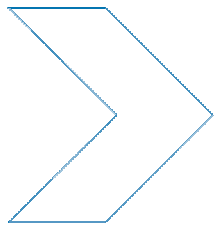


Evaluation of the South Australian  
default 50 km/h speed limit

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## Evaluation of the South Australian default 50 km/h speed limit

CN Kloeden, JE Woolley, AJ McLean

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October 2004



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## TITLE

Evaluation of the South Australian default 50 km/h speed limit

## AUTHORS

CN Kloeden, JE Woolley, AJ McLean

## PERFORMING ORGANISATION

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

## SPONSORED BY

Department of Transport and Urban Planning  
Post Office Box 1  
Walkerville SA 5081  
AUSTRALIA

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## ABSTRACT

On 1 March 2003 the default urban speed limit in South Australia was reduced from 60 km/h to 50 km/h. On-road speeds just before the default limit was introduced were compared with speeds a year later. The numbers of casualty crashes and casualties in the year before the default limit was introduced were compared with the corresponding numbers in the first year that the default limit was in effect. On roads where the speed limit was reduced from 60 km/h to 50 km/h, average vehicle speeds decreased by 2.3 km/h and casualties by 24 per cent. On roads where the speed limit remained at 60 km/h, average vehicle speeds decreased by 0.9 km/h and casualties by 7 per cent.

## KEYWORDS

speed limit, legislation, accident rate, before and after study

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## Summary

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On 1 March 2003 the default urban speed limit in South Australia was reduced from 60 km/h to 50 km/h. On-road speeds just before the default limit was introduced were compared with speeds a year later. The number of casualty crashes and casualties in the year before the default limit was introduced were compared with those in the first year that the default limit was in effect.

On roads where the speed limit was reduced from 60 km/h to 50 km/h:

- The average travelling speed fell by 2.3 km/h
- The average free travelling speed fell by 2.2 km/h
- The number of casualty crashes fell by 20% (330 fewer casualty crashes)
- The number of people injured in crashes fell by 24% (495 fewer casualties)
- The number of people needing treatment by a private doctor fell by 16% (103 fewer cases)
- The number of people needing treatment at a hospital fell by 29% (352 fewer cases)
- The number of people needing admission to hospital fell by 13% (34 fewer cases)
- The number of people fatally injured fell from 14 to 8
- This reduction in casualties is estimated to have saved the South Australian community at least \$30 million

On roads where the speed limit remained at 60 km/h:

- The average travelling speed fell by 0.9 km/h
- The average free travelling speed fell by 0.7 km/h
- The number of casualty crashes fell by 5% (165 fewer casualty crashes)
- The number of people injured in crashes fell by 7% (327 fewer casualties)
- The number of people needing treatment by a private doctor fell by 3% (48 fewer cases)
- The number of people needing treatment at a hospital fell by 10% (240 fewer cases)
- The number of people needing admission to hospital fell by 6% (30 fewer cases)
- The number of people fatally injured fell from 35 to 26
- This reduction in casualties is estimated to have saved the South Australian community at least \$32 million

In before and after evaluations such as these it is not justifiable to attribute all of the magnitude of the above changes to the introduction of the default 50 km/h speed limit. However, this outcome has also been observed in other states and territories in Australia. It therefore appears to be reasonable to conclude that the reduction in the speed limit was, by far, the major factor in the observed reductions in travelling speeds, crashes and casualties on the affected roads and that the reductions on other roads derived largely from the accompanying emphasis on speed reduction.

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# 1 Introduction

On 1 March 2003 the default urban speed limit in South Australia was reduced from 60 km/h to 50 km/h.

The Centre for Automotive Safety Research was commissioned by the Department of Transport and Urban Planning (DTUP) to conduct an evaluation of the new 50 km/h default urban speed limit in terms of changes in vehicle travelling speeds and casualty crash numbers.

## 1.1 Implementation

In South Australia, the urban speed limit is now 50 km/h unless otherwise signed. Since March 2003, all non-50 km/h roads had to have the speed limit signposted. DTUP initially erected approximately 4,000 60 km/h signs on urban arterial roads, for which it is responsible. The initial philosophy was to have signs repeated at a maximum of one kilometre intervals and at the intersections of major roads (ie signalised intersections). In addition, 50 km/h signs were erected to replace 60 km/h signs at the end of school zones and crossings.

Local Government Authorities were able to nominate, with supporting evidence, which of their roads, if any, should remain at 60 km/h. Ultimately, however, DTUP could exercise its authority to determine the speed limit on these roads. The Adelaide City Council decided to adopt 50 km/h throughout most of its central city road network as did large rural towns such as Mount Gambier and Murray Bridge.

South Australia Police exercised a three month amnesty period for speed enforcement on 50 km/h roads from 1 March 2003.

The speed limit change generated some complaints from the community, particularly with regard to confusion about what the speed limit is on a given road. In response to this, DTUP provided reminder signs (see Figure 1.1) for erection by Local Government Authorities on roads with the highest number of complaints. In August and September 2003, DTUP conducted further fine tuning, erecting more 60 km/h speed limit signs on its roads to achieve a general spacing of 600 to 700 metres between consecutive signs. In general, DTUP was reluctant to install 50 km/h signs.

Figure 1.1  
50 km/h default urban speed limit reminder sign



During 2003, the Department of Transport and Urban Planning consulted with additional rural communities and introduced further speed limit reductions to 50 km/h in country towns, many on major roads and highways. This process was performed separately due to the need to take into account speed transition zones and the needs of the affected communities.

## 1.2 Public awareness

Mass media advertising was adopted by the State Government to promote the impending change in the urban area speed limit. This commenced on 14 February 2003 on television and radio.

A study into the effectiveness of the advertising campaign was performed in terms of advertising indicators. It was based on a sample of 804 people who lived in metropolitan Adelaide and who had driven in South Australia in the last two months. Conducted in April 2003, the findings were as follows (McGregor Tan Research, 2003):

- The research indicates that the campaign has been very successful in achieving awareness and to a large extent acceptance of the 50 km/h speed limit.
- All drivers surveyed were aware of the new speed limit.
- 94% indicated they had seen or heard advertising or information relating to the new 50 km/h speed limit.
- Most of these drivers (86%) recalled seeing or hearing advertisements on television, with half saying they had seen ads in the newspaper and half mentioning they had heard the radio ads. 12% had seen the billboard ads, followed by 5% brochures.
- 64% thought the main message was that the 50 km/h speed limit was being introduced in SA.
- 21% thought the main message was that streets with a 50 km/h speed limit are safer. A further 10% indicated that the new limit will improve safety.
- 18% said that the main message was that if there is no sign the speed limit is 50 km/h.
- 10% said your car will stop 10 metres sooner at 50 km/h compared to 60 km per hour.
- Unprompted recall of the slogan "50 K streets are safer streets" was 10%.
- Prompted recall was 74%.
- There was high agreement that people were given enough prior notice and information that the speed limit was being introduced (4.2 and 4.3 agreement respectively on 5 point scale), and acceptance of the safety aspect (4.0 score).
- There was low agreement (2.9 out of 5) that introduction of the 50 km/h speed limit was about revenue raising.
- Awareness of the telephone enquiry line and web site was found to be 10% and 15%.
- While few had used either, there was a relatively greater access of the web site than the enquiry line among these users.
- 78% were aware the South Australian Police were conducting an education campaign (a campaign indicating there would be no fines for minor offences) following the introduction of the new 50 km/h speed limit. Of those aware of the education campaign, 9 in 10 were supportive.
- Most drivers thought that the level of police presence was unchanged during the education period.
- When asked what they considered to be the main reason that the government reduced the speed limit to 50 km/h on local streets, the two key reasons were: safety (72%) and to raise revenue (15%).



- 58% thought the 50 km/h limit was appropriate for residential streets in Adelaide, with 26% indicating 60 km/h. 8% nominated 40 km/h. One interpretation of the data is that two out of three people believe that the appropriate speed limit should be 50 km/h or lower.
- In essence the research shows that there is total awareness of the 50 km/h speed limit on residential streets in Adelaide. Most have seen or heard the advertising campaign, and generally 7 in 10 drivers understand that the main reason for the speed limit relates to safety.
- While there is a significant minority (about a quarter of drivers), who believe that the more appropriate speed on residential streets should be 60 km/h, a majority believe that the limit should be 50 km/h.
- Further tracking on these driver attitudes and behaviour in relation to the endorsement of speed limit would be useful.

