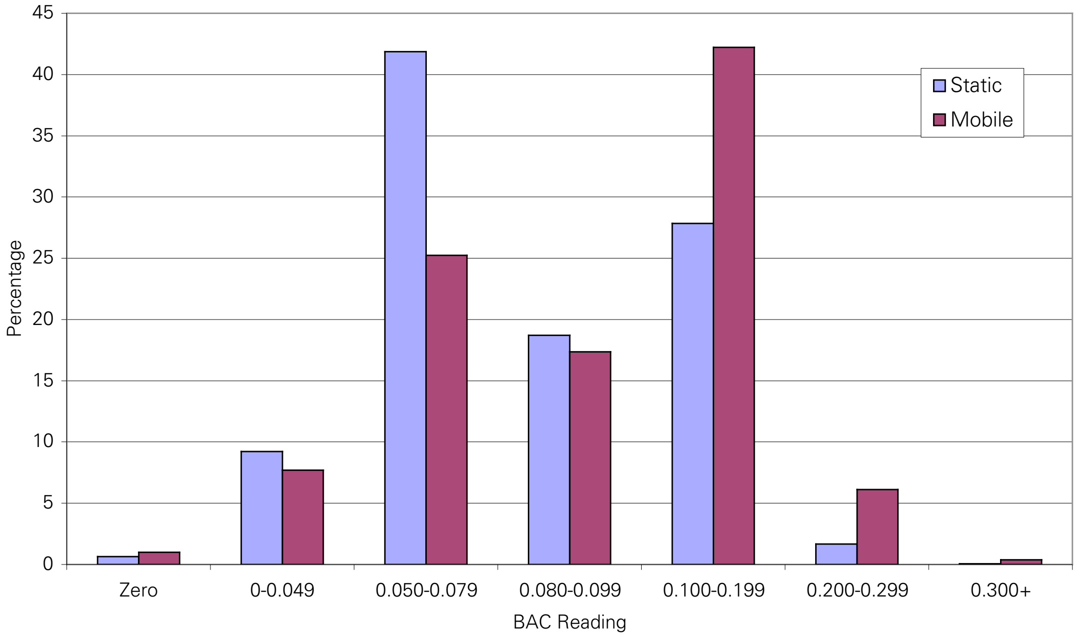

Figure 2.6
Percentage of static and mobile RBT detection rates by BAC category, 2003

2.2.4 Blood alcohol levels of seriously and fatally injured drivers/riders

The effectiveness of random breath testing can be measured by the BAC levels of drivers and motorcycle riders involved in road crashes. If road users have been deterred from drink driving, then the percentage of seriously and fatally injured drivers with a zero BAC, or a BAC under .05, would be expected to increase and, conversely, the percentage of drivers/riders with higher BAC levels should decrease.

When calculating these percentages, only drivers/riders with a known BAC are considered. Limitations in the matching process for blood samples with the DTEI Traffic Accident Reporting System (TARS) database, and the infrequency with which police measurements are made and recorded for drivers who do not go to hospital, mean that not all driver/riders involved in a crash have a known BAC (Kloeden, McLean & Holubowycz, 1993).

Table 2.17 and Figure 2.7 show the percentage of drivers/riders with a known BAC who were fatally injured in a road crash. From 2000 to 2002, the percentage of fatally injured drivers/riders with a BAC of .050 or greater increased to a level of 34 percent. In 2003, the percentage with a BAC at .050 or above decreased to a level of 26 percent.

Table 2.17
Percentage of drivers and motorcycle riders fatally injured
in road crashes by known BAC category, 1993-2003

Year	Zero	.001 - .049	.050 - .079	.080 - .099	.100 - .199	.200 - .299	.300+	> .050	Number of known cases	% known	Total number
1993	45.63	0.97	0.97	0.00	28.16	23.30	0.97	53.40	103	91.96	112
1994	64.29	2.38	3.57	1.19	14.29	14.29	0.00	33.34	84	95.45	88
1995	69.57	2.17	2.17	1.09	10.87	13.04	1.09	28.26	92	95.83	96
1996	63.92	4.12	1.03	3.09	13.40	12.37	2.06	31.95	97	90.65	107
1997	61.84	6.58	0.00	0.00	18.42	11.84	1.32	31.58	76	95.00	80
1998	73.17	4.88	2.44	3.66	8.54	7.32	0.00	21.96	82	96.47	85
1999	67.95	5.13	2.56	1.28	12.82	10.26	0.00	26.92	78	88.64	88
2000	71.15	3.85	0.96	1.92	9.62	11.54	0.96	25.00	104	97.20	107
2001	66.27	3.61	1.20	2.41	13.25	12.05	1.20	30.11	83	94.32	88
2002	62.20	3.66	3.66	0.00	21.95	7.32	1.22	34.15	82	89.13	92
2003	70.37	3.70	3.70	1.23	14.81	4.94	1.23	25.91	81	91.01	89

Note. BAC data from 1997 to 2002 may differ from the previous report (Wundersitz & McLean, 2004) due to recent manual updating of blood sample results on the database.

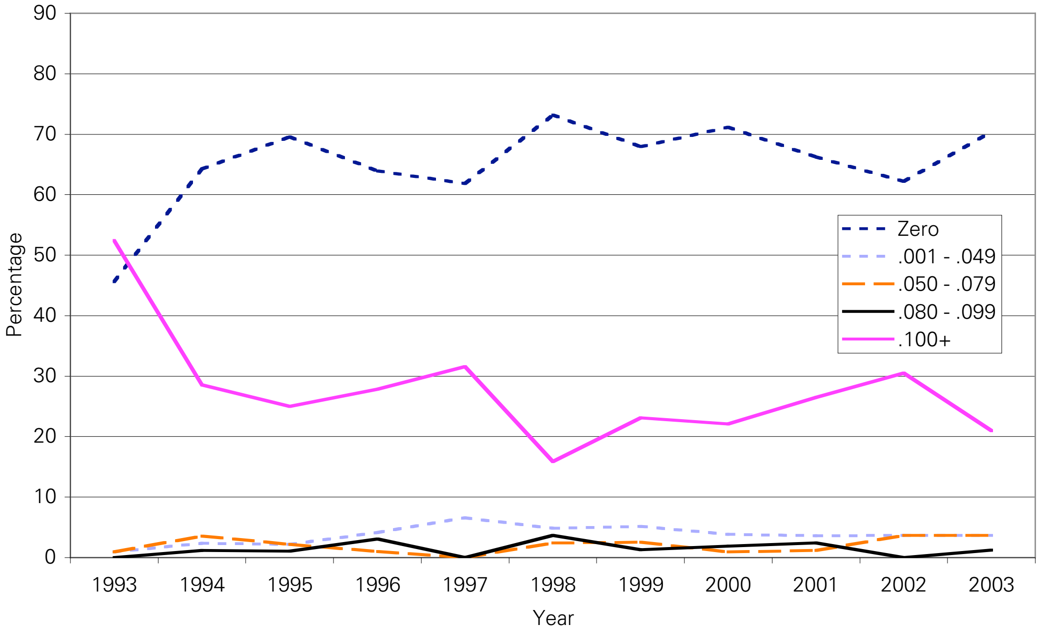

Figure 2.7
Percentage of drivers and motorcycle riders fatally injured by known BAC category, 1993-2003

Table 2.18, and Figure 2.8 show the percentage of drivers/riders seriously injured in a crash from 1993 to 2003 by known BAC category. A serious injury is defined as 'a person who sustains injuries and is admitted to hospital as a result of a road crash and who does not die as a result of those injuries within 30 days of the crash' (Transport Information Management Section, Transport SA, 2001.)

Data for the year 2000 have been updated in the TARS database recently. As a result, the total number of rider and driver serious injuries in 2000 has increased since the last report (Wundersitz & McLean, 2004). However, this did not alter the number of cases with a known BAC and so the percentages by BAC category remain unchanged.

During 2003, the percentage of BACs less than .050 remained at the same level as in 2002 at 80 percent. No BAC levels were recorded over .300. The percentage of known BACs has remained consistently low since 1999; 63 percent were known in 2003. It is worth noting that fatally injured drivers had a greater percentage recording a BAC over 0.100 than did seriously injured drivers in 2003 (30% vs. 17%), as has been the case in previous years.

Table 2.18
Percentage of drivers and motorcycle riders seriously injured in road crashes by known BAC category, 1993-2003

Year	Zero	.001 - .049	.050 - .079	.080 - .099	.100 - .199	.200 - .299	.300+	> .050	Number of known cases	% known	Total number
1993	70.67	4.63	2.92	2.23	13.21	6.00	0.34	24.70	583	70.92	822
1994	74.64	3.07	1.13	1.29	15.02	4.68	0.16	22.28	619	72.40	855
1995	73.20	3.45	2.19	2.04	13.79	5.02	0.31	23.35	638	79.65	801
1996	78.05	4.16	1.43	0.91	11.82	3.51	0.13	17.80	770	79.55	968
1997	80.20	2.15	1.32	0.99	10.07	4.95	0.33	17.66	606	70.79	856
1998	79.55	3.55	1.70	1.14	8.52	4.83	0.71	16.90	704	75.21	936
1999	77.74	2.51	2.51	1.08	12.21	3.59	0.36	19.75	557	63.73	874
2000	81.22	2.96	1.91	0.35	10.61	2.96	0.00	15.83	575	64.03	898
2001	73.94	3.91	2.44	2.12	12.05	5.21	0.33	22.15	614	63.43	968
2002	78.02	2.18	2.52	1.68	12.08	3.36	0.17	19.81	596	65.64	908
2003	77.44	2.74	1.71	1.37	12.65	4.10	0.00	19.83	585	63.24	925

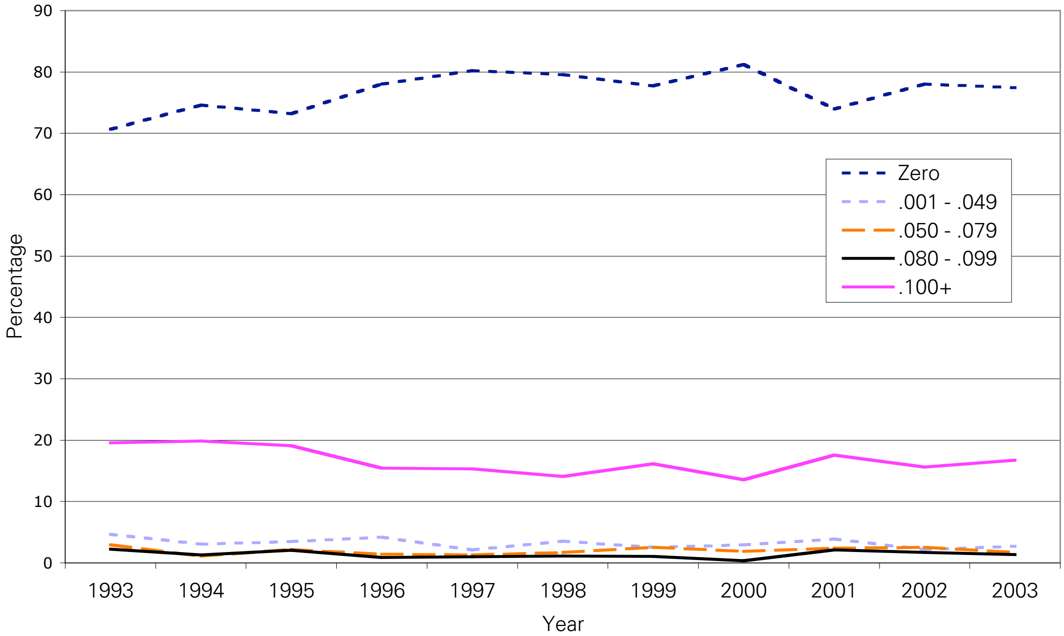

Figure 2.8
Percentage of drivers and motorcycle riders seriously injured by known BAC category, 1993-2003

2.2.5 Roadside drink driving surveys

Both roadside breath alcohol surveys and random breath testing operations provide a useful measure of the distribution of driver's BAC levels. However, roadside surveys are not accompanied by enforcement. No roadside drink driving surveys have been undertaken in South Australia since 1997 (see Kloeden & McLean, 1997).

2.3 Anti-drink driving publicity

During 2003, publicity campaigns have continued to target drink driving and support random breath testing operations. The main objective of the drink driving advertising strategy throughout this period did not alter from previous years. The campaign aimed to reinforce the community perception that there is a high likelihood of detection of drink drivers to highlight the likely consequences of being apprehended. The on-going campaign slogan was "Drink Drive. You'll be Sorry". The primary target audience was males aged 19 to 29 years and the secondary target audience was females in the same age group.

Two alternative versions of the "Christmas Surgeon" advertisement that had aired during Christmas 2002 were produced. Wording was altered slightly to reflect the school holiday period in January ("Holiday Surgeon") and adapted to rural regions ("Country Surgeon"). These commercials were aired in the metropolitan and rural areas for two to four-week bursts during key periods in the first half of 2003, specifically around the January long weekend (January, February) and Easter (April).

A new publicity campaign was introduced in May 2003 and used in the Adelaide metropolitan area and rural regions. The new television commercial was titled "The Moment of Decision" and was aired during May, June and September. This advertisement served to highlight the decision to drive after drinking and the consequences of this decision. This commercial was also screened in cinemas and supplemented by a radio version.

Another anti-drink drive campaign was produced in December 2003 following the announcement of new drink drive initiatives introduced in the first phase of the State Government's road safety reform package. The 'Drink Drive Initiatives' campaign aimed to inform the community about changes to drink driving laws and penalties, communicate the benefits of the new initiatives and highlight the risk of detection. The campaign used two complimentary television advertisements: "Booze Bus" (deterrence) and "Fill It Up" (consequences). The "Booze Bus" television commercial was used to inform the community that every police vehicle is now equipped with random breath testing technology and to reinforce the perceived high risk of detection. '"Fill It Up" focused on the new penalty of automatic loss of licence for drivers convicted of a second or subsequent drink driving offence when detected with a blood alcohol level between 0.05 and 0.079. The consequence of serious injury was also emphasized. The campaign was supplemented by an integrated billboard advertisement, aimed to deter drink drivers, and radio commercials that dealt with the consequences of drink driving. The same campaign was adopted in the Adelaide metropolitan area and rural regions.

Estimated media and planning (excluding production) costs for anti-drink driving advertising for the calendar year 2003 totalled $778,069. A greater proportion ($585,580) was spent in the Adelaide metropolitan area than in rural regions ($192,489) (Personal communication with Steve Sibonis, Transport SA, September 2004). An additional $112,756 was spent on the production of the 'Moment of Decision' television advertisement and $12,676 was spent transferring the advertisement from television to cinema. In total, $903,501 was invested in anti-drink driving publicity in 2003, a 37 percent increase since the last reported campaign costs in 2002 (Wundersitz & McLean, 2003).

3 Speeding

This Section explores performance indicators for speed enforcement. Current speed enforcement methods of operations will be discussed followed by an examination of drivers detected for speed offences. Finally, the two primary outcome measures for speed enforcement are investigated: changes in speed related crashes and covertly measured on-road vehicle speed distributions. It must be noted that the results of speed enforcement in South Australia in 2003 need to be viewed in light of the change in the default urban speed limit on March 1st, 2003, from 60 km/h down to 50 km/h and the reduction in midyear in the speed limit of a large number of rural roads from 110 down to 100 km/h.

3.1 Speed enforcement practices and levels of operation

Effective speed enforcement is required to create high levels of both specific deterrence, through high levels of apprehension and punishment, and general deterrence, through the belief in the high likelihood of encountering speed limit enforcement. Current theories of speed management in Australia contend that balanced methods of covert and overt, and static and mobile, enforcement are required to deter motorists, both specifically and generally (McInerney, Cairney, Toomath, Evans & Swadling, 2001; Wundersitz, Kloeden, McColl, Baldock & McLean, 2001, Zaal, 1994). Speed enforcement must also be prolonged and intensive to obtain maximum effect. Furthermore, speed enforcement needs to be supported by regular anti-speeding publicity (Elliot, 1993).

