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Annual performance indicators of enforced driver behaviours in South Australia, 2009

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TITLE

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ABSTRACT

This report was produced to quantify performance indicators for selected enforced driver behaviours (drink driving, drug driving, speeding and restraint use) in South Australia for the calendar year 2009. The level of random breath testing (RBT) in South Australia in 2009 increased to the highest level of the five year period. The proportion of tests conducted using mobile RBT remained stable. The detection rate, based on evidentiary testing, decreased slightly in 2009 and was lower than in most other Australian jurisdictions. The level of drug testing increased by 70 per cent in 2009. Testing rates per head of population continued to be the highest in Australia. The drug detection rate rose slightly in 2009, as did the level of drug driving among fatally injured drivers. THC (the active component of cannabis) was the most commonly detected drug. The number of hours spent on speed enforcement decreased in 2009. The number of speeding detections decreased for all types of detection devices. Detections per thousand vehicles passing a speed camera decreased, most likely due to driver adaptation to the lowering of the speed limit tolerance in late 2007. Systematic speed surveys found no change in mean travelling speeds but the percentage of vehicles speeding by more than 5 km/h reduced on Adelaide arterial roads. Restraint offences increased by 10 per cent in 2009. Restraint use in serious and fatal crashes remained lower in rural regions than in the metropolitan area. Males were more likely to be charged with a restraint offence and less likely to be wearing a restraint in a fatal or serious injury crash. An observational restraint use survey undertaken during 2009 revealed seat belt usage was at a high level (98 per cent), although males were found to have slightly lower usage rates than females.

KEYWORDS

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

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Summary

The Centre for Automotive Safety Research at the University of Adelaide has been engaged by the Department for Transport, Energy and Infrastructure (DTEI) to produce an annual report quantifying the performance indicators for selected enforced driver behaviours (drink driving, drug driving, speeding and restraint use) in South Australia since 1996. The present report examines performance indicators for the calendar year 2009.

For each of the driver behaviours, information was collected on the current levels and outcomes of police enforcement operations, 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, drug driving, speeding and restraint use will assist in optimising enforcement operations and related publicity, and may assist in reducing road trauma on South Australian roads. The main findings from the performance indicators for enforced behaviours in 2009 are summarised below.

DRINK DRIVING

In 2009, the level of random breath testing in South Australia increased to the highest level of the five year period. The increase in testing was in both the metropolitan and rural areas. The overall level of testing exceeded the annual target and equated to testing approximately 64 per cent of licensed drivers in South Australia. Regarding the method of RBT, the proportion of mobile testing remained relatively stable.

South Australian detection rates (drink drivers detected per 1,000 drivers tested), based on evidentiary testing, decreased slightly in 2009 but remained at a relatively high level. An increase was observed in rural areas. The overall detection rate for screening tests also decreased in 2009. The reduction in the detection rate for mobile testing in the metropolitan area observed in 2008 remained at a similarly low level in 2009, compared to previous years. The overall detection rate in South Australia for evidentiary tests was similar to Tasmania, but lower than the other four jurisdictions for which the data was available.

Consistent with previous years, mobile RBT was more efficient in detecting drink drivers than static RBT. The ratio of mobile to static RBT detection rates suggested that mobile RBT was particularly advantageous in detecting drink drivers in rural regions, particularly from 4pm to 6am. Static RBT was predominantly conducted at highly visible times (i.e. 4pm to 10pm) to enhance the deterrent effect of RBT. A greater proportion of testing was conducted on days when drink driving rates were highest (i.e. Fridays and Saturdays).

Crash data suggested that there was a decrease in the involvement of alcohol in fatal crashes (37% of drivers had an illegal BAC) and serious injury crashes (19% of drivers had an illegal BAC) in 2009. However, the BAC of drivers was unknown for a considerable percentage of serious injury crashes (38%) and one fatal injury crash (1%).

In 2009, the first of two publicity campaigns highlighted society’s disapproval and rejection of drink drivers. The second campaign positively reinforced planning ahead before drinking, in particular encouraging people to avoid taking the car.

DRUG DRIVING

Legislation allowing random drug testing in South Australia was introduced in July 2006 and so drug testing and detection data are available for three full years.

In 2009, 43,721 random drug tests were conducted, equating to 3.9 per cent of licensed drivers in South Australia. The majority of these tests were conducted in the metropolitan area. The level of drug testing increased by about 70% compared to the previous year. In comparison to other Australian jurisdictions, South Australia had the highest testing rate per head of population.

Around 22 drivers per 1,000 tested were confirmed positive (by evidentiary laboratory analysis) for at least one of the three prescribed drugs, which was slightly higher than the previous year. THC (the active component of cannabis) was the most commonly detected drug followed by Methylamphetamine and MDMA (ecstasy). Random drug testing detection rates were 2.8 times higher than random alcohol breath testing detection rates in 2009. This may be due to factors other than a higher prevalence of drug driving such as more targeted enforcement, the zero tolerance approach for all drivers and a longer detection window after drug use. Detection rates were similar in metropolitan and rural regions.

Of the fatally injured drivers in 2009, 22 per cent tested positive for the prescribed drugs, a level that was higher than previous years. This finding in combination with the higher detection rates suggests that there was a higher level of drug driving in South Australia in 2009.

Two anti-drug driving publicity campaigns were run in 2009. The first aimed to increase the perceived risk of detection while the second attempted to address myths associated with drug driving. Analysis of drug test results of drivers fatally injured in a crash and offence data suggest that publicity campaigns should continue to target male drivers.

SPEEDING

The number of hours spent on speed enforcement in South Australia (excluding dual purpose red light/speed cameras) decreased by eight per cent in 2009. The decrease in speed detection hours was confined to metropolitan areas while rural speed detection hours increased. Similarly the decrease was confined to non-camera devices with camera hours increasing slightly.

The total number of speed detections decreased in 2009 with around 31 per cent of licensed drivers in South Australia detected for speeding (including red light/speed cameras). Decreases in detections were recorded for speed cameras, red light/speed cameras, and non-camera devices. Detection rates (excluding red light/speed camera detections) per hour of enforcement and per 1,000 vehicles passing speed cameras decreased in 2009. Speed camera detection rates per hour decreased in both the metropolitan area and in rural regions, while non-camera devices' detection rates increased in the metropolitan area and remained at a similar level to the previous year in rural areas. The decrease in speed camera detection rates is likely to be attributable to driver adaptation to the reduction in the speed camera tolerance level, enacted in October 2007. Speed camera detection rates per 1,000 vehicles passing were higher in rural areas than in the metropolitan area suggesting that speeding is more prevalent in rural areas.

The systematic measurement of vehicle speeds at 130 sites across South Australia in 2009 showed mean speeds did not change but the percentage of drivers speeding by more than five, 10 and 15 km/h decreased on arterial roads in Adelaide. This reduction was only observed on arterial roads in Adelaide therefore it may be related to enforcement activities, as such roads are where drivers are likely to have the highest perceived risk of being caught. This supports the earlier suggestion that the decrease in detection rate is due to drivers adjusting their behaviour to the reduced enforcement speed tolerance over time.

The anti-speeding publicity campaign in 2009 was a continuation of the campaign developed in 2008. The message focused on changing the perception that driving a small amount (i.e. 5km/h) over the speed limit is not dangerous.

RESTRAINT USE

As in previous years, determining the effectiveness of restraint use enforcement was problematic because of the lack of information on specific hours of restraint enforcement undertaken in 2009. The number of restraint offences provides some indication of the level of enforcement. Restraint offences in 2009 increased by 10 per cent. Part of this increase may be due to the introduction of new legislation in March 2008, which made drivers responsible for the restraint use of their passengers, regardless of the age of the passengers. 2009 was the first full year this new legislation was in effect.

Crash data indicated that 64 per cent of fatally injured occupants were wearing a restraint in 2009. 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).

The observational restraint use survey undertaken during 2009 revealed seat belt usage in South Australia was at a high level (above 98%) and had increased since the last survey in 2002 (Wundersitz and Anderson, 2009). Males were also found to have slightly lower restraint use rates than females. This, combined with 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 use enforcement.

Two restraint use publicity campaigns were used during 2009. Both campaigns focused predominantly on the risks and consequences of not using restraints.

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 engaged by the Department for Transport, Energy and Infrastructure to examine the performance indicators of selected enforced driver behaviours in South Australia on an annual basis.

The specific aim of this report was to assess performance indicators related to drink driving, drug driving, speeding and restraint use in South Australia for the calendar year 2009. The findings from this report are important for the evaluation and planning of future enforcement operations concerned with these driver behaviours.

For each of the driver behaviours, information was collected on the current levels of police enforcement operations and detections, 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. In addition, any information available from on-road surveys was reported.

The first section of the report examining drink driving continues on from other annual reports discussing the operations and effectiveness of RBT (White & Baldock, 1997; Baldock & Bailey, 1998; Hubbard, 1999; Wundersitz & McLean, 2002). From 2002 onwards, the annual report also evaluated two other major enforceable behaviours, speeding and restraint use (see Wundersitz & McLean, 2004; Wundersitz et al., 2007; Baldock et al., 2007; Wundersitz & Baldock, 2008a, Wundersitz & Baldock, 2008b). As random roadside drug testing commenced in South Australia in 2006, drug driving enforcement data is also included in this series of reports (Wundersitz *et al*., 2009).

In this report RBT, speeding and restraint use data are presented for the years 2005 to 2009 and drug data are available for 2007 to 2009.

2 Drink driving and random breath testing

The first section of this report describes the operation and effectiveness of random breath testing (RBT) in South Australia for the calendar year 2009 in terms of the number of tests, the percentage of licensed drivers tested, detection rates, and alcohol involvement in serious and fatal road crashes. To enable a comparison between South Australian practices and those of the police in other Australian jurisdictions, RBT statistics from all Australian states and territories are provided. In addition, anti-drink driving publicity campaigns operating during 2009 are reviewed.

2.1 RBT practices and methods of operation

Random breath testing (RBT) is a form of drink driving enforcement that was first introduced into Australia in the state of Victoria in 1976 (Harrison *et al.*, 2003). Other states introduced RBT in the 1980s, with South Australia first implementing RBT in 1981.

Random breath testing 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.

The Traffic Intelligence Section of the South Australian Police (SAPOL) provided the following information about RBT operations. In South Australia, RBT operations are conducted using either 'static' or 'mobile' methods. Traditional static or stationary RBT involves setting up checkpoints on the side of the road. Motorists passing these points are randomly selected to be pulled over to the side of the road where they must submit to a preliminary breath test.

Mobile RBT was first introduced in New South Wales in late 1987 and has subsequently been introduced into all Australian states. Mobile RBT allows police in any mobile vehicle (i.e., car or motorcycle) to stop vehicles at random and breath test the driver. An important part of RBT is that any driver may be pulled over and breath tested without any suspicion that the driver is impaired by alcohol. South Australian parliament passed a Bill in June 2003 legislating the use of mobile testing during 'prescribed periods' which included long weekends, school holidays and four other periods during the year. In June 2005, legislation passed through state parliament enabling mobile random breath testing to be conducted on a full-time basis rather than only during prescribed periods. Consequently, 2009 is the fourth year in which data for full-time mobile testing is available for the entire 12-month period.

All general patrol and traffic vehicles are equipped with a preliminary breath testing device (971 alco-testers were available in 2009). 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, used in prosecution. At static RBT sites, evidentiary testing is either conducted in special vans, a smaller version of the traditional booze bus, or at a suitably equipped police station. Drivers testing over the legal limit with mobile RBT are usually driven to the nearest police station or static RBT site.

Evidentiary testing must be completed within two hours of the last known time of driving. Those found to be over the prescribed limit for the evidentiary test are officially recorded as having exceeded the prescribed concentration of alcohol. The number of evidentiary breath testing instruments available for use in South Australia increased from 107 in 2008 to 145 in 2009.

Drink driving enforcement is the responsibility of the SA Police's 14 Local Service Areas (LSAs) in South Australia, six of which are located in the Adelaide metropolitan area and eight in rural regions. A Commander in each LSA has the responsibility for ensuring drink driving enforcement targets are met and that the operations are efficient and effective. A number of corporate traffic operations specifically targeting drink/drug drivers were conducted in 2009, know as Operation Consequence these were conducted in February, August, October and November. A number of other corporate traffic operations targeted the "fatal five", including drink driving.

In South Australia, the prescribed BAC limit has been 0.05g/100ml since July 1991. If apprehended with a BAC level of 0.05 to 0.079g/ml, the fully licensed driver incurs a Traffic Infringement Notice (TIN), an expiation fee, and a penalty of three demerit points. In July 2008 the demerit point penalty increased to four demerit points and the expiation fee increased from $164 to $420. Drivers convicted of a second or subsequent offence at this BAC level also receive a licence suspension for a minimum of three months. If detained with a BAC level of 0.08g/ml or higher the driver will: immediately lose their licence for six months (12 months if BAC is 0.150g/ml or above), be required to make a court appearance, receive a court imposed fine, and incur five demerit points (6 demerit points if BAC is 0.150g/ml or above). The amount of the fine and length of licence disqualification is dependent on the actual BAC level and previous offences.

2.1.1 Number of tests performed

The following sections examine RBT in terms of levels of testing and detections, based on data from SAPOL. To provide a complete picture of the operation and effectiveness of RBT in South Australia, the following data represent a combination of both static and mobile testing. Table 2.1 and Figure 2.1 summarise the changes in the number of random breath tests conducted from 2005 to 2009 for 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, 2005-2009

Year	Metro	Rural	Total	% difference from previous year
2005	399,612	247,246	646,858	-1.0
2006	399,967	290,920	690,891	6.8
2007	389,251	289,031	678,282	-1.8
2008	371,785	289,294	661,079	-2.5
2009	397,872	318,727	716,599	8.4

A testing target was set at 612,000 (combined static and mobile) in 2006 with the intention that an average of one in every two licensed drivers is tested in South Australia. The testing target was further increased to 660,000 in 2008.

The total number of tests (716,599) conducted in 2009 exceeded the target by over eight per cent. This level of testing was increased from previous years, being the highest level of testing over the last five years. RBT testing levels increased in both the metropolitan and rural areas.

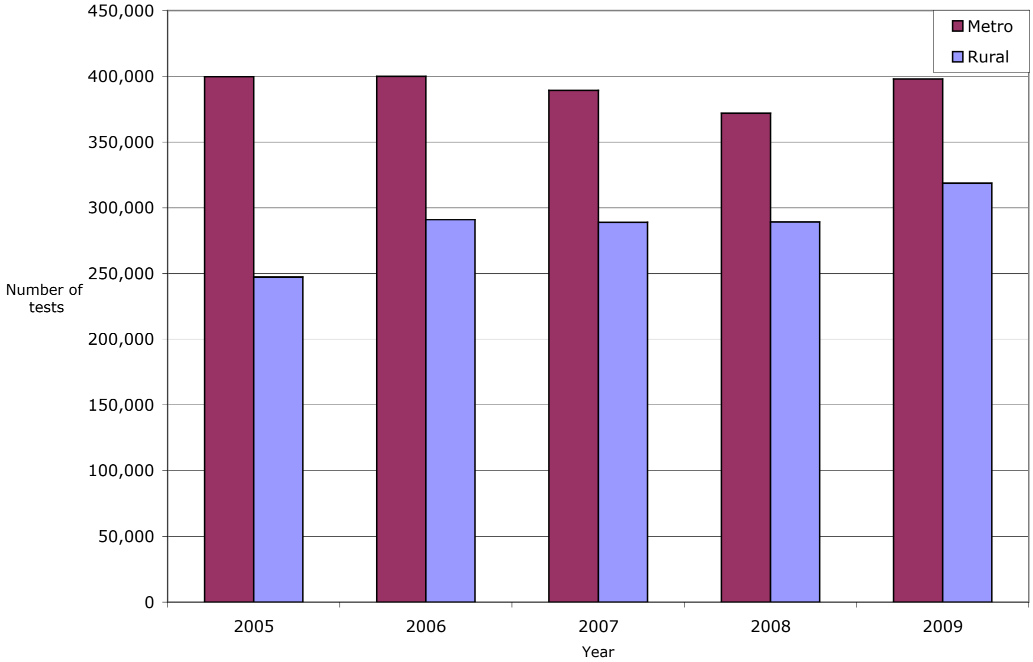

Figure 2.1
Number of random breath tests in South Australia, 2005-2009

The number of random breath tests conducted by static and mobile testing methods from 2005 to 2009 is summarised in Table 2.2. Since the introduction of full time mobile RBT operations in June 2005, the proportion of mobile testing has increased until 2008. The 2009 proportion of mobile testing is slightly reduced from the 2008 proportion.

Table 2.2
Number of random breath tests conducted in South Australia by testing method, 2005-2009

Year	Static	Mobile	Total	% Mobile
2005	567,710	79,148	646,858	12.2
2006	576,261	114,630	690,891	16.6
2007	530,939	147,343	678,282	21.7
2008	477,273	183,806	661,079	27.8
2009	521,470	195,129	716,599	27.2

DAY OF WEEK

The number of random breath tests performed on each day of the week, as a percentage of all tests in a year, is shown in Table 2.3 for the years 2005 to 2009. Consistent with previous years, the greatest proportion of testing was performed on Friday and Saturday in 2009. The proportion conducted on Thursday increased in 2009, representing a greater proportion of tests than Sunday for the first time in the data presented.

Table 2.3
Random breath tests performed by day of week, 2005-2009
(expressed as a percentage of total tests each year)

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun
2005	13.6	7.3	7.7	13.2	20.2	21.8	16.1
2006	10.1	10.1	8.3	10.4	20.3	24.0	16.7
2007	12.7	6.9	10.1	10.2	19.4	26.1	14.8
2008	10.5	9.0	11.5	11.2	17.7	25.1	14.9
2009	10.7	8.6	8.5	15.1	16.0	27.0	14.0

Table 2.4 shows that the distribution of testing by day of week for static and mobile RBT in 2009 was similar to previous years with the exception of an increase in the proportion of static RBT conducted on Thursdays to a higher proportion than both Friday and Sunday.