In addition to mass media advertising, information brochures were produced for distribution in several languages and information relating to which roads were to retain a 60 km/h speed limit was made available on the Internet at the Department of Transport and Urban Planning website. Detailed maps showing speed zonings were also made available for the metropolitan road network and rural townships.

## 2 Changes in vehicle speeds

This Section examines the changes in vehicle travelling speeds associated with the introduction of the 50 km/h default speed limit.

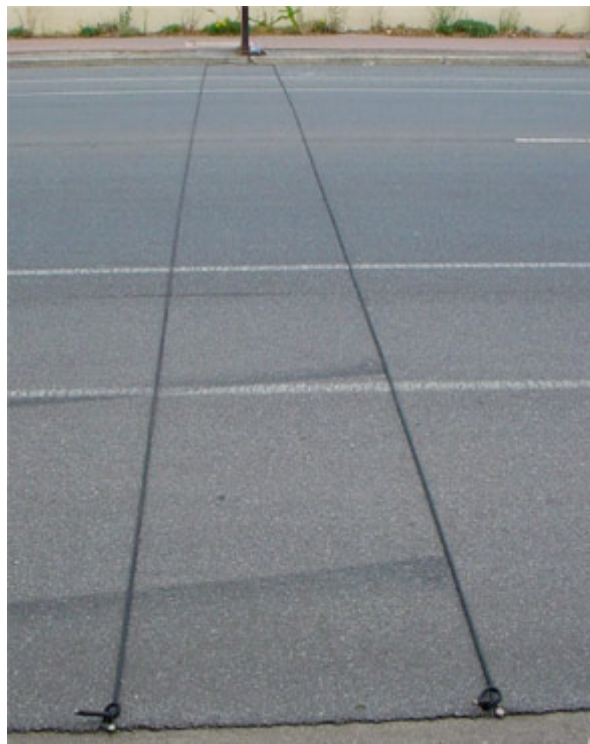
### 2.1 Methodology

The Department of Transport and Urban Planning arranged for speeds to be measured at 52 randomly selected sites across the state prior to 1 March 2003, when the 50 km/h default urban speed limit was introduced, and again a year later. The sites consisted of the following road types:

- 10 main roads (arterials) which retained their 60 km/h speed limit
- 12 major residential roads (collectors) which were changed to the 50 km/h speed limit
- 18 residential streets in the metropolitan area (urban local) which were changed to the 50 km/h speed limit
- 12 residential streets in rural townships (rural local) which were changed to the 50 km/h speed limit

Data were recorded using Metrocount traffic counters with a pair of pneumatic tubes laid across the carriageway as shown in Figure 2.1. Surveys were conducted so that a minimum of 24 hours of traffic data was obtained during weekdays at each site. Measurement points were at straight mid-block sections located in such a manner to ensure that drivers could adopt their chosen speed without significant influence from the road alignment or junctions.

Figure 2.1  
Example of detectors used to  
measure on-road vehicle speeds



The speeds of all vehicles in both directions of travel at each site for a full 24 hour period were used for analysis. The individual sites and the number of vehicle speeds recorded (ie: the traffic volume) before and after the change in the default urban speed limit are shown in Tables 2.1 to 2.4.

**Table 2.1**  
Number of speed measurements on arterial roads  
which retained a 60 km/h speed limit

Road	Suburb	2002 measurements	2003 measurements
Prospect Road	Blair Athol	15,954	16,576
Tapleys Hill Road	Fullham Gardens	16,858	16,938
Montacute Road	Newton	5,723	5,211
Goodwood Road	Cumberland Park	19,576	20,417
Greenhill Road	Burnside	7,027	5,590
Kenihans Road	Happy Valley	9,527	13,156
Springbank Road	Clapham	21,896	22,617
Fullarton Road	Kent Town	21,441	21,858
North East Road	Manningham	19,262	18,473
Burbridge Road	Brooklyn Park	11,871	12,541
<b>Total</b>		<b>149,135</b>	<b>153,377</b>

**Table 2.2**  
Number of speed measurements on collector roads  
which changed to a 50 km/h speed limit

Road	Suburb	2002 measurements	2003 measurements
Claremont Avenue	Netherby	1,405	1,507
Blair Park Drive	Craigmore	3,723	3,927
Seaview Road	West Beach	3,527	4,585
Barcelona Road	Noarlunga Downs	3,158	3,357
Milan Terrace	Stirling	2,059	2,097
Jetty Road	Largs Bay	1,756	1,817
Perry Barr Road	Hallett Cove	1,844	1,738
Scenic Way	Hackham	1,081	1,041
Valetta Street	Kidman Park	9,665	9,053
Sydenham Road	Norwood	4,581	4,465
Sixth Avenue	St Peters	1,416	1,238
Bonython Avenue	Novar Gardens	2,513	2,564
<b>Total</b>		<b>36,728</b>	<b>37,389</b>

**Table 2.3**  
**Number of speed measurements on urban local roads**  
**which changed to a 50 km/h speed limit**

Road	Suburb	2002 measurements	2003 measurements
Bowyer Street	Rosewater	511	458
Charles Road	Beverly	526	515
Adelaide Street	Maylands	437	469
Hambledon Road	Campbelltown	2,151	1,963
Gilbertson Road	Seacliff Park	485	490
Northcote Street	Kilburn	1,002	961
Vincent Road	Smithfield Plains	287	259
Andrew Avenue	Salisbury East	204	183
Esplanade	Glenelg North	1,293	1,691
Olive Avenue	Broadview	366	327
Commercial Street	Marleston	894	895
Bermudez Crescent	Paralowie	1,492	2,645
London Drive	Salisbury East	1,037	1,156
Farrell Street	Glenelg South	307	351
Main Street	Beverly	871	860
George Street	Adelaide	998	1,039
Archer Street	North Adelaide	1,965	2,258
Coorara Avenue	Payneham South	2,839	2,693
<b>Total</b>		<b>17,665</b>	<b>19,213</b>

**Table 2.4**  
**Number of speed measurements on rural local roads**  
**which changed to a 50 km/h speed limit**

Road	Town	2002 measurements	2003 measurements
Conroe Drive	Mount Gambier	2,569	3,405
Reginald Street	Mount Gambier	279	257
Stratford Street	Millicent	117	99
Cedar Avenue	Naracoorte	1,699	1,901
Hobbs Street	Berri	185	176
Fiedler Street	Berri	1,388	1,303
Meander Avenue	Renmark	258	313
Bruce Road	Barmera	1,032	925
Parham Crescent	Port Augusta	216	216
Woodford Street	Port Augusta	411	426
Bowman Street	Crystal Brook	488	525
Thomas Street	Wallaroo	46	47
<b>Total</b>		<b>8,688</b>	<b>9,593</b>

## 2.2 All vehicle speeds

The speeds of all vehicles at each site were averaged both before and after the introduction of the 50 km/h default limit. A change in mean speed was then calculated for each site. These results are shown in Table 2.5.

Table 2.5  
Mean speeds on the measured roads before and after  
the change in the default urban speed limit