Speed cameras and non-camera operations (laser devices, hand held radars and mobile radars in Police vehicles) are the two broad types of speed enforcement currently employed in South Australia. The Traffic Research and Intelligence Section of the SA Police has provided the following information about speed enforcement operations.

SPEED CAMERA OPERATIONS

Speed cameras were introduced into South Australia in June 1990. The Police Security Services Branch, a semi-independent body, currently operates the speed cameras. There are 37 staff and 17 speed cameras available for use. The speed cameras operate from unmarked vehicles to give some degree of anonymity to the operations but signs may be placed after the location to advise that a camera has been passed in an effort to enhance general deterrence effects.

It has been argued (e.g. Rothengatter, 1990) that automatic speed detection devices, such as speed cameras, provide no immediate punishment (the fine arrives in the mail), which reduces the potential deterrent effect of the enforcement. Homel (1988), however, argues that the most important aspect of punishment as a deterrent, is not *immediacy* of punishment, but *certainty* of punishment. Automatic devices that do not cease operating while a 'ticket' is being written better achieve this certainty of punishment.

A list of camera locations for each day is produced by a computer program, based on road crash statistics weighted for the involvement of speed in the crashes. The program can be adjusted to schedule locations that are the subject of complaints regarding speeding and locations that exhibit very high speeds or are known areas of speeding. The locations of some speed cameras (though not precise times of operations) are also provided in advance to a media outlet for publication/broadcasting in return for road safety publicity and support. Some major speed detection operations are also advertised in advance in order to raise the profile of speed enforcement practices.

NON-CAMERA OPERATIONS

During non-camera operations, the speeds of vehicles are measured and offending drivers are pulled over to the side of the road to be charged. Hand held radars are generally used more frequently on open roads and not in the metropolitan area. The numbers of non-camera speed detection devices used South Australia during 2003 are presented in Table 3.1. Currently, laser gun devices are the most common forms of non-camera speed detection in South Australia.

Table 3.1
Non-camera detection devices used in South Australia, 2003

Non-camera detection devices	Total
Lasers	154
Mobile Radars	54
Handheld Radars	25

The coordination of police operated speed detection is handled by Police Local Service Areas (LSAs). Each LSA Commander is given a target number of hours of speed detection to be performed with an expectation that, over a year, there will be, on average, a minimum of one hour of activity per laser per day. Police using non-camera devices for speed detection have discretionary power when determining speed limit tolerance levels.

The locations and times of non-camera speed detection activity are determined using the local knowledge of patrol officers supported by statistical information supplied by intelligence officers. These intelligence officers have access to information on road crashes and the amount of speed detection activity in an area as well as complaints about speeding motorists. A team of motorcycle officers involved in specialist task force style operations also spends a significant amount of time on speed detection activity.

3.1.1 Number of hours of speed detection

The total number of hours spent on speed detection in South Australia for both metropolitan and rural areas, using any means, from 2000 to 2003, is depicted in Figure 3.1. The location of the speed detection device determines whether speed detection hours are recorded as metropolitan or rural. Overall, the number of speed detection hours in South Australia decreased by 11 percent in 2003, compared to the historic high of 2002. This was due to a 26 percent drop in metropolitan areas (hours of speed detection rose by 5% in rural areas).

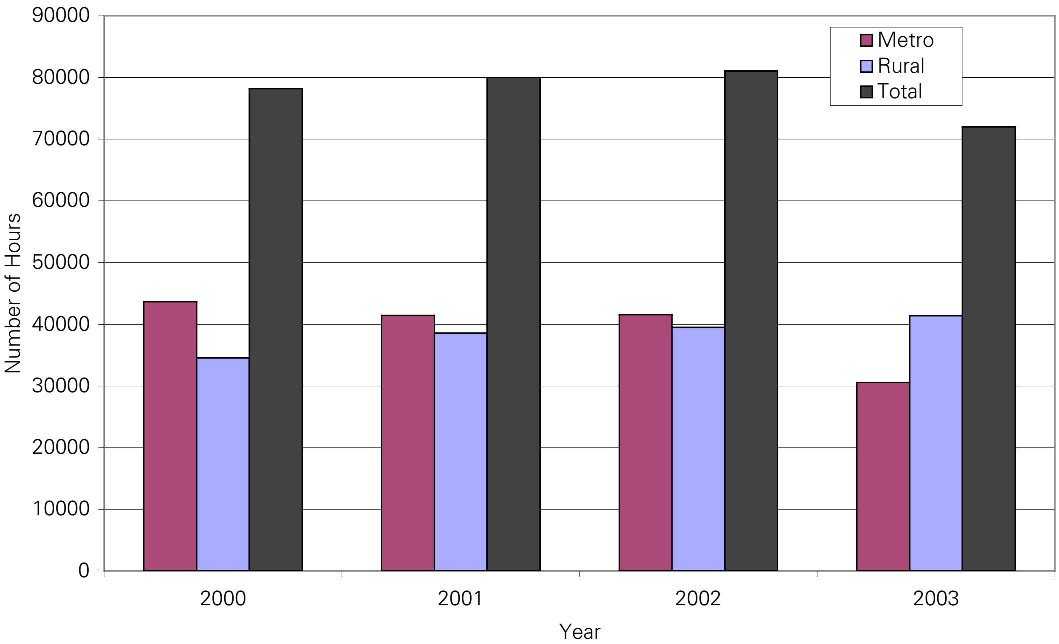

Figure 3.1
Number of speed detection hours in South Australia, 2000-2003

Table 3.2 summarises the changes in hours spent on speed detection by speed cameras only, from 2000 to 2003 for metropolitan and rural areas. Speed cameras were used predominantly in the metropolitan areas. Overall, the number of hours utilised for speed camera operation has decreased by almost 39 percent from 2000 to 2003. The greatest decrease in speed camera detection hours was evident in 2003 when the number of hours decreased in both the metropolitan area and rural regions, by 36 and 24 percent, respectively.

Table 3.2
Number of hours for speed detections by speed cameras in South Australia, 2000-2003

Year	Camera			% difference from previous year
	Metro	Rural	Total	
2000	31,928	4,017	35,945	
2001	30,456	4,959	35,415	-1.0
2002	28,972	4,646	33,628	-5.1
2003	18,444	3,551	21,995	-34.6

In contrast to speed camera devices, non-camera devices were used more widely in rural areas (see Table 3.3). Non-camera devices include laser guns, mobile radar and handheld radar. The total number of non-camera hours has increased consistently by approximately five to six percent each year since 2000.

Table 3.3
Number of hours for speed detections by non-camera devices in South Australia, 2000-2003

Year	Non-Camera			% difference from previous year
	Metro	Rural	Total	
2000	11,726	30,528	42,254	
2001	10,968	33,632	44,600	5.6
2002	12,602	34,861	47,463	6.4
2003	12,148	37,847	49,995	5.3

DAY OF WEEK

The number of hours spent on speed detection by day of week from 2000 to 2003, in terms of the percentage of all tests performed in a year, is presented in Table 3.4 for speed cameras and in Table 3.5 for non-speed camera devices. For both methods of speed detection, the number of hours was spent evenly throughout the week and has varied little each year.

Table 3.4
Number of speed detection hours for speed cameras by day of week, 2000-2003 (expressed as a percentage of total hours each year)

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun
2000	13.2	14.6	15.0	14.5	14.2	14.8	13.7
2001	13.5	14.2	15.1	14.3	14.6	15.0	13.4
2002	13.7	14.5	15.2	14.5	14.0	14.5	13.6
2003	14.0	13.8	15.2	15.1	14.0	14.5	13.5

Table 3.5
Number of speed detection hours for non-camera devices by day of week, 2000-2003 (expressed as a percentage of total hours each year)

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun
2000	14.2	13.8	12.6	14.3	16.9	15.0	13.4
2001	14.2	13.2	12.6	14.0	16.7	15.3	14.0
2002	13.7	13.1	13.5	14.5	16.4	15.7	13.1
2003	13.2	12.4	12.8	14.9	17.3	16.1	13.3

TIME OF DAY

Figure 3.2 depicts the speed detection hours (expressed as a percentage of the total hours each year) for all speed detection devices by the time of day, from 2000 to 2003. There was little variation in the distribution of speed detection hours by time of day each year. The majority of speed detection was conducted from 6am to 8pm. Compared to other times of the day, there was a noticeable dip in the distribution of detection hours around lunchtime (12 - 2pm).

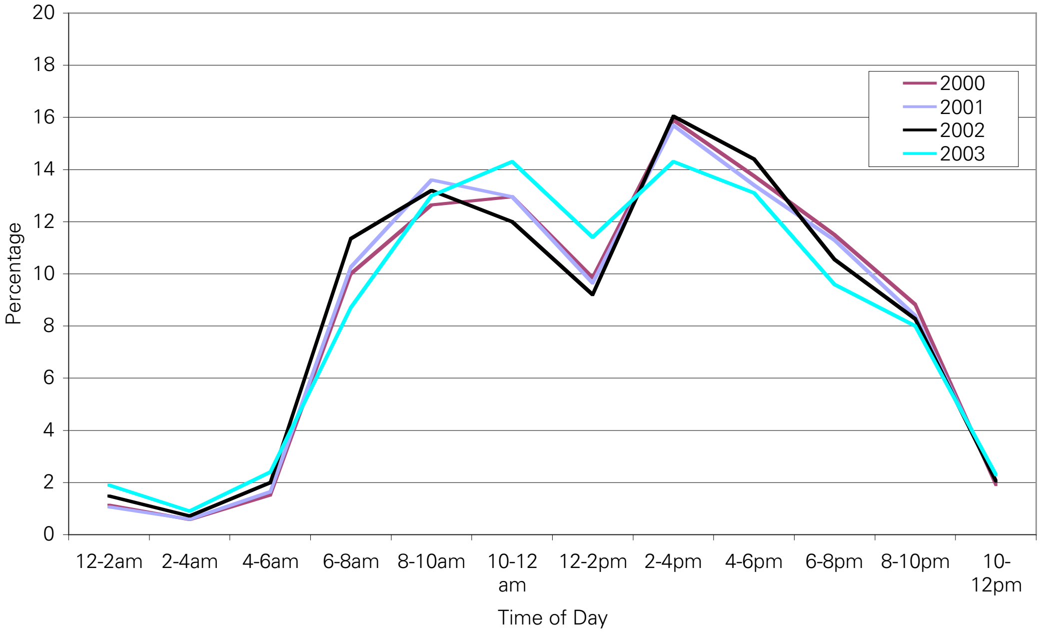

Figure 3.2
Hours spent on speed detection in South Australia by time of day, 2000-2003

The distribution of hours spent on speed detection by time of day is presented separately for speed cameras (Table 3.6) and for non-camera devices (Table 3.7). The distribution of speed camera hours by time of day in 2003 was similar to the previous year. Speed cameras were operated most frequently between 6am and 8pm. Less than one percent of speed camera detection hours were spent in the early hours of the morning between 12 and 6 am.

Table 3.6
Number of speed detection hours for speed cameras by time of day, 2000-2003
(expressed as a percentage of total hours each year)

Year	Midnight-6 AM	6-8 AM	8-10 AM	10 AM-Noon	Noon-2 PM	2-4 PM	4 -6 PM	6 -8 PM	8 PM - Midnight
2000	0.8	13.4	14.0	12.9	7.5	18.9	13.8	12.6	6.1
2001	0.1	16.1	14.2	12.7	5.7	18.6	13.1	13.1	6.4
2002	0.1	18.0	14.1	11.7	5.4	18.8	14.4	11.4	6.2
2003	0.2	18.5	13.3	12.5	5.0	18.3	14.8	11.3	6.0

Non-camera devices were operated predominantly from 8am to 6pm. In 2003, an increase in non-camera speed detection hours from 10am to noon was offset by a decrease from 8pm to midnight. Compared to speed cameras, non-camera devices were more frequently operated in the early hours of the morning (12-6am) but used less frequently between 6 and 8am. The dip in the percentage of hours spent between 12 and 2pm, noted in Figure 3.2, was evident only for speed camera detection.

Table 3.7
Number of speed detection hours for non-camera devices by time of day, 2000-2003
(expressed as a percentage of total hours each year)

Year	Midnight -6 AM	6 -8 AM	8 -10 AM	10 AM-Noon	Noon-2 PM	2-4 PM	4-6 PM	6-8 PM	8 PM-Midnight
2000	5.3	6.6	11.3	13.0	12.2	12.9	13.7	10.4	14.7
2001	6.0	4.4	13.0	13.2	13.6	12.8	13.7	9.5	13.7
2002	7.2	4.7	12.3	12.3	13.0	13.3	14.4	9.7	13.2
2003	7.4	4.4	12.9	15.1	14.2	12.5	12.3	8.8	8.9

3.2 Level of speeding

3.2.1 Number of speed detections

The number of licensed drivers and number of speed detections, by speed cameras and non-cameras, in South Australia for the years 2000 to 2003 can be seen in Table 3.8. The number of speed camera detections has decreased by 48 percent since 2001. In contrast, the number of non-camera detections has increased by 24 percent in the same time period. The total number of detections decreased from 2002 to 2003 by 27 percent. Although non-camera detections comprised a greater proportion of all detections in 2003, camera detections were still over double the number of non-camera detections. Given that the number of hours of operation of non-camera devices was greater than the number of hours of operation of speed cameras, the greater number of detections occurring with speed cameras is most likely attributable to the greater efficiency of cameras. Speed cameras check the speeds of all vehicles, not just those that the police officer chooses to check with non-camera devices. It must also be noted that non-camera devices are used more in rural areas, which are characterised by lower levels of traffic density.

Inspection of the number of speed detections divided by the number of licensed drivers in South Australia indicates that approximately 16 percent of licensed drivers were detected for a speeding offence in 2003. The percentage of licensed drivers detected has decreased steadily from the years 2000 and 2001 when approximately 25 percent of licensed drivers were detected.

Table 3.8
Number and percentage of licensed drivers detected speeding in South Australia, 2000-2003

Year	Number of speed camera detections	Number of non-camera detections	Total number of detections	Number of licensed drivers	% of licensed drivers detected
2000	219,202	40,520	259,722	1,028,083*	25.3
2001	226,879	41,105	267,984	1,045,077*	25.6
2002	184,765	45,702	230,467	1,046,878*	22.0
2003	118,280	50,039	168,319	1,052,030*	16.0

Source: Driver's Database, Registration and Licensing Section, Transport SA
* Number of licence holders at 30 June

3.2.2 Speeding detection rates

Speeding detection rates provide an indication of the current levels of compliance with speed limits. A lower detection rate may indicate the greater deterrent effectiveness of speed detection methods. However, detection rates may also be affected by speed enforcement operational practices and factors such as locations, volumes of traffic and type of speed detection, as well as exceptional factors such as changes in speed limits. As noted in the introduction to this Section, the general urban speed limit in South Australia changed to 50 km/h in March, 2003.

In this Section, speeding detection rates are defined as the number of drivers detected for speeding per hour of enforcement. Speeding detection rates for camera and non-camera devices are summarised in Table 3.9 for metropolitan and rural areas, for the years 2000 to 2003. If the speeding detection rate is interpreted as the level of speeding behaviour, the results suggest that overall, speeding has decreased since the year 2000 by almost 30 percent, to an average level of 2.3 detections per hour in 2003.