Table 2.4
Random breath tests performed by day of week in 2005-2009 (expressed as a percentage of total tests each year) for static and mobile RBT

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun
2005							
Static	13.9	7.1	7.7	13.8	20.5	21.2	15.8
Mobile	11.0	8.8	7.6	9.1	18.7	26.4	18.5
2006							
Static	10.1	10.2	8.0	10.1	20.4	24.0	17.2
Mobile	10.5	9.1	9.7	11.7	20.1	24.3	14.6
2007							
Static	13.2	6.2	10.1	9.6	19.1	26.7	15.1
Mobile	11.1	9.1	9.8	12.2	20.2	23.8	13.9
2008							
Static	10.1	8.4	11.6	10.7	17.4	26.2	15.5
Mobile	11.3	10.7	11.4	12.6	18.5	22.3	13.3
2009							
Static	10.6	8.0	7.9	15.5	15.4	28.6	14.0
Mobile	11.0	10.2	10.1	14.0	17.8	22.9	14.0

TIME OF DAY

The percentage of tests performed from 2005 to 2009 by time of day is presented in Table 2.5. Note that the eight hours between 6am and 2pm have been grouped while all other columns represent only two hours. In 2009, RBT was conducted most commonly between 6pm and 10pm, indicating that there was a slight shift in testing hours away from earlier in the evening compared to the previous year. There were relatively low levels of testing between midnight and 6am, a pattern broadly consistent with previous years.

Table 2.5
Random breath tests performed by time of day, 2005-2009 (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
2005	5.6	2.9	2.1	20.4	11.2	11.2	15.0	17.1	14.6
2006	4.2	3.1	2.4	22.4	10.0	11.6	17.4	17.1	11.8
2007	5.7	6.6	2.4	18.3	8.9	8.8	14.9	18.3	16.1
2008	5.1	2.5	2.3	24.8	9.5	12.6	15.4	17.4	10.5
2009	5.5	5.0	3.7	22.1	7.9	9.2	14.9	17.3	14.2

Time of day testing data from 2005 to 2009 is shown in Table 2.6 separately for static and mobile RBT. In 2009, police conducted static RBT most frequently during the early evening (i.e. from 6pm to 10pm). Mobile testing was most frequent between 10pm and 12pm, generally having a large proportion conducted during the late night and early hours of the morning than static testing. A large increase in the proportion of mobile tests conducted between 2am and 6am occurred in 2009, compared to previous years.

Table 2.6
Random breath tests performed by time of day in 2005-2009 (expressed as a percentage of total tests in the year) for static and mobile RBT

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
2005									
Static	4.8	2.8	2.2	20.6	11.7	11.4	15.3	17.2	14.1
Mobile	11.1	3.6	1.8	18.9	7.8	9.3	13.0	16.4	18.0
2006									
Static	3.2	3.1	2.6	22.0	10.2	12.2	18.1	17.4	11.2
Mobile	9.0	3.2	1.4	24.1	9.1	8.9	13.7	15.8	14.8
2007									
Static	4.7	7.7	2.6	17.1	8.5	8.3	14.7	19.4	16.9
Mobile	9.0	2.8	1.9	22.7	10.2	10.3	15.8	14.2	13.2
2008									
Static	3.5	2.4	2.3	25.1	9.7	13.4	15.7	18.8	9.1
Mobile	9.0	3.0	2.3	23.9	9.1	10.4	14.6	13.8	13.9
2009									
Static	4.4	2.6	2.9	23.3	7.4	10.4	17.5	19.6	11.8
Mobile	8.6	11.6	5.8	18.9	9.2	6.0	8.0	11.2	20.6

Table 2.7 shows the percentage of RBT tests per month for static and mobile testing in 2009. There were few discernable patterns by month for static or mobile testing. Lower levels of static testing were observed during the winter months, probably due to the effects of wet weather. Generally, higher levels of static testing were recorded in December.

Table 2.7
Random breath tests by month in 2009 (expressed as a percentage of total tests in the year) by location for static and mobile RBT

Month	Static			Mobile		
	Metro	Rural	Total	Metro	Rural	Total
Jan	8.8	9.3	9.0	8.7	8.8	8.7
Feb	7.6	7.1	7.4	8.0	8.4	8.2
Mar	8.2	9.2	8.6	8.8	8.4	8.6
Apr	7.5	11.1	9.0	9.9	9.2	9.5
May	5.1	6.3	5.6	6.7	8.2	7.5
Jun	7.1	4.5	6.0	6.5	7.0	6.8
Jul	5.6	5.1	5.4	7.7	6.9	7.3
Aug	10.6	8.4	9.7	8.3	8.5	8.4
Sep	7.2	7.7	7.4	6.8	7.4	7.1
Oct	10.7	9.7	10.3	8.7	9.0	8.8
Nov	8.7	8.9	8.8	11.0	8.0	9.4
Dec	13.0	12.6	12.8	8.9	10.2	9.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

2.1.2 Percentage of licensed drivers tested

The numbers of licensed drivers and percentage of licensed drivers tested in South Australia for the years 2005 to 2009 are presented in Table 2.8 and in Figure 2.2. The testing target level of 1 in 2 drivers has been exceeded each year during this time period. Around 64 per cent of licensed drivers were tested in 2009, an increase from the previous year.

Table 2.8
Number and percentage of licensed drivers tested in South Australia, 2005-2009

Year	Number of tests	Number of licensed drivers [a]	% of licensed drivers tested
2005	646,858	1,093,550	59.2
2006	690,891	1,042,774	66.3
2007	678,282	1,073,103	63.2
2008	661,079	1,085,503	60.9
2009	716,599	1,126,847	63.6

Note. Licence information could only be extracted for the financial year to June 30.
[a] Source: 2005 DRIVERS database, Registration and Licensing Section, DTEI.
2006-2009 TRUMPS database, Registration and Licensing Section, DTEI.

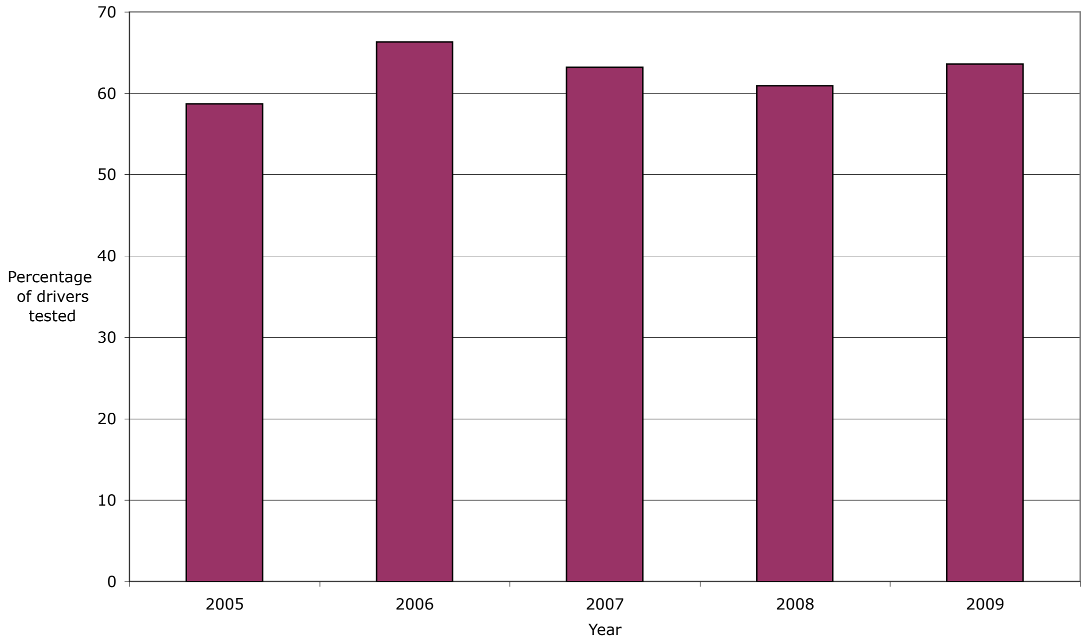

Figure 2.2
Percentage of licensed drivers tested, 2005-2009

2.1.3 Interstate comparisons

To establish standards against which South Australian practices may be assessed, information was collected on the levels of RBT conducted in other Australian jurisdictions. Table 2.9 shows the levels of overall RBT in all Australian jurisdictions, including South Australia, with total numbers expressed, where possible, in terms of the relative contributions of mobile and static testing methods. Victorian data for 2009 was unavailable due to a change in their data systems in mid 2009. Consistent with previous years, the highest levels of RBT were conducted in New South Wales and Queensland. Victoria has also previously had a high level of RBTs conducted. In South Australia, the proportion of RBT that was conducted using mobile testing methods was lower than Tasmania, Western Australia and Queensland but higher than New South Wales.

Table 2.9
Number of random breath tests conducted in Australian jurisdictions in 2009, by testing method

Jurisdiction	Static	Mobile	Total	% Mobile
South Australia	521,470	195,129	716,599	27.2
New South Wales	3,322,994[a]	923,948	4,246,942	21.8
Queensland	1,992,127[b]	862,620	2,854,747	30.2
Tasmania	187,120	437,934	625,054	70.1
Victoria	UK	UK	UK	UK
Western Australia	274,074[c]	292,130	566,204	51.6
Northern Territory	UK	UK	157,719	UK
Australian Capital Territory	UK	UK	86,007	UK

[a] Total includes tests conducted by RBT buses.

[b] Total includes 93,661 tests conducted using RBT 'booze buses'.

[c] Total is only tests conducted using RBT 'booze buses'.

NB: UK = unknown

A more appropriate measure of RBT levels in different jurisdictions can be gained by adjusting RBT numbers for the number of drivers in each jurisdiction. To avoid any difficulties associated with differences in licensing conditions across jurisdictions, a simpler measure is breath tests per head of population. As population here refers to total population, and not driving age population, the figures in Table 2.10 will not be of great value beyond the context of the table. That is, they only provide a means by which to compare jurisdictions. When RBT levels are expressed as rates per head of population (Table 2.10), the highest rates of RBT were reported for Tasmania, followed by the Northern Territory and Queensland. South Australia's level of RBT was similar to the level reported in 2008 (41%), and higher than levels in the ACT and Western Australia. The pattern of results in 2009 is relatively similar to that reported for 2008 (see Wundersitz *et al.*, 2010) although the proportion tested has increased in the Northern Territory and the Victorian result is not known.

Table 2.10
Number of random breath tests conducted in Australian jurisdictions in 2009, as a percentage of population

Jurisdiction	Total	Pop 2009 [a]	% of Pop
South Australia	716,599	1,633,900	43.9
New South Wales	4,246,942	7,191,500	59.1
Queensland	2,854,747	4,473,000	63.8
Tasmania	625,054	505,400	123.7
Victoria	UK	5,496,400	UK
Western Australia	566,204	2,270,300	24.9
Northern Territory	157,719	227,700	69.3
Australian Capital Territory	86,007	354,900	24.2

[a] Source: Estimated resident population data from Australian Bureau of Statistics (2010) *Australian Demographic Statistics, December 2009.* Catalogue No 3101.0.

2.2 Levels of drink driving

2.2.1 RBT detections

The numbers of RBT detections in South Australia for the years 2005 to 2009 are shown in Table 2.11. Note that RBT detections in this table refer only to drivers who recorded an illegal BAC using evidentiary testing. Drivers who tested over the limit on the initial screening test but who were under the limit on the evidentiary test are not included in the table. In 2009, the number of detections increased by seven per cent and remained at a relatively high level.

Table 2.11
Number of RBT detections in South Australia, 2005-2009

Year	Number of RBT detections	Per cent change from previous year
2005	4,973	42.0
2006	4,419	-11.1
2007	5,835	24.3
2008	5,313	-8.9
2009	5,690	7.1

2.2.2 RBT detection rates

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 an estimate of the effectiveness of RBT. A lower detection rate may indicate greater effectiveness of RBT and other drink driving countermeasures, although it must be acknowledged that detection rates are also affected by operational factors such as the locations, times and types of RBT enforcement used.

The RBT detection rates for metropolitan and rural areas from 2005 to 2009 are presented in Table 2.12 and Figure 2.3 in terms of the number of drivers found to be over the legal limit per thousand tested. In this case, drivers are only included if they recorded an illegal BAC using evidentiary testing. The overall RBT detection rate in 2009 decreased slightly but continues to be at a relatively high level of about eight per 1,000 tested. An increase in the rural detection rate was offset by a decrease in the metropolitan detection rate.

Table 2.12
RBT detection rates, 2005-2009
(number of drivers detected with an Illegal BAC per 1,000 tested)

Year	Metro	Rural	Total
2005	8.3	6.7	7.7
2006	7.1	5.5	6.4
2007	9.4	7.4	8.6
2008	9.4	6.3	8.0
2009	8.8	6.9	7.9

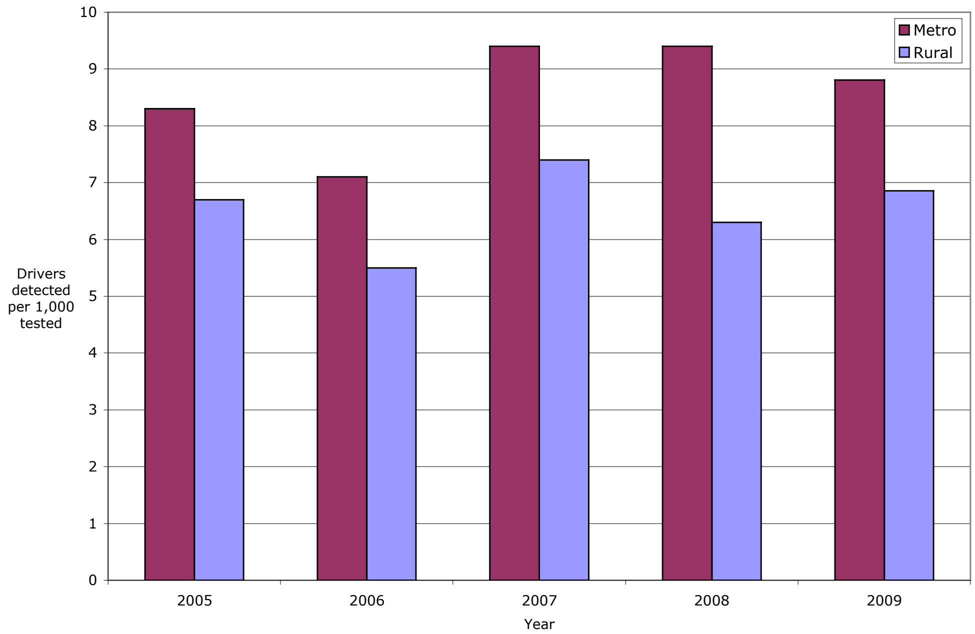

Figure 2.3
RBT detection rates per 1,000 tests, 2005-2009

Table 2.13 shows the detection rates associated with static and mobile RBT in metropolitan and rural areas from 2005 to 2009. Note that the detection rates in Table 2.13 represent the percentage of drivers tested who were over the legal limit on the *screening* test, while the figures in Table 2.12 represent the percentages of drivers over the legal BAC limit on the *evidentiary* test. Evidentiary test numbers were not available for mobile and static RBT separately. Percentages of drivers detected over the limit on screening tests will exceed the number detected over the limit on later, evidentiary tests (i.e. the BAC of some drivers detected over the limit on a screening test may be lower, and could reduce to a legal level, on a later evidentiary test).

A total of 6,480 drivers were detected with an illegal BAC by a screening test in 2008. Consistent with the detection rate based on evidentiary testing, the overall detection rate for screening tests decreased slightly from 9.1 per 1000 in 2008 to 9.0 per 1000 in 2009. Table 2.13 shows that static and mobile detection rates in 2009 remained at similar levels to 2008. Mobile RBT continues to detect a greater percentage of drink drivers than static RBT. Static and mobile detection rates were highest in metropolitan areas, consistent with previous years. With the exception of 2006, the ratio of mobile to static RBT detection rates indicates that mobile RBT is more effective in rural areas.

Table 2.13
RBT detection rates (screening test only), 2005-2009
(number of drivers detected with an Illegal BAC per 1,000 tested)
for static and mobile RBT, by location

Year and location	Static	Mobile	Ratio of mobile to static
2005			
Metro	8.6	32.4	3.8
Rural	2.9	27.4	9.4
Total	6.6	29.3	4.4
2006			
Metro	9.9	57.4	5.8
Rural	6.1	34.0	5.6
Total	8.4	43.5	5.2
2007			
Metro	6.4	40.7	6.4
Rural	2.8	22.4	8.0
Total	5.0	30.5	6.1
2008			
Metro	6.0	23.8	4.0
Rural	2.1	18.9	9.0
Total	4.4	21.5	4.9
2009			
Metro	6.5	24.4	3.8
Rural	2.2	17.3	7.8
Total	4.7	20.6	4.4

TIME OF DAY

RBT detection rates (evidentiary test results) by time of day, shown in Table 2.14, indicate that the highest detection rates in 2009, for both metropolitan and rural areas, were between midnight and 6am. This is consistent with previous years.

Table 2.14
RBT detection rates by time of day, 2005-2009
(number of drivers detected with an Illegal BAC per 1,000 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
2005									
Metro	Data not available								
Rural	Data not available								
Total	Data not available								
2006									
Metro	38.5	27.1	31.8	14.2	1.5	3.8	2.4	5.7	5.0
Rural	34.3	92.5	23.3	8.4	1.0	2.1	4.2	5.7	8.6
Total	36.8	35.6	29.6	11.7	1.2	2.7	3.0	5.7	6.0
2007									
Metro	31.0	16.4	33.5	3.6	1.5	5.0	7.4	8.1	6.8
Rural	40.4	46.2	51.3	2.3	1.2	3.5	3.0	6.8	9.1
Total	34.2	22.0	35.9	3.1	1.3	4.1	4.6	7.6	7.6
2008									
Metro	38.3	49.0	44.8	3.6	2.5	3.5	4.0	8.1	9.1
Rural	34.0	63.4	20.6	1.6	1.2	1.9	3.3	5.2	14.7
Total	36.6	53.0	34.7	2.7	1.7	2.6	3.8	7.0	10.8
2009									
Metro	27.7	25.4	25.1	3.9	3.1	7.1	3.5	6.9	7.2
Rural	39.2	27.6	11.5	1.9	1.7	3.0	4.1	7.5	9.5
Total	31.7	26.2	20.2	2.9	2.2	4.1	3.7	7.1	8.0

Detection rates by time of day for mobile and static RBT are presented in Table 2.15. Again, note that these detection rates, unlike those in Table 2.14, are *not* for drivers detected with illegal BACs in evidentiary tests but are for drivers detected with illegal BACs in the initial screening test. Therefore, the figures in Table 2.15 will generally be higher than those in Table 2.14. It should also be noted that there can be a time difference of up to two hours between a screening test and the corresponding evidentiary test. This causes a skewing of the detection rates for screening tests to earlier times than the evidentiary tests. In general, higher RBT detection rates were observed at night from 10pm to 6am, although in rural regions the mobile testing detection rate was high from 4pm to 2am.