Road type	Road name	Mean speed 2002 (km/h)	Mean speed 2003 (km/h)	Change in mean speed (km/h)
Arterial	Prospect Road	58.8	56.2	-2.6
Arterial	Tapleys Hill Road	62.1	60.6	-1.5
Arterial	Montacute Road	58.9	59.2	+0.3
Arterial	Goodwood Road	51.8	52.6	+0.8
Arterial	Greenhill Road	55.2	51.8	-3.5
Arterial	Kenihans Road	56.5	54.6	-1.8
Arterial	Springbank Road	60.1	59.0	-1.1
Arterial	Fullarton Road	51.9	51.1	-0.8
Arterial	North East Road	60.6	61.1	+0.6
Arterial	Burbridge Road	62.9	62.9	+0.0
Collector	Claremont Avenue	50.2	49.3	-0.9
Collector	Blair Park Drive	61.4	61.5	+0.1
Collector	Seaview Road	43.5	47.7	+4.2
Collector	Barcelona Road	59.8	54.1	-5.8
Collector	Milan Terrace	59.1	57.7	-1.4
Collector	Jetty Road	52.4	50.1	-2.3
Collector	Perry Barr Road	57.3	52.7	-4.6
Collector	Scenic Way	58.6	55.2	-3.3
Collector	Valetta Street	55.2	51.8	-3.4
Collector	Sydenham Road	48.8	47.2	-1.6
Collector	Sixth Avenue	51.7	51.0	-0.7
Collector	Bonython Avenue	54.1	52.2	-1.8
Urban local	Bowyer Street	40.1	37.3	-2.8
Urban local	Charles Road	46.2	44.1	-2.0
Urban local	Adelaide Street	41.6	36.2	-5.4
Urban local	Hambleton Road	52.9	48.3	-4.5
Urban local	Gilbertson Road	55.6	52.8	-2.8
Urban local	Northcote Street	50.4	48.5	-1.9
Urban local	Vincent Road	49.8	49.6	-0.1
Urban local	Andrew Avenue	37.1	36.0	-1.1
Urban local	Esplanade	44.2	42.1	-2.1
Urban local	Olive Avenue	40.0	41.1	+1.0
Urban local	Commercial Street	43.3	40.6	-2.7
Urban local	Bermudez Crescent	48.4	46.3	-2.1
Urban local	London Drive	42.4	39.3	-3.1
Urban local	Farrell Street	36.3	36.5	+0.2
Urban local	Main Street	52.8	50.7	-2.1
Urban local	George Street	33.3	29.6	-3.7
Urban local	Archer Street	45.4	44.7	-0.7
Urban local	Coorara Avenue	57.8	51.9	-5.9
Rural local	Conroe Drive	50.5	50.0	-0.5
Rural local	Reginald Street	44.5	43.8	-0.7
Rural local	Stratford Street	29.1	33.6	+4.5
Rural local	Cedar Avenue	56.4	52.7	-3.7
Rural local	Hobbs Street	31.1	31.6	+0.5
Rural local	Fiedler Street	48.7	47.7	-1.0
Rural local	Meander Avenue	36.1	40.7	+4.6
Rural local	Bruce Road	62.9	57.6	-5.3
Rural local	Parham Crescent	45.8	46.4	+0.6
Rural local	Woodford Street	32.4	32.4	-0.1
Rural local	Bowman Street	41.4	41.2	-0.2
Rural local	Thomas Street	30.6	29.6	-1.0

A clear majority of all sites, overall and within each road type, showed a reduction in the mean speed after the change in the default urban speed limit.

The overall reductions were calculated by taking the mean of all speeds measured on roads of the given road type before and after the change in the default urban speed limit (Table 2.6). The effect of this is to bias the overall mean speeds towards the sites with high traffic volumes. This is desirable for two reasons: it limits the effect of sites with small numbers of measurements which are subject to large random variation, and it is biased towards sites with the highest exposure and hence the highest expected crash numbers.

**Table 2.6**  
Overall reduction in mean speeds after the introduction of the 50 km/h default urban speed limit

Road type	Reduction in mean speed (km/h)
Arterial*	0.85
Collector	1.92
Urban local	3.13
Rural local	1.40
All roads changed to 50 km/h	2.29

\* Arterial roads retained a 60 km/h speed limit

The number of speeds measured in each of the road types where the speed limit was reduced was found to be roughly in proportion to the incidence of crashes on those road types.

The distributions of speeds from the 2002 survey are compared with the 2003 survey for each road type in Figures 2.2 to 2.5.

**Figure 2.2**  
Distribution of speeds on arterial roads before and after the introduction of the 50 km/h default urban speed limit (arterial roads retained a 60 km/h speed limit)

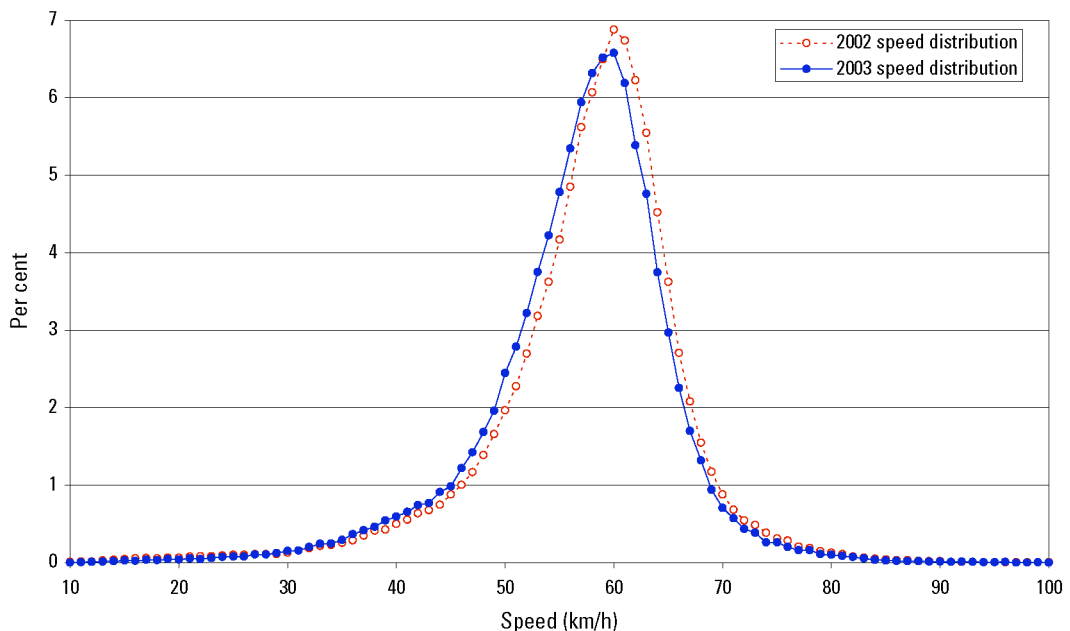


Figure 2.3  
 Distribution of speeds on collector roads before and after  
 the introduction of the 50 km/h default urban speed limit

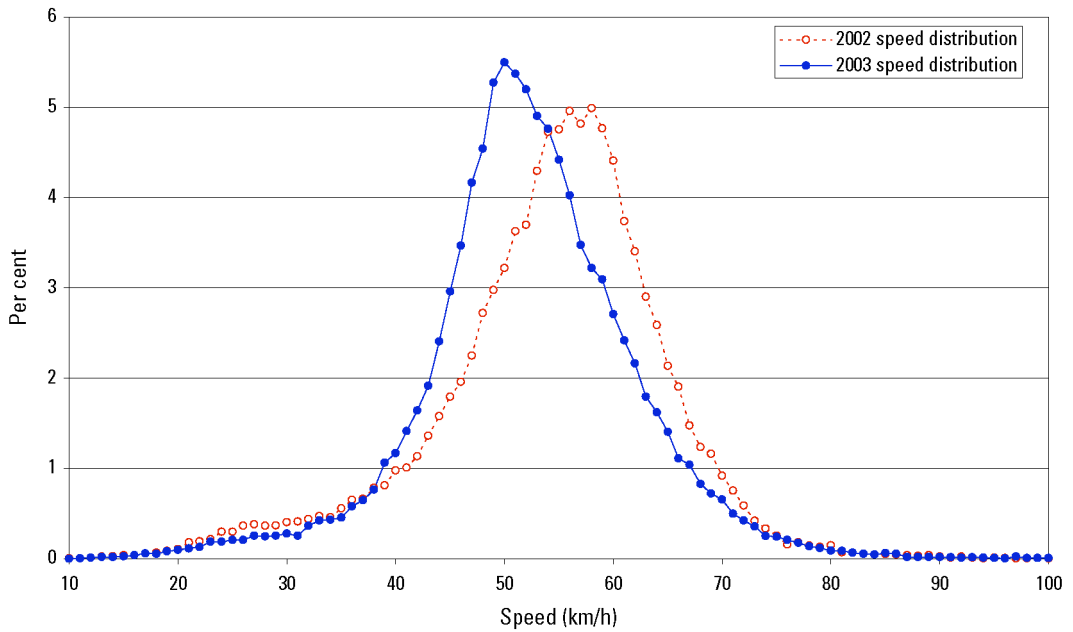


Figure 2.4  
 Distribution of speeds on urban local roads before and after  
 the introduction of the 50 km/h default urban speed limit