However, this decrease in the detection rate may not be only the result of reductions in speeding. It could be at least partly due to increases in the proportion of speed enforcement that is conducted using non-camera devices (see Tables 3.2 and 3.3). In each year for which data are provided in Table 3.9, speed cameras were responsible for much higher detection rates of approximately five to six detections per hour, compared to non-camera devices detecting approximately one driver per hour. As noted previously, the main reason for this difference is most likely the greater efficiency of speed cameras. Speed cameras continuously check speeds of all vehicles while it takes time (at least 5 minutes) for police officers to pull over and charge speeding offenders when operating non-camera devices. To a lesser extent, the difference in detection rates between cameras and non-camera devices may also be attributable to the greater number of speed cameras in the metropolitan area where traffic volumes are much greater.

In any case, this lower detection rate associated with non-camera devices, combined with the increasing proportion of speed enforcement conducted using these devices, could explain a portion of the reduction in the overall speeding detection rate in the final column of Table 3.9. There is evidence for some reduction in actual speeding, with declines in detection rates when using cameras. No declines were observed for detection rates when using non-camera devices.

The metropolitan areas reported higher detection rates than rural regions for both methods of detection. The greater volumes of traffic in metropolitan areas are probably responsible for the higher detection rate than a greater prevalence of speeding. Detection rates based on traffic volumes are examined in a later Section.

Table 3.9
Speeding detection rates, 2000-2003 (number of drivers detected speeding per hour)

Year	Camera			Non-Camera			Overall
	Metro	Rural	Total	Metro	Rural	Total	Total
2000	6.26	4.79	6.10	1.68	0.68	0.96	3.32
2001	6.67	4.79	6.41	1.67	0.68	0.92	3.35
2002	5.71	4.15	5.49	1.73	0.69	0.96	2.84
2003	5.69	3.77	5.38	1.95	0.70	1.00	2.34

DAY OF WEEK

The following Tables examining detection rates by day of week and time of day have been separated by detection method due to the differences in detection rates noted above. All of the following detection rates are expressed in terms of speeding detections per hour. Table 3.10 indicates that speed camera detection rates were highest on weekends in 2003, consistent with previous years. Speed camera detection rates in 2003 were lower than in the year 2000 for each day of the week.

Table 3.10
Speeding detection rates for speed cameras by day of week, 2000-2003

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun
2000	5.66	5.25	6.03	5.42	6.02	7.01	7.32
2001	5.52	5.56	6.05	6.49	6.41	7.45	7.45
2002	6.04	4.73	4.99	4.82	5.19	6.65	6.14
2003	4.88	4.76	4.86	5.04	5.44	6.05	6.71

Table 3.11 shows the detection rates for non-camera devices by day of the week from 2000 to 2003. As in previous years, in 2003 detection rates were consistent across the days of the week.

Table 3.11
Speeding detection rates for non-camera devices by day of week, 2000-2003

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun
2000	0.97	0.92	0.93	0.91	0.90	0.97	1.15
2001	0.90	0.87	0.86	0.92	0.94	0.92	1.04
2002	0.95	0.95	0.97	0.94	0.93	0.99	1.03
2003	1.00	1.12	1.18	0.88	0.92	0.93	1.06

TIME OF DAY

The speeding detection rates for speed cameras by the time of day from 2000 to 2003 are shown in Table 3.12. In 2003, speed camera detection rates were highest during the day (6am to 6pm) and lowest between midnight and 6am. The low rate of detections between midnight and 6am may be due to lower traffic volumes rather than lower rates of speeding. The pattern of detection rates in 2003 was consistent with previous years.

Table 3.12
Speeding detection rates for speed cameras by time of day, 2000-2003

Year	Midnight-6 AM	6-8 AM	8-10 AM	10 AM-Noon	Noon-2 PM	2-4 PM	4-6 PM	6-8 PM	8 PM-Midnight
2000	4.61	7.21	6.25	5.64	6.08	6.90	5.82	5.17	4.56
2001	3.67	7.16	7.42	7.27	6.61	7.76	6.04	3.41	3.34
2002	1.66	5.14	6.26	5.61	5.99	5.91	6.16	3.70	4.74
2003	1.16	5.40	5.70	6.14	5.49	6.56	5.15	3.70	3.16

Speeding detection rates for non-camera devices by time of day for the years 2000 to 2003 are presented in Table 3.13. In 2003, as in previous years, detection rates with non-camera devices were generally lower from midnight to 6am. Again, this may be due to lower traffic volumes rather than lower rates of speeding.

Table 3.13
Speeding detection rates for non-camera devices by time of day, 2000-2003

Year	Midnight-6 AM	6-8 AM	8-10 AM	10 AM-Noon	Noon-2 PM	2-4 PM	4-6 PM	6-8 PM	8 PM-Midnight
2000	0.88	0.97	0.95	0.94	1.05	0.91	0.94	0.99	0.96
2001	0.55	1.08	0.95	0.94	0.91	0.79	1.08	1.04	0.88
2002	0.69	1.01	1.01	1.00	1.00	0.83	1.05	1.05	0.96
2003	0.71	1.17	1.13	0.94	0.91	1.06	1.14	1.00	0.97

DETECTION RATES BY SEX

Accurate sex and age data are not available for speed camera offences because the infringement notice is sent to the vehicle owner who may not have been the driver at the time of the offence. Table 3.14 shows the detection rates for males and females from 2000 to 2003 for non-camera devices. The ratio of male to female speeding detection rates in 2003 remained at a similar level to previous years, with males 2.6 times more likely to be detected than females. Clearly, speeding continues to be a greater problem among male drivers.

Table 3.14
Number and sex of licence holders, detected speeding by non-camera devices, 2000-2003

Year	Male			Female			Ratio of male to female detection rate
	Licence holders	Detected	Detection rate (per hundred licensed)	Licence holders	Detected	Detection rate (per hundred licensed)	
2000	542,811	39,783	7.33	480,120	13,123	2.73	2.68
2001	553,141	36,977	6.68	486,509	11,867	2.44	2.74
2002	552,451	41,118	7.44	488,723	14,000	2.86	2.60
2003	553,702	52,305	9.45	492,448	17,962	3.65	2.59

NB: Refer to Table 3.8 for the overall rate of speeding detections.

3.2.3 Speed camera detection rates per 1000 vehicles passed - 2003

Variations in speed detection rates per hour may be attributed to changes in traffic volume. Traffic volume is an important consideration, particularly when comparing the detection rates of high volume metropolitan streets to low volume rural roads. Speed cameras record the actual number of vehicles passing each camera detection point. In this Section, speed detection rates are calculated based on the number of speeding vehicles per 1,000 vehicles recorded passing the detection point, in order to determine whether the higher detection rates in metropolitan areas may be attributed to greater traffic volumes. Equivalent data were not available for non-speed camera devices.

Table 3.15 shows the speeding detection rates per 1,000 vehicles passing the speed camera for the years 2000 to 2003. It can be seen that detection rates per vehicle passing are higher in rural regions than in the metropolitan area, suggesting a greater prevalence of speeding in rural areas. This could be due to a number of factors, including the lower traffic volumes in rural areas allowing for a greater opportunity for drivers to freely choose their own travelling speed. It is noteworthy that the rural detection rate decreased from 23 to 18 per 1,000 drivers from 2000 to 2003, while metropolitan rates remained relatively stable over the same time period. These contrasting results could reflect the effects of increasing enforcement in rural regions relative to the metropolitan region.

Table 3.15
Number of vehicles passing speed cameras and speeding detection rates (per 1,000 vehicles passed), 2000-2003

Year	Metro		Rural		Total detection rate
	No. of vehicles	Detection rate	No. of vehicles	Detection rate	
2000	18,167,492	11.01	847,851	22.68	11.53
2001	17,048,361	11.91	1,017,770	23.35	12.56
2002	15,262,875	10.84	975,159	19.78	11.38
2003	9,354,235	11.21	751,501	17.80	11.70

Tables 3.16 and 3.17 show speeding detection rates per 1,000 vehicles passing by day of week and time of day for speed cameras in the years 2001 to 2003. It can be seen that, in 2003, detection rates per 1,000 vehicles passing were higher on the weekend and lower between midnight and 6am. The latter finding is in contrast to 2002, in which the highest detection rate occurred between midnight and 6am.

Table 3.16
Speeding detection rates for speed cameras (per 1000 vehicles passed) by day of week, 2001-2003

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun
2001*	11.39	11.11	11.52	12.85	12.37	14.14	14.80
2002*	12.69	9.95	10.24	9.84	10.33	13.85	13.11
2003	11.18	9.88	10.43	10.21	11.68	14.10	15.20

*Data unavailable but rates calculated using data for other variables

Table 3.17
Speeding detection rates for speed cameras (per 1000 vehicles passed) by time of day, 2001-2003

Year	Midnight-6 AM	6-8 AM	8-10 AM	10 AM-Noon	Noon-2 PM	2-4 PM	4-6 PM	6-8 PM	8 PM-Midnight
2001*	9.25	14.21	14.26	11.75	13.59	13.16	11.70	9.50	8.88
2002*	15.80	11.13	13.29	9.93	11.79	10.18	12.10	10.85	11.56
2003	5.71	11.49	13.3	11.25	12.69	11.49	11.46	11.21	11.43

*Data unavailable but rates calculated using data for other variables

3.2.4 Red light speed cameras

Red light cameras have the ability to record vehicle speeds in addition to recording the running of red lights at intersections. In dual purpose mode, red light cameras recorded speeding offences from December 15, 2003. As data are only available for several weeks during 2003, it was decided that speed data from red light cameras would not be included in this report.

3.2.5 'Excessive speed' as the apparent error in serious and fatal crashes

The effectiveness of speed enforcement may be estimated by the involvement of 'excessive speed' in crashes. In the TARS database, one driver in each crash is assigned a single 'apparent error' indicating what the police reported as the primary error made by the driver. Only one driver in a multiple vehicle crash is assigned an apparent error. One of these possible apparent errors is 'excessive speed'. Obviously, drivers will not readily admit to police that they were travelling at an excessive speed at the time of the crash. This means that the drivers of crash-involved vehicles will only get classified with an apparent error of 'excessive speed' when there are reliable witnesses to excessive speed or when excessive speed is clearly indicated by tyre marks or vehicle damage. Therefore, the apparent error of 'excessive speed' is an underestimate of speeding and probably represents only cases of very high speeding rather than speeding in general. Fatal crashes involving more than one vehicle are usually investigated by police to a greater extent but illegal speed is unlikely to be listed as the sole apparent error unless it is clearly excessive and considered to be more important than other factors.

Table 3.18 shows that the role of excessive speed in fatal crashes fluctuates from year to year, which is due to the relatively small number of such crashes. In 2003, approximately 13 percent of fatal crashes were linked to excessive speed. This is certain to be an underestimate of the percentage of speed-related crashes for the reasons given above.

Table 3.18
'Excessive speed' as the apparent error in fatal crashes, 2000-2003

Year	'Excessive Speed'		Other apparent errors	Total crashes
	(N)	(%)		
2000	15	9.93	136	151
2001	21	15.44	115	136
2002	15	10.87	123	138
2003	17	12.59	118	135

Table 3.19 shows the excessive speed is judged to play a role in approximately three to four percent of serious injury crashes per year. Serious injury crashes are those in which a person sustains injuries and is admitted to hospital as a result of a road crash but does not die within 30 days of the crash. The year 2003 was typical in terms of excessive speed involvement in such crashes.

Table 3.19
'Excessive speed' as the apparent error in serious casualty crashes, 2000-2003

Year	'Excessive speed'		Other apparent errors	Total crashes
	(N)	(%)		
2000	37	3.01	1192	1229
2001	34	2.73	1213	1247
2002	48	4.00	1151	1199
2003	37	3.17	1149	1167

Serious casualty crashes and fatal crashes are combined in Table 3.20 to show the distribution of crashes in which the apparent error was listed as 'excessive speed' in metropolitan and rural regions. The percentage of 'excessive speed' crashes in both metropolitan and rural areas in 2003 was broadly consistent with previous years.

Table 3.20
'Excessive speed' as the apparent error in serious and fatal crashes by location of crash, 2000-2003

Year	Metro 'Excessive Speed'		Total metro crashes	Rural 'Excessive Speed'		Total rural crashes
	(N)	(%)	(N)	(N)	(%)	(N)
2000	30	4.03	744	22	3.46	636
2001	32	4.48	715	23	3.44	668
2002	31	4.62	671	32	4.80	666
2003	32	5.03	636	22	3.40	647

Table 3.21 shows that the majority of serious and fatal crashes with an apparent error of 'excessive speed' involved male drivers. In 2003, males were almost nine times more likely than females to be the driver in a speed-related crash.

Table 3.21
'Excessive speed' as the apparent error in serious and fatal crashes by sex of driver, 2000-2003

Year	Male		Female		Total 'excessive speed' crashes
	(N)	(%)	(N)	(%)	
2000*	44	88.00	6	12.00	52
2001	45	81.82	10	18.18	55
2002	60	95.24	3	4.76	63
2003	43	89.58	5	10.42	48

* 2 cases sex unknown

3.2.6 On-road speed surveys

Using crashes as an outcome measure to assess speed enforcement is problematic. In addition to the difficulties involved in identifying speed-related crashes, crash rates are also affected by many other factors. The most direct outcome measure of speed enforcement is travelling speed. Speed monitoring, independent of enforcement activities, provides the most accurate record of the distribution of travelling speeds.

As mentioned in the previous report, the systematic monitoring of speeds is not widespread in Australia. McInerney et al. (2001) reported that regular speed information was collected in only New South Wales, Victoria and South Australia. The lack of comprehensive systematic speed monitoring was acknowledged in the 2003 and 2004 National Road Safety Action Plan, which recommended road safety practitioners "undertake detailed monitoring of travel speeds (independent of enforcement action)" (Australian Transport Safety Bureau, 2002, p14).

This report summarises the outcomes from metropolitan and rural on-road speed surveys, conducted by DTEI, throughout South Australia. The variables most relevant in the context of this report are:

- *Free speeds* – determined to be vehicles that have greater than a four second gap to the vehicle in front, implying that the driver is "free" to adopt a travel speed independent of influence from other traffic.
- The *mean free speed* represents the average speed of all vehicles with a gap of more than four seconds, passing a certain point on the road. Small changes in the mean free speed can reflect substantial changes to the whole speed distribution
- The *85th percentile* of free speeds is the speed below which 85 per cent of vehicles with a gap of more than four seconds are travelling. Conversely, 15 per

cent of drivers choose to travel over this speed. The 85th percentile is commonly used by engineers to set road design standards and treatments.

Whilst the speed of all vehicles is an important consideration in crash causation in general, free speeds are of interest in the context of this report as they better reflect drivers' choices of travelling speed.

URBAN ON-ROAD SPEED SURVEYS

At present, there are no systematic on-road speed surveys conducted in the Adelaide metropolitan area. Speed surveys are undertaken for other purposes, usually on a needs basis, so they do not constitute a reliable source of data for determining historical trends.

On March 1st 2003, the default urban speed limit was reduced from 60 to 50 km/h on local roads and most collector roads. The speed limit on arterial roads remained unchanged at 60 km/h. It should be noted that speed limit signs had to be erected where the speed limit differed from the default urban speed limit. In practice, this meant that arterial roads were signed at 60 km/h.

In 2003, follow-up speed surveys were conducted by DTEI as part of an evaluation of the 50km/h default urban speed limit (also being conducted by CASR – for the outcome of this evaluation, see Kloeden, Woolley and McLean (2004)). Surveys of on-road speeds were conducted using traffic classifiers at 52 locations in urban areas (including the Adelaide metropolitan area and South Australian regional towns). The surveys were conducted at randomly selected sites, with 30 surveys undertaken on local access streets, 12 surveys on collector roads and 10 surveys on arterial roads. The timing of the observations was made to match as closely as possible the previous set of observations in late November and early December 2002. A minimum of 24 hours of speed data were recorded for each site during weekdays.