Table 2.15
RBT detection rates (screening test only) in 2009
(number of drivers detected with an Illegal BAC per 1,000 tested) by time of day and location

Method	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
Static									
Metro	13.9	18.0	16.1	1.9	3.5	4.2	5.3	4.8	9.3
Rural	11.1	11.3	2.3	1.0	1.7	1.5	2.1	2.6	6.9
Total	13.3	17.7	12.5	1.5	2.1	2.2	4.2	4.2	8.8
Mobile									
Metro	46.9	26.3	29.1	10.4	10.6	39.5	48.4	28.8	21.7
Rural	28.9	6.2	3.0	11.6	15.6	21.4	29.1	23.8	16.8
Total	37.3	15.5	16.3	10.9	13.1	28.0	35.8	26.1	18.9
Both									
Metro	23.9	21.7	20.6	4.1	7.0	12.5	8.9	7.8	12.5
Rural	22.6	6.5	2.7	3.2	5.0	4.6	8.6	8.6	13.2
Total	23.5	16.3	14.2	3.6	5.6	6.7	8.8	8.0	12.8

To determine whether there were any combinations of location (metro or rural) and time of day in which mobile RBT was more likely than static RBT to detect drink drivers, the ratio, for each location and time of day combination, of mobile to static RBT detection rate was calculated. The results, displayed in Table 2.16, indicate that mobile RBT is more effective in detecting drink drivers between 4pm to 8pm in both metropolitan and rural areas.

Table 2.16
The ratio of mobile to static RBT detection rates in 2009, by location and time of day

Location	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	3.4	1.5	1.8	5.5	3.0	9.5	9.1	6.0	2.3
Rural	2.6	0.5	1.3	11.4	9.3	14.3	14.0	9.2	2.4
Total	2.8	0.9	1.3	7.5	6.2	12.9	8.6	6.3	2.1

DAY OF WEEK

Table 2.17 shows detection rates by day of week for static and mobile RBT, presented separately for metropolitan and rural testing. Detections here are for drivers testing positive on the screening test rather than on the evidentiary test. Overall, detection rates were higher from Friday to Sunday, reflecting the same day of week pattern for mobile testing. These trends were evident in metropolitan and, to a slightly lesser extent, in rural areas.

Table 2.17
RBT detection rates (screening tests only) in 2009
(number of drivers detected per 1,000 tested) by day of week and location

Method	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Static							
Metro	2.9	4.3	4.0	4.5	8.2	7.5	10.2
Rural	1.6	1.5	2.1	1.5	1.8	3.0	2.9
Total	2.3	3.5	3.3	3.3	5.0	5.7	7.4
Mobile							
Metro	16.3	17.7	19.1	21.9	28.5	29.6	32.7
Rural	11.9	12.4	13.5	17.4	19.6	19.6	18.5
Total	14.2	15.4	16.5	19.7	23.0	23.4	25.6
Both							
Metro	6.7	7.9	8.4	8.5	13.3	11.1	15.4
Rural	4.5	6.2	6.4	6.1	7.9	8.2	8.0
Total	5.7	7.4	7.5	7.4	10.4	9.8	12.4

RBT DETECTION RATES BY MONTH

Static and mobile RBT detection rates by month are displayed in Table 2.18 for both metropolitan and rural areas. Note, again, that these detection rates refer to the results of screening tests. For static testing, the detection rate was highest during the first quarter and August. For mobile testing, rates were highest in May and October.

Table 2.18
RBT detection rates by month in 2009
(number of drivers detected with an Illegal BAC per 1,000 tested), by location

Month	Static			Mobile		
	Metro	Rural	Total	Metro	Rural	Total
Jan	6.9	2.8	5.2	19.0	14.4	16.5
Feb	7.4	2.8	5.6	23.1	16.0	19.2
Mar	7.9	2.4	5.5	28.2	16.7	22.2
Apr	7.3	1.7	4.5	20.4	15.1	17.7
May	7.0	2.5	4.9	36.8	19.5	26.7
Jun	4.2	2.4	3.6	24.7	15.8	19.8
Jul	4.8	2.3	3.8	23.3	17.7	20.5
Aug	7.6	2.9	5.9	22.0	19.8	20.8
Sep	4.2	1.6	3.1	20.6	16.4	18.3
Oct	6.0	1.9	4.4	29.8	23.6	26.5
Nov	6.2	2.5	4.6	21.6	17.7	19.9
Dec	7.0	1.4	4.7	26.0	14.8	19.7
Total	6.5	2.2	4.7	24.4	17.3	20.6

RBT DETECTION RATES BY SEX

Table 2.19 shows the detection rates for males and females from 2005 to 2009, based on evidentiary testing data and the number of licensed drivers of each gender. The detection rate is 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. Note that the sum of the number of male and female licence holders differs from the number of licence holders in Table 2.8 because there were 4152 cases for which sex was unknown. However, the difference does not affect the pattern of drink driving activities evident in the data.

The ratio of male to female drink driving detection rates in 2009 indicates that, on average, males are about three and a half times more likely to be detected than females. This trend is consistent with previous years and reinforces the notion that drink driving continues to be a problem among male drivers.

Table 2.19
Number of licence holders, RBT detection rate and comparative ratio of detection rate by sex, 2005-2009

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
2005	574,093	Data not available		512,926	Data not available		
2006	535,440	3,485	6.51	501,470	934	1.86	3.50
2007	553,341	4,609	8.33	514,047	1,226	2.38	3.50
2008	519,648	4,173	8.03	560,287	1,140	2.03	3.96
2009	582,108	4,476	7.69	540,587	1,214	2.25	3.42

Note. The number of licence holders was obtained from the DRIVERS database for 2005. From 2006, data was obtained from TRUMPS, Registration and Licensing Section, DTEI.

RBT DETECTION RATES BY AGE GROUP

The detection rates by age group for 2009 are shown in Table 2.20, based on evidentiary testing data and number of licensed drivers of each age group. The detection rate is expressed in terms of the number of licence holders because police do not record the age of drivers tested who do not have an illegal BAC. Note that the total number of RBT detections is less than shown previously as there were seven drivers who were under 16 years old who had a positive BAC (and were also driving unlicensed). This does not affect the data presented in Table 2.20.

The highest detection rates in 2009 were for drivers aged 20 to 29. This shows that drink driving is a problem with younger drivers, although not specifically in the traditional young driver age group of 16 to 24 years old. After peaking at the 20 to 24 age group the detection rate declines with increasing age.

Table 2.20
Number of licence holders, RBT detections and detection rate by age group, 2009

Age Group (yrs)	Licence holders	Detected by RBT	RBT detection rate (per thousand licensed)
16-19	66,036	399	6.04
20-24	89,770	1,122	12.50
25-29	93,573	992	10.60
30-39	194,547	1,382	7.10
40-49	217,470	998	4.59
50-59	202,269	584	2.89
60 +	263,182	206	0.78
Total	1,126,847	5,683	5.04

RBT DETECTIONS BY BAC READING

The number of drink drivers detected by RBT in metropolitan and rural regions by BAC category is presented in Table 2.21. The table includes all drivers detected during evidentiary testing because BACs are not recorded for the screening test. Consequently, BAC readings are not available separately for static and mobile RBT. Note that the BAC categories changed in 2006.

A number of BAC readings were recorded in the range from 0.001 to 0.049mg/L. These low readings may be attributed to some drivers having special licence conditions (i.e. truck, taxi, learner and provisional licence drivers) requiring a zero BAC. For these drivers, any positive BAC reading was regarded as illegal. Similar to the previous year, around 19 per cent recorded a high BAC level, that is, a BAC of 0.150mg/L and above. Rural regions had a greater proportion of drivers with a high BAC level (23%) than the metropolitan area (16%).

Table 2.21
Number of drivers detected by RBT by BAC category and region, 2006-2009

	RBT BAC readings (mg/L)					
Year	0.001-0.049	0.050-0.079	0.080-0.149	0.150+	Refused	Total
2006						
Metro	285	827	1,321	388	0	2,821
Rural	145	360	742	351	0	1,598
2007						
Metro	429	981	1,691	577	23	3,701
Rural	219	418	1,031	489	17	2,174
2008 [a]						
Metro	390	906	1,592	577	28	3,493
Rural	174	376	833	414	21	1,818
2009						
Metro	475	948	1,507	574	28	3,532
Rural	240	422	1,009	515	13	2,199

2.2.3 Interstate comparisons

RBT detection data were obtained from all Australian jurisdictions and are shown in Table 2.22. Again, for ease of comparison, these are expressed in terms of detections per head of population. Some jurisdictions provided screening test data and others provided evidentiary test data. Consequently, Table 2.22 is split into screening and evidentiary testing detections to allow meaningful comparisons. South Australian RBT detections are given for both screening and evidentiary testing, as are Western Australia's.

The screening test data show that Queensland had the highest number of RBT detections in 2009 and, when adjusted for population, the highest screening detection rate. All jurisdictions had a higher screening and evidentiary detection rate than South Australia. The Northern Territory had the highest percentage of population detected by RBT in 2009.

Table 2.22
RBT detections in 2009 in Australian jurisdictions

	Jurisdiction	RBT Detections	% of Population
Screening	South Australia	6,480	0.40
	Queensland [a]	34,839	0.78
	Western Australia [b]	12,983	0.57
	Victoria	UK	UK
Evidentiary	South Australia	5,690	0.35
	New South Wales	UK	UK
	Western Australia [c]	12,240	0.54
	Tasmania	4,687	0.93
	Australian Capital Territory	1,564	0.44
	Northern Territory	3,874	1.70

Source: Estimated resident population data from Australian Bureau of Statistics (2009) *Australian Demographic Statistics, December 2009.* Catalogue No 3101.0

[a] Includes detections conducted at a booze bus (evidentiary testing).

[b] Includes 4,310 detections conducted at a booze bus.

[c] Includes 3,567 detections conducted at a booze bus

A detection rate taking into account the number of drivers tested is a better indicator of the effectiveness of RBT enforcement than rates per head of population. Data were unavailable to calculate RBT detection rates per thousand drivers tested in Victoria and New South Wales. South Australian detection rates per thousand tested are compared to rates in other jurisdictions for static and mobile methods in Table 2.23. Once again, to make meaningful comparisons, detection rates are given separately for screening and evidentiary testing. For testing with screening devices, South Australia had a detection rate that was lower than Queensland and Western Australia. The detection rate for mobile RBT in South Australia was comparable to the other jurisdictions for which data were available. With respect to evidentiary testing, South Australia's overall detection rate was low compared to most other jurisdictions for which data were available.

Table 2.23
RBT detection rates, 2009, (number of drivers detected with an illegal BAC per thousand tested) for selected Australian jurisdictions for static and mobile

Testing	Jurisdiction	Static	Mobile	Total
Screening	South Australia	4.7	20.6	9.0
	Queensland	8.2	21.5	12.2
	Western Australia	15.7	29.7	22.9
	Victoria	UK	UK	UK
Evidentiary	South Australia	3.0	21.0	7.9
	New South Wales	UK	UK	UK
	Western Australia	13.0	29.7	21.6
	Tasmania	3.5	9.2	7.5
	Australian Capital Territory	UK	UK	18.2
	Northern Territory	UK	UK	24.6

Overall, compared to other Australian jurisdictions, in 2009 South Australia had a relatively low rate of testing per head of population, a comparable proportion of tests conducted using mobile methods, low drink driving detection rates per capita but comparable detection rates per thousand tested.

2.2.4 Blood alcohol levels of seriously and fatally injured drivers

The BAC levels of drivers and motorcycle riders involved in road crashes provide another measure or estimate of the effectiveness of random breath testing. 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 0.05mg/L, would be expected to increase and, conversely, the percentage of drivers with higher BAC levels should decrease.

When calculating these percentages, only drivers with a known BAC are considered. Not all crash involved drivers have a known BAC due to limitations in the matching process for forensic blood samples with the DTEI Traffic Accident Reporting System (TARS) database and the infrequency with which police record BAC data for drivers (Kloeden, McLean & Holubowycz, 1993).

The BAC distribution of drivers who were fatally injured in a road crash and for whom a BAC was recorded is presented in Table 2.24. The results for 2009 are indicative of relatively high levels of alcohol involvement in fatal crashes. Almost 37 per cent of fatally injured drivers had a BAC above 0.050mg/L. The percentage of drivers with a BAC level above 0.100mg/L decreased from 34 per cent in 2008 to 24 per cent in 2009. However, the relatively small number of fatalities means that the results will fluctuate from year to year more than the results for serious injuries (see Table 2.25 for serious injuries). The proportion of known BAC levels increased in 2009 to almost 99 per cent, an improvement on the level recorded in previous years.

Table 2.24
Percentage of drivers and motorcycle riders fatally injured in road crashes by known BAC category, 2005-2009

Year	Zero	.001 - .049	.050 - .079	.080 - .099	.100 - .199	.200 - .299	.300+	> .050	Number of known cases	% known	Total number
2005	55.41	10.81	1.35	1.35	10.81	20.27	0.00	33.78	74	80.43	92
2006	54.29	5.71	4.29	1.43	20.00	11.43	2.86	40.00	70	87.50	80
2007	62.50	7.14	0.00	5.36	19.64	3.57	1.79	30.36	56	84.85	66
2008	55.36	7.14	1.79	1.79	16.07	17.86	0.00	37.50	56	91.80	61
2009	57.89	5.26	2.63	10.53	9.21	7.89	6.58	36.84	76	98.70	77

Table 2.25 shows the percentage of drivers seriously injured by known BAC level. A seriously injured person 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). During 2009, 19 per cent of drivers seriously injured in a crash had a BAC of 0.050mg/L or greater, which was the lowest level recorded over the five year period. The percentage of drivers with a BAC above 0.100 in 2009 was 15 per cent, lower than previous years. Note that the percentage of seriously injured drivers with a BAC above 0.100mg/L was considerably lower than the percentage above this BAC level for fatally injured drivers (24%, refer to Table 2.24). The percentage of known BAC levels for seriously injured drivers in 2009 increased but remained at a relatively low level (62%).

In general, these results are indicative of a lower level of alcohol involvement in fatal and serious injury crashes during 2009 compared to previous years.

Table 2.25
Percentage of drivers and motorcycle riders seriously injured in road crashes by known BAC category, 2005-2009

Year	Zero	.001 - .049	.050 - .079	.080 - .099	.100 - .199	.200 - .299	.300+	> .050	Number of known cases	% known	Total number
2005	75.15	2.74	1.76	1.57	14.09	4.11	0.59	22.11	511	66.36	770
2006	74.02	3.74	2.43	2.06	14.02	3.74	0.00	22.24	535	63.02	849
2007	75.66	2.45	1.02	1.84	15.13	3.89	0.00	21.89	489	57.60	849
2008	72.14	2.59	2.59	2.81	15.33	4.32	0.22	25.27	463	60.92	760
2009	77.43	3.59	1.48	2.32	12.45	2.74	0.00	18.99	474	61.56	770

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 drivers' BAC levels. Information from roadside surveys is particularly useful because the 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

There were two anti-drink driving publicity campaigns conducted during 2009. The 'Everyone Hates Drink Drivers' campaign was continued from 2008, and a new campaign named 'Thinking About Drinking' was also developed.

The 'Everyone Hates Drink Drivers' campaign targeted 20 to 39 year old males, particularly those living in regional areas. The aim of the campaign was to create an undesirable image of people who drink drive in order to reduce drink driving behaviour. The slogan 'Everyone Hates Drink Drivers' was used to reflect the disapproval of drink drivers by the community so that drivers would stop drink driving to avoid society's rejection. Furthermore, the audience was encouraged to realise, regardless of their own personal risks, rewards, or consequences of drink driving, that society will reject them and therefore their personal evaluation of possible benefit is of limited value.

The campaign was designed to continue to reinforce the laws, penalties, and negative outcomes associated with drink driving. Males aged 40 to 55 years old were also addressed by the campaign, again with particular focus on those in regional areas. The purpose of this was to reinforce awareness and responsible approaches to alcohol and driving in this group.

The campaign was promoted via television commercials, billboards in the CBD and main arterials, posters and stickers in the bathrooms of clubs and pubs, and banner advertisements on websites used by the target audience. Mobile text messages were also sent out each weekend of the campaign to those who had subscribed to the FreshFM radio database. This campaign was run during the month of March, 2009.

The new campaign that was developed in 2009 used the slogan 'Thinking about drinking? Don't take the car'. The aim of the campaign was to positively reinforce the planning ahead of a drinking occasion and to encourage people to avoid taking the car. The campaign provided alternatives to drink driving such as taking a taxi, bus, walking, or staying at a hotel or friend's place, and urged drivers to plan ahead every time, rather than just sometimes. The primary audience of the campaign was 20 to 39 year old males, while the secondary audience was 40 to 55 year old males. For both the primary and secondary audience there was a particular emphasis on those living in regional areas.

The 'Thinking About Drinking' campaign was run for three weeks starting in mid September, 2009, and again for four weeks starting in early December. Television commercials for the campaign included role models responsibly enjoying their drinking occasion and avoiding using a car. Sides of buses depicted alcoholic beverages at the top of the bus windows in order to make passengers look like they were thinking about drinking and therefore taking public transport. The campaign slogan was also printed on the side of the buses. Posters were placed in the bathrooms of clubs and pubs and banner advertisements were placed on websites prior to the weekend to encourage pre-planning.

3 Drug driving

3.1 Drug driving enforcement and operations

Victoria was the first jurisdiction in the world to introduce legislation for the random drug screening of drivers in December 2004. The legislation made it an offence to drive with any level of methylamphetamine (MA, 'speed', 'ice', 'crystal meth') or Delta-9-tetrahydrocannabinol (THC, the active component of cannabis) in the blood or saliva. In September 2006, methylenedioxymethamphetamine (MDMA, ecstasy) was added to the Victorian legislation (Boorman, 2007).

Random roadside saliva testing is now conducted in all states in Australia, with only the territories yet to introduce such testing (see Table 3.1). It is carried out to detect recent drug use, rather than driver impairment. That is, in Australia, a 'zero tolerance' approach is used, whereby no amount of the drug tested for is allowed to be present.

Table 3.1
Chronology of introduction of random roadside drug testing legislation in Australian jurisdictions

Australian jurisdiction	Year legislation introduced
Victoria	December 2004
Tasmania	July 2005
South Australia	July 2006
New South Wales	December 2006
Western Australia	October 2007
Queensland	December 2007

In South Australia, random drug testing of drivers for THC and methylamphetamine began in July 2006. MDMA was added later to the legislation in September 2006. Any driver in South Australia may be required to undertake a random roadside saliva test, including the passenger acting as a 'qualified supervising driver' for a learner driver. Random drug testing sites are set up similarly to static RBT sites but signage clearly states that drug testing is being undertaken. Some drug testing sites are random while others are more targeted, selected on the basis of crash data or the area being known to have a drug problem.