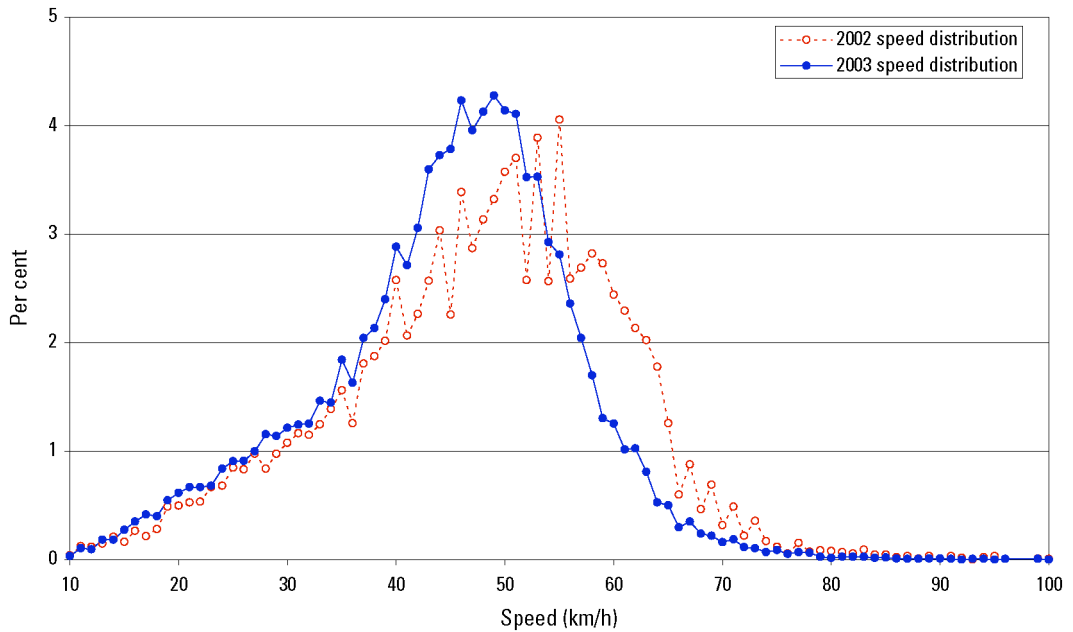
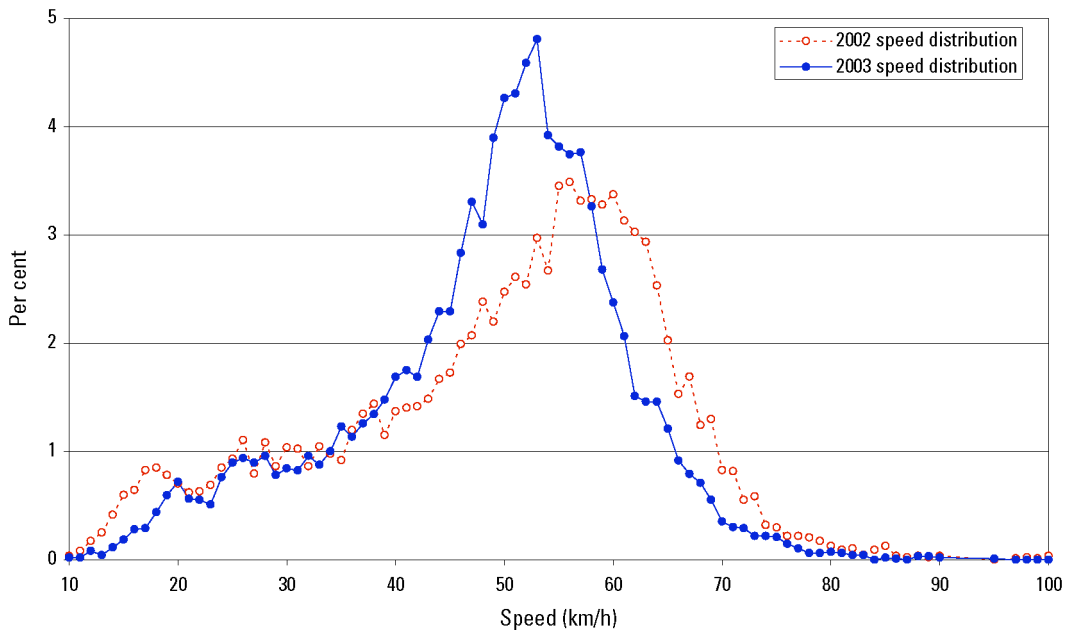


Figure 2.5  
Distribution of speeds on rural local roads before and after  
the introduction of the 50 km/h default urban speed limit



There was an obvious shift to the left for all of the speed distributions shown in Figures 2.2 to 2.5 indicating an overall reduction in vehicle speeds.

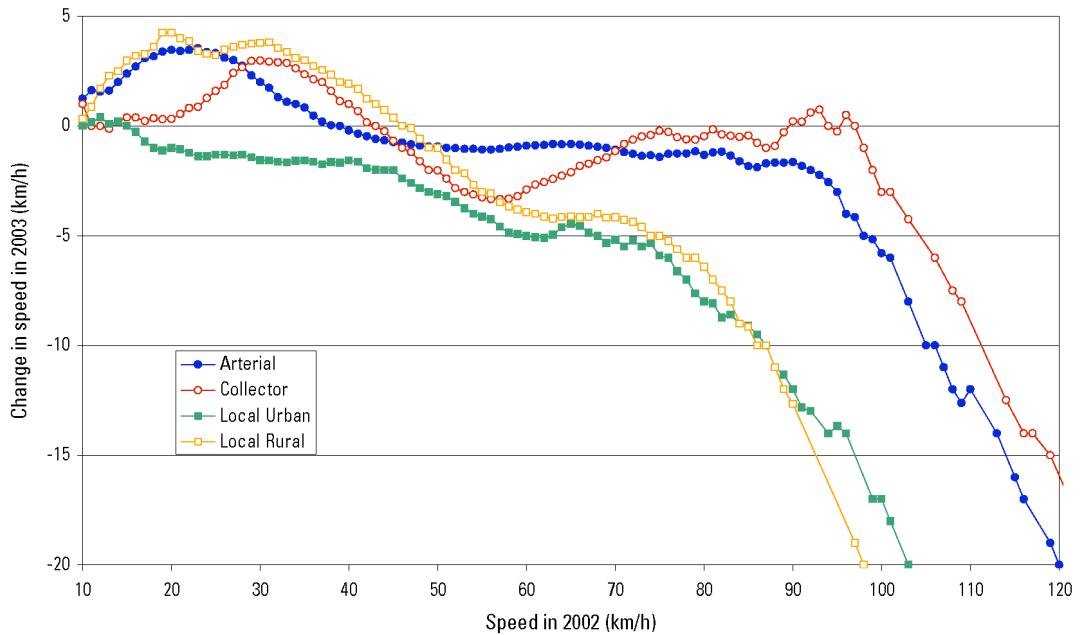
However, it is not clear from these Figures what was happening at individual speeds. In other words, did drivers who were travelling at, say, 60 km/h before the introduction of the 50 km/h speed limit reduce their travelling speed by the same amount as drivers who had travelled at 55 km/h?

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

For example, suppose that in 2002 58 per cent of vehicles were travelling at or above 60 km/h and 47 per cent were travelling at or below 60 km/h. This means that vehicles travelling at 60 km/h occupied the percentile range from 42 (100 - 58) to 47 per cent of all speeds measured in 2002. This percentile range was then applied to the 2003 speed distribution and the average of all speeds in that range was calculated. The 2002 speed was then subtracted from the average of the 2003 speeds in that percentile range. The results for each individual km/h of speed in 2002 are shown in Figure 2.6.



Figure 2.6  
Change in speed in 2003 by speed in 2002 on the different road types



If we hypothetically assume that the same group of drivers travelled along each section of road in 2002 and 2003 and that they all maintained their rank in travelling speed relative to each other, then Figure 2.6 gives their change in speed in 2003 based on their speed in 2002. The following changes then become apparent:

- Very fast drivers (80 km/h and above) on all road types in 2002 slowed down the most in 2003 (although the small numbers of vehicles at high speeds means that chance variation can have a large effect on these results).
- Drivers on arterial roads travelling between 50 km/h and 70 km/h in 2002, slowed down by about 1 km/h in 2003.
- On collector roads, drivers travelling just below 60 km/h in 2002 slowed down the most in 2003.
- On local streets both in urban and rural areas, the higher the travelling speed in 2002, the greater the reduction in speed in 2003.
- Very slow drivers (below about 45 km/h) on most road types in 2002 tended to speed up in 2003 (although, once again, the small numbers of vehicles at low speeds means that chance variation can have a large effect on the results).