Table 3.22 shows the measured speeds before and after the reduction in the default urban speed limit on roads affected by the reduction. Table 3.23 shows the measured speeds before and after the reduction in the speed limit on arterial roads that remained unchanged at 60 km/h.

Table 3.22
Mean free travelling speeds on roads that changed from 60 to 50 km/h

Road type	Road name	Mean free travelling speed 2002 (km/h)	Mean free travelling speed 2003 (km/h)
Collector	Claremont Avenue	50.2	49.4
Collector	Blair Park Drive	61.7	61.6
Collector	Seaview Road	43.7	47.9
Collector	Barcelona Road	59.9	54.1
Collector	Milan Terrace	59.1	57.9
Collector	Jetty Road	52.4	50.2
Collector	Perry Barr Road	57.3	53.0
Collector	Scenic Way	58.5	55.3
Collector	Valetta Street	55.7	52.2
Collector	Sydenham Road	49.0	47.4
Collector	Sixth Avenue	51.8	51.1
Collector	Bonython Avenue	54.0	52.4
Urban local	Bowyer Street	40.1	37.1
Urban local	Charles Road	46.2	44.1
Urban local	Adelaide Street	41.6	36.2
Urban local	Hambledon Road	53.0	48.5
Urban local	Gilbertson Road	55.6	52.7
Urban local	Northcote Street	50.2	48.5
Urban local	Vincent Road	49.7	49.6
Urban local	Andrew Avenue	37.1	36.0
Urban local	Esplanade	44.3	42.1
Urban local	Olive Avenue	40.1	41.1
Urban local	Commercial Street	43.2	40.8
Urban local	Bermudez Crescent	48.6	46.4
Urban local	London Drive	44.0	40.7
Urban local	Farrell Street	36.3	36.5
Urban local	Main Street	52.8	50.7
Urban local	George Street	33.5	29.7
Urban local	Archer Street	45.0	44.9
Urban local	Coorara Avenue	57.7	52.1
Rural local	Conroe Drive	49.8	50.5
Rural local	Reginald Street	44.2	43.8
Rural local	Stratford Street	29.0	33.6
Rural local	Cedar Avenue	56.5	52.6
Rural local	Hobbs Street	31.1	31.6
Rural local	Fiedler Street	48.8	47.7
Rural local	Meander Avenue	36.3	40.8
Rural local	Bruce Road	63.1	57.7
Rural local	Parham Crescent	45.8	46.4
Rural local	Woodford Street	32.8	32.6
Rural local	Bowman Street	41.4	41.3
Rural local	Thomas Street	30.6	29.6

Table 3.23
Mean free travelling speeds on arterial roads before and after the change in the default urban speed limit

Road type	Road name	Mean free travelling speed 2002 (km/h)	Mean free travelling speed 2003 (km/h)
Arterial	Prospect Road	58.6	56.3
Arterial	Tapleys Hill Road	63.0	61.6
Arterial	Montacute Road	58.8	59.3
Arterial	Goodwood Road	53.5	54.6
Arterial	Greenhill Road	55.7	52.3
Arterial	Kenihans Road	57.7	56.2
Arterial	Springbank Road	61.1	60.6
Arterial	Fullarton Road	52.4	51.9
Arterial	North East Road	61.9	62.5
Arterial	Burbridge Road	63.5	63.1

Table 3.24 summarises the effect of the introduction of the 50 km/h default urban speed limit. The reductions were calculated by taking the mean of all free travelling speeds measured on roads of the given road type before and after the change in the default urban speed limit.

Table 3.24
Overall reduction in mean free travelling speeds after the introduction of the 50 km/h default urban speed limit

Road type	Reduction in mean free travelling speed (km/h)
Arterial*	0.72
Collector	1.77
Urban local	3.07
Rural local	1.17
All roads changed to 50 km/h	2.19

* Arterial roads retained a 60 km/h speed limit

The effect of the speed limit change was to reduce mean free speeds by 2.2 km/h on roads for which there was a change in the speed limit. A reduction in free speeds of 0.7 km/h was also observed on arterial roads that retained their 60 km/h speed limit.

Figure 3.3 shows the distribution of free travelling speeds from the 2002 survey compared with the 2003 survey for collector roads. There was an obvious shift to the left in 2003 indicating an overall reduction in free travelling speeds. Similar trends are evident in the distributions for the other road types. Local roads also showed a narrowing of the distribution as the number of vehicles travelling at higher speeds decreased.

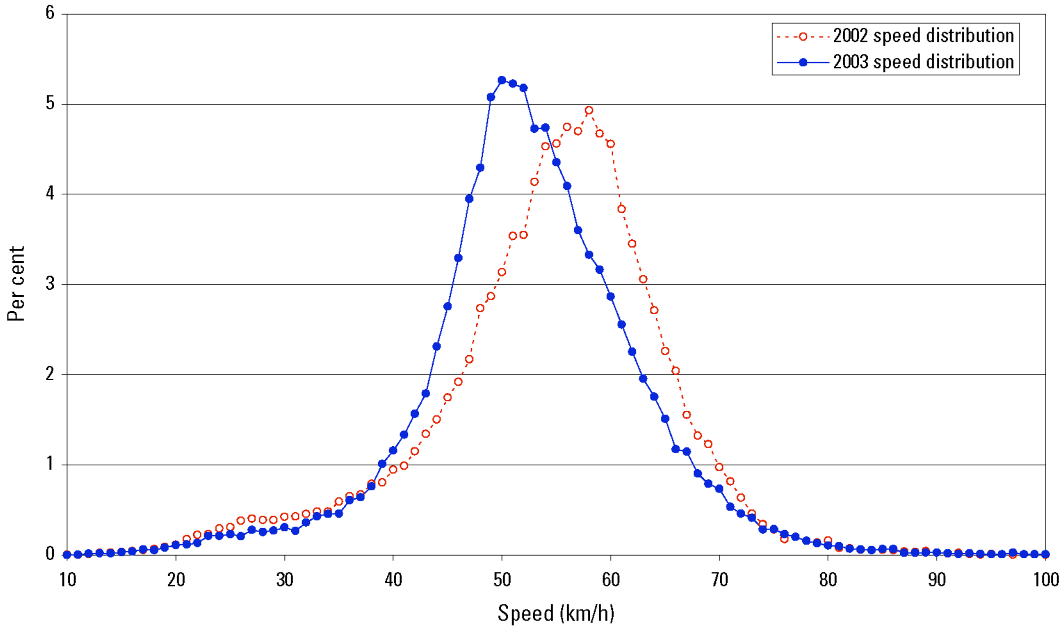

Figure 3.3
Distribution of free travelling speeds on collector roads before and after the introduction of the 50 km/h default urban speed limit

Figure 3.4 shows an approximation, given some assumptions, of what was happening with individual free travelling speeds. That is, did drivers who were travelling at, say, 60 km/h before the introduction of the 50 km/h speed limit reduce their travelling speed by the same amount as drivers who had travelled at 55 km/h? (For an explanation of the methodology used to generate these data, see Appendix B)

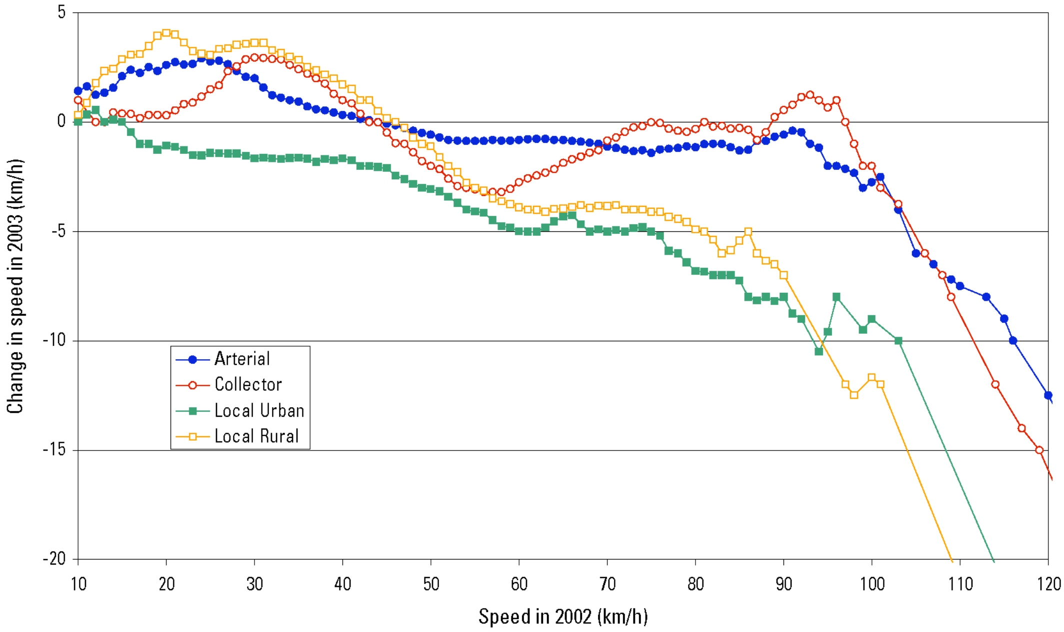

Figure 3.4
Change in free travelling speed in 2003 by free travelling speed in 2002 on the different road types

The following changes are apparent:

- Very fast drivers (80 km/h and above) on all road types in 2002 slowed down the most in 2003 (although the small numbers of vehicles at high speeds means that chance variation can have a large effect on these results).
- Drivers on arterial roads travelling between 50 km/h and 70 km/h in 2002, slowed down by about 1 km/h in 2003.
- On collector roads, drivers travelling just below 60 km/h in 2002 slowed down the most in 2003.
- On local streets both in urban and rural areas, the higher the travelling speed in 2002, the greater the reduction in speed in 2003.

Very slow drivers (below about 45 km/h) on most road types in 2002 tended to speed up in 2003 (although, the small numbers of vehicles at low speeds means that chance variation can have a large effect on the results).

In summary, speed measurements in urban areas in both rural and metropolitan environments have shown a reduction in travelling speeds most likely associated with the introduction of the 50 km/h default urban speed limit. Even arterial roads, where the speed limit remained unchanged, were observed to have a small reduction in travelling speeds. Those drivers also travelling the fastest (80km/h and above) slowed down the most on all road types.

RURAL SPEED ON-ROAD SPEED SURVEYS

On-road speed surveys using traffic classifiers have been conducted by DTEI from 2000 throughout rural South Australia. The surveys are undertaken at 21 locations: six in country towns on 60 km/h or 50 km/h speed zoned roads, six on 100 km/h zoned roads, six on 110 km/h zoned roads and three on remote outback roads. The regions for each measurement site were chosen on a convenience basis but the road to be surveyed in each region was selected randomly. The surveys are usually conducted around the beginning of August because this month was found to most closely represent the annual average daily traffic (AADT). A minimum of one week's worth of speed and volume data were collected for traffic travelling in both directions. Data presented here represent all vehicle categories.

Table 3.25 shows the summary of the aggregated speed parameters and traffic volumes for all free speed vehicles in the rural speed surveys conducted from 2000 to 2003 in South Australia. The average of the mean and 85th percentile speeds for each speed limit group was weighted by free speed volume. An approximation for variation in speeds is provided by subtracting the mean from the 85th percentile speed. This provides an indication of the likely range of speeds of the majority of vehicles around the mean speed. Tables showing speeds for individual sites are included in Appendix A.

Table 3.25
Surveyed free speeds in rural areas for all vehicles by speed zones, 2000-2003

	Free Speeds (km/h)			Volumes (veh / week)	
	Mean	85th pc	Variation (Mean – 85th pc)	Free Speed Vehicles	All Vehicles
60 km/h					
2000	62.2	70.2	8.0	93,529	107,202
2001	62.0	69.6	7.7	94,394	110,131
2002	61.2	68.6	7.4	93,347	107,760
2003	58.7	66.2	7.4	59,801	68,254
100 km/h					
2000	92.5	105.9	13.4	34,694	39,925
2001	90.8	103.3	12.5	35,035	41,270
2002	91.8	104.1	12.3	35,446	41,383
2003	92.6	105.2	12.6	40,522	48,075
110 km/h					
2000	104.2	115.4	11.2	40,855	47,570
2001	102.0	113.3	11.2	42,243	49,287
2002	102.9	113.6	10.7	44,293	51,528
2003	104.2	114.3	10.1	41,152	48,205

Speeds on the sampled 60 km/h roads appear to be trending downward with a large drop apparent in 2003. This may have been a secondary effect from the introduction of the 50 km/h default urban speed limit. The sustainability of these reductions will need to be monitored as motorists become accustomed to the new default urban speed limit. The large drop in traffic volumes in 2003 is due to the omission of two of the six measured roads that had their speed limits reduced to 50 km/h. The variation in speeds also appears to be reducing from 2000 but no real changes seem apparent between 2002 and 2003.

Speeds on the sampled 100 km/h and 110 km/h roads appear to remain relatively constant with no discernable downwards trend emerging. Traffic volumes on the 100 km/h roads have increased considerably for the 2003 measurements due to the addition of one of six roads that had its speed limit increased from 100 km/h to 110 km/h in 2001. The speed limit change on this particular road was also responsible for the decrease in traffic volumes on 110 km/h roads.

For reference, speeds on the two 50 km/h roads in the survey are shown in Table 3.26. Of note is the mean speed on the Nuriootpa road, which is well above the 50 km/h speed limit.

Table 3.26
Surveyed free speeds on 50 km/h roads in rural areas

Speed Zone	DTEI Site	Location	Mean	85th	Var	Free speed vehicles	All vehicles
50 km/h	6683	Freeling	52.5	61.1	8.6	8,144	8,554
50 km/h	6684	Nuriootpa	62.3	68.2	5.9	26,401	32,844

Speeds from the outback locations are shown in Table 3.27.

Table 3.27
Surveyed free speeds in rural areas for all vehicles by speed zones, 2000-2003

	Mean	85th pc	Variation	Free speed volume	Total volume
Quorn (110 km/h)					
2000	104.9	118.3	13.4	3,030	3,214
2001	104.1	118.0	13.9	2,693	2,780
2002	107.6	121.4	13.8	2,219	2,288
2003	100.5	113.5	13.0	2,320	2,397
Woomera (110 km/h)					
2000	104.1	119.8	15.7	2,337	2,422
2001	110.2	126.7	16.5	2,241	2,311
2002	110.2	127.4	17.2	2,558	2,643
2003	107.9	121.4	13.5	2,690	2,787
Lynhurst (100 km/h) unsealed surface					
2000	81.9	95.5	13.6	1,080	1,101
2001	75.5	94.7	19.2	794	815
2002	79.7	100.7	21.0	740	765
2003	72.3	91.9	19.6	586	597

Each site shows annual fluctuation with no discernable trends present in each of the speed parameters. This can be attributed in part to the lower volumes of traffic on these roads. The volume of traffic at the site at Lynhurst has almost halved over the four year period from 2000.

3.3 Anti-speeding publicity

A major role of anti-speeding publicity is to support enforcement activities. A comprehensive study of the relationship between anti-speeding publicity and speed enforcement was conducted from 1998 to 2001 in the Adelaide metropolitan area to identify whether changes in on-road free speeds could be attributed to changes in advertising intensity (Woolley, Dyson & Taylor, 2001). Television advertising was shown to have an immediate effect on speed behaviour independent of enforcement. Although the reduction in mean free speed was small, it was statistically significant. Faster drivers were found to reduce their speed significantly after advertising while small reductions in speed were found for the main body of drivers. It was concluded that anti-speeding television advertising at moderate intensity with supporting enforcement could reduce on-road speeds.

Previous publicity campaigns directed at speeding behaviour have aimed to convey the message that speeding is dangerous and can have negative consequences for the speeding driver, as well as other people. As noted previously, on March 1st, 2003, the general 'default' speed limit in built-up areas of all South Australian cities and towns was reduced from 60 km/h to 50 km/h. Thus, anti-speeding publicity in 2003 concentrated on informing the road-using community about the implemented speed limit change, communicating the benefits of the reduced speed limit, and reminding road users of their legal obligations. The new anti-speeding campaign targeted all road users.