Random drug testing is combined with breath testing for alcohol. Therefore, drug testing can occur anywhere and at anytime where breath alcohol testing is permitted. The drug testing procedure begins after a driver has provided a sample of breath for an alcohol test. The procedure for drug testing itself occurs in three stages. Firstly, drivers are required to complete a saliva screening test. The saliva test involves licking an absorbent swab until the saliva sample is collected. The sample is screened at the roadside by the Securetec Drugwipe II Twin device while the driver is still seated in their car. This process takes approximately 5 minutes. Secondly, if the first test is positive, the driver is required to leave their vehicle to accompany police for further testing in the drug truck or police station. At this stage, the driver will be required to undertake a second oral fluid test using the Cozart Drug Detection System. Finally, if positive results are recorded on this second test, the oral fluid is divided into two separate portions and a sample is submitted to the Forensic Science Centre for further laboratory analysis. The total process takes approximately 30 minutes.

Results from the laboratory analysis take approximately two weeks to obtain. If the results confirm the presence of THC, methylamphetamine or MDMA, police will charge the driver on the basis of driving with 'a prescribed drug (THC or methylamphetamine or MDMA) in oral fluid or blood'. All saliva and blood samples are destroyed after prosecution proceedings are completed.

Drivers who test positive for THC or methylamphetamines are advised by police not to drive until the drug is no longer detectable in their system (up to 5 hours for THC and up to 24 hours for methylamphetamines and MDMA). If the driver is alone, police will assist in arranging alternative transport. All drivers who test positive are given a driver direction notice that directs them not to drive based on suspicion about their fitness to drive (Section 40(k), Road Traffic Act). Violation of the driver direction notice incurs a maximum fine of $5000.

Drivers found with a prescribed drug in oral fluid or blood for the first time in a five year period can elect to either pay an expiation fee or dispute the fee but risk receiving a higher court fine if they lose the case. On the 1st of July, 2008, the demerit points a driver received were increased from three to four and the expiation fee was increased from $313 to $420. For a first offence the court fine ranged from $500 to $900. For a second offence, a driver must appear in court and face court imposed penalties including a $700 fine (minimum) and a licence disqualification of not less than six months. Drivers committing a third offence receive a minimum $1100 court fine and licence disqualification of not less than 12 months. All subsequent offending drivers receive the same fine and a licence disqualification for 24 months. Police acknowledge that most offenders elect to pay the expiation fee.

Under the current legislation, a driver who is pulled over for a random roadside saliva test is required to undertake the test, with penalties applied for refusal. From 2008, if it was the driver's first offence and he/she failed to undertake the test, a fine of $500 (minimum), six demerit points and a court imposed licence disqualification of not less than six months is applied. Second and subsequent offences involve a minimum fine of $1100 and licence disqualification for not less than 24 months.

During 2007 random roadside drug testing was conducted by a group of 13 traffic police, who were specifically trained to conduct driver drug testing full time. One truck was dedicated to drug testing throughout South Australia. In 2008, roadside drug testing operations were expanded significantly with a testing target set at 40,000 tests for the financial year 2008/2009. An integral part of this expansion was decentralisation. Approximately 260 traffic enforcement members from LSAs throughout South Australia were trained to conduct drug testing from February to October 2008. The core group of 13 specialist drug testers continued to monitor and oversee drug testing operations by providing training and extra resources when needed. The Traffic Support Branch was responsible for providing LSA's with testing targets but it was the responsibility of individual LSAs to determine where, when and how the testing was undertaken.

A corporate traffic operation 'Operation Consequence' specifically targeted drug/drink drivers in February and August, October and November 2009.

3.1.1 Number of tests performed

Based on data from SAPOL, the following sections explore drug driving in terms of levels of random roadside drug testing and confirmed detections. Table 3.2 shows the number of random drug tests conducted in South Australia from 2007, the first calendar year for which 12 months of data were available, to 2009. In 2009, the total number of drivers drug tested increased by almost 70% from the previous year, equating to approximately 3.9 per cent of licensed drivers. A greater number of tests were undertaken in the metropolitan area (74%) than in rural regions, consistent with the previous year.

Table 3.2
Number and percentage of licensed drivers drug tested in South Australia, 2007-2009

Year	Metro	Rural	Total	No. of licensed drivers	% of licensed drivers tested
2007	9,753	2,575	12,328	1,073,103	1.15
2008	20,505	5,384	25,889	1,085,503	2.38
2009	32,504	11,217	43,721	1,126,847	3.88

DAY OF WEEK

Table 3.3 shows the number of drug tests performed on each day of the week as a percentage of all tests in 2009. Generally, the greatest proportion of testing was performed on weekends. While this trend was evident in both metropolitan and rural areas, Fridays had a similar proportion to Sundays in rural areas.

Table 3.3
Drug tests performed by day of week, 2009 (expressed as a percentage of total tests each year)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Metro	12.3	11.8	9.7	13.7	12.1	23.9	16.6
Rural	13.3	6.2	7.0	13.8	17.0	25.2	17.5
Total	12.5	10.4	9.0	13.8	13.3	24.2	16.8

TIME OF DAY

The distribution of drug tests by time of day, as shown in Table 3.4, indicates that drug testing in 2009 was predominantly conducted from 8am to 10pm. Very little drug testing was conducted in rural areas at night and in the early hours of the morning (i.e. 10pm to 6am).

Table 3.4
Drug tests performed by time of day, 2009 (expressed as a percentage of total tests each year)

	12-2 AM	2-4 AM	4-6 AM	6-8 AM	8–10 AM	10-12 AM	12-2 PM	2-4 PM	4-6 PM	6-8 PM	8-10 PM	10-12 PM
Metro	4.8	1.0	0.9	3.8	10.1	11.5	7.3	7.5	10.1	17.5	18.2	7.3
Rural	1.0	0.1	1.0	2.0	9.9	17.3	14.3	14.6	15.7	14.3	7.3	2.4
Total	3.9	0.8	0.9	3.3	10.0	13.0	9.1	9.3	11.6	16.7	15.4	6.0

TESTING BY MONTH

The distribution of drug tests performed by month in 2009 is presented in Table 3.5. Drug testing increased as the year progressed, with the exception of a drop in June and July. In metropolitan areas the greatest proportion of test occurred in October and December while in rural areas the greatest proportion of tests occurred in May and November.

Table 3.5
Drug tests performed by month of year, 2009 (expressed as a percentage of total tests each year)

Month	Metro	Rural	Total
Jan	6.5	7.1	6.7
Feb	7.8	6.9	7.6
Mar	8.7	7.9	8.5
Apr	8.9	7.0	8.4
May	7.0	11.0	8.0
Jun	5.2	8.0	5.9
Jul	6.1	5.0	5.8
Aug	8.9	8.8	8.9
Sep	9.9	6.8	9.1
Oct	11.3	8.5	10.6
Nov	8.3	15.6	10.2
Dec	11.5	7.4	10.4
Total	100.0	100.0	100.0

3.1.2 Interstate comparisons

Information on the levels of drug testing conducted in other Australian jurisdictions was collected to provide standards with which South Australian practices might be compared. To provide a measure of drug testing levels in different jurisdictions, drug testing numbers are adjusted for population in each jurisdiction. Drug tests per head of population are given in Table 3.6 rather than tests per licensed driver to avoid differences in licensing conditions across jurisdictions.

In comparison to other jurisdictions, South Australia conducted the greatest number of tests and also had the highest testing rate per head of population (2.68%), followed by Victoria (0.51%).

Table 3.6
Number of random drug tests conducted in Australian jurisdictions in 2009, as a percentage of population

Jurisdiction	Total	Pop 2009 [a]	% of Pop
South Australia	43,721	1,633,900	2.68
New South Wales	24,884	7,191,500	0.35
Queensland	12,559	4,473,000	0.28
Tasmania[b]	509	505,400	0.10
Victoria	27,883	5,496,400	0.51
Western Australia	7,527	2,270,300	0.33

[a] Source: Estimated resident population data from Australian Bureau of Statistics (2009) *Australian Demographic Statistics, December 2009.* Catalogue No 3101.0.

[b] Number is an underestimate due to data collection issues

3.2 Levels of drug driving

3.2.1 Confirmed positive drug detections

As mentioned in Section 3.1, current random roadside drug testing in South Australia is designed to detect three types of illicit drugs: methylamphetamines (i.e. ‘speed’), THC (i.e.

cannabis) and MDMA (i.e. 'ecstasy'). Unlike breath alcohol testing, there are no legal concentration levels for the prescribed drugs. Test results are given as either positive or negative for drugs. The number of confirmed positive drug detections in 2009 by type of drug is shown in Table 3.7. A confirmed positive drug detection refers to a positive drug test result from forensic testing in the laboratory. The results indicate that many drivers tested positive for more than one drug. A total of 261 drivers tested positive for a combination of two of the three prescribed drugs and 21 tested positive to all three drugs. THC has overtaken Methylamphetamine as the drug type detected most frequently.

Table 3.7
Confirmed positive drug detections by drug type, 2009

Drug	Detections
Methylamphetamine	559
THC	574
MDMA	60
Combination	261
All prescribed drugs	21
Total	953

DETECTIONS BY SEX

The numbers of confirmed positive detections for males and females in 2009 are shown in Table 3.8. Around 75 per cent of the confirmed positive detections were for males. This proportion was slightly higher in rural areas. Note that sex is not recorded for testing data so detection rates could not be calculated. Consequently, these data should be interpreted cautiously because it may be the case that more male drivers were tested.

Table 3.8
Confirmed positive drug detections by sex, 2009

Sex	Metro	Rural	Total
Female	128	24	152
Male	586	215	801
Total	714	239	953

DETECTIONS BY AGE GROUP

Table 3.9 indicates that detections were more prevalent among drivers aged 20 to 49 years, particularly drivers aged 30 to 39 years. Similar to the detection data by sex in Table 3.8, there were no comparable testing data to calculate detection rates among the different age groups and so these findings should be interpreted with caution.

Table 3.9
Confirmed positive drug detections by age group, 2009

Age Group (yrs)	Metro	Rural	Total
16-19	27	9	36
20-24	90	28	118
25-29	100	41	141
30-39	274	86	360
40-49	189	60	249
50-59	34	14	48
60 +	0	1	1
Total	714	239	953

3.2.2 Detection rates

Drug detection rates provide an estimate of the effectiveness of roadside drug testing. Detection rates, based on the number of drivers detected with an illegal drug per thousand tested, are presented in Table 3.10. In 2009, approximately 22 drivers per 1000 tested were confirmed positive for the illicit drugs tested, a level that is slightly higher than the previous year. There was little variation in the detection rate in metropolitan and rural areas.

Table 3.10
Confirmed positive drug detection rates (per 1,000 tested) in South Australia, 2007-2009

Year	Metro		Rural		Total	
	No. of detections	Detection rate	No. of detections	Detection rate	No. of detections	Detection rate
2007	236	24.2	59	22.9	295	23.9
2008	447	21.8	105	19.5	552	21.3
2009	714	22.0	239	21.3	953	21.8

DETECTION RATES BY DAY OF WEEK

Table 3.11 shows that drug detection rates were highest on Fridays and lowest on Mondays. In metropolitan areas Friday was the only day with a much higher detection rate than other days while in rural areas both Thursday and Friday had a much higher detection rate than other days of the week.

Table 3.11
Confirmed positive drug detections per 1,000 tests by day of week, 2009

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Metro	15.8	18.2	25.4	21.7	35.5	21.4	18.4
Rural	18.8	20.3	19.1	29.7	30.9	14.8	17.8
Total	16.6	18.6	24.1	23.8	34.0	19.6	18.2

DETECTION RATES BY MONTH

The distribution of drug detection rates by month is displayed in Table 3.12. The detection rate was highest in January and lowest during the last two months of the year. In metropolitan areas March, July and August also stood out as having higher detection rates than the other months. Detection rates by month in rural areas are variable due to the small number of tests and detections.

Table 3.12
Confirmed positive drug detections per 1,000 tested by month of year, 2009

Month	Metro	Rural	Total
Jan	39.2	26.5	35.7
Feb	18.9	27.3	20.9
Mar	30.2	16.9	27.0
Apr	18.6	22.8	19.5
May	18.1	25.1	20.6
Jun	18.9	40.3	26.3
Jul	33.7	5.4	27.5
Aug	26.0	31.3	27.4
Sep	17.7	22.4	18.6
Oct	19.3	17.8	19.0
Nov	19.2	10.8	15.9
Dec	13.2	12.0	13.0
Total	22.0	21.3	21.8

3.2.3 Interstate Comparison

The detection rates in the Australian jurisdictions that conducted drug testing in 2009 are shown in Table 3.13. The detection rate in South Australia was comparable to most other states (i.e. midrange) with the exception of Tasmania. Tasmania's very high detection rate is most likely a result of data collection issues with negative tests and less randomness in testing.

Table 3.13
Confirmed positive drug detections and detection rates (per 1,000 tested) in Australian jurisdictions in 2009

Jurisdiction	Total Positives	Detection rate
South Australia	953	21.8
New South Wales	480	19.3
Queensland	253	20.1
Tasmania	219	430.3
Victoria	298	10.7
Western Australia	287	38.1

3.2.4 Drug driving in fatal crashes

The number of drivers and motorcycle riders testing positive for illegal drugs in road crashes can also be used as a measure of the effectiveness of roadside drug testing. If motorists were deterred from drug driving, the percentage of crash involved drivers with a positive drug test would be expected to decrease. Positive drug test results for fatally injured drivers from 2005 to 2009 are presented in Table 3.14. Note that drug test data for drivers seriously injured in a crash are not reported due to difficulties with obtaining the data and matching records. A positive result means that a driver has been detected with one or a combination of the three prescribed drugs tested for in random drug testing: methylamphetamine, THC or MDMA.

Similar to BAC levels, positive drug test results are derived from the analysis of blood and are acquired directly from forensic toxicology reports. Drug results are entered into the TARS crash database, manually matched to fatal crashes by name and age of driver, and date of crash. Table 3.14 shows that, for the first time, all drivers killed in a fatal crash were tested for the presence of drugs. In 2009, 22 per cent of drivers who were fatally injured tested positive for drugs. This proportion was similar to previous years.

Table 3.14
Drug test results of fatally injured drivers and riders by location, 2005-2009

	Number of positives			% of tested	Number	
Year	Metro	Rural	Total	positive	tested	Total fatalities
2005	10	8	18	24.3	74	92
2006	9	8	17	23.6	72	80
2007	3	11	14	25.0	56	66
2008	6	5	11	19.6	56	61
2009	5	12	17	22.1	77	77

Table 3.15 shows that for the five-year period from 2005 to 2009, the majority of fatally injured drivers who tested positive for drugs were male, although the percentage that were male was reduced in 2009 compared to the previous four years.

Table 3.15
Drug test results of fatally injured drivers and riders by sex, 2005-2009

	Males		Females			
		% of no.		% of no.	Number	
Year	N	tested	N	tested	tested	Total fatalities
2005	17	94.4	1	5.6	74	92
2006	17	100.0	0	0.0	72	80
2007	14	100.0	0	0.0	56	66
2008	10	90.9	1	9.1	56	61
2009	14	82.4	3	17.6	77	77

3.3 Anti-drug driving publicity

Publicity campaigns addressing drug driving in 2009 included a new 'Mythbusters' campaign and a continuation of the 'If you do drugs and drive you will get caught. That's the reality' campaign. The latter campaign aimed to make people aware that the police have the technology to detect cannabis, ecstasy, and speed, and are targeting drug driving. The campaign also aimed to increase people's understanding of the negative effects of drugs on driving ability and to encourage people to believe that if they take drugs and drive they will be caught by the police.

The campaign targeted people aged 20 to 40 years old, with a particular emphasis on males. Advertisements were aired on the television and radio, and were printed on full bus backs and street magazines. The campaign was run for four weeks at a time starting from the beginning of February and early May. The television and radio commercials emphasised the distorted sense of reality associated with drug use and then closed with the reality of getting caught by the police. The print advertisements in magazines were from a drug driver's perspective demonstrating the effects of cannabis, ecstasy, and speed and also concluded with the driver being caught.

The new ‘Mythbusters’ campaign for 2009 attempted to address myths associated with marijuana, speed, and ecstasy use that may lead to drivers believing it is safe to drive under the influence of these drugs. The campaign slogan was “So you think you’re ok to drive on drugs?”. The campaign aimed to raise awareness of the negative impact of drugs on driving ability in order to increase drug drivers’ consideration of this effect before driving under the influence, and in turn use of alternatives to drug driving.

The target audience of the campaign was 20 to 40 year olds, with more emphasis on males than females. The campaign was run for four weeks from the beginning of October. Advertisements appeared on the television, radio, in posters, street magazines and online. The television commercials made a comparison between the act of driving while under the influence of drugs with other tasks where sobriety is considered important. The advertisements portrayed a surgeon under the influence of marijuana preparing to operate, a bus driver about to drive after taking ecstasy, and a pilot taking speed when preparing to take flight, all of whom made obviously ridiculous claims that they would be able to safely perform their tasks. These scenarios were then related back to a drug driver. The radio advertisements were aired especially on youth radio stations and included the pilot and surgeon scenarios. The posters were displayed in the bathrooms of pubs and nightclubs.

4 Speeding

This section explores performance indicators for speed enforcement. Current speed enforcement methods of operation are discussed, followed by an examination of the number of drivers being detected for speed offences. Next, the two primary outcome measures for speed enforcement are investigated: changes in speed-related crashes and covertly measured on-road vehicle speed distributions. Finally, anti-speeding campaigns operating in 2009 are described.

4.1 Speed enforcement practices and levels of operation

Effective speed enforcement is necessary to create high levels of specific deterrence (through high levels of apprehension and punishment) and general deterrence (through the belief in the high likelihood of encountering enforcement). Current theories of speed management in Australia argue that balanced methods of covert and overt, and fixed/static and mobile enforcement are required to deter motorists, both specifically and generally (McInerney, *et al*, 2001; Wundersitz *et al*, 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).

The effectiveness of different speed enforcement programs can vary with the road environment in which they operate. Research evidence suggests that the covert operation of mobile speed cameras reduces casualty crash frequency on arterial roads in metropolitan areas and country towns, and to a lesser extent, on highways in rural areas (Cameron & Delaney, 2006). Hand-held laser guns have been found to reduce casualty crash frequency (but not crash severity) on arterial roads in metropolitan Melbourne (Fitzharris *et al.*, 1999) while mobile radar devices have been found to reduce casualty crashes on rural roads (Goldenbeld & Van Schagen, 2005). Fixed speed cameras have been shown to reduce casualty crashes in black spot areas (e.g. Gains *et al.*, 2003) and reduce travelling speeds on rural freeways (Retting et al., 2008).