The final three points have been observed in other studies of speed limit reductions in Adelaide (Woolley, Dyson, Taylor, Zito, Stazic, 2003).

## 2.3 Free travelling speeds

While the speeds of all vehicles are the most relevant to crash causation in general, they do not capture the influence on drivers' freely chosen speeds under different conditions. This is because drivers in the middle of a platoon of traffic are limited to the speed of the vehicle in front of them and thus do not really have a free choice travel speed.

In order to assess changes to drivers' choice of speed it is preferable to restrict the analysis to free travelling speeds. Free travelling speeds are commonly defined here and elsewhere as the speeds of vehicles that are travelling at least 4 seconds behind the vehicle in front of them. The assumption is that if these drivers wished to travel faster they could, given the large gap in front of them.

Table 2.7 shows the percentage of vehicles that had a free travelling speed by road type. On all road types, the percentage of vehicles with a free travelling speed dropped in 2003. This is consistent with the increase in traffic on each of these road types seen in Tables 2.1 to 2.4 leading to slightly greater congestion.

**Table 2.7**  
Per cent of vehicles with a free travelling speed before and after the introduction of the 50 km/h default urban speed limit

Road type	Per cent of vehicles with a free travelling speed 2002	Per cent of vehicles with a free travelling speed 2003
Arterial*	49.5	48.1
Collector	85.4	82.5
Urban local	93.5	91.3
Rural local	93.0	89.0

\* Arterial roads retained a 60 km/h speed limit

The free travelling speeds were averaged at each site both before and after the introduction of the 50 km/h default limit. A change in mean free travelling speed was then calculated for each site. These results are shown in Table 2.8.

A clear majority of all sites, overall and within each road type, showed a reduction in the mean free travelling speed after the change in the default urban speed limit.

Table 2.8  
Mean free travelling speeds on the measured roads before and after  
the change in the default urban speed limit

Road type	Road name	Mean free travelling speed 2002 (km/h)	Mean free travelling speed 2003 (km/h)	Change in mean free travelling speed (km/h)
Arterial	Prospect Road	58.6	56.3	-2.4
Arterial	Tapleys Hill Road	63.0	61.6	-1.4
Arterial	Montacute Road	58.8	59.3	+0.5
Arterial	Goodwood Road	53.5	54.6	+1.1
Arterial	Greenhill Road	55.7	52.3	-3.4
Arterial	Kenihans Road	57.7	56.2	-1.5
Arterial	Springbank Road	61.1	60.6	-0.5
Arterial	Fullarton Road	52.4	51.9	-0.5
Arterial	North East Road	61.9	62.5	+0.5
Arterial	Burbridge Road	63.5	63.1	-0.4
Collector	Claremont Avenue	50.2	49.4	-0.8
Collector	Blair Park Drive	61.7	61.6	-0.1
Collector	Seaview Road	43.7	47.9	+4.2
Collector	Barcelona Road	59.9	54.1	-5.8
Collector	Milan Terrace	59.1	57.9	-1.2
Collector	Jetty Road	52.4	50.2	-2.3
Collector	Perry Barr Road	57.3	53.0	-4.3
Collector	Scenic Way	58.5	55.3	-3.2
Collector	Valetta Street	55.7	52.2	-3.5
Collector	Sydenham Road	49.0	47.4	-1.6
Collector	Sixth Avenue	51.8	51.1	-0.8
Collector	Bonython Avenue	54.0	52.4	-1.6
Urban local	Bowyer Street	40.1	37.1	-3.0
Urban local	Charles Road	46.2	44.1	-2.1
Urban local	Adelaide Street	41.6	36.2	-5.3
Urban local	Hambledon Road	53.0	48.5	-4.5
Urban local	Gilbertson Road	55.6	52.7	-2.9
Urban local	Northcote Street	50.2	48.5	-1.7
Urban local	Vincent Road	49.7	49.6	-0.1
Urban local	Andrew Avenue	37.1	36.0	-1.1
Urban local	Esplanade	44.3	42.1	-2.2
Urban local	Olive Avenue	40.1	41.1	+1.0
Urban local	Commercial Street	43.2	40.8	-2.4
Urban local	Bermudez Crescent	48.6	46.4	-2.1
Urban local	London Drive	44.0	40.7	-3.3
Urban local	Farrell Street	36.3	36.5	+0.2
Urban local	Main Street	52.8	50.7	-2.1
Urban local	George Street	33.5	29.7	-3.8
Urban local	Archer Street	45.0	44.9	-0.1
Urban local	Coorara Avenue	57.7	52.1	-5.6
Rural local	Conroe Drive	49.8	50.5	+0.6
Rural local	Reginald Street	44.2	43.8	-0.4
Rural local	Stratford Street	29.0	33.6	+4.6
Rural local	Cedar Avenue	56.5	52.6	-3.9
Rural local	Hobbs Street	31.1	31.6	+0.4
Rural local	Fiedler Street	48.8	47.7	-1.1
Rural local	Meander Avenue	36.3	40.8	+4.5
Rural local	Bruce Road	63.1	57.7	-5.4
Rural local	Parham Crescent	45.8	46.4	+0.6
Rural local	Woodford Street	32.8	32.6	-0.2
Rural local	Bowman Street	41.4	41.3	-0.1
Rural local	Thomas Street	30.6	29.6	-1.0

Table 2.9 gives the overall reductions in mean free travelling speeds after the introduction of the 50 km/h default limit for each of the road types and for all roads on which the speed limit was changed to 50 km/h. These reductions were calculated by taking the mean of all free travelling speeds measured on roads of the given road type before and after the change in the default urban speed limit.

**Table 2.9**  
Overall reduction in mean free travelling speeds after the introduction of the 50 km/h default urban speed limit

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

\* Arterial roads retained a 60 km/h speed limit

The distributions of free travelling speeds from the 2002 survey are compared with the 2003 survey for each road type in Figures 2.7 to 2.10.

**Figure 2.7**  
Distribution of free travelling speeds on arterial roads before and after the introduction of the 50 km/h default urban speed limit (arterial roads retained a 60 km/h speed limit)

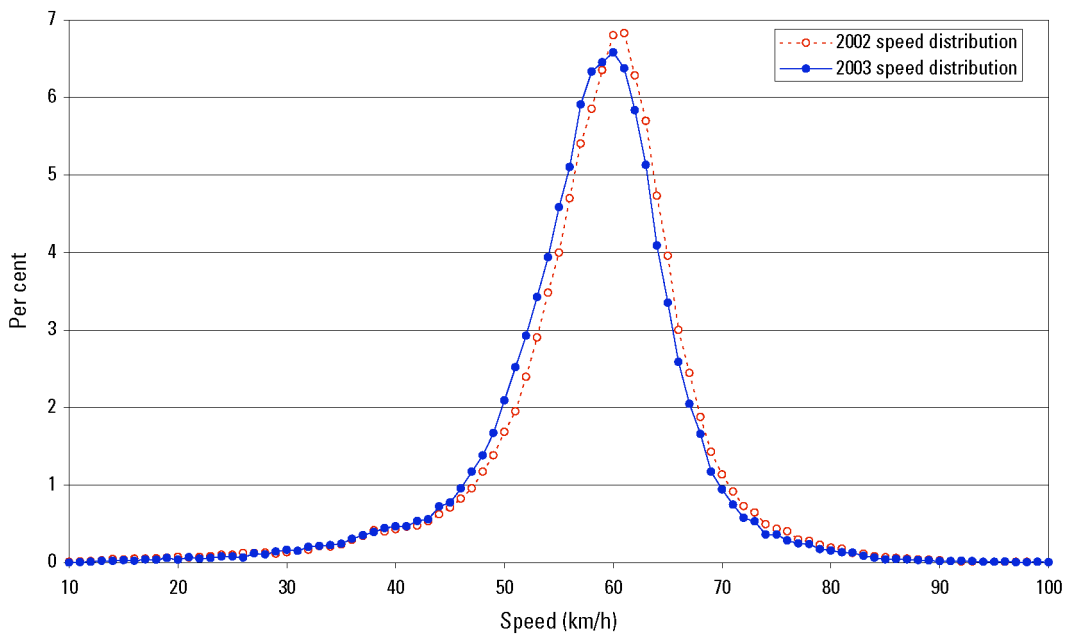


Figure 2.8  
 Distribution of free travelling speeds on collector roads before and after  
 the introduction of the 50 km/h default urban speed limit