The '50km/h Speed Limit on Local Streets' campaign was implemented in two phases. The first six weeks of mass media advertising commenced in February, to coincide with the ministerial launch, and concluded at the end of March. A second one week 'reinforcement' advertising phase was run in the last week of May to coincide with the end of the three month police education period.

The campaign was conducted in metropolitan Adelaide and rural regions with the core message of '50 km/h streets are safer streets'. The mass media strategy was comprised of three television commercials and supported by integrated radio, press (newspapers and magazines) and outdoor advertising (billboards and posters). Two of the television commercials, 'Slow' and 'Car Cam', were designed to provide information about the change in the default speed limit. The third commercial 'Child's Play' intended to deter speeding behaviour by demonstrating the potential consequences of speeding, specifically the possibility of crashing. 'Slow' and 'Child's Play' were screened both before and after the introduction of the default 50 km/h speed limit. 'Car Cam' was only aired after the speed limit change and portrayed the types of streets likely to have the new 50 km/h speed limit. The television and radio campaign included all metropolitan and most regional stations while outdoor advertising was confined to the Adelaide metropolitan area.

A pamphlet providing more detailed information was distributed through a variety of government and non-government agencies. A simplified version of the pamphlet was also provided in several non-English languages. Further information was also provided on the Transport SA website and via media releases.

During the calendar year 2003, a total of $551,382 was spent on advertising costs (media planning and buying, not production) (Personal communication with Steve Sibonis, Transport SA, September 2004). Of the total cost, $425,098 was spent on anti-speeding advertising in the metropolitan area and $126,284 spent in regional areas. This amount represents a 38.9 percent increase on the total expenditure in 2002.

4 Restraint use

The following Section investigates the operation and effectiveness of restraint enforcement by examining restraint-related offences detected by Police, restraint use in fatal and serious casualty crashes, and publicity promoting restraint use.

4.1 Restraint enforcement practices and levels of operation

The use of vehicle occupant restraints or seat belts has been shown to be effective in reducing serious and fatal injuries as a consequence of a crash (ETSC, 1996). Restraint usage is strongly influenced by legal requirements and enforcement practices. Legislation for the compulsory use of restraints was introduced in South Australia in 1971.

Similar to drink driving and speeding behaviour, the effects of restraint use enforcement can be optimised when combined with information or publicity campaigns (Gundy, 1988). The most effective way of increasing restraint usage is through intensive, highly visible and well-publicised enforcement (ETSC, 1999). The so-called ‘blitz’ approach appears to have long-term effects when involving high levels of enforcement over a short period of time, usually one to four weeks, that is repeated several times a year.

Restraint enforcement, like speeding enforcement, is regarded as an on-going activity throughout the year in South Australia. The detection of restraint non-wearing relies mainly on traffic patrol observations but the restraint use of vehicle occupants may also be checked when a driver has been detected for any traffic offence or when the vehicle has been involved in a road crash. In South Australia, drivers have legal responsibility for passenger restraint use, particularly for children under 16 years of age. The driver must ensure that seat belts are available and fit for use.

There were no specific campaigns targeting restraint use apart from a designated month in the police enforcement calendar (October 2003). It is possible that small localised campaigns may have been enacted in some rural regions but the central Traffic Research and Intelligence Section was unaware of any such campaigns.

4.2 Levels of restraint use

4.2.1 Restraint non-use offences

There are seven different types of restraint related offences. The frequencies of these offences for the years 2000 to 2003 are listed in Table 4.1. It must be noted that the driver of the vehicle is held legally responsible for the last four offences listed. The total number of offences detected increased by eight percent in 2003. It is not possible to determine if this small increase is the result of lower rates of seatbelt wearing or greater enforcement.

Consistently, the most common restraint offence involved the driver failing to wear a seat belt adjusted and fastened properly. Approximately 3.7 percent of offences specifically involved failing to restrain children under the age of 16 years. It is likely that the true number of offences involving unrestrained children is higher as some of the other restraint offence types may have included children. All types of restraint offences are aggregated in the subsequent Tables.

Table 4.1
Restraint offences and detections, 2000-2003

Restraint offences	2000		2001		2002		2003	
	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)
Fail to wear seatbelt properly adjusted and fastened (driver)	6329	83.9	8812	85.8	8671	85.6	9157	83.5
Fail to wear seatbelt properly adjusted and fastened (passenger)	842	11.2	1060	10.3	1041	10.3	1211	11.0
Fail to occupy seat fitted with a seatbelt	28	0.4	30	0.3	14	0.1	6	0.1
Sit in front row of seat when not permitted	5	0.1	2	<0.1	1	<0.1	4	<0.1
Fail to ensure child under 1 year old restrained	24	0.3	26	0.3	32	0.3	39	0.4
Fail to ensure child under 16 wears seatbelt	203	2.7	264	2.6	283	2.8	366	3.3
Fail to ensure front row passenger properly restrained	114	1.5	79	0.8	85	0.8	180	1.6
Total	7545	100.0	10273	100.0	10127	100.0	10963	100.0

Table 4.2 shows restraint offences detected in metropolitan and rural areas from 2000 to 2003. In 2003, the location was recorded for all seatbelt offences for the first time (the reason for this difference is unknown). The lack of complete information for previous years complicates interpretation of the data but it is likely that the number of offences in rural areas in 2003 was the highest for the four years. It can also be seen that the number of offences in the metropolitan area is consistently well over double the number in rural regions (a ratio of 2.3 in 2003).

Specific information (i.e. region, day of week, time of day) was unknown for almost one tenth of restraint offences detected in previous years. However, in 2003, this information was specified for all offences. The reason for this difference is unknown.

Table 4.2
Restraint offences detected by region, 2000-2003

Year	Metro		Rural		Unknown	Total restraint offences detected
	(N)	(%)	(N)	(%)	(N)	
2000	5,079	73.6	1,823	26.4	643	7,545
2001	6,624	70.8	2,739	29.2	910	10,273
2002	6,969	75.8	2,223	24.2	935	10,127
2003	7,660	69.9	3,303	30.1	-	10,963

DAY OF WEEK

The distribution of restraint-related offences detected from 2000 to 2003 by day of week is presented in Table 4.3 in terms of the percentage of total offences detected each year. Restraint offences were detected evenly throughout the week.

Table 4.3
Number of restraint offences detected by day of week, 2000-2003 (expressed as a percentage of total offences detected each year)

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun	No. Unknown
2000	13.6	12.9	13.4	15.9	15.1	14.8	14.3	643
2001	13.9	13.9	15.3	15.5	14.0	13.9	13.9	910
2002	13.5	14.0	14.4	15.2	15.8	15.9	11.2	935
2003	14.5	14.5	15.2	14.1	13.4	15.3	13.0	-

TIME OF DAY

Table 4.4 displays restraint offences detected by time of day in the three years from 2000 to 2003. In 2003, the distribution of restraint offence detections by time of day did not vary from the previous years. Restraint offences were detected most frequently during the day between 8am and 6pm. Restraint offence detections were much less common from midnight until 6am.

Table 4.4
Number of restraint offences detected by time of day, 2000-2003 (expressed as a percentage of total offences detected each year)

Year	Midnight -6 AM	6-8 AM	8-10 AM	10 AM- Noon	Noon- 2 PM	2-4 PM	4 -6 PM	6 -8 PM	8 PM - Midnight	No. Unknown
2000	1.9	2.6	11.1	18.1	17.3	15.3	17.0	8.9	7.8	643
2001	1.7	2.2	11.7	18.9	17.1	14.6	17.9	9.1	6.7	910
2002	1.7	2.3	11.2	17.4	17.6	15.7	20.0	7.7	6.4	935
2003	1.8	2.6	12.8	18.4	16.7	15.2	18.2	8.2	6.0	-

SEX AND AGE

Detected restraint offences by sex and age for 2002 and 2003 are presented in Table 4.5. Males were over three times more likely to have been detected for a restraint offence than females in 2003. The 2003 results were consistent with the previous year although the number of cases in which sex was not recorded decreased significantly. No data were available for children aged under 16 years since the driver of the vehicle is legally responsible for the restraint offence.

Table 4.5
Number and percentage of restraint offences detected by sex and age, 2002-2003

	2002						2003					
	Male		Female		Total		Male		Female		Total	
Age	N	%	N	%	N	%	N	%	N	%	N	%
16-19 yrs	666	9.7	239	10.6	905	8.9	721	8.8	253	9.7	974	8.9
20-29 yrs	2279	33.3	768	33.9	3047	30.1	2817	34.2	935	35.7	3752	34.2
30-49 yrs	2683	39.2	949	41.9	3632	35.9	3246	39.4	1079	41.2	4325	39.5
50 yrs +	1218	17.8	303	13.4	1521	15.0	1445	17.5	350	13.4	1795	16.4
Unknown age	5	0.1	5	0.2	10	0.1	7	0.1	1	<0.1	8	0.1
Unknown sex					1012	10.0					109	1.0
Total	6851	100.0	2264	100.0	10127	100.0	8236	100.0	2618	100.0	10963	100.0

Unknown age: Date of birth was not recorded or data entry error.
Unknown sex: Age and sex was not recorded or data entry error.

4.2.2 Restraint use by vehicle occupants in serious and fatal crashes

Restraint use by vehicle occupants involved in crashes is often difficult to determine conclusively. In some cases, if there is no physical evidence (i.e. injuries, scuff marks on seatbelt), police rely on self-report. Restraint use is only recorded on the TARS database if a vehicle occupant is injured. Seat belt status is categorised into six different groups in the database but they have been condensed into three groups for this report: restraint worn (includes child restraints), restraint not worn (includes child restraints and restraint not fitted) and unknown (restraint is fitted but unknown if worn). The following Tables give the number and percentage of restraint use for car occupants sustaining injuries in a serious casualty or fatal crash. When calculating these percentages, only car occupants with known restraint use status were considered.

Table 4.6 shows the restraint usage for vehicle occupants injured in a fatal crash from 2000 to 2003. In 2003, restraint use in fatal crashes was the lowest of all the years for which data are available (56 percent). Restraint status was known for 79 percent of all injured vehicle occupants in fatal crashes in 2003, an increase on the previous year (68%).

Table 4.6
Restraint usage of fatally injured vehicle occupants, 2000-2003

Year	Restraint worn		Number of known cases	Total Occupant fatalities
	(N)	(%)		
2000	52	62.7	83	128
2001	59	80.8	73	107
2002	49	65.3	75	111
2003	53	55.7	95	121

Restraint use for vehicle occupants seriously injured in a crash from 2000 to 2003 is presented in Table 4.7. A serious injury is defined as an injury requiring the person to be admitted to hospital but does not cause the person to die within 30 days of the crash. In 2003, the percentage known to be wearing restraints was 88 percent, which was comparable to previous years. The restraint status of all injured vehicle occupants in serious crashes was reported for only 57 percent of occupants in 2003. Each year, restraint usage by injured occupants was much higher in serious injury crashes than in fatal crashes.

Table 4.7
Restraint usage of seriously injured vehicle occupants, 2000-2003

Year	Restraint worn		Number of known cases	Total occupants injured
	(N)	(%)		
2000	633	89.2	710	1,230
2001	582	85.1	684	1,232
2002	612	85.2	718	1,188
2003	567	88.1	643	1,126

Restraint usage for fatally and seriously injured vehicle occupants is presented in Table 4.8 and Figure 4.1 according to the region where the crash occurred. Overall restraint use was 84 percent in 2003, similar to previous years. Injured vehicle occupant restraint wearing rates remained slightly higher for crashes in the Adelaide metropolitan area than for crashes in rural regions.

Table 4.8
Restraint usage of fatally and seriously injured vehicle occupants by region, 2000-2003

Year	Metro Worn		Rural Worn		Total Worn		Total Killed/ Injured
	(N)	(%)	(N)	(%)	(N)	(%)	
2000	303	87.0	382	85.7	685	86.4	1,358
2001	280	87.0	361	83.0	641	84.7	1,339
2002	287	84.9	374	82.2	661	83.4	1,299
2003	297	88.7	323	80.1	620	84.0	1,247

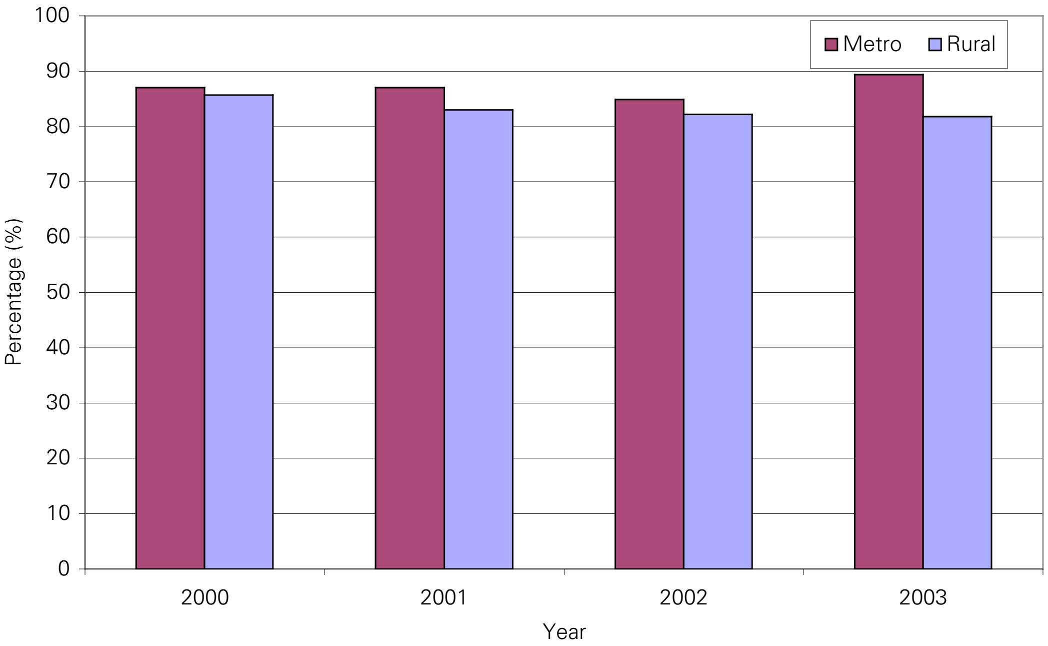

Figure 4.1
Restraint usage of fatally and seriously injured vehicle occupants, by location, 2000-2003

Table 4.9 and Figure 4.2 show the number and percentage of fatally and seriously injured vehicle occupants wearing restraints, by sex. In 2003, consistent with previous years, injured males had considerably lower restraint usage rates (82%) than injured females (89%).