Speed cameras (including dual purpose red light cameras) and non-camera operations (i.e., 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 Intelligence Section of 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 speed cameras are currently operated by the Traffic Camera Unit that is under the command of the Traffic Support Branch. There were 18 mobile speed cameras available for use in 2008 and they were expected to operate for a target of 3,060 hours per month. Two cameras were deployed in rural areas each week. The speed cameras operate from unmarked vehicles to give some degree of anonymity and covertness to the operations. To enhance general deterrence effects, prior to the 6th of July, 2009, signs could be placed after the location to advise that a camera has been passed . This policy was changed due to physical violence against camera operators and the signs were no longer displayed.

It has been argued (e.g. Rothengatter, 1990) that automatic speed detection devices such as speed cameras, provide no immediate punishment (i.e., the fine arrives in the mail), and consequently reduce the potential deterrent effect of the enforcement. However, the literature suggests that the most important aspect of punishment as a deterrent is the *certainty* of detection, rather than severity or immediacy of sanctions (Homel, 1988; Pogarsky, 2002). Automatic devices that do not cease operating while a 'ticket' is being written better achieve this certainty of punishment.

Each day, a list of camera locations 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 speeding-related complaints and locations that are known for high levels 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.

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 2003. Information provided by SAPOL indicates that at the beginning of 2009 there were 72 dual purpose red light/speed cameras: 65 in the metropolitan area and 7 in rural regions.

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 issued a fine. Mobile and hand held radars are used more frequently on open roads, with few operating in the metropolitan area. The numbers of non-camera detection devices used in metropolitan and rural areas during 2009 are summarised in Table 4.1. The number of lasers increased slightly in 2009 (there were two additional devices). Mobile radars remained the most common form of non-camera speed detection devices in South Australia.

Table 4.1
Non-camera detection devices used in South Australia, 2009

Non-camera detection devices	Metro	Rural	Total
Lasers	63	103	166
Mobile Radars	0	219	219
Handheld Radars	0	36	36

The coordination of police operated speed detection is managed by SAPOL 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 instrument, per shift. The State Coordination Group Traffic sets speed detection targets. 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 by the local knowledge of patrol officers and 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 spend a significant amount of time on speed detection activity.

4.1.1 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 2005 to 2009, is depicted in Figure 4.1. The location of the speed detection device determines whether speed detection hours are recorded as metropolitan or rural.

In 2009, the total number of speed detection hours for South Australia decreased by approximately eight per cent. The decrease in speed detection hours was confined to metropolitan areas (19.8%) while rural speed detection hours increased (2%). Note that the hours of operation of dual purpose red light cameras were unavailable and so are not included here, or in any of the following tables.

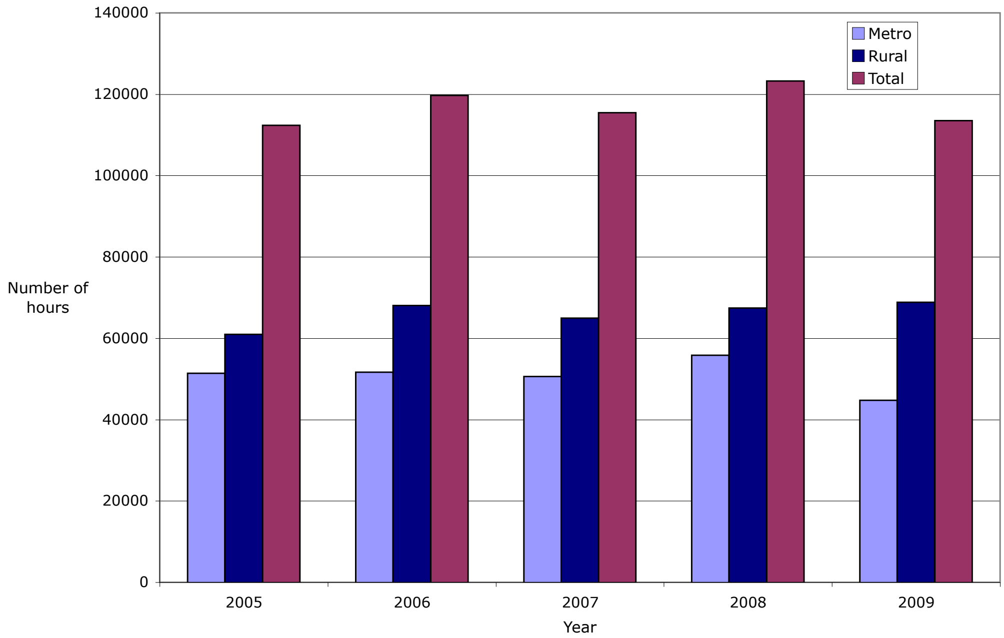

Figure 4.1
Number of speed detection hours in South Australia, 2005-2009

Table 4.2 summarises the hours spent on speed detection for speed cameras only, from 2005 to 2009 in metropolitan and rural areas. Speed cameras were used predominantly in the metropolitan area. The numbers of hours for speed camera operation have remained relatively stable over the past four years. In 2009, the number of hours was slightly increased relative to the previous year. The total exceeds the target number of speed camera detection hours (36,720). While a slight decrease was recorded in the metropolitan area (4%) the number of hours in rural regions increased considerably (34%).

Table 4.2
Number of hours for speed detections by speed cameras in South Australia, 2005-2009

Year	Camera			% difference from previous year
	Metro	Rural	Total	
2005	25,353	4,680	30,030	22.0
2006	31,103	8,674	39,777	32.5
2007	28,937	9,609	38,546	-3.1
2008	30,051	8,421	38,472	-0.2
2009	28,898	11,275	40,173	4.4

In contrast to speed cameras, non-camera devices were used more widely in rural areas (see Table 4.3). Non-camera devices include laser guns, mobile radar and handheld radar. The total number of non-camera hours decreased by 13.4 per cent in 2009 to the lowest levels seen in the period shown in Table 4.3. A decrease in hours was reported in the rural regions (2.5%) and the metropolitan area (38.5%).

Table 4.3
Number of hours for speed detections by non-camera devices in South Australia, 2005-2009

Year	Non-Camera			% difference from previous year
	Metro	Rural	Total	
2005	26,021	56,261	82,282	66.1
2006	20,556	59,373	79,929	-2.9
2007	21,637	55,316	76,953	-3.7
2008	25,739	59,025	84,764	10.2
2009	15,824	57,545	73,369	-13.4

DAY OF WEEK

The number of hours spent on speed detection from 2005 to 2009 by day of week is presented in Table 4.4 for speed cameras and in Table 4.5 for non-speed camera devices. Speed detection hours are given in terms of the percentage of all hours undertaken in a year. For both methods of speed detection, the number of hours were spread evenly throughout the week and were relatively consistent from year to year.

Table 4.4
Number of speed detection hours for speed cameras by day of week, 2005-2009
(expressed as a percentage of total hours each year)

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total (%)
2005	14.1	14.7	14.6	14.8	14.3	14.8	12.7	100
2006	13.6	14.1	14.6	15.2	15.0	14.2	13.2	100
2007	14.1	14.1	14.8	14.6	14.8	14.6	13.1	100
2008	13.8	14.6	14.9	14.7	14.1	14.5	13.5	100
2009	13.3	13.9	15.3	15.2	14.2	14.8	13.2	100

Table 4.5
Number of speed detection hours for non-camera devices by day of week, 2005-2009
(expressed as a percentage of total hours each year)

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total (%)
2005	14.4	12.4	11.8	14.4	15.5	16.2	15.2	100
2006	14.1	14.0	13.5	14.8	15.7	14.4	13.5	100
2007	14.1	13.7	14.6	14.5	15.4	14.1	13.6	100
2008	14.0	14.0	14.8	14.8	15.8	13.7	12.9	100
2009	14.7	13.2	13.8	15.3	16.1	13.4	13.4	100

TIME OF DAY

Figure 4.2 displays the speed detection hours (expressed as a percentage of the total hours each year) for all speed detection devices by the time of day, for 2009 and the five year average from 2004 to 2008. 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. There is a noticeable dip in the distribution of detection hours between 12 and 2pm compared to other times of the day. During 2009 there was a lower proportion of detection hours at night from 8pm to midnight compared to the previous five years and an increase in the proportion of speed detection hours between 6am and 8am.

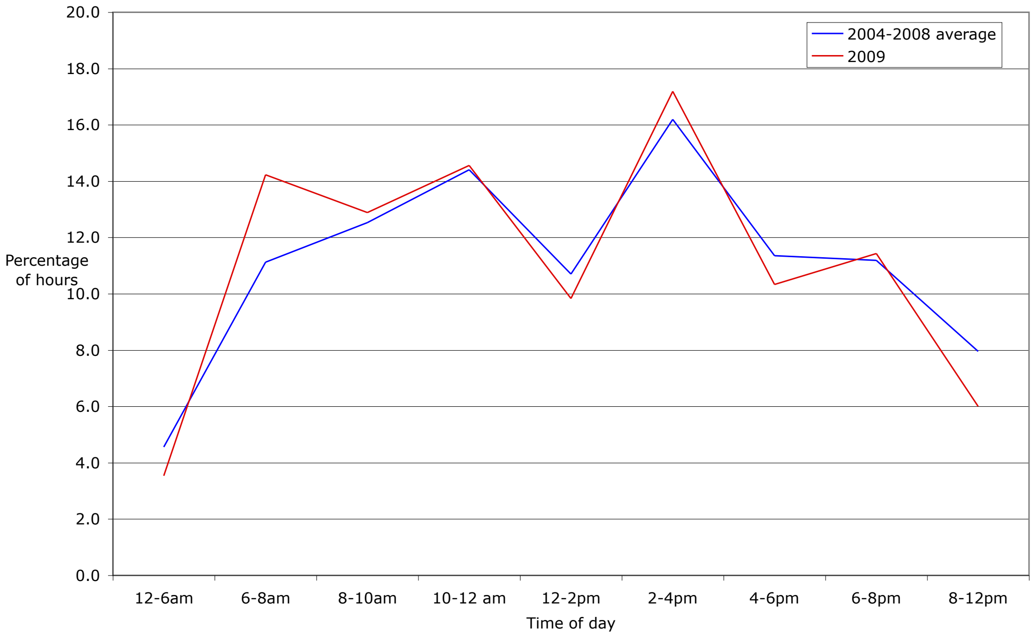

Figure 4.2
Hours spent on speed detection in South Australia by time of day

The distribution of hours spent on speed detection by time of day is presented separately for speed cameras (Table 4.6) and for non-camera devices (Table 4.7). In 2009, the distribution of speed camera hours by time of day was comparable to that in previous years. Speed cameras were operated most frequently during the hours before and after school (i.e. 6 – 8am and 2 – 4pm) and from 6 to 8 pm. They were operated least frequently at night and in the early hours of the morning (8pm – 6am), and between 12 and 2pm.

Table 4.6
Number of speed detection hours for speed cameras by time of day, 2005-2009
(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
2005	0.4	21.5	9.4	15.0	3.1	24.4	7.9	16.1	2.1
2006	0.1	24.2	6.8	17.7	2.2	25.0	4.3	19.0	0.6
2007	<0.0	26.0	7.9	15.0	1.9	25.7	5.4	17.8	0.4
2008	0.1	24.5	8.6	13.5	1.7	27.1	5.6	18.5	0.7
2009	<0.0	26.6	8.0	14.9	1.7	25.5	5.8	17.1	0.4

Non-camera devices were operated predominantly from 8am to 6pm. The pattern of non-camera speed detection hours resembled that of the previous year. Relative to camera operations, non-camera devices were more frequently operated at night and in the early hours of the morning (8pm-6am), and between 12 and 2pm. Non-camera devices were used less frequently between 6 and 8am, as well as 2 and 4pm, compared to speed cameras.

Table 4.7
Number of speed detection hours for non-camera devices by time of day, 2005-2009
(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
2005	7.2	5.5	13.1	14.7	14.4	11.9	12.4	8.7	12.1
2006	6.3	6.4	15.1	16.3	15.2	12.7	12.0	7.5	8.4
2007	6.1	6.0	15.3	14.9	14.7	11.9	13.4	8.6	9.1
2008	5.5	6.4	15.9	13.6	14.3	12.1	14.0	8.6	9.6
2009	5.5	7.4	15.6	14.4	14.3	12.7	12.8	8.3	9.1

DETECTION HOURS BY MONTH

Table 4.8 shows the distribution of speed detection hours by month for speed camera and non-camera devices in 2008 and 2009. Both speed camera and non-camera devices were operated relatively evenly throughout 2009. Note that the target of 3,060 hours of detection per month for speed cameras was not met in December only.

Table 4.8
Number of speed detection hours by month for speed cameras and non-camera devices in 2008 and 2009 (expressed as a percentage of total hours each year)

Month	2008			2009		
	Camera	Non-cam	Total	Camera	Non-cam	Total
Jan	9.8	9.3	9.4	8.5	9.1	8.9
Feb	8.4	8.8	8.7	8.1	8.3	8.3
Mar	9.2	10.3	9.9	8.3	9.5	9.1
Apr	8.6	7.4	7.8	8.6	10.1	9.5
May	8.6	6.8	7.4	9.1	7.8	8.3
Jun	7.8	7.0	7.3	9.2	6.6	7.5
Jul	7.4	7.1	7.2	8.6	7.9	8.2
Aug	8.2	8.9	8.6	9.0	8.6	8.7
Sep	7.9	8.7	8.4	7.7	8.2	8.0
Oct	7.4	8.6	8.2	7.7	7.9	7.8
Nov	7.4	8.1	7.9	7.8	7.5	7.6
Dec	9.2	9.1	9.1	7.5	8.4	8.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

4.2 Levels of speeding

4.2.1 Number of speed detections

Table 4.9 presents the numbers of speed detections, by speed cameras and non-cameras, in South Australia for the years 2005 to 2009. Inspection of the number of speed detections divided by the number of licensed drivers in South Australia indicates that approximately 31 per cent of licensed drivers were detected for a speeding offence in 2009. Note that a new database was used to extract the number of licensed drivers in 2006. Consequently, the percentage of detected licensed drivers for 2005 is not directly comparable with the following years. It should also be noted that for half of October, 2009 new digital speed cameras were trialled, resulting in operation hours being logged but no detections being recorded.

The total number of detections decreased by 17 per cent in 2009. Speed camera detections decreased (13%), as did non-camera detections (14%) and dual purpose camera detections (28%). The trial of new speed cameras in October contributed to approximately 3.5 per cent of the 13 per cent reduction in speed camera detections

As noted in Section 4.1.1, the number of hours of operation of non-camera devices was greater than the number of hours of operation of conventional speed cameras but the number of drivers detected by non-camera devices was less than a quarter of the number detected by 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 passing vehicles whereas the operator of non-camera devices selects which vehicles' speeds will be checked. Note also that non-camera devices are used more in rural areas that are characterised by lower levels of traffic density.

Table 4.9
Number and percentage of licensed drivers detected speeding in South Australia, 2005-2009

Year	Number of speed camera detections	Number of red light speed camera detections	Number of non-camera detections	Total number of detections	Number of licensed drivers	% of licensed drivers detected
2005	84,565	51,038	48,171	183,774	1,093,550 [a]	16.8
2006	137,370	67,255	46,966	251,591	1,042,774 [b]	24.1
2007	180,866	100,563	44,805	326,234	1,073,103 [b]	30.4
2008	258,198	119,407	48,795	426,400	1,085,503 [b]	39.3
2009	225,732	85,911	42,036	353,679	1,126,847 [b]	31.4

Note. Licence information could only be extracted for the financial year to June 30.

[a] Source: DRIVERS database, Registration and Licensing Section, DTEI

[b] Source: TRUMPS database, Registration and Licensing Section, DTEI

4.2.2 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. It should be noted that on 1 October 2007 there was a reduction in the speed limit tolerance applied to detections of violations using speed cameras. That is, motorists could be detected as speeding for exceeding the speed limit by a smaller minimum amount than previously. This new tolerance was used throughout 2008 and 2009. It should also noted that the issue with the October data discussed in Section 4.2.1 meant that all October data was excluded when calculating overall detection rates.

In this section, speeding detection rates are defined as the number of drivers detected for speeding per hour of enforcement. Table 4.10 summarises speeding detection rates for camera and non-camera devices for metropolitan and rural areas, for the years 2005 to 2009. If the speeding detection rate is interpreted as the level of speeding behaviour, the results suggest that speeding has decreased (by 6%) in 2009 but has doubled since 2005.

The overall decrease in the speed camera detection rate in 2009 of 13 per cent was comprised of decreases in both metropolitan (12%) and rural areas (1%). This represents the first drop in the speed camera detection rate over the time period shown. The non-speed camera detection rate remained stable at a relatively low level, similar to previous years.

As noted previously, the main reason for this greater detection rate of speed cameras is likely to be their greater efficiency. Speed cameras continuously check speeds of all vehicles and deliver automated punishment via the mail. In comparison, non-camera devices are not capable of checking the speeds of all passing vehicles and it takes time (at least five minutes) for police to pull over and charge speeding offenders when operating these devices.

The metropolitan area reported higher detection rates than rural regions for both methods of detection. The greater volume of traffic in the metropolitan area is probably responsible for the higher detection rate rather than a greater prevalence of speeding. Detection rates based on traffic volumes are examined in Section 4.2.3. Note that the overall difference in detection rates between cameras and non-camera devices may also be partly attributable to the greater number of speed cameras in the metropolitan area, where traffic volumes are much greater.

Table 4.10
Speeding detection rates, 2005-2009 (number of drivers detected speeding per hour)

Year	Camera			Non-Camera			Overall
	Metro	Rural	Total	Metro	Rural	Total	Total
2005	2.99	1.88	2.82	0.93	0.43	0.59	1.18
2006	3.72	2.50	3.45	1.11	0.41	0.59	1.54
2007	5.13	3.37	4.69	0.93	0.45	0.58	1.95
2008	7.39	4.30	6.71	0.92	0.43	0.58	2.49
2009[a]	6.49	4.24	5.86	1.11	0.43	0.57	2.35

[a] Data for October excluded due to new speed camera trial

DAY OF WEEK

The following tables show detection rates per hour and have been separated by detection method because of the differences in detection rates noted above. Table 4.11 shows that during 2009, speed camera detection rates were spread relatively evenly throughout the week, although Saturday and Sunday had slightly higher detection rates. Speed camera detection rates were at their lowest from Tuesday to Wednesday. Rates per day were lower in 2009 compared to 2008, reflecting the overall decrease noted in Table 4.10.