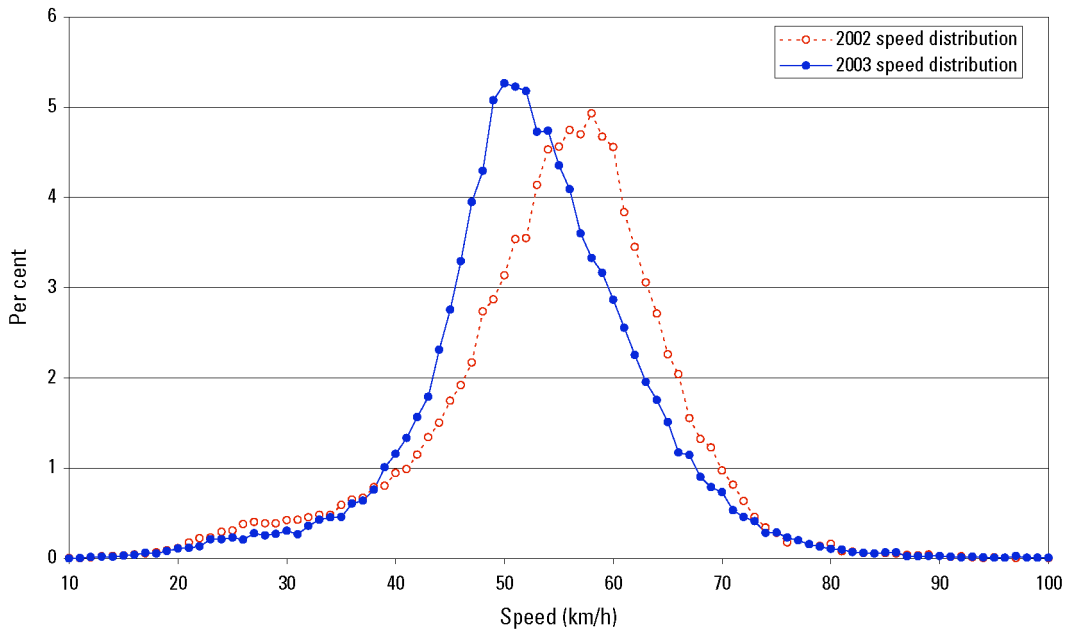


Figure 2.9  
 Distribution of free travelling speeds on urban local roads before and after  
 the introduction of the 50 km/h default urban speed limit

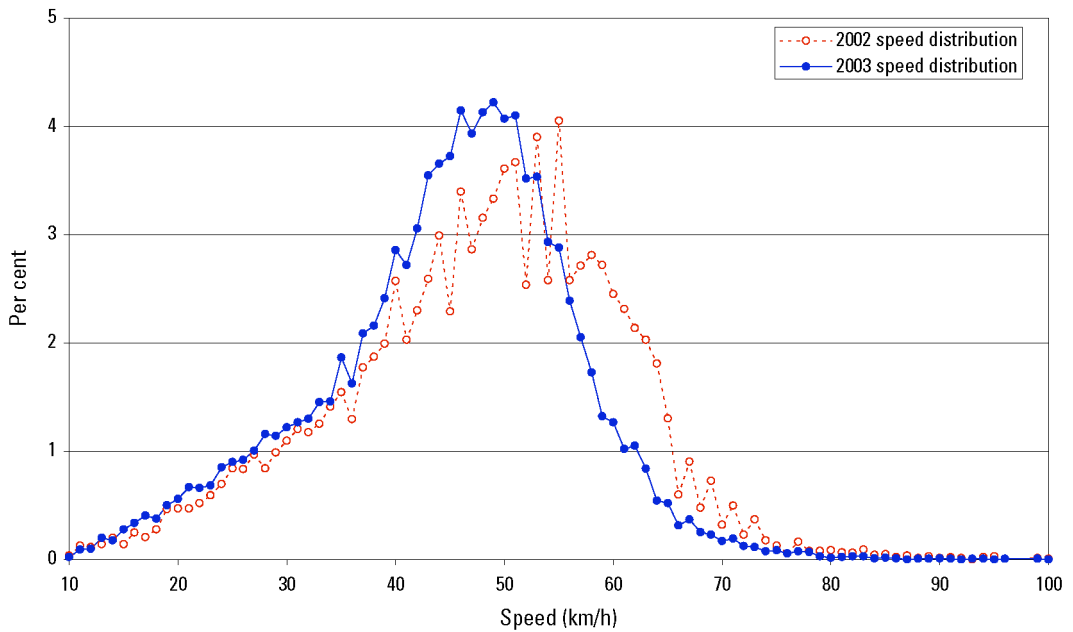
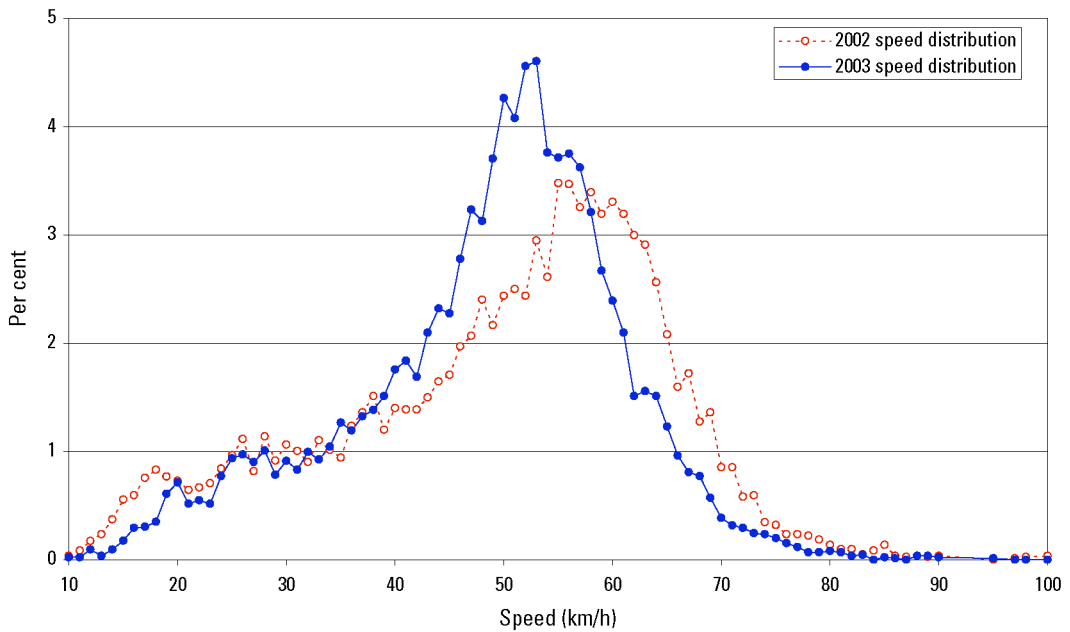


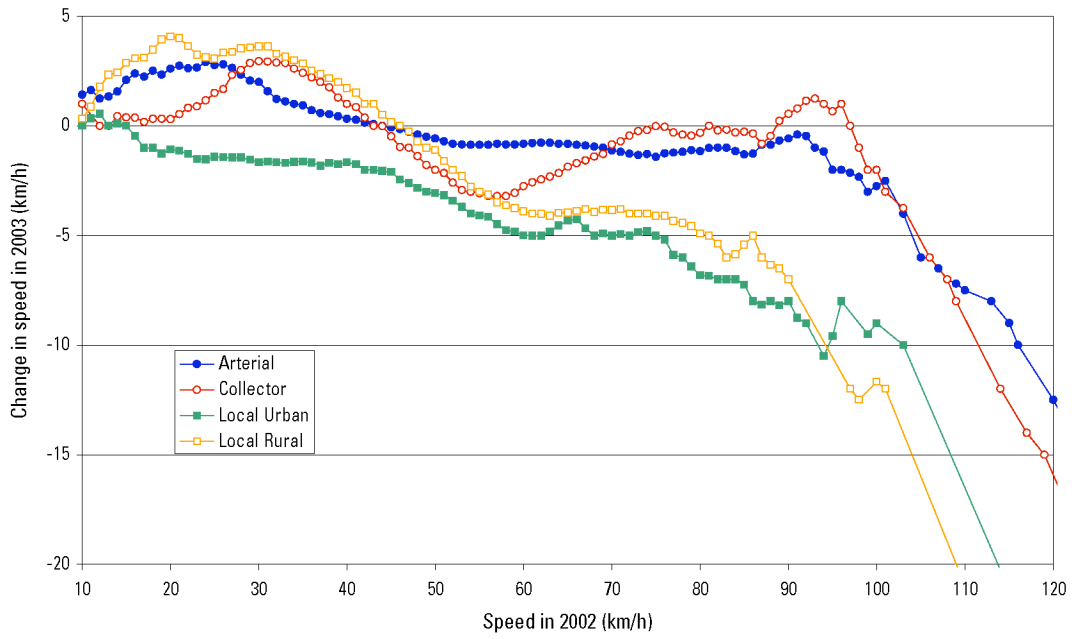
Figure 2.10  
Distribution of free travelling speeds on rural local roads before and after  
the introduction of the 50 km/h default urban speed limit



There was an obvious shift to the left for all of the free travelling speed distributions shown in Figures 2.7 to 2.10 indicating an overall reduction in free travelling speeds. Local roads also showed a narrowing of the distribution as the number of vehicles travelling at higher speeds decreased.