Table 4.9
Restraint usage of fatally and seriously injured vehicle occupants by sex, 2000-2003

Year	Male Worn		Female Worn		Total Killed/ Injured
	(N)	(%)	(N)	(%)	
2000	311	80.8	368	91.5	1,341
2001	317	80.9	321	88.7	1,332
2002	351	80.3	309	87.0	1,297
2003	315	81.8	300	89.3	1,247

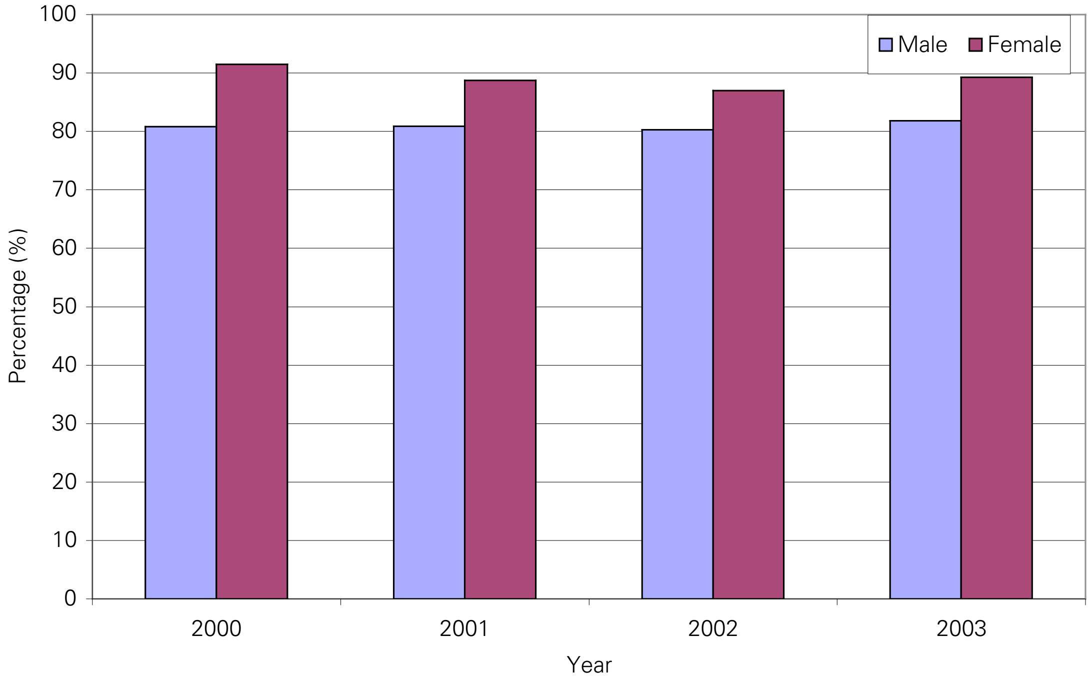

Figure 4.2
Restraint usage of fatally and seriously injured vehicle occupants, by sex, 2000-2003

4.2.3 On-road observational restraint use surveys

On-road observational surveys provide another means to measure the effectiveness of restraint enforcement. No observational studies of restraint use were conducted in 2003. Results from previous surveys are described in the 2002 report on annual performance indicators of enforced driver behaviours (Wundersitz & McLean, 2004).

4.3 Restraint publicity

In previous years, publicity campaigns promoting restraint use have primarily targeted parents of children in rural regions. In September 2003, a new media campaign was developed incorporating both metropolitan and rural regions. Similar to previous years, the restraint campaign in 2003 aimed to reach a primary target audience of parents with young children. However, in 2003 males aged 14 years and over were selected as a secondary target audience. The campaign was structured to inform road users about the strong relationship between the extent of injury and restraint usage, emphasize the risk of being detected when not wearing a restraint, and reinforce the potential consequences of not wearing a restraint. There was no main specific campaign slogan.

The campaign encouraging restraint use consisted of television and radio commercials aired in both the Adelaide metropolitan area and rural regions, unlike previous years when no media was broadcast in the metropolitan area. The radio commercial was intended to warn parents about the possible consequences of their child being involved in a crash while unrestrained and the penalties incurred (fines and demerit points) when detected with an unrestrained child passenger. The television commercial "Demonstration" depicted the possible consequences of not restraining children when involved in a crash. This advertisement was aired in October and November, 2003.

The campaign was also supported by other printed materials (i.e. pamphlets and posters) that were distributed through a network of outlets such as Registration and Licensing offices, police stations, RAA, community health centres and hospitals.

A specific campaign targeting Aboriginal restraint use in the Upper Spencer Gulf region and the Riverland in 2002 continued until the end of January in 2003. This campaign included the television commercial, "Buckle Them Up", and was supported by radio, pamphlets and posters, all available in English or Pitjantjatjara.

During the previous three years, the majority of the media expenditure for restraint publicity was spent in rural regions on media and production and only a small percentage spent in the Adelaide metropolitan area on the distribution of pamphlets and training material (Wundersitz & McLean, 2004). In 2003, the money invested in restraint-related advertising increased significantly (by over 500%) to a total of $279,148. Of this, $169,784 was spent on media planning and buying ($93,184 in rural regions and $76,600 in the metropolitan area) (Personal communication with Steve Sibonis, Transport SA, September 2004). Spending on restraint advertising increased significantly in the metropolitan area due to the airing of a television advertisement. Production costs were $104,364 for the 'Demonstration' television commercial and $5,000 for the associated radio commercial.

5 Discussion

Performance indicators of enforced driver behaviours are important for understanding the relationship between driver behaviour, enforcement activity and crash related information. The European Transport Safety Council (ETSC, 2001) recognised the importance of systematic monitoring of driver behaviour by independent institutions to create road safety performance indicators. Following the recommendations of the ETSC, this annual report quantifies the effects of the enforcement of drink driving, speeding and non-wearing of restraints legislation in South Australia.

5.1 Drink-driving and random breath testing

In a review of the impact of random breath testing across Australia, Homel (1990) concluded that the success of RBT depends critically on the method of its enforcement. In particular, he found that only the 'boots and all' model of RBT had been unambiguously successful. This model includes high visibility of RBT stations in locations that are difficult to predict and evade, rigorous enforcement and extensive publicity. Both enforcement and publicity must be sustained in operation. Combined, these factors influence drink driving behaviour through general deterrence, by increasing the perceived likelihood of detection and emphasising the consequences of legal sanctions.

There were a couple of significant legislative changes in 2003 that were relevant to anti-drink driving enforcement. Penalties for a second offence in the range from .05 to .079 g/100ml were increased and mobile RBT was introduced in 'prescribed periods' in September.

LEVELS OF TESTING

In 2003, random breath testing levels in South Australia decreased by 11 percent from 2002 when the highest level was recorded. Just over 58 percent of licensed drivers were breath tested in 2003, compared to 65 percent in 2002. Overall, the current level of testing was greater than the recommendation of Baldock and White (1997) that 1 in 2 licensed drivers be tested. However, further declines in the level of RBT testing should be discouraged to avoid decreasing the perceived probability of detection.

The decrease in the level of testing was greater in the Adelaide metropolitan area than in rural regions. This meant a continuation of the trend in recent years for an increasing share of total RBT to be comprised of testing in rural areas.

VISIBILITY OF RBT

Homel (1990) suggests that to increase the perceived probability of detection, random breath testing should be conducted on days and at times when it is more likely to be seen by potential drink drivers. Homel maintains that experimentation is required to determine the balance of testing at times and places of high traffic volume when the incidence of drinking and driving is low, and when the incidence of drink driving rates is high but the traffic volume is low. The most recent late night surveys in metropolitan Adelaide indicated that drink driving rates were highest on Wednesday and Thursday nights, and after midnight (Kloeden & McLean, 1997). More recent roadside breath testing surveys conducted in Perth (Friday to Sunday, 10pm-3am) in 1999 found that drink driving rates were highest after midnight and on Friday nights (Ryan, 2000). In South Australia during 2003, the greatest percentage of breath tests continued to be performed on Fridays, Saturdays and Sundays.

Thirty one percent of RBT tests in 2003 were performed from 8pm to midnight compared to nine percent from midnight to 6am. Time series analysis of Tasmanian RBT data indicated that tests conducted before midnight were more important as a general deterrent than late night or day time testing. However, low numbers of crashes and tests after midnight precluded definitive conclusions (Henstridge, Homel & Mackay, 1997). Harrison (2001) suggested that enforcement taking place early in the chain of decisions leading to drink driving may be more effective in deterring drink driving than enforcement targeting decisions later on, particularly in rural areas. In 2003, RBT operations occurred more when there were higher traffic volumes rather than when the greatest drink driving rates were reported. RBT operations conducted in the early part of the evening would have been visible to potential drink drivers on their way to drinking venues and may have influenced subsequent alcohol consumption or the decision to drive. This satisfies the 'high visibility' component necessary for successful deterrent RBT operations recommended by Homel (1990).

However, RBT is also needed at times when the highest drink drive rates occur, in order to detect actual drink drivers. During 2003, the risk of detection was potentially increased through the introduction of more covert mobile detection methods. Hendrie (2003) emphasizes the importance of adapting the type of RBT enforcement to the characteristics of the region where it is being implemented, rather than assuming a 'best practice' model fits every situation. Experimentation should be continued to maintain a balance between deterrence and detection.

EFFECTIVENESS

Detection rates offer an approximation of the level of drink driving. Thus, the considerable increase (45%) in the detection rate in South Australia from 2002 to 2003 may be interpreted as an increase in drink driving levels due to less effective RBT operations. However, detection rates may also be influenced by enforcement practices. The observed increase in the detection rate may be partly attributed to a small increase in breath testing after midnight when drink driving rates are higher. In fact, a positive relationship has been observed between the percentage of testing after midnight (midnight-6am) and detection rates over the past ten years (see Figure 5.1). This relationship suggests that detection rates were dependent on specific enforcement operation times and practices. The increase in the South Australian detection rate was also likely to have been the result of the introduction of mobile RBT, which is discussed in its own Section.

While detection rates increased, the percentage of fatally injured drivers/riders with a BAC of .050 or greater (another indicator of the level of drink driving or RBT effectiveness) decreased. Figure 5.1 shows that the detection rate appears to be more closely associated with RBT testing after midnight than alcohol-related serious and fatal crashes. This provides further evidence that the detection rate may be more closely associated with the efficiency of RBT methods (the capacity for the methods to detect drink drivers) than the actual level of drink driving in South Australia.

The examination of the involvement of alcohol in serious and fatal road crashes provides perhaps a better picture of the effectiveness of RBT operations (i.e. the extent to which RBT produces decreases in drink driving). The reduction of alcohol involvement in fatal crashes suggests that RBT operations based on a combination of high visibility (i.e. most testing before midnight) which has a deterrent effect, and lower profile or more covert operations focusing on detection (i.e. increased testing after midnight, mobile RBT) were effective in reducing the level of drink driving in 2003. However, crash rates can only confidently be used to evaluate RBT enforcement when BAC levels of all drivers are determined in all crashes. The percentage of drivers seriously injured in a crash with an unknown BAC has remained at an unacceptably high level in 2003. Improving the matching process of blood samples with the TARS database creates a more complete and reliable database.

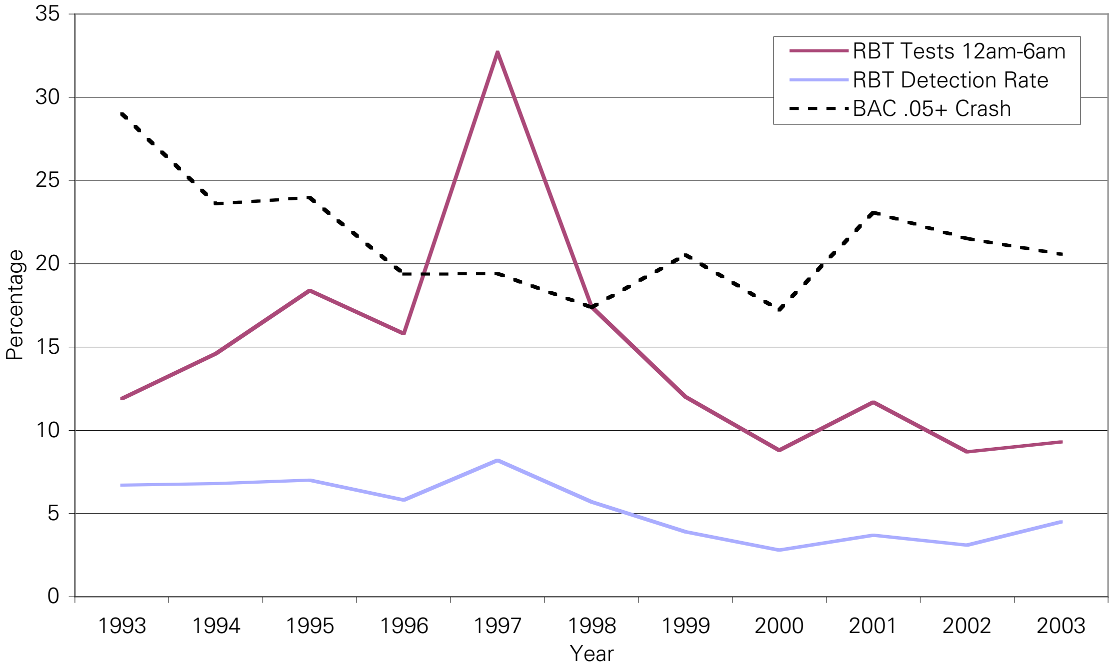

Figure 5.1
RBT detection rate, percentage of tests midnight-6am (percentage of total tests each year) and percentage of seriously or fatally injured drivers/riders with a BAC over 0.05 g/100ml, 1993-2003

MOBILE RANDOM BREATH TESTING

It was expected that the effectiveness of RBT operations in South Australia would be improved by the introduction of 'mobile' RBT to target drink driving offenders who believe that RBT can be avoided. The introduction of mobile RBT allowed patrols to test any driver at any time and increased the flexibility of RBT operations considerably. The low visibility of mobile RBT complemented the high visibility of static RBT and enhanced the overall deterrent value of RBT. The value of combining mobile and stationary RBT methods has been acknowledged in the literature (Harrison, Newman, Baldock & McLean, 2003; Homel, 1990; Zaal, 1994). However, Homel (1990) warns that mobile RBT methods should never become the main method of RBT operations because mobile testing is less visible, and thus less of a deterrent than stationary testing.

In 2003, police were authorised to conduct mobile RBT only during 'prescribed periods'. It is understood that South Australia was the only Australian state to have such restrictions placed on mobile RBT operations. Mobile RBT would certainly be more effective, in terms of increasing the probability of detection, if these restrictions were abolished.

Mobile RBT detection rates were over ten times greater than static detection rates and higher BAC readings were recorded. This is likely to have resulted from the higher proportion of drink drivers caught by mobile operations on back streets and the opportunity to specifically target suspected impaired drivers instead of the more random approach of stationary testing.

Mobile RBT was particularly effective in country areas where police personnel are often limited and the 'grapevine effect' is known to undermine the potential value of a highly visible static RBT station. The mobile detection rate in rural areas was almost twenty times greater than the rural static detection rate. This finding was consistent with Harrison's (2001) research investigating the effectiveness of drink driving enforcement strategies (overt and covert) in two different rural communities in South Australia and Victoria. Harrison (2001) concluded that rural drink drivers typically did not appear to consider the consequences of their behaviour. Thus, detection would be more useful than deterrence and maximised by unpredictable, smaller covert mobile operations.

Detection rates for mobile RBT were highest in the Adelaide metropolitan area, on weekends (particularly Sundays), and in the early hours of the morning (i.e. midnight-6am). Males had higher detection rates than females. These findings may be interpreted as indicators of the time, location and sex of drivers associated with the highest levels of drink driving or they may reflect the more targeted operations of mobile RBT.

Few published studies have evaluated mobile RBT methods and, in most studies, RBT data has been confounded with that of stationary RBT (Harrison et al, 2003). In the present study, there appeared to be some evidence that the introduction of RBT was at least partly responsible for an increase in detection rates during the last few months of 2003. Nevertheless, only limited conclusions can be drawn on the effectiveness of restricted mobile RBT when operating for only a short time. A more comprehensive evaluation of the effectiveness of mobile RBT will be possible in following years when data are available for a full year.

PUBLICITY

In 2003, expenditure on anti-drink driving publicity increased substantially (37%). The campaigns encompassed both metropolitan and rural regions and used a variety of media.

Homel (1990) specified that publicity accompanying RBT activities should not simply be educational but have a deterrent value. The 2003 publicity campaign met this requirement by airing advertisements informing road users of greater RBT resources and reinforcing the associated increased risk of detection. Harrison (2001) suggested that publicity focusing on the early decisions in the chain of decision making relating to drink driving (i.e. how people get to drinking venues) may be more beneficial than targeting decisions later on (i.e. how to get home). This alternative strategy should be considered for future anti-drink driving campaigns.