Table 4.11
Speeding detection rates per hour for speed cameras by day of week, 2005-2009

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun
2005	2.73	2.58	2.33	2.73	2.86	3.10	3.46
2006	3.24	3.37	3.27	3.53	3.63	3.93	3.15
2007	4.16	4.44	4.18	4.72	5.18	5.43	4.70
2008	6.88	6.39	6.14	6.23	7.23	7.70	6.44
2009	5.54	5.07	5.00	5.59	5.69	5.97	6.54

Detection rates for non-camera devices by day of the week from 2005 to 2009 are shown in Table 4.12. Similar to previous years, 2009 detection rates were very consistent across the days of the week.

Table 4.12
Speeding detection rates per hour for non-camera devices by day of week, 2005-2009

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun
2005	0.58	0.59	0.57	0.58	0.57	0.57	0.63
2006	0.60	0.57	0.58	0.57	0.56	0.60	0.64
2007	0.58	0.58	0.57	0.56	0.59	0.57	0.62
2008	0.59	0.59	0.55	0.56	0.56	0.57	0.63
2009	0.58	0.59	0.56	0.53	0.55	0.57	0.64

Table 4.13 shows the total detections for dual purpose red light/speed cameras by day of week from 2005 to 2009 (detections per hour could not be calculated). In 2005 and 2006, motorists were much more likely to be detected speeding by red light cameras on weekdays than during the weekend although there were a large number of detections for which day of week was unknown. In contrast, from 2007 onwards there were more red light camera speed detections on weekends than weekdays. Note that detection data are difficult to interpret without data for hours of operation.

Table 4.13
Speeding detections for red light/speed cameras by day of week, 2005-2009

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun
2005	7,691	7,974	8,024	8,339	7,467	756	18
2006[a]	10,879	10,675	10,661	10,959	9,521	942	33
2007	12,923	12,609	12,708	12,796	13,637	18,212	17,678
2008	15,793	14,469	14,861	15,327	16,184	21,322	21,451
2009	10,954	10,225	10,554	10,829	11,273	16,179	15,897

[a] Day of week was unknown for 10,769 red light/speed detections

TIME OF DAY

The speeding detection rates for speed cameras by time of day from 2005 to 2009 are presented in Table 4.14. The after school hours of 2-4pm had a higher detection rate than other times while the hours of 6pm to midnight had a lower detection rate. The low number of hours of operation during the early morning may contribute to highly variable detection levels at this time from year to year.

Table 4.14
Speeding detection rates per hour for speed cameras by time of day, 2005-2009

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
2005	1.26	3.08	3.30	2.99	2.54	3.37	2.84	1.47	1.26
2006	1.41	3.42	3.21	3.40	3.27	4.82	3.11	2.00	1.64
2007	9.75	4.83	4.17	4.35	3.71	6.54	4.05	2.65	3.54
2008	7.43	7.27	5.64	6.14	5.00	9.23	6.21	3.64	6.32
2009	4.07	6.14	5.23	5.10	4.61	7.62	4.64	2.97	2.88

Table 4.15 shows the speeding detection rates for non-camera devices by time of day for the years 2005 to 2009. In 2009 detection rates with non-camera devices were relatively evenly spread across the hours of the day.

Table 4.15
Speeding detection rates per hour for non-camera devices by time of day, 2005-2009

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
2005	0.35	0.66	0.67	0.59	0.57	0.52	0.72	0.58	0.54
2006	0.35	0.59	0.61	0.59	0.54	0.56	0.73	0.62	0.62
2007	0.36	0.58	0.63	0.59	0.55	0.54	0.72	0.56	0.56
2008	0.81	0.59	0.63	0.59	0.56	0.56	0.72	0.56	0.82
2009	0.33	0.58	0.65	0.62	0.56	0.53	0.69	0.52	0.46

The numbers of speeding detections for red light cameras by time of day from 2005 to 2009 are presented in Table 4.16. Detections were highest during the day between 10am and 4pm but these numbers are difficult to interpret without data for hours of operation.

Table 4.16
Speeding detections for red light/speed cameras by time of day, 2005-2009

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
2005	7,308	4,974	5,099	5,492	5,831	5,782	5,018	5,043	6,491
2006	7,540	5,860	7,022	8,470	9,038	8,343	7,065	6,344	7,567
2007	11,707	8,891	10,178	12,192	13,204	12,741	10,972	9,249	11,429
2008	12,286	10,043	12,420	14,538	15,756	15,252	13,656	12,142	13,314
2009	8,336	7,755	9,230	11,067	11,552	11,208	9,730	8,285	8,748

DETECTION RATES BY MONTH

The speeding detection rates by month for speed cameras and non-camera devices for 2008 and 2009 are shown in Table 4.17. Speed camera detection rates on average have reduced in 2009 compared to 2008. Of particular note is the much lower speed camera detection rate in October. This is the result of the trial of new speed cameras during a portion of October, as discussed in Section 4.2.1.

Table 4.17
Speeding detection rates per hour by month
for speed cameras and non-camera devices, 2008 and 2009

Month	2008			2009		
	Camera	Non-cam	Total	Camera	Non-cam	Total
Jan	7.32	0.59	2.77	7.13	0.56	2.77
Feb	7.29	0.61	2.64	6.39	0.63	2.60
Mar	7.18	0.63	2.53	6.66	0.64	2.59
Apr	6.54	0.56	2.62	5.79	0.60	2.25
May	5.87	0.53	2.47	5.01	0.55	2.28
Jun	6.19	0.55	2.45	5.28	0.53	2.59
Jul	7.27	0.54	2.71	5.13	0.54	2.25
Aug	6.35	0.54	2.26	5.92	0.59	2.54
Sep	7.18	0.60	2.52	5.48	0.62	2.27
Oct	7.04	0.57	2.40	2.70	0.60	1.32
Nov	6.18	0.56	2.20	5.51	0.47	2.31
Dec	6.06	0.59	2.31	6.44	0.50	2.44
Total	6.71	0.58	2.49	5.62	0.57	2.36

4.2.3 Speed camera detection rates per 1,000 vehicles passing

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 with low volume rural roads. Speed cameras record the actual number of vehicles passing each camera detection point. To determine whether the higher detection rates in metropolitan areas may be attributed to greater traffic volumes, in this section speed detection rates are calculated based on the number of speeding vehicles per 1,000 vehicles recorded passing the detection point. Equivalent data were not available for non-speed camera devices.

Speeding detection rates per 1,000 vehicles passing a speed camera for the years 2005 to 2009 are shown in Table 4.18. Consistent with detection rates per hour of speed enforcement, detection rates per 1,000 vehicles passing decreased in 2009 by five per cent. This was comprised of an eight per cent decrease in the metropolitan area and one per cent increase in rural areas.

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 lower traffic volumes in rural areas allowing for a greater opportunity for drivers to freely choose their own travelling speed or a lower perceived risk of being detected.

Table 4.18
Number of vehicles passing speed cameras and speeding detection rates (per 1,000 vehicles passing), 2005-2009

Year	Metro		Rural		Total detection rate
	No. of vehicles	Detection rate	No. of vehicles	Detection rate	
2005	9,847,889	7.69	792,058	11.13	7.95
2006	12,094,519	9.57	1,342,133	16.14	10.22
2007	12,018,107	12.35	1,603,790	20.22	13.28
2008	10,528,044	21.09	1,336,892	27.07	21.76
2009[a]	8,889,877	19.48	1,614,637	27.39	20.70

[a] Data for October excluded due to new speed camera trial

Speeding detection rates per 1,000 vehicles passing by day of week and time of day for speed cameras in the years 2005 to 2009 are shown in Table 4.19 and Table 4.20 respectively. In 2009, higher speeding detection rates were recorded on weekends, a finding generally consistent with previous years. With respect to the time of day, the detection rate per 1,000 vehicles passing varied considerably. Detection rates were quite high from midnight to 6am, similar to the previous two years. Note that in these early hours of the morning, speed cameras operated for a short period of time in metropolitan areas only. The detection rate was also moderately high from 12 to 2pm.

Table 4.19
Speeding detection rates for speed cameras (per 1,000 vehicles passing) by day of week, 2005-2009

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun
2005	7.63	6.94	6.65	7.72	7.49	9.07	10.84
2006	9.60	9.33	9.54	9.57	9.90	12.95	11.48
2007	11.66	12.07	11.08	12.48	12.95	18.60	15.94
2008	22.28	19.60	17.86	19.66	21.59	29.02	24.88
2009	18.55	18.45	15.96	19.48	20.25	22.30	25.84

*Data unavailable but rates calculated using data for other variables

Table 4.20
Speeding detection rates for speed cameras (per 1,000 vehicles passing) by time of day, 2005-2009

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
2005	10.27	8.99	10.15	7.50	8.60	7.59	7.65	6.12	6.52
2006	6.97	10.21	12.21	9.40	15.38	10.66	9.92	9.03	9.57
2007	90.59	13.72	16.63	11.22	18.97	14.13	13.22	10.71	16.05
2008	81.70	22.84	23.26	17.21	22.60	24.68	23.62	16.39	25.64
2009	62.98	21.29	21.45	16.00	29.25	22.32	18.88	14.67	17.71

*Data unavailable but rates calculated using data for other variables

Figure 4.3 shows speed detection rates per 1,000 vehicles passing by month of the year for the years 2005 to 2009. There is no discernable pattern across the five years. Consistent with detection rates per hour, the detection rate in 2009 remained at the higher level first observed in October 2007, when the speeding tolerance was reduced for all speed cameras. Note that the detection rate for October, 2009 has not been included due to the trial of new speed cameras discussed in Section 4.2.1.

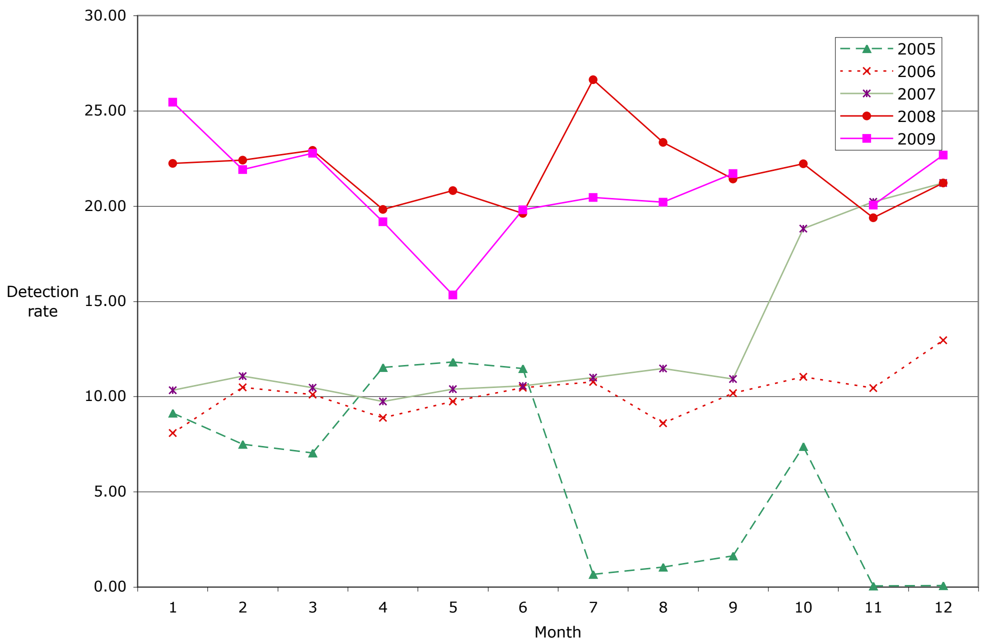

Figure 4.3
Speed camera detection rate (per 1,000 vehicles passing) in South Australia by month, 2005–2009

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

The effectiveness of speed enforcement may be estimated by the involvement of speed as a factor in crashes, however reliable data in sufficient numbers is not readily available. In the DTEI 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. In a multiple vehicle crash only one driver is assigned an apparent error. One of these possible apparent errors is 'excessive speed'. Drivers do not typically readily admit to police that they were travelling at an excessive speed at the time of the crash. This means that crash-involved vehicles will only be classified with an apparent error of 'excessive speed' when there are reliable witnesses to excessive speed or when excessive speed is clearly indicated by vehicle damage or tyre marks. The apparent error of 'excessive speed' is therefore an underestimate of speeding in crashes and probably represents only cases of very high speeding rather than speeding in general. Fatal crashes involving more than one vehicle are usually investigated to a greater extent (i.e. by specially trained police) than less severe crashes. However, illegal speed is still unlikely to be listed as the sole apparent error unless it is clearly excessive and considered to be more important than other factors.

'Excessive speed' was listed as the major driver error in approximately seven per cent of fatal crashes and 0.9 per cent of serious injury crashes in 2009. The small number of fatal crashes and the issues mentioned above make it hard to draw any real conclusions about the involvement of speed in these crashes. In any case, these are likely to be underestimates of the percentage of speed related crashes.

Given that the involvement of speeding in crashes cannot be determined directly from police crash records, the NSW Roads and Traffic Authority developed a set of criteria for determining whether or not a crash is considered as having involved speed as a contributing factor (NSW Centre for Road Safety, 2008). Using the NSW Road Traffic Authority definition[1], DTEI determined that 42 per cent of fatal crashes in 2009 could be considered as involving speed as a contributing factor. Given that this is based upon a small number of crashes (only fatal crashes) and that it is has been questioned if this method has sufficient scientific basis (Diamantopoulou et al. 2003), little weight should be placed on the exact percentage. What can be interpreted from this data is that speed remains an important factor in fatal crashes in South Australia. It can also be used to look at trends within the data. The majority of the drivers deemed at fault in these speed related crashes were male (82%). Over two thirds (68%) of these crashes occurred in rural areas.

4.2.5 On-road speed surveys

Speed monitoring independent of enforcement activities provides an indication of what travelling speeds motorists are adopting on the road network. This is of critical importance if we are to determine if our current approach to speed countermeasures is effective. As mentioned in previous reports, the systematic monitoring of speeds is not widespread in Australia.

A systematic and ongoing method of measuring vehicle speeds was introduced in South Australia in 2007 to assess the effects of speed reduction countermeasures and to monitor the speed behaviour of South Australian motorists over time. The collection of speed data at 130 sites (includes sites with historical measurements and new sites) is described by Kloeden and Woolley (in press) in the CASR report “Vehicle speeds in South Australia 2009”. Speed data were collected for one week in 2009 at each of the selected sites and summary speed statistics and speed distributions were analysed for each of the road types surveyed. Sites were located in metropolitan Adelaide and in rural regions.

To summarise the Kloeden and Woolley (in press) report, in 2009 there were no statistically significant changes to the mean speeds of vehicles in South Australia. However, the percentage of vehicles travelling at speeds more than five, 10 and 15 km/h above the speed limit has reduced significantly on arterial roads in Adelaide. This change was not observed in rural areas. For further details, see the full report.

4.3 Anti-speeding publicity

An anti-speeding publicity campaign developed in 2008 known as ‘Creepers’ was continued in 2009. This campaign targeted low level speeding. The main objectives of the campaign included catching the attention of drivers who speed at low levels in order to make them aware that they were being targeted. Additionally, the campaign was aimed at making drivers aware that driving slightly above the speed limit is still speeding, that this activity is not harmless, and to encourage low level speeders to drive at or below the legal limit.

This campaign was designed to be viewed by all drivers yet had a particular focus on younger males (16 to 39 years old). The campaign was run in both metropolitan and regional

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[1] A motor vehicle is assessed as having been travelling at excessive speeding if it satisfies the conditions described below:
(a) The vehicle’s controller (driver or rider) was charged with a speeding offence; or the vehicle was described by police as travelling at excessive speed; or the stated speed of the vehicle was in excess of the speed limit.
(b) The vehicle was performing a manoeuvre characteristic of excessive speed, that is: while on a curve the vehicle jack-knifed, skidded, slid or the controller lost control; or the vehicle ran off the road while negotiating a bend or turning a corner and the controller was not distracted by something or disadvantaged by drowsiness or sudden illness and was not swerving to avoid another vehicle, animal or object and the vehicle did not suffer equipment failure.

SA and was conducted at the start of January, April, and August, running for four weeks each time. The campaign included television commercials, radio announcements, and advertisements on bus shelters, regional outdoor billboards, and bus backs.

5 Restraint use

The following section investigates the operations and effectiveness of restraint enforcement by examining restraint-related offences detected by police, restraint use in fatal and serious casualty crashes, on-road restraint use surveys, and publicity promoting restraint use.

5.1 Restraint enforcement practices and levels of operation

Vehicle occupant restraint (or seat belt) usage has been shown to be effective in reducing serious and fatal injuries in the event of a crash (ETSC, 1996). Restraint usage is strongly influenced by legal requirements and enforcement practices. South Australia introduced the legislation for the compulsory use of restraints 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). Long-term effects were observed when this so-called ‘blitz’ approach incorporated high levels of enforcement over a short period, usually one to four weeks, repeated several times a year.

Restraint enforcement is similar to speeding enforcement as it 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. On 1 March 2008, legislation came into effect making a driver of a vehicle legally responsible for the restraint use of all their passengers, regardless of age. Previously a driver was only legally responsible for the restraint use of passengers aged less than 16 years. The driver is responsible for ensuring that seat belts are available and fit for use.

Similar to previous years, no specific information was available on the hours spent by police exclusively targeting restraint use in 2009, although it is known that a corporate traffic operation ‘Belt Up’ specifically targeted restraint use in November. Consequently, this section will provide details of restraint offences, restraint use among vehicle occupants involved in road crashes, on-road survey results and advertising promoting the use of restraints.

5.2 Levels of restraint use

5.2.1 Restraint non-use offences

There are eight types of restraint-related offences. Table 5.1 displays the frequencies of these offences from 2005 to 2009. The last three offences listed are the driver’s responsibility by law. In 2009, there was a 10 per cent increase for the total number of restraint offences detected, resulting in the highest number of restraint offences detected in the past five years. Note that a passenger over 16 years of age can also incur an offence if unrestrained and so multiple offences can be generated from a single event.

Failure to wear a seat belt adjusted and fastened properly (driver) has been the most common restraint offence from 2005 to 2009. The offence of ‘failure to ensure passenger over 16 wears seatbelt’ that was only introduced in March, 2008 contributed 5.4 per cent of the total restraint offences. Over three per cent of offences in 2009 involved a failure to ensure that children under the age of 16 years were wearing seat belts. Some of the other restraint offence types may have included children, so it is likely that the true number of offences involving unrestrained children is higher. All types of restraint offences are aggregated in the subsequent tables.