However, it is not clear from these graphs what was happening at individual free travelling speeds. As described earlier in this Report (page 10), a method was developed to explore this further and the change in free travelling speed for each individual km/h of speed is shown in Figure 2.11.

Figure 2.11  
 Change in free travelling speed in 2003 by free travelling speed in 2002 on the different road types



The results are very similar to those for all speeds as seen in Figure 2.6 and similar conclusions are apparent.

## 3 Changes in casualty and casualty crash numbers

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This Section examines the changes in casualty and casualty crash numbers associated with the introduction of the default 50 km/h speed limit both on roads that had their speed limit reduced from 60 km/h to 50 km/h and on roads that remained at 60 km/h.

### 3.1 Methodology

Casualty crashes in South Australia are recorded by the police on a per report basis in their vehicle collision computer database system. This data is then further processed by the Department of Transport and Urban Planning (DTUP) into the traffic accident reporting system database (TARS). A copy of this database current in August 2004 for the years 1994-2004 was analysed for this Report.

In order to analyse the change in crash numbers over time on roads that changed from 60 km/h to 50 km/h it was necessary to identify those roads as coded by the TARS database. Since no such identification existed it was necessary to obtain lists of roads remaining at 60 km/h from DTUP and local councils and to create a list of 60 km/h roads that did not change along with their TARS road number.

We briefly considered using the police coding of speed limit in the 2003 TARS data to identify 50 km/h roads but this coding was found to be unreliable.

The following logic was used to classify crashes as being on one of three road types: those roads that changed from 60 to 50 km/h; those roads that remained at 60; or those roads with some other limit:

- if the police-recorded speed limit was 50 or 60 km/h and the crash occurred on a road on our list of 60 roads or at an intersection where at least one of the roads was on our list of 60 roads then the crash was classified as being on a road that remained at 60
- if the police-recorded speed limit was 50 or 60 km/h and the crash occurred on a road not on our list of 60 roads or at an intersection where neither of the roads was on our list of 60 roads then the crash was classified as being on a road that changed from 60 to 50
- in all other cases the crash was classified as being on an "other limit" road
- in addition, in all cases where the crash was recorded as happening in a car park, it was classified as being on an "other limit" road even if it matched the above criteria.

While this was not an infallible method for classifying the crashes, it was the best method we could use given the available data and should approximate the real situation very closely.

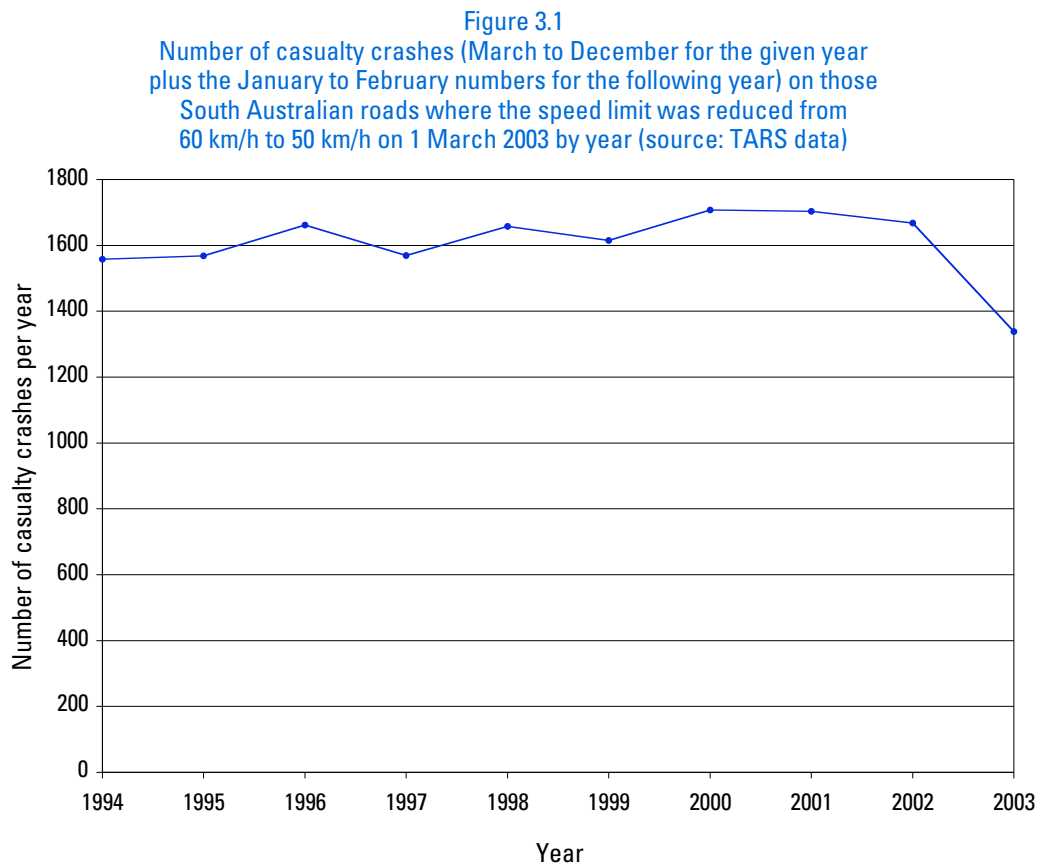
Property damage only crashes could not be adequately investigated due to a decision by DTUP to cease processing most of the reports on those crashes from 1 July 2003.



## 3.2 Casualty crashes on roads going from 60 km/h to 50 km/h

Since the 50 km/h default limit was introduced on 1 March 2003, casualty crash numbers for March 2003 - February 2004 inclusive were compared with the corresponding March - February casualty crash numbers for previous years.

Figure 3.1 shows the number of casualty crashes (March to December for that year plus the January to February numbers for the following year) for the last 10 years on the set of roads that had their speed limit reduced from 60 km/h to 50 km/h on 1 March 2003. A slight upward trend is apparent up until 2002 with a big reduction after the change of speed limit.



The monthly casualty and casualty crash numbers from January 1994 to June 2004 were examined. To allow for months of different lengths, the numbers for each month were divided by the number of days in that month to get an average casualty or casualty crash rate per day. Underlying monthly variations were corrected for by dividing that rate by the average casualty or casualty crash rate per day for that month in the years 1981 to 2002 and multiplying by the overall average casualty or casualty crash rate per day.

The resultant monthly rate for casualty crashes is shown in Figure 3.2 and the resultant monthly rate for casualties is shown in Figure 3.3.