Anti-drink driving publicity in 2003 primarily targeted young males. Male drivers continued to constitute the majority of drink drive offenders in 2003. Males were, on average, 3.5 times more likely to be detected than females and the ratio of male to female detection rates increased in the last two years. Based on these findings, anti-drink driving publicity should continue to target males.

5.2 Speeding

The success of speed enforcement depends on balanced methods of police enforcement to deter motorists, both specifically and generally. This enforcement needs to be supported by regular anti-speeding publicity that emphasises the high levels of speed enforcement taking place.

A number of significant legislative changes occurred in 2003 that were relevant to speed limit enforcement. The default urban speed limit reduced from 60 to 50 km/h; the speed limit on many rural roads reduced from 110 to 100 km/h; and, late in the year, red light cameras operated in dual purpose mode, also detecting and photographing vehicles exceeding the speed limit.

LEVEL OF OPERATIONS

The number of hours spent on speed detection in South Australia fell by 11 percent in 2003, with the decrease occurring entirely within the metropolitan area (a decrease of 26% compared to a 5% rise in rural areas). These changes are related to a decrease in the hours of operation of speed cameras, which are predominantly used in the metropolitan area, and an increase in the use of non-camera devices, which are used more commonly in rural regions. Although the trend in rural regions is promising, further declines in the hours of speed detection in the metropolitan area should be discouraged, especially given the change in the default urban speed limit that was introduced in 2003.

VISIBILITY OF OPERATIONS

To increase general deterrence, the perceived likelihood of detection must be increased. Drivers' perceptions of the likelihood of detection are influenced by knowledge of the levels of enforcement conducted, and by direct observation of enforcement activities undertaken (Swadling, 1997). Therefore, to increase the perceived probability of detection, speed detection devices should be operated on days and at times when they are most likely to be seen by potential speeders (Homel, 1990). However, a mixture of covert and overt speed enforcement is necessary to optimise both general and specific deterrence (perceived high levels of apprehension and punishment).

Speed detection hours in South Australia, for both speed cameras and non-camera devices, were spread evenly throughout the week, the majority during daylight hours (6am-8pm). This pattern of speed detection operations has varied little from 2000 to 2003. Therefore, it appears that speed detection has maintained a high level of general deterrence by operating at times when the majority of drivers are on the road.

For specific deterrence, it is important to also conduct speed enforcement during times when rates of speeding are higher. Speed camera data suggest higher speeding rates on weekends, both in terms of detections per hour and detections per vehicle passing. The balance in terms of hours of enforcement across all days of the week would appear to a good balance between operation during high traffic periods (weekdays) and high speeding days (weekends). Data for time of day in 2003 indicate higher rates of speeding during the day time hours and so the concentration of speed detection during these hours is appropriate.

A noticeable reduction in speed camera operations was observed at 12-2pm, around lunch time. This decrease my simply be related to speed camera operator's lunch break, or to this time period being a common time at which camera locations are changed. This time of day may be considered as 'lunch time peak hour' when many potential speeders are on the roads (high visibility). Staggering speed camera operators' lunch times or the times at which locations are changed may be an easy way to minimise this aberration in the timing of speed detection and increase the perceived likelihood of detection.

EFFECTIVENESS

There has been a considerable drop in speed detection rates from 2000 (3.3 detections per hour) to 2003 (2.3). This drop in the detection rate is likely to be mostly due to the increasing proportion of speed enforcement that is being undertaken using non-camera devices rather than speed cameras. Non-camera devices are less efficient than speed cameras because, unlike the latter, they do not measure the speed of every passing vehicle and do not cease operating while a driver is being apprehended and charged. It is notable that the detection rate for non-camera devices did not change across these four years. There was a small drop in the detection rate for cameras, which could be due to changes in the locations used for cameras or to drivers getting better at evading apprehension by cameras, such as by taking note of advertised camera locations.

The percentage of licensed drivers detected exceeding the speed limit in 2003 was 16 percent, compared to 25 percent in 2000 and 2001. As this considerable drop is likely to be due largely to changes in enforcement practices rather than reductions in speeding behaviour, it appears that a reversal of the recent decreases in the hours of speed camera enforcement is necessary to promote specific deterrence. It is also noteworthy that the detection rate per 1,000 vehicles passing with speed cameras has declined in rural regions, where overall levels of speed enforcement have been maintained, but not in the metropolitan region, where levels of speed enforcement have declined.

It can be argued that the incidence of speed-related crashes and the measurement of on-road vehicle speeds provide a better indication of speed distributions and changes in speeding behaviour than detection rates because they are not as heavily influenced by enforcement operations. However, a problem with crash data is the under-reporting of the involvement of speeding in crashes in the TARS database, leading to an under-estimation of the role of speeding in crashes in South Australia. Combining serious and fatal crashes, five percent of metropolitan, and less than four percent of rural, crashes were attributed to speed, which was consistent with previous years. Although the under-reporting of speeding in crashes makes it difficult to evaluate the effects of enforcement on speed-related crash occurrence, the finding that almost all speed-related crashes involved male drivers emphasises the importance of deterring male drivers from speeding in order to reduce crashes. Males were also two and a half times as likely as females to have been detected speeding by non-camera devices (data by sex for camera detections are not able to be provided).

The measurement of on-road travel speeds in urban areas is not done in South Australia in a systematic manner, making it difficult to use on-road speed data to evaluate enforcement operations. However, on-road speed surveys were conducted in 2003 and 2002 in order to evaluate the effects of the change in the default urban speed limit from 60 to 50 km/h. It was found that travel speeds decreased on roads on which the speed limit was decreased but also, by a smaller amount, on arterial roads that remained at 60 km/h. Significantly, the largest reductions in travel speed were observed at the higher end of the travel speed distribution (that is, by drivers travelling at 80 km/h and above prior to the speed limit reduction). The measurement of on-road travel speeds in rural areas is done on a more consistent basis but the only change in 2003 was a small reduction in travel speed on roads zoned at 60 km/h that was probably due to the reduced default urban speed limit on non-arterial roads. Small traffic volumes can make it difficult to base firm conclusions on on-road travel speed data collected in rural areas.

PUBLICITY

The use of media and publicity to support speed enforcement enhances the effect of the enforcement (Zaal, 1994). This practice has been followed in South Australia and should continue.

Publicity raises the perceived risk of detection and assists in the process of changing behaviour by providing public acceptance of enforcement (Elliot, 1993; Zaal, 1994). An evaluation of anti-speeding television advertising in the Adelaide metropolitan area reported slight but statistically significant decreases in mean free speeds (Woolley et al., 2001).

During 2003, expenditure on speed-related publicity increased considerably (39%) from 2002. This was very necessary, given the need to emphasise the changes in speed limits that occurred in 2003.

5.3 Restraint use

A lack of information on restraint enforcement operations, compared with the enforcement of speeding and drink driving, makes it very difficult to assess its effectiveness. On-road observational surveys of restraint use provide the best indication of restraint use levels but no observational surveys were undertaken in 2003. In the absence of this information, the number of restraint offence detections (an indicator of enforcement activities), the level of restraint use for injured occupants in crashes, and publicity were examined to monitor trends in 2003.

LEVELS OF RESTRAINT ENFORCEMENT

The total number of restraint offences detected in South Australia increased by eight percent in 2003. The number of restraint offences provides only a rough estimate of the prevalence of restraint non-usage, and is heavily dependent on police enforcement strategies. Thus, the increase in offences in 2003 may be attributed to either lower levels of restraint wearing or, more likely, changes in enforcement.

Restraint usage can be increased through high levels of enforcement over short periods of time, when applied repeatedly (ETSC, 1999). To the best of our knowledge, in 2003 no 'blitz'-like restraint enforcement campaigns were conducted. There were also no other specific large-scale restraint enforcement campaigns, although few details were available regarding police enforcement operations. If the number of detected offences is used as an approximate guide to enforcement activities, it appears that restraint enforcement occurred predominantly during daylight hours (8am-6pm) and was spread relatively evenly throughout the week. This was consistent with previous years. The majority of offences were also detected in the metropolitan region. This could be due to greater enforcement in the metropolitan area or to this area's greater traffic volumes and, thus, its greater number of potential offenders. Males in 2003 were three times as likely as females to be charged with a restraint offence, which was consistent with previous years. The quality of data with regard to restraint offences was much better in 2003 than in the years from 2000 to 2002.

LEVELS OF RESTRAINT USE AND EFFECTIVENESS

The percentage of injured vehicle occupants wearing restraints in serious injury crashes in South Australia was 89 percent in 2003, which was comparable to previous years but the level of restraint use of 57 percent in fatal crashes was the lowest in all years from 2000 to 2003. Similar to previous years, in 2003 restraint wearing rates for injured vehicle occupants in serious and fatal crashes were somewhat lower in rural regions than in the metropolitan area, suggesting that attention needs to be given specifically to restraint use in rural areas.

Injured vehicle occupant restraint wearing rates were much lower in fatal crashes than in serious casualty crashes (and are usually reported to be lower for crashes than for the general driving population observed during on-road surveys - see Wundersitz & McLean, 2004). A possible reason for the finding of lower wearing rates in fatal, compared to serious injury, crashes is that police overestimate seat belt usage in less severe crashes. A US study compared the seat belt use reported by trained crash investigators (the benchmark) and police (Schiff & Cummings, 2004). Police were least likely to make errors on seat belt use for deceased vehicle occupants but were more likely to overestimate seat belt usage for occupants involved in non-injury or minor to moderate injury crashes. It is less likely, however, that such differences exist between judgements for fatal and serious injury crashes.

More likely is that restraint wearing rates were lower in fatal crashes because the higher severity of the injuries sustained were directly related to the vehicle occupant being unrestrained. Restraint use status was only reported for injured vehicle occupants. Thus, the confounding nature of the relationship between crash injury and restraint use may compromise crash data as an indicator of the actual level of restraint use.

Restraint use status was unknown for a large proportion of injured vehicle occupants in serious (21%) and fatal (43%) crashes. Although the percentage unknown has decreased for serious crashes, better records of restraint use need to be kept to improve database reliability and accuracy, and for the evaluation of restraint enforcement practices.

As there were no observational restraint use surveys, no information was available on restraint use by seating position in the vehicle. In 2002, seat belt usage in South Australia was at a high level (above 95%) but was observed to be lower for rear seat passengers than for drivers and front seat passengers. Males were also found to have slightly lower restraint use rates than females (Wundersitz & McLean, 2004). This is consistent with the finding in 2003 of males being more likely to be charged with restraint offences and to be unrestrained in fatal and serious injury crashes. Self-reported restraint use has also been found by researchers to be lower among males (Milano, McInturff & Nichols, 2004; Reinfurt, Williams, Wells & Rodgman, 1996). Therefore, males remain an important target for restraint enforcement.

Restraint offence rates provided the only indication of age differences in restraint use. In contrast to self-report survey findings that young drivers (aged 18-34 years) are associated with lower restraint use (Milano et al, 2004; Reinfurt et al, 1996), in the present study drivers aged 30 to 49 years incurred the most offences. The higher offence rate of this age group may be partially attributed to incurring offences for unrestrained children.

PUBLICITY

Restraint enforcement is by nature more covert than other forms of enforcement such as random breath testing or overt speed detection. In order to increase the perceived risk of apprehension and general deterrence of the behaviour, high publicity of enforcement is recommended (Zaal, 1994).

The money invested in restraint use publicity in South Australia increased significantly (by over 500%) in 2003 with the advent of a new mass media campaign incorporating both the metropolitan and rural areas. The increase in restraint publicity was most notable in the Adelaide metropolitan area. This was the first time in many years that a television commercial promoting restraint use was aired within the metropolitan area. It is difficult to assess the impact of the dramatic increase in publicity during 2003 in the absence of a formal evaluation.

The advertisement used in the campaign, 'Demonstration', concentrated on the consequences of not using restraints rather than publicising restraint enforcement to increase the perceived likelihood of being caught. Future restraint enforcement operations in South Australia would benefit from accompanying publicity concentrating on deterrence, particularly one or two weeks prior, and during an enforcement period (see Stefani, 2002).

Research indicates that the use of unintentional or unpaid publicity, that is, publicity not supported by the organisation(s) that disseminated the mass media campaign, is important for the outcome of a publicity campaign (Delaney, Lough, Whelan & Cameron, 2004; Elliot, 1993). Citing a national campaign to increase restraint use in the United States, Milano et al. (2004) reported that unpaid advertising was highly effective when used in conjunction with paid advertising and enforcement. However, they also noted that unpaid media was not effective by itself to reach high-risk groups (i.e. young males). The level of unpaid restraint use publicity for 2003 is unknown but should be encouraged to enhance future restraint use publicity campaigns and enforcement.

The publicity campaign encouraging restraint use targeted parents of young children and males. The targeting of males was supported by the restraint offence and crash data. Unfortunately, little data were available on child restraint use in 2003 to confirm whether parents of young children should remain a target of restraint use publicity campaigns. Offences for unrestrained children were higher in 2003 than in 2000-02, indicating the possibility that child restraint compliance rates decreased. However, as mentioned previously, offence rates must be interpreted with caution as they most likely reflect enforcement practices rather than restraint use.

6 Conclusions

The establishment of consistent performance indicators for drink driving, speeding and restraint use enforcement practices will assist in optimising enforcement operations, related publicity and further reduce road trauma on South Australian roads. Providing a consistent framework to collect and evaluate this information will help in achieving these aims.

The main findings from the performance indicators for each enforced behaviour in South Australia in 2003 are summarised.

DRINK DRIVING

In 2003, the number of random breath tests conducted in South Australia decreased by 11 percent from the number in 2002. Although the level of RBT in 2002 was a record and the 2003 level was still above the target of 600,000 tests per year, any further declines in RBT should be discouraged.

An important change in enforcement methods in 2003 occurred with the introduction of mobile RBT. Although South Australia, unlike other states, only implemented mobile testing during special 'prescribed periods', it still meant an enhanced ability to detect drinking drivers who used back streets to evade static RBT. Supporting this suggestion, detection rates from mobile RBT were considerably higher than detection rates associated with static RBT for both metropolitan and rural areas. It would be useful if the requirement that mobile RBT only be conducted during 'prescribed periods' be abolished, in order to extend the specific deterrence offered by mobile testing. It is worth noting that mobile RBT was only introduced in September, The usefulness of mobile RBT should be more apparent after a full year of testing.

There was a decrease in the involvement of alcohol in fatal crashes in 2003 but the BAC of drivers was unknown for a sizeable percentage (37%) of serious injury crashes, as has been the case in previous years, which makes it difficult to draw conclusions about the level of alcohol involvement in crashes in South Australia. Improving the matching process of blood samples with the TARS database would create a more complete and reliable database, and make it simpler to determine whether current enforcement methods are having the desired effect on drink driving behaviour.

In 2003, expenditure on anti-drink driving publicity increased substantially. The campaign encompassed both metropolitan and rural regions and used a variety of media.

SPEEDING

A number of significant legislative changes occurred in 2003 that were relevant to speed limit enforcement. The default urban speed limit reduced from 60 to 50 km/h; the speed limit on many rural roads reduced from 110 to 100 km/h; and, late in the year, red light cameras started operating in dual purpose mode, also detecting and photographing vehicles exceeding the speed limit.

The number of hours spent on speed detection in South Australia fell by 11 percent in 2003, with the decrease occurring entirely within the metropolitan area (a decrease of 26% compared to a 5% rise in rural areas). These changes are related to a decrease in the hours of operation of speed cameras, which are predominantly used in the metropolitan area, and an increase in the use of non-camera devices, which are used more commonly in rural regions. Although the trend for increased enforcement in rural regions is promising, further declines in the hours of speed detection in the metropolitan area should be discouraged, especially given the need to enforce the new default urban speed limit that was introduced in 2003.