Table 5.1
Restraint offences and detections, 2005-2009

Offence (%)	2005	2006	2007	2008	2009
Fail to wear seatbelt properly adjusted & fastened (driver)	85.4	85.6	84.3	77.0	74.8
Fail to wear seatbelt properly adjusted & fastened (passenger)	9.7	9.8	9.9	11.1	12.3
Fail to occupy seat fitted with a seatbelt	0.1	0.1	0.3	0.3	0.3
Sit in front row of seat when not permitted	0.0	<0.1	<0.1	<0.1	0.1
Fail to ensure front row passenger properly restrained	0.8	0.5	0.6	1.0	1.1
Fail to ensure child under 1 year restrained	0.6	0.5	0.7	0.6	0.5
Fail to ensure child under 16 wears seatbelt	3.4	3.5	3.9	2.5	2.7
Fail to ensure passenger over 16 wears seatbelt	-	-	-	4.6	5.4
Total (N)	9,555	10,758	9,346	11,810	12,969

Table 5.2 shows restraint offences detected in metropolitan and rural areas from 2005 to 2009. Note that there is an exceptionally large number of unknowns. This is because the data cleansing software is not able to read the suburb and, thus, it is not possible to determine the location of all offences. The number of unknowns in 2009 is much less than in 2008 but still represent an important proportion of offences. Consequently, the large number of unknowns makes it difficult to meaningfully compare 2009 data to those of previous years.

Table 5.2
Restraint offences detected by region, 2005-2009

Year	Metro		Rural		Unknown	Total restraint offences detected
	(N)	(%)	(N)	(%)	(N)	
2005	5,915	61.9	3,640	38.1	-	9,555
2006	6,514	73.8	2,307	26.2	1,937	10,758
2007	3,675	39.3	1,838	19.7	3,833	9,346
2008	6,777	57.4	2,577	21.8	2,442	11,810
2009	8,200	63.2	3,759	29.0	1,010	12,969

DAY OF WEEK

The distribution of restraint-related offences detected from 2005 to 2009 by day of week, in terms of the percentage of total offences detected each year, is displayed in Table 5.3. The offences were relatively evenly spread throughout the days of the week, the exception being Thursday which had a lower proportion of offences than other days of the week.

Table 5.3
Number of restraint offences detected by day of week, 2005-2009
(expressed as a percentage of total offences detected each year)

Year	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total (%)
2005	12.4	15.0	14.8	13.4	15.0	15.1	14.1	100
2006	15.4	15.8	15.5	15.7	13.9	12.9	10.8	100
2007	14.7	14.4	15.7	16.7	15.1	12.2	11.2	100
2008	14.9	14.5	15.3	16.3	15.0	13.4	10.6	100
2009	14.9	14.1	13.4	11.1	16.6	14.3	15.5	100

TIME OF DAY

In 2009, the distribution of restraint offence detections by time of day was similar to that in previous years (see Table 5.4). Restraint offences were detected most frequently during the day between the hours of 8am and 6pm.

Table 5.4
Number of restraint offences detected by time of day, 2005-2009 (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	Total (%)
2005	Data not available									
2006	1.3	2.4	12.5	20.6	19.3	15.4	17.0	6.8	4.7	100
2007	1.6	2.4	13.4	21.3	18.0	14.2	16.6	7.3	5.1	100
2008	2.6	2.1	12.0	19.3	17.1	15.3	18.2	7.7	5.7	100
2009	2.6	2.4	12.9	19.5	18.2	15.1	15.1	8.3	5.9	100

RESTRAINT OFFENCES BY MONTH

Table 5.5 shows restraint offences for both metropolitan and rural areas in terms of the percentage of total offences detected in 2009. The effect of the enforcement operation in November that specifically targeted restraint non-use can be clearly seen in Table 5.5: the number of restraint offences in November was more than double the monthly average. December also had a greater proportion of offences than other months, which may suggest a higher level of enforcement in this month although no enforcement operation specifically targeting restraint use took place in December.

Table 5.5
Number of restraint offences detected by month in 2009
(expressed as a percentage of total offences detected in the year)

Month	Metro	Rural	Unknown	Total
January	6.1	7.1	20.5	7.5
February	7.2	8.7	22.1	8.8
March	6.6	7.4	21.4	8.0
April	5.7	7.1	16.8	6.9
May	4.5	4.4	9.7	4.9
June	6.3	5.5	3.9	5.9
July	6.7	6.1	0.9	6.1
August	8.4	7.2	1.0	7.5
September	6.3	6.5	0.8	6.0
October	7.9	6.5	0.8	6.9
November	21.7	22.9	1.8	20.5
December	12.6	10.5	0.4	11.0

SEX AND AGE

Table 5.6 displays the detected restraint offences by sex and age for 2008 and 2009. The greatest proportion of restraint offences of all age groups during 2008 and 2009 was recorded for vehicle occupants aged 20 to 29 years. In both years males were much more likely to have been detected for a restraint offence than females. Few data were available for children aged less than 16 years, as the driver of the vehicle is legally responsible for these restraint offences.

Table 5.6
Number and percentage of restraint offences detected by year, sex and age, 2008-2009

	2008						2009					
	Male		Female		Total		Male		Female		Total	
Age	N	%	N	%	N	%	N	%	N	%	N	%
0-15 yrs	1	<0.1	1	<0.1	2	<0.1	6	0.1	3	0.1	9	0.1
16-19 yrs	646	7.6	313	9.9	959	8.1	687	7.5	440	11.8	1127	8.7
20-29 yrs	2271	26.6	984	31.1	3255	27.6	2389	26.1	1113	29.9	3502	27.0
30-39 yrs	1808	21.2	648	20.4	2456	20.8	1899	20.8	720	19.4	2619	20.2
40-49 yrs	1647	19.3	606	19.1	2253	19.1	1698	18.6	654	17.6	2352	18.1
50-59 yrs	1226	14.4	370	11.7	1596	13.5	1340	14.7	436	11.7	1776	13.7
60+ yrs	940	11.0	249	7.8	1189	10.1	1119	12.2	350	9.4	1469	11.3
Unknown age	1	<0.1	2	0.1	3	<0.1	6	0.1	1	<0.1	7	0.1
Unknown sex	-	-	-	-	97	0.8	-	-	-	-	108	0.8
Total	8540	100.0	3173	100.0	11810	100.0	9144	100.0	3717	100.0	12969	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.

5.2.2 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 there is no physical evidence such as injuries or scuff marks on seatbelts so police must rely on self-report. The TARS database records restraint use if a vehicle occupant is injured. Restraint use is categorised into seven 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 seriously or fatally injured in a crash. When calculating these percentages, only car occupants with known restraint use status were considered.

Table 5.7 shows the restraint usage for fatally injured vehicle occupants from 2005 to 2009. In 2009, 64 per cent of vehicle occupants in fatal crashes were wearing restraints. This is a slight increase from 2008. Restraint status was known for 74 per cent of all fatally injured vehicle occupants in 2009.

Table 5.7
Restraint usage of fatally injured vehicle occupants, 2005-2009

Year	Restraint worn		Number of known cases	Total occupant fatalities
	(N)	(%)		
2005	58	65.9	88	113
2006	39	65.0	60	78
2007	52	75.4	69	95
2008	36	60.0	60	69
2009	44	63.8	69	93

Restraint use for seriously injured vehicle occupants from 2005 to 2009 is presented in Table 5.8. A serious injury is defined as an injury that requires the person to be admitted to hospital but which does not cause the person to die within 30 days of the crash. In 2009, the percentage known to be wearing restraints was 90 per cent but restraint status was reported for only 66 per cent of seriously injured vehicle occupants. Each year, restraint use is higher for seriously injured occupants than for fatally injured occupants.

Table 5.8
Restraint usage of seriously injured vehicle occupants, 2005-2009

Year	Restraint worn		Number of known cases	Total occupants injured
	(N)	(%)		
2005*	544	86.5	629	989
2006	548	89.3	614	973
2007	580	87.7	661	1,034
2008	496	88.4	561	848
2009	474	90.1	526	798

* Data for 2005 differs from the previous report due to the continuous updating of data.

Restraint usage according to the region where the crash occurred for fatally and seriously injured vehicle occupants is presented in Table 5.9 and Figure 5.1. Overall restraint use increased slightly to 87 per cent in 2009. Injured vehicle occupant restraint wearing rates remained higher for crashes in the Adelaide metropolitan area (89%) than for crashes in rural regions (86%). The discrepancy between the metropolitan and rural restraint usage in 2009 was smaller than for any other year presented in Table 5.9.

Table 5.9
Restraint usage of fatally and seriously injured vehicle occupants by region, 2005-2009

Year	Metro Worn		Rural Worn		Total Worn		Total Killed/ Injured
	(N)	(%)*	(N)	(%)*	(N)	(%)*	
2005	254	86.7	348	82.1	602	83.9	1,102
2006	287	89.7	300	85.2	587	87.4	1,051
2007	307	88.9	325	84.4	632	86.6	1,129
2008	255	91.4	277	81.0	532	85.7	917
2009	239	88.8	279	85.6	518	87.1	891

* Percentage of known

Note: Data differs from the previous report due to the continuous updating of data

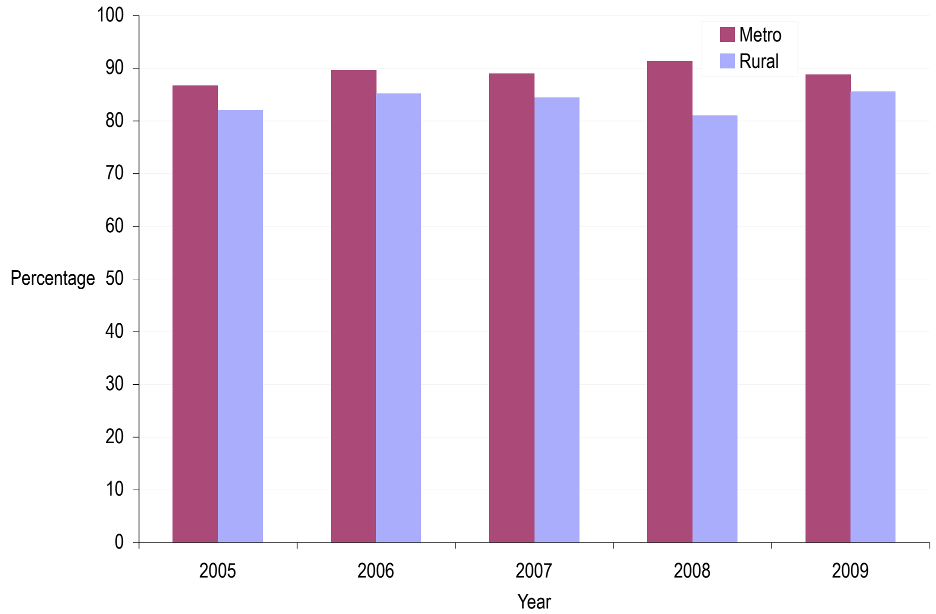

Figure 5.1
Restraint usage of fatally and seriously injured vehicle occupants, by location, 2005-2009

Table 5.10 and Figure 5.2 show the number and percentage of fatally and seriously injured vehicle occupants wearing restraints, by sex. Overall, injured males had lower restraint usage rates than injured females. In 2009, male restraint use was similar to previous years at approximately 80 per cent. Female restraint use was increased relative with previous years at a level of around 94 per cent.

Table 5.10
Restraint usage of fatally and seriously injured vehicle occupants by sex, 2005-2009

Year	Male Worn		Female Worn		Total Killed/ Injured
	(N)	(%)*	(N)	(%)*	
2005	318	79.9	284	89.0	1,102
2006	301	83.1	286	92.3	1,051
2007	339	82.3	293	92.1	1,129
2008	263	81.2	269	90.6	917
2009	249	80.3	269	94.4	891

* Percentage of known

Note: Data differs from the previous report due to the continuous updating of data

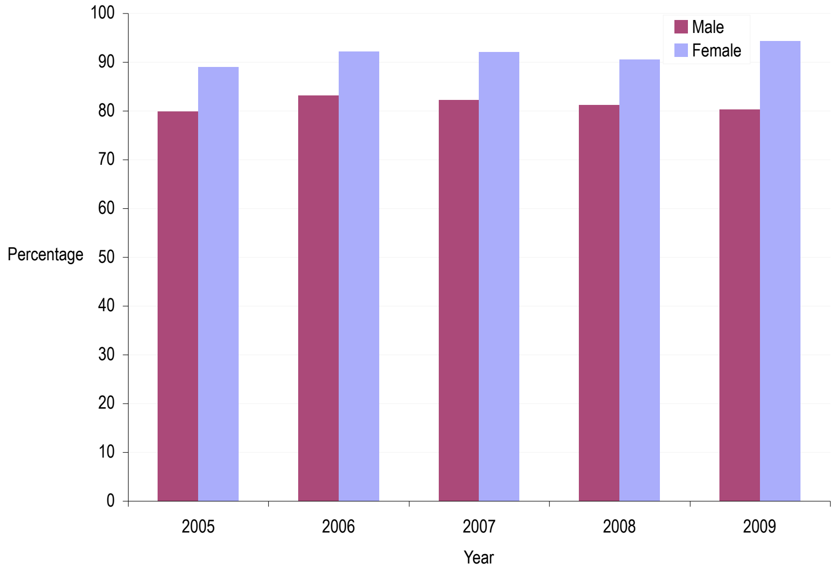

Figure 5.2
Restraint usage of fatally and seriously injured vehicle occupants, by sex, 2005-2009

5.2.3 On-road observational restraint use surveys

On-road observational surveys of restraint use provide another means to measure the effectiveness of restraint enforcement. An observational survey was conducted in March, 2009 at 61 sites in metropolitan and rural areas of South Australia. The survey found that 98.4 per cent of occupants in the metropolitan area were wearing a seatbelt, a two per cent increase from the last observational survey of restraint use conducted in 2002. This percentage was marginally lower in most rural areas. The percentage wearing a restraint in rural areas had also increased slightly, relative to the 2002 observation survey. Males had slightly lower restraint use rates than females, consistent with the 2002 survey. The full methodology and results can be seen in Wundersitz and Anderson (2009).

5.3 Restraint publicity

Two publicity campaigns addressed restraint use in 2009. Both of the campaigns primarily targeted 16 to 39 year olds, with a skew towards males and those living in regional areas. The secondary audience for the campaigns was passengers. The 'belt up or you'll kill someone' campaign was continued from 2008, and was run for approximately four weeks in June. In addition to reinforcing the penalties for both drivers and passengers associated with not wearing a seat belt, the campaign aimed to change the attitude of the target audience from thinking the use of a seat belt is a personal choice and only affects the individual, to an attitude that seatbelt use protects all car occupants. The campaign demonstrated the risk to other car occupants by not wearing a seat belt in order to provide a new incentive for seatbelt use.

A television advertisement for the campaign was borrowed from the United Kingdom and depicts a mother having a rear-end collision with another vehicle. The son in the back seat of the car who is not wearing his seatbelt is pushed forward due to the impact, colliding with his mother in the front seat and killing her. Advertisements were also aired on radio stations, particularly those listened to by youth, and during breakfast or driving times. Online banner ads were displayed on whereis.com.au, a site providing maps and driving directions to users. Advertisements were displayed on the Motor Accident Commission's regional banner and billboard network, on bus backs, and in bus shelters.

The new campaign developed in 2009 addressing restraint was known by its main slogan 'dead easy'. The campaign was run for four weeks starting in early December and focused on the reasons and excuses people may use for not wearing a seatbelt. The campaign aimed to raise awareness of the consequences of not wearing a seatbelt as well as the benefits of seat-belt use, regardless of the length of the trip. The purpose was to reduce casualties by encouraging people to use seatbelts every time they are travelling in a vehicle.

The campaign was advertised on the radio and on bus backs, bus shelters, in large format, and on regional banners. These forms of media were chosen to be at the closest point of the behaviour. The radio advertisements were designed to be very short so that they could be aired frequently throughout the day, frequently reminding drivers to wear their seat-belt. Each advertisement addressed a potential excuse someone might make in order to not wear a seat belt. The advertisement demonstrated how simple it is to wear a seat belt in comparison to the consequences of not wearing a seatbelt.

6 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) recommends the systematic monitoring of driver behaviour by independent institutions to create road safety performance indicators. Following these recommendations, this annual report quantifies the effects of the enforcement of drink driving, drug driving, speeding and non-wearing of restraints in South Australia.

6.1 Drink-driving and random breath testing

In a review of the impact of random breath testing across Australia, Homel (1990) concluded that the most successful model includes highly visible 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, that is, by increasing the perceived likelihood of detection and emphasising the consequences of legal sanctions.

In June 2005, legislation enabled mobile RBT to be conducted on a full time basis rather than only during ‘prescribed periods’ in South Australia. Consequently, 2009 was the fourth calendar year in which full time mobile RBT data were available for the entire 12-month period.

LEVELS OF TESTING

The level of random breath testing increased in 2009 to the highest level of the five year period. SAPOL’s target of 660,000 tests per year was exceeded. The total tests represent approximately 64 per cent of licensed drivers in South Australia. The increase in testing was in both the metropolitan and rural areas.

Comparisons with other Australian jurisdictions revealed that South Australia tested a greater proportion of the population than the ACT and Western Australia but a smaller proportion than the remaining states and territories. This trend is consistent with previous years. In Tasmania, RBT levels were well over one test for every person in the state per year, compared to less than one in every two people in South Australia.

While static testing increased in 2009, the proportion of mobile testing remained relatively stable at 27 per cent (28% in 2008). Compared to other jurisdictions, the proportion of mobile testing in South Australia was higher than in New South Wales but lower than three other jurisdictions (Qld, WA, Tas). Tasmania recorded the highest level at around 70 per cent.

VISIBILITY OF RBT

To increase the perceived probability of detection, Homel (1990) suggests that random breath testing should be conducted on days and at times when it is more likely to be seen by potential drink drivers. Alternatively, to detect drink drivers, random breath testing needs to be at times when most drink driving occurs. 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.

Night time surveys of drink driving provide information about times when the incidence of drink driving is greatest but such surveys have not been conducted in South Australia since 1997. The most recent roadside breath testing surveys conducted in Australia (Friday to Sunday, 10pm-3am), found that drink driving rates were highest after midnight and on Friday nights in Perth (Ryan, 2000). Consequently, to detect drink drivers, RBT is needed later in the evening (after midnight) and on days when the highest drink driving rates occur.

To deter drink drivers, Harrison (2001) suggests that enforcement taking place early in the decision making process leading to drink driving may be more effective than enforcement targeting decisions later on, particularly in rural areas. Consequently, highly visible RBT methods should operate in the early part of the evening (i.e. 6pm to 10pm) so that potential drink drivers see enforcement on their way to drinking venues, thus influencing subsequent alcohol consumption or the decision to drive.

During 2009, the greatest percentage of static and mobile breath tests continued to be performed on Fridays and Saturdays, days when drink driving rates are typically higher. For time of day, highly visible static testing was undertaken predominantly from 4pm to 10pm, an earlier part of the evening when potential drink drivers would see RBT activities on their way to drinking venues. This might increase perceived risk of detection and general deterrence. The level of mobile testing was highest from 10pm to 4am and was much higher than static testing from midnight to 6am. Therefore, mobile testing, the form of RBT most likely to detect drink drivers, was undertaken at times when drink driving rates are highest, consistent with best practice in the literature.

EFFECTIVENESS

For specific deterrence, it is important to apprehend a large proportion of drink drivers. In 2009, the total number of RBT detections (evidentiary) in South Australia increased by seven per cent continuing at a relatively high level. Generally, a high number of detections are interpreted as indicating a higher level of drink driving activity, or, reflecting enforcement practices that concentrate largely on detection rather than deterrence. In comparison to other states providing evidentiary RBT detection data, the number of detections per head of population in South Australia was lower than the other four jurisdictions which could provide such data.

Detection rates (drink drivers detected per 1,000 drivers tested) provide a measure for estimating the effectiveness of RBT. Based on evidentiary testing, detection rates in South Australia decreased slightly in 2009. An increase was experienced in rural areas while the metropolitan detection rate decreased. The overall detection rate in South Australia for evidentiary tests was similar to Tasmania, but lower than the other four jurisdictions for which the data was available.

Consistent with evidentiary testing results, the overall detection rate for screening tests decreased slightly in 2009. The overall detection rate was lower than Queensland and Western Australia.

Consistent with previous years, mobile RBT was more efficient in detecting drink drivers than static RBT. It has been argued that mobile RBT provides a better means of detecting drink drivers, particularly those trying to avoid static RBT sites (Harrison et al., 2003). Note that few studies have formally evaluated mobile RBT methods and, in most studies, mobile RBT data have been confounded with those of stationary RBT (Harrison et al, 2003). The ratio of mobile to static RBT detection rates was higher in rural regions, suggesting that mobile RBT was of particular benefit in rural regions. In particular, mobile RBT was most effective in detecting rural drink drivers from 4pm to 6am. Mobile RBT requires fewer police personnel, a limited resource in rural regions, and offers a solution for the 'grapevine' or 'word-of-mouth' effect known to undermine highly visible static operations. Effective drink driving enforcement is particularly important in rural regions because this is where a greater proportion of high BAC levels (0.150mg/L and above) were recorded by RBT operations.

RBT detection rate data indicate that static and mobile detection rates were highest from 10pm to 6am, a period typically associated with high alcohol consumption. Consequently, even though fewer RBT activities were conducted after midnight, they were effective in detecting drink drivers. With respect to day of week, detection rates were highest from Friday to Sunday, days when drink driving rates are highest.

The BAC distribution of drivers who were fatally injured in a crash in 2009 is indicative of a slightly lower level of alcohol involvement than in the previous year. The percentage of fatally injured drivers with an illegal BAC (i.e. 0.050mg/L and above) decreased to 37 per cent and the proportion with a high BAC level (i.e. 0.100mg/L and above) also decreased to 24 per cent. However, the small number of fatalities means that random variation may play a large role in the variation from year to year. Data for serious injury crashes also showed a decrease in the proportion of drivers with an illegal BAC (19% at 0.050mg/L and above). The greater number of serious injury crashes means that they are a more reliable indicator of alcohol involvement in crashes. The percentage of cases in which BACs for drivers were known increased in 2009 for both serious injury (62%) and particularly, fatal crashes (99%). However, there is still scope for improvement in obtaining more BAC data for serious injury crashes so that the database can provide an even better indication of the level of drink driving.

The best indicator of the level of drink driving and, consequently, of the effectiveness of RBT as a deterrent, is a roadside survey. No such surveys have been conducted in South Australia since 1997.

PUBLICITY

Homel (1990) emphasised that publicity accompanying RBT activities should not simply be educational but have a deterrent value. The first campaign conducted in 2009 followed these recommendations: the campaign was designed to reflect the disapproval of drink drivers by the community, the deterrent value being the threat of social exclusion.

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). The second campaign conducted in 2009 followed these recommendations: the campaign positively reinforced planning ahead before drinking, in particular encouraging people to avoid taking the car. Both campaigns used a variety of media to convey this message.

6.2 Drug driving

Introduced in July 2006, random roadside drug testing is a relatively new enforcement activity in South Australia. This present report is the third in this series to examine drug driving enforcement operations and its effectiveness. As a result, this report is limited to only three years of data.

LEVELS OF TESTING

In 2009, the third full year of random drug testing, 43,721 drivers or 3.9 per cent of the licensed drivers in South Australia were tested. This level of testing represents an increase of about 70% over the previous year with the majority of tests performed in the metropolitan area (74%). Testing rates per head of population were over five times higher in South Australia than in other Australian jurisdictions supplying comparative drug testing data.

Random drug testing was conducted predominantly on weekends, when drug driving rates are likely to be higher, and from 8am to 10pm, times when drug testing would be highly visible. Very little drug testing was conducted in the early morning hours (i.e. 2-6am) when levels of drug driving might be expected to be high.

EFFECTIVENESS

As drug detection data are available for only three years, limited conclusions can be drawn about the effectiveness of drug testing operations. Drug detection rates provide a guide as to the times and days when drug driving is more prevalent and give an indication of the profile of drivers detected drug driving. This information can be used to refine future enforcement activities.

Examination of confirmed positive detections (detections confirmed by evidentiary laboratory analysis) revealed that THC was the most commonly found illicit drug of the three tested, very closely followed by methylamphetamine. This is despite the screening tests detecting methylamphetamine more reliably than cannabis. There is evidence that roadside screening tests often fail to detect cannabis when it is present (Verstraete & Raes, 2006). Note also that cannabis can only be detected for 5 hours after consumption while methylamphetamines can be detected 24 hours afterwards. Detection data also indicated that drivers aged 30-39 years were detected for the greatest number of drug offences and males were much more likely to be detected than females. However, testing data were not available to clarify whether this finding was due to more drug driving among these groups or to more drivers in these groups being tested.

Detection rates (drug drivers detected per 1,000 tested) provide an indication of the effectiveness of random drug testing. Just under 22 drivers per 1,000 tested were confirmed positive for at least one of the prescribed drugs, a level slightly higher than the previous year. This detection rate was comparable with other Australian jurisdictions. Both metropolitan and rural areas had similar detection rates. In comparison to evidentiary RBT detection rates, drug detection rates (per 1,000 tested) were 2.8 times higher. The drug detection rate in South Australia was comparable to most other states (i.e. midrange).

The number of crash involved drivers testing positive for drugs can provide an indication of the level of drug driving. Of the drivers fatally injured in a crash, 22 per cent were positive for at least one of the prescribed drugs in 2009. This proportion was slightly higher than the previous year. Together, the increase in detection rates and higher proportion of fatally injured drivers with positive drug results suggest a higher level of drug driving in South Australia. The reason for the apparent increase is not known.

PUBLICITY

In 2009 two publicity campaigns that supported enforcement activities were run. The first campaign was a continuation of a campaign that began in 2008. It aimed to increase the perceived risk of detection by creating awareness of the ability of technology to detect drugs and emphasising that police are actively targeting drug drivers. The new campaign for 2009 attempted to address myths associated with drug driving and increase awareness of the negative impact drugs have on driving ability.

Various media were used to convey these campaign messages and males aged 20 to 40 years were targeted. Given that fatal crash data and drug driving offence data indicate that the majority of drug drivers are male and aged 30 to 40 years, publicity campaigns and enforcement activities should continue to target this group.

6.3 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 and the certainty of detection.

LEVEL OF OPERATIONS

The number of hours spent on speed enforcement in South Australia in 2009 decreased by approximately eight per cent. The hours of operation of dual purpose red light/speed cameras are not included in this total. Therefore, the true number of hours of speed detection is greater than is stated within this report.

The number of speed camera hours in 2009 increased relative to the previous year, and exceeded the target number of detection hours. In rural areas, the number of hours increased while in the metropolitan area, the number of hours decreased. The hours of operation for non-camera devices (laser devices, hand-held radars and mobile radars) decreased moderately (by 13.4%) in 2009 to the lowest level of the five year period (2005 to 2009). A decrease was recorded in both rural and metropolitan areas. Non-camera devices were used much more frequently in rural areas while camera devices where used much more frequently in metropolitan areas.

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 (Swadling, 1997). Consequently, 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). In addition, 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 operations in South Australia have been organised to produce a high level of general deterrence by operating at times when the majority of drivers are on the road. For speed cameras and non-camera devices, speed detection hours were spread evenly throughout the week with the majority operating during daylight hours from 6am to 8pm (although in comparison to speed cameras, non-camera devices were more frequently operated at night). This pattern of speed detection operations has varied little from 2005 to 2009.

For specific deterrence, it is important to conduct speed enforcement during times when rates of speeding are higher. Speed camera data suggest higher speeding rates on weekends. As speed enforcement was conducted evenly across all days of the week, it appears that a good balance between operations during high traffic periods (weekdays) and high speeding days (weekends) was achieved. Detection data from speed cameras for time of day in 2009 indicated higher rates of speeding from midnight to 6am although low hours of operation at this time are likely to have exaggerated the rates. Data from on-road speed surveys could be analysed by time of day and day of week to determine more accurately when speeding rates are highest, as these data are not influenced by enforcement operations.

EFFECTIVENESS

In 2009, the proportion of licensed drivers in South Australia detected for speeding offences, including the number detected with dual purpose red light/speed cameras, decreased to 31 per cent. A decrease in the number of detections was observed for all forms of speed detection with speed camera detections decreasing by 13 per cent and non-camera detections decreasing by 14 per cent. Dual purpose red light speed detections decreased moderately (28%).

The small decrease in speed camera detections and detection rate (per 1,000 vehicles passing) may suggest a small reduction in the level of speeding took place in 2009, relative to the previous year. It should be noted that this follows a sharp increase in the number of detections and particularly the detection rate when the speed tolerance was lowered in October 2007. A possibly explanation for the reduction in detections and detection rate is, therefore, drivers adjusting their behaviour to the reduced tolerance over time. The moderate decrease in dual purpose speed camera detections may also be the result of driver adjustment, in this case to the presence of the dual purpose camera at a given intersection. As no data are available for hours of enforcement or vehicles passing these devices a detection rate could not be calculated, therefore reduced exposure can not be ruled out as the cause of this decrease in detections.

Over half of all detections were made with conventional speed cameras, most likely due to the greater efficiency of speed cameras. Speed cameras check the speeds of all vehicles, not just those that the police officer selects and no time is lost to write a ticket. Cameras are also used more frequently in the metropolitan area, which is characterised by a higher level of traffic density than rural areas.

Detection rates accounting for traffic volumes were much higher in rural areas, suggesting a greater prevalence of speeding in rural areas. This is probably due, in part, to a greater opportunity to freely choose travelling speeds in rural areas. There may also be a lesser perceived risk of being detected in rural areas. Consequently, to reduce speeding in rural areas, higher levels of speed enforcement are needed.

The measurement of on-road vehicle speeds can 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. A systematic method of measuring vehicle speeds was introduced in South Australia in 2007 to assess the effects of speed reduction countermeasures and to monitor the speed behaviour of South Australian motorists over time. Speed data were collected at 130 sites (historical and new sites). In 2009 mean speeds did not change but the percentage of drivers speeding by more than five, 10 and 15 km/h decreased on arterial roads in Adelaide. This reduction was only observed on arterial roads in Adelaide; therefore it may be related to enforcement activities as such roads are where drivers are likely to have the highest perceived risk of detection. This supports the earlier suggestion that the decrease in detection rate is due to drivers adjusting their behaviour to the reduced enforcement speed tolerance over time. Anti-speeding publicity campaigns may also have contributed to this reduction.

The involvement of speed as a factor in crashes cannot be reliably determined in sufficient numbers to examine the effect of enforcement. However, such data can be used to observe trends in speeding crashes. Males consistently represent a clear majority of drivers involved in fatal crashes where speed was determined to be a factor (by the NSW RTA method) and remain an important target for speed enforcement.

PUBLICITY

Information and publicity campaigns developed to educate motorists about speed limits have had little success (Sivak et al., 2007). Instead, publicity can be useful in raising the perceived risk of detection and assisting in the process of changing behaviour by providing public acceptance of enforcement (Elliot, 1993; Zaal, 1994). This is important because the certainty of detection is more important as a deterrent than severity or immediacy of sanctions. An evaluation of anti-speeding television advertising in the Adelaide metropolitan areas reported slight but statistically significant decreases in mean free speeds (Woolley et al., 2001).

The publicity campaign conducted in 2009 sought to increase public awareness of the consequences of speeding, death and injuries, even when slightly over the speed limit. Given that between about 16 and 43 per cent of drivers broke the speed limit by less than 10km/hr (depending on the road type) on both metropolitan and rural roads in 2007, low level speeding appears to be a suitable focus for a campaign (Kloeden and Woolley, in press). The campaign did not specifically attempt to raise drivers' perceived risk of detection.

6.4 Restraint use

It was very difficult to assess the effectiveness of restraint use enforcement operations, as there was a lack of information on this type of enforcement. On-road observational surveys of restraint use provide the best indication of restraint use levels. Such a survey was undertaken in 2009. The number of restraint offence detections (an indicator of enforcement activities), the level of restraint use for injured occupants in crashes, the level of restraint use found in on-road observational surveys and publicity were examined to monitor trends in 2009.

LEVELS OF RESTRAINT ENFORCEMENT

The total number of restraint offences detected in South Australia increased by 10 per cent in 2009. 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. A new restraint non-use offence came into effect on 1 March 2008. This new rule made it an offence for the driver to fail to ensure passengers over the age of 16 are restrained. This offence allows the offending passenger to be fined as well as the driver and so two offences can be generated from the one event. 2009 is the first full year since this rule came into effect.

Restraint usage can be increased through high levels of enforcement over short periods, when applied repeatedly (ETSC, 1999). If the number of detected offences is used as an approximate guide to enforcement activities, it appears that restraint enforcement was spread relatively evenly throughout the week. Restraint enforcement occurred predominantly during daylight hours (8am-6pm) when restraint use is most easily observed. The majority of offences were detected in the metropolitan region. This could be attributed to greater enforcement in the metropolitan area or to greater traffic volumes, although it must be noted that the location of the offence was unknown in many cases.

In 2009, males were 2.5 times more likely than females to be detected for a restraint offence, and vehicle occupants aged 20 to 29 years were detected for more offences than any other age group. This was consistent with previous years.

LEVELS OF RESTRAINT USE AND EFFECTIVENESS

The percentage of injured vehicle occupants wearing restraints in serious injury crashes in South Australia in 2009 was 90 per cent, which was slightly higher than the previous year but generally comparable to other years. The level of restraint use of 64 per cent in fatal crashes was higher than the previous year (60%) but the small numbers of fatal crashes makes it difficult to interpret these results. Similar to previous years, restraint wearing rates for injured vehicle occupants in serious and fatal crashes in 2009 were higher in the metropolitan area (89%) than rural regions (86%), as is historically the case, suggesting that attention still needs to be given specifically to non-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 the general driving population observed during on-road surveys, see Wundersitz & McLean, 2004). Restraint wearing rates might be lower in fatal crashes, compared to serious injury crashes, due to police not specifically trained in crash investigation overestimating seat belt usage in less severe 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. The status of restraint use is 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 considerable proportion of injured vehicle occupants in fatal (26%) and serious (34%) crashes. Continuing improvement in the recording of restraint use status will improve database reliability and accuracy and also improve the evaluation of restraint enforcement practices.

The observational restraint use survey undertaken during 2009 revealed seat belt usage in South Australia was at a high level (above 98%) and had increased since the last survey in 2002 (Wundersitz and Anderson, 2009). Males were also found to have slightly lower restraint use rates than females. This is consistent with the finding in 2009 of males being more likely to be charged with restraint offences and to be unrestrained in fatal and serious injury crashes. The level of restraint use in fatal and serious injury crashes for males remained similar to previous years at 80 per cent while restraint use for females in such crashes increased to 94 percent. Self-reported restraint use has also been found to be lower among males in the literature (Milano et al., 2004; Reinfurt et al., 1996). Data from the United States have also shown that male drivers restrain their child passengers less than female drivers (Glassbrenner, 2003). Therefore, males remain an important target for restraint enforcement.

Many children in Australia are not using an appropriate restraint for their size (Edwards et al., 2006; Stewart & Lennon, 2007). A recent study found that more than 30 per cent of children from four to six years of age were too small for the restraints they were using. Therefore, in order to improve children's safety in the car as passengers, parents should be informed of when to move children into larger restraints (Stewart & Lennon, 2007). It must be noted that failure to ensure that a child is appropriately restrained was not an offence in South Australia in 2009 but an amendment to the Australian Road Rules is in effect from July 2010 which mandates the use of age appropriate restraint systems for children up to the age of seven.

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, a high level of enforcement publicity is recommended (Zaal, 1994).

Two restraint use publicity campaigns were used during 2009. Both campaigns focused predominantly on the risks and consequences of not using restraints. The advertisements were aimed towards drivers and passengers, incorporating both the rural and metropolitan areas. Future restraint enforcement operations in South Australia would benefit from accompanying publicity concentrating on deterrence, particularly one or two weeks prior to, and during, the enforcement period (see Stefani, 2002). Media strategies might also specifically target rural areas where restraint use appears to be lower.

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 et al., 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, it was also noted that unpaid media was not effective by itself to reach high-risk groups (i.e. young males). The amount of unpaid restraint use publicity received in 2009 is unknown but it should be encouraged to enhance future restraint use publicity campaigns and enforcement. Restraint offence and crash data suggest that publicity and restraint use enforcement should be targeted towards young males as they are a high-risk group.

Restraint use legislation seems to be most effective when it is accompanied by strict enforcement and publicity. Restraint use of drivers in Korea rose from 23 per cent to 98 per cent in less than a year as a result of increased publicity from the national police enforcement campaign and doubling the fines for not using a restraint. Increased publicity and enforcement also increased restraint use in provinces in France and Canada by 10 to 15 per cent within one year (World Health Organization, 2004).

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