Speed detection hours are concentrated during the day time and are balanced across the week. This provides a good balance between operation during high traffic periods (weekdays) and high speeding days (weekends). However, enforcement practices should be altered to prevent the drop in speed camera detection hours during the lunch period (12-2pm).

Speed detection rates (vehicles detected per hour) in 2003 were considerably lower than those from 2000, which is most likely to be due to the increasing proportion of speed enforcement that is being undertaken using non-camera devices rather than the more efficient speed cameras. There was also a drop in the total number of drivers detected speeding (down 27% from the number in 2002), again most likely to be due to the reduction in the use of speed cameras. These reductions should be reversed in order to produce greater deterrence of speeding.

As was the case for previous years, 'excessive speed' was seriously underestimated as an apparent driver error in the TARS database. Consequently, meaningful analysis of serious injury and fatal crashes was limited due to under-reporting bias.

On-road travel speed surveys are not conducted in a systematic manner in urban areas but surveys undertaken specifically to assess the effects of the speed limit change in 2003 found reductions on roads on which the speed limit changed but also found reductions, of a smaller magnitude, on arterial roads on which the speed limit remained at 60 km/h. In rural areas, a similar, small reduction in travel speeds on roads zoned at 60 km/h was observed.

Publicity related to speed limit enforcement increased considerably (39%) from 2002. This was very necessary, given the need to emphasis the changes in speed limits that occurred in 2003. Advertising campaigns should focus on male drivers, as almost all speed-related crashes involved male drivers and male drivers were two and a half times as likely as females to have been detected by non-camera devices (data by sex for camera detections are not able to be provided).

RESTRAINT USE

Determining the effectiveness of restraint use enforcement was very difficult because no specific restraint enforcement campaigns were undertaken. The number of restraint offences provides some indication of the level of enforcement. In 2003, restraint offences increased slightly from 2002.

Unfortunately, there were no observational surveys in 2003 to provide data that could be used to determine the effectiveness of restraint use enforcement. Wearing rates for vehicle occupants involved in crashes are difficult to interpret because of the confounding nature of the relationship between crash injury and wearing rates in crashes (wearing restraints reduces injury). Furthermore, better records of restraint use for all vehicle occupants in serious and fatal crashes need to be kept to improve database reliability and accuracy.

Although overall restraint usage rates in 2003 are unknown, the higher likelihood of males being charged with restraint offences and of being unrestrained in fatal and serious injury crashes indicates that males remain an important target for restraint enforcement. Publicity designed to promote restraint use should also be aimed at males.

The amount of money spent on publicity in 2003 was significantly greater than previous years and was focused on the consequences of not wearing restraints, rather than on enforcement. The effectiveness of the increase in publicity was not formally evaluated.

Acknowledgments

This study was funded by the South Australian Department for Transport, Energy and Infrastructure (DTEI) through a Project Grant to the Centre for Automotive Safety Research. The DTEI Project Manager was Tamra Patterson.

The Centre for Automotive Safety Research receives core funding from both DTEI and the South Australian Motor Accident Commission.

Data for this report were provided by numerous sources. These included: Brenda Lawler of the Traffic Intelligence Section, Traffic Support Branch, SA Police; Steve Sibonis, Coordinator, Marketing and Communications, Community Education and Information Service, DTEI; and James Smith, Statistician, Safety Strategy, Transport Planning Agency, DTEI.

The views expressed in this report are those of the authors and do not necessarily represent those of the University of Adelaide or the sponsoring organizations.

References

Australian Transport Safety Bureau. (2002). *National Road Safety Action Plan. 2003 and 2004.* Canberra: Australian Transport Safety Bureau.

Baldock, M.R.J. & White, M. (1997). *Random breath testing in South Australia: Operation and effectiveness 1996.* ORS Report No.3/97. Adelaide: Office of Road Safety.

Delaney, A., Lough, B., Whelan, M., & Cameron, M. (2004). *Review of mass media campaigns in road safety.* Report No. 220. Clayton, Victoria: Monash University Accident Research Centre.

Elliot B. (1993). *Road safety mass media campaigns: A meta analysis.* Report No. CR 118. Sydney: Federal Office of Road Safety.

ETSC. (1996). *Seat belt and child restraints: Increasing use and optimising performance.* Brussels: European Transport Safety Council.

ETSC. (1999). *Police enforcement strategies to reduce traffic casualties in Europe*. Brussels: European Transport Safety Council.

ETSC. (2001). *Transport safety performance indicators.* Brussels: European Transport Safety Council.

Gundy (1988). The effectiveness of a combination of police enforcement and public information for improving seat belt use. In J.A. Rothengatter & R.A. de Bruin (Eds.) *Road user behaviour: Theory and research*. Assen, NL: Van Goreum.

Harrison, W.A. (2001). *Drink driving and enforcement: Theoretical ssues and an investigation of the effects of three enforcement programs in two rural communities in Australia*. (AP-R181). New South Wales: Austroads.

Harrison, W., Newman, S., Baldock, M., & McLean, J. (2003). *Drink driving enforcement: issues in developing best practice.* Sydney: Austroads.

Hendrie, D. (2003). *Random breath testing: its effectiveness and possible characteristics of a 'best practice' approach*. Report No. RR125. Crawley, Western Australia: University of Western Australia Injury Research Centre.

Henstridge, J. Homel, R. & Mackay, P. (1997). *The long-term effects of random breath testing in four Australian states: A time series analysis*. Report No. CR 162. Canberra: Federal Office of Road Safety.

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

Homel, R. (1990). Random breath testing and random stopping programs in Australia (Ch 7). In R.J. Wilson & R.E. Mann (Eds.), *Drinking and Driving: Advances in Research and Prevention* (pp. 159-202). New York: The Guilford Press.

Hubbard, N.R. (1999). *Random breath testing in South Australia: operation and effectiveness, 1998*. Report Series 3/99. Adelaide: Transport SA.

Kloeden, C.N. & McLean, A.J. (1997). *Night-time drink driving in Adelaide: 1987-1997.* ORS Report No. 5/97. Adelaide: Office of Road Safety.

Kloeden, C.N. McLean, A.J. & Holubowycz, O.T. (1993). *An investigation into the reasons why BAC data for road accident casualties is missing from the South Australian traffic accident database.* ORS Report No. 1/93. Adelaide: Office of Road Safety.

Kloeden, C.N., Woolley, J.W., & McLean, A.J. (2004).Evaluation of the 50km/h default urban speed limit in South Australia. Adelaide: Centre for Automotive Safety Research.

McInerney, R., Cairney, P., Toomath, J., Evans, J. & Swadling, D. (2001). *Speed enforcement in Australasia: Volume 1; Practice - Performance measures - Outcome measures & Volume 2: Appendices*. AP-R189/01. Sydney: Austroads.

Milano, M., McInturff, B., & Nichols, J. L. (2004). The effect of earned and paid media strategies in high visibility enforcement campaigns. *Journal of Safety Research*, 35, 203-214.

Reinfurt, D. W., Williams, A. F., Wells, J. K., & Rodgman, E. (1996). Characteristics of drivers not using seat belts in a high belt use state. *Journal of Safety Research*, 27(4), 209-215.

Rothengatter, T. (1990). The scope of automatic detection and enforcement systems. In: *Proceedings of road safety and traffic environment in Europe, in* Gothenburg, *Sweden, September 26-28, 1990,* VTI rapport 365A, p 166-176

Ryan, G.A. (2000). *Roadside survey of drinking drivers in Perth, Western Australia.* Research Report No. 94. Perth: Road Accident Prevention Unit.

Schiff, M. A., & Cummings, P. (2004). Comparison of seat belt use by police and crash investigators: variation in agreement by injury severity. *Accident Analysis and Prevention*, 36(6), 961-965.

Stefani, A. M. (2002). *Progress in implementing strategies to increase the use of seat belts*. Report No. MH-2002-109. Washington, DC: National Highway Traffic Safety Administration.

Swadling, D. (1997). *Speed enforcement strategies in Western Australia.* Research Report ARR 310. Victoria: ARRB Transport Research.

Transport Information Management Section, Transport SA. (2001). *Road crashes in South Australia, 1999*. Statistical Report. Adelaide: Transport SA.

Vulcan, P., Cameron, M., Mullan, N. & Dyte, D. (1996). *Possibility of adapting some road safety measures successfully applied in Victoria to South Australia*. Report No. 102. Clayton, Victoria: Monash University Accident Research Centre.

Woolley, J.E., Dyson, C.B. & Taylor, M.A.P. (2001). T*he South Australian road safety media evaluation study - Final draft*. Adelaide: Transport SA. and Motor Accident Commission Transport Systems Centre, University of South Australia, Adelaide.

Wundersitz, L.N., Kloeden, C.N., McColl, R.A., Baldock, M. R. J. & McLean, A. J. (2001). *Metropolitan Adelaide 2001 speed situation analysis.* Unpublished Report: Transport SA.

Wundersitz, L. N. & McLean, A. J. (2002). *The operation and effectiveness of random breath testing in South Australia, 2000*. Unpublished Report: Transport SA.

Wundersitz, L. N. & McLean, A. J. (2004). *Annual performance indicators of enforced driver behaviours, 2002.* CASR Report Series CASR001. Adelaide: Centre for Automotive Safety Research, The University of Adelaide.

Zaal, D. (1994). *Traffic law enforcement: A review of the literature.* Report No. 53. Canberra: Federal Office of Road Safety.

Appendix A

Table A1:
Mean and 85th percentile free speeds on rural 60 km/h roads 2000-2003

	Freeling*	Nuriootpa*	Clare	Pt Lincoln	Naracoorte	Waikerie
Mean free speed (km/h)						
2000	57.9	66.0	63.0	64.3	55.0	61.1
2001	59.8	64.3	63.0	65.8	54.2	61.7
2002	58.1	65.1	60.8	64.9	55.4	59.6
2003			61.2	63.3	52.8	57.1
85 pc speed (km/h)						
2000	68.1	73.1	69.8	74.2	63.8	68.6
2001	68.9	70.8	69.5	76.1	62.6	69.8
2002	67.1	71.5	66.9	75.0	63.9	66.8
2003			67.3	72.9	60.7	64.5

* Speed limit changed from 60 to 50 km/h in 2003

Table A2:
Free speed volumes and total traffic volumes on rural 60 km/h roads 2000-2003

	Freeling*	Nuriootpa*	Clare	Pt Lincoln	Naracoorte	Waikerie
Free speed volume						
2000	7,326	26,333	22,281	9,710	12,875	15,004
2001	7,967	26,591	22,285	9,613	13,103	14,835
2002	7,573	25,269	22,828	9,766	13,063	14,848
2003			22,607	9,795	12,885	14,514
Total volume						
2000	7,677	32,913	27,568	10,304	13,736	15,004
2001	8,415	33,293	27,845	10,213	13,955	16,410
2002	7,910	30,857	28,312	10,358	13,848	16,475
2003			28,169	10,379	13,669	16,037

* Speed limit changed from 60 to 50 km/h in 2003

Table A3:
Mean and 85th percentile free speeds on rural 100 km/h roads 2000-2003

	Hart	Currency Creek	Belvidere	Lyndoch	Morgan	Kimba*	Yorketown#
Mean free speed (km/h)							
2000	104.4	86.7	93.2	96.4	98.1	109.3	
2001	106.5	86.9	92.7	92.9	96.2		
2002	104.3	85.5	93.6	99.0	95.7		
2003	105.4	87.1	93.1	97.3	98.3		97.9
85 pc speed (km/h)							
2000	119.9	99.6	108.5	109.9	114.7	125.3	
2001	120.6	99.5	105.8	105.2	111.4		
2002	117.3	97.7	107.5	111.6	110.9		
2003	118.5	99.7	107.5	109.6	113.3		112.1

* Speed limit changed from 100 to 110 km/h in 2001
# Speed limit changed from 110 to 100 km/h in 2003

Table A4:
Free speed volumes and total traffic volumes on rural 100 km/h roads 2000-2003

	Hart	Currency Creek	Belvidere	Lyndoch	Morgan	Kimba*	Yorketown#
Free speed volume							
2000	1,228	15,620	4,815	10,241	1,393	1,397	
2001	1,766	16,815	5,049	10,045	1,360		
2002	1,690	17,206	5,216	10,015	1,319		
2003	1,669	18,108	5,328	11,759	1,137		2,521
Total volume							
2000	1,237	18,954	5,196	11,658	1,425	1,455	
2001	1,803	20,840	5,488	11,749	1,390		
2002	1,720	21,344	5,638	11,336	1,345		
2003	1,698	22,746	5,782	14,049	1,162		2,638

* Speed limit changed from 100 to 110 km/h in 2001
# Speed limit changed from 110 to 100 km/h in 2003

Table A5:
Mean and 85th percentile free speeds on rural 110 km/h roads 2000-2003

	Kimba	Reedy Creek	Berri	Orroroo	Mosquito Creek	Yorketown#	Kimba*
Mean free speed (km/h)							
2000	104.8	110.0	103.6	97.0	106.4	100.0	
2001	101.8	108.3	98.9	98.2	106.9	97.9	110.4
2002	103.1	107.0	100.0	100.3	106.8	101.8	106.9
2003	103.4	107.3	102.1	99.8	107.9		107.5
85 pc speed (km/h)							
2000	117.3	122.0	114.8	109.5	115.7	114.9	
2001	114.5	119.2	109.9	111.6	116.8	113.1	126.4
2002	114.9	117.1	111.0	114.3	115.4	116.0	119.8
2003	115.2	117.6	112.3	113.1	116.4		120.9

* Speed limit changed from 100 to 110 km/h in 2001
# Speed limit changed from 110 to 100 km/h in 2003

Table A6:
Free speed volumes and overall traffic volumes on rural 110 km/h roads 2000-2003

	Kimba	Reedy Creek	Berri	Orroroo	Mosquito Creek	Yorketown#	Kimba*
Free speed volume							
2000	3,439	3,894	17,226	3,574	9,999	2,723	
2001	3,498	3,725	17,819	3,335	10,124	2,715	1,027
2002	3,801	4,005	18,005	3,409	10,436	3,178	1,459
2003	3,838	4,203	17,719	3,660	10,760		972
Total traffic volume							
2000	3,568	4,009	21,976	3,750	11,454	2,813	
2001	3,626	3,857	22,737	3,490	11,711	2,823	1,043
2002	3,948	4,159	22,990	3,592	12,023	3,304	1,512
2003	4,003	4,386	22,537	3,875	12,419		985

* Speed limit changed from 100 to 110 km/h in 2001
# Speed limit changed from 110 to 100 km/h in 2003

Appendix B

The authors of the report evaluating the effects of the reduction in the South Australian default urban speed limit from 60 to 50 km/h were interested in knowing what changes were occurring not only to overall travel speeds but also to speeds at the level of the individual driver. For example, they wanted to know whether drivers who were travelling at 60 km/h before the speed limit change reduced their travelling speed by the same amount as drivers who had travelled at 55 km/h.

A method was developed to explore this question. For a given road type, the observed speeds were rounded to the nearest integer and ranked separately for both 2002 and 2003. Then, for each distinct speed in the 2002 data, the corresponding percentile speeds in the 2003 data were averaged to get a corresponding speed.

For example, suppose that in 2002, 58 per cent of vehicles were travelling at or above 60 km/h and 47 per cent were travelling at or below 60 km/h. This means that vehicles travelling at 60 km/h occupied the percentile range from 42 (100 - 58) to 47 per cent of all speeds measured in 2002. This percentile range was then applied to the 2003 speed distribution and the average of all speeds in that range was calculated. The 2002 speed was then subtracted from the average of the 2003 speeds in that percentile range.