Figure 3.2  
 Average number of casualty crashes per day for each month from January 1994 to June 2004  
 on those South Australian roads where the speed limit was reduced from  
 60 km/h to 50 km/h on 1 March 2003 (corrected for underlying monthly variations)

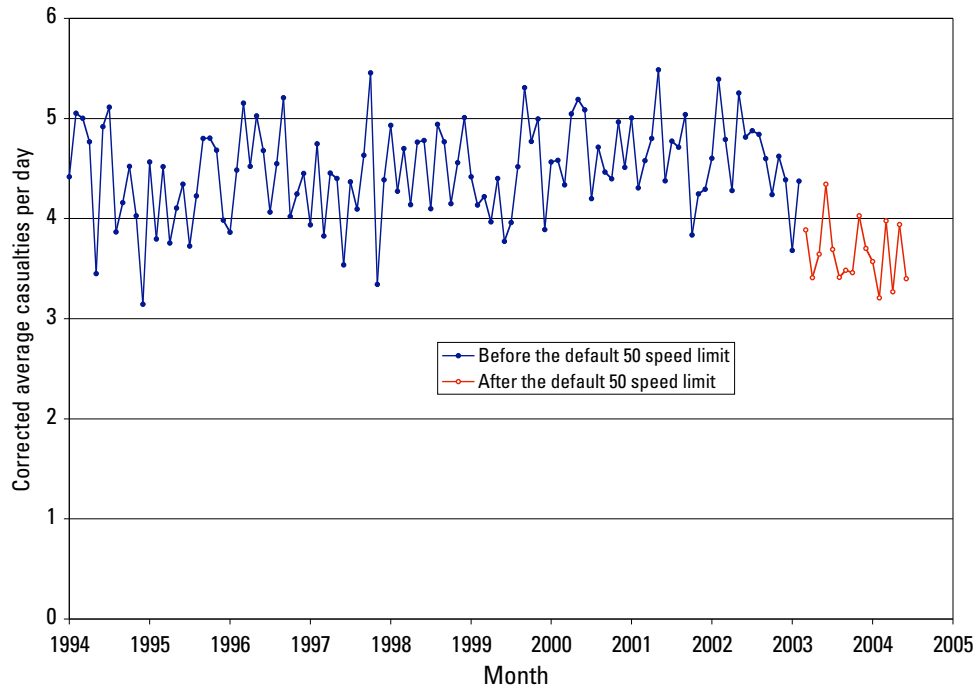


Figure 3.3  
 Average number of casualties per day for each month from January 1994 to June 2004  
 on those South Australian roads where the speed limit was reduced from  
 60 km/h to 50 km/h on 1 March 2003 (corrected for underlying monthly variations)

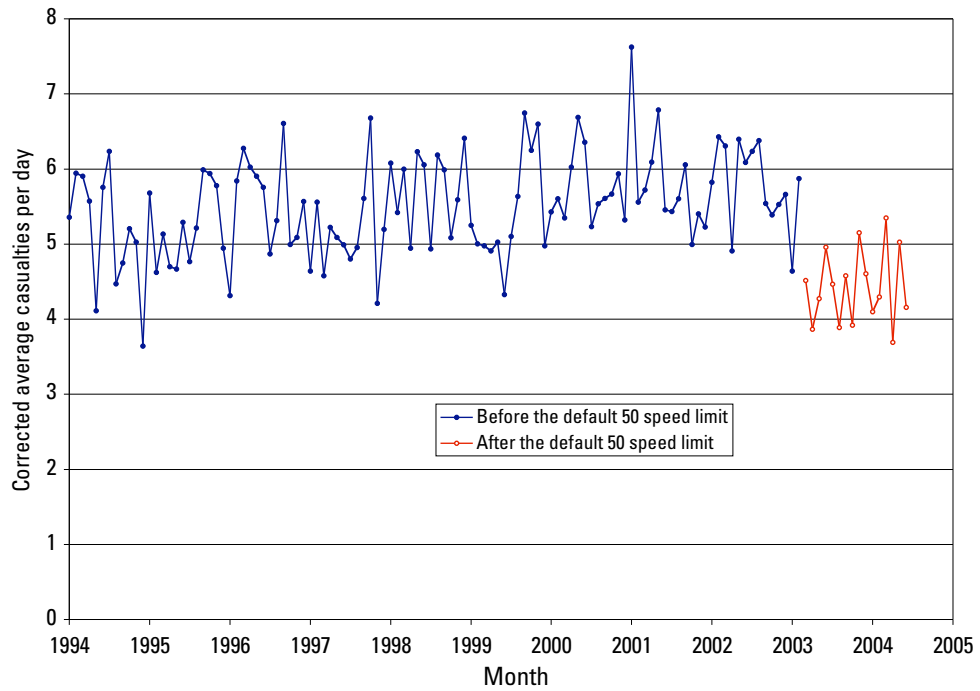


Table 3.1 breaks down the casualty crashes by the severity of the most severely injured person involved in the crash, as indicated mainly by the type of treatment, and compares data for the year after the default limit was reduced with data for the year before. The number of cases in all levels of injury severity fell after the speed limit was reduced and the two groups with the largest numbers showed statistically significant reductions along with total casualty crashes.

**Table 3.1**  
**Number of casualty crashes on those South Australian roads**  
**where the speed limit was reduced from 60 km/h to 50 km/h on 1 March 2003**  
**by crash severity and time period (source: TARS data)**

Crash injury severity	Mar 2002 - Feb 2003 60 km/h limit	Mar 2003 - Feb 2004 50 km/h limit	Per cent change	95% confidence limits of % change
Private doctor	527	452	-14.2	-25.9, -2.6
Hospital treated	895	676	-24.5	-33.1, -15.8
Hospital admitted	233	202	-13.3	-30.8, +4.2
Fatal	13	8	-38.5	-100, +30.6
Total casualty crashes	1668	1338	-19.8	-26.2, -13.3

Table 3.2 examines individual casualty numbers by the severity of the injury to the casualty and compares the year after the default speed limit was reduced to the year before. The number of cases in all levels of injury severity fell after the speed limit was reduced and the two groups with the largest numbers showed statistically significant reductions along with total casualties. The reductions in the number of casualties was greater than for the corresponding reduction in the number of casualty crashes indicating that, on average, fewer people were as severely injured per crash following the speed limit reduction.

**Table 3.2**  
**Number of casualties on those South Australian roads**  
**where the speed limit was reduced from 60 km/h to 50 km/h on 1 March 2003**  
**by casualty severity and time period (source: TARS data)**

Casualty severity	Mar 2002 - Feb 2003 60 km/h limit	Mar 2003 - Feb 2004 50 km/h limit	Per cent change	95% confidence limits of % change
Private doctor	627	524	-16.4	-27.0, -5.8
Hospital treated	1198	846	-29.4	-36.8, -22.0
Hospital admitted	262	228	-13.0	-29.5, +3.6
Fatal	14	8	-42.9	-108.5, +22.8
Total casualties	2101	1606	-23.6	-29.2, -17.9

The reductions in casualty crashes and casualties in the first year after the default limit was introduced compared to the year before are presented in Table 3.3.

**Table 3.3**  
**First year reductions on those South Australian roads where the**  
**speed limit was reduced from 60 km/h to 50 km/h on 1 March 2003**

Measure	First year reduction
Total number of casualty crashes	330
Number of private doctor crashes	75
Number of hospital treatment crashes	219
Number of hospital admission crashes	31
Number of fatal crashes	5
Total number of casualties	495
Number of private doctor casualties	103
Number of hospital treated casualties	352
Number of hospital admissions	34
Number of fatalities	6

The observed reductions in casualties were then converted into a dollar saving to the South Australian community using the Bureau of Transport Economics (2000) human capital method updated to 2004 dollars (Australian Bureau of Statistics, 2004). The results are shown in Table 3.4.

**Table 3.4**  
**First year casualty dollar savings on those South Australian roads**  
**where the speed limit was reduced from 60 km/h to 50 km/h on 1 March 2003**

Casualty severity	Number of casualties saved in first year	Cost per casualty in 2004 dollars	Total savings
Minor casualties	455	\$14,434	\$6,567,470
Serious casualties	34	\$390,922	\$13,291,348
Fatalities	6	\$1,804,257	\$10,825,542
<b>Total</b>			<b>\$30,684,360</b>

The Bureau of Transport Economics method takes into account the following costs: lost labour in the workplace, household and community; hospital and other medical; long term care; legal; workplace disruption; vehicle damage; emergency services; property damage; travel delays; and quality of life. While the quality of life factor does try to capture some of the intangible costs of injuries and deaths, it does so only partially. Willingness-to-pay methods, which attempt to include all intangible costs, typically give somewhat higher costs for injuries and double or triple the cost for a fatality. The willingness-to-pay method is used by all transport agencies of the United States Government, including the National Highway Traffic Safety Administration.

Table 3.5 shows the crash types and compares the year after the default limit was reduced to the year before. All crash types except "head on", "left road out of control" and "hit animal" showed reductions with "right angle", "rear end", "side swipe" and "right turn" being statistically significant in their own right.

**Table 3.5**  
**Number of casualty crashes on those South Australian roads**  
**where the speed limit was reduced from 60 km/h to 50 km/h on 1 March 2003**  
**by type of crash and time period (source: TARS data)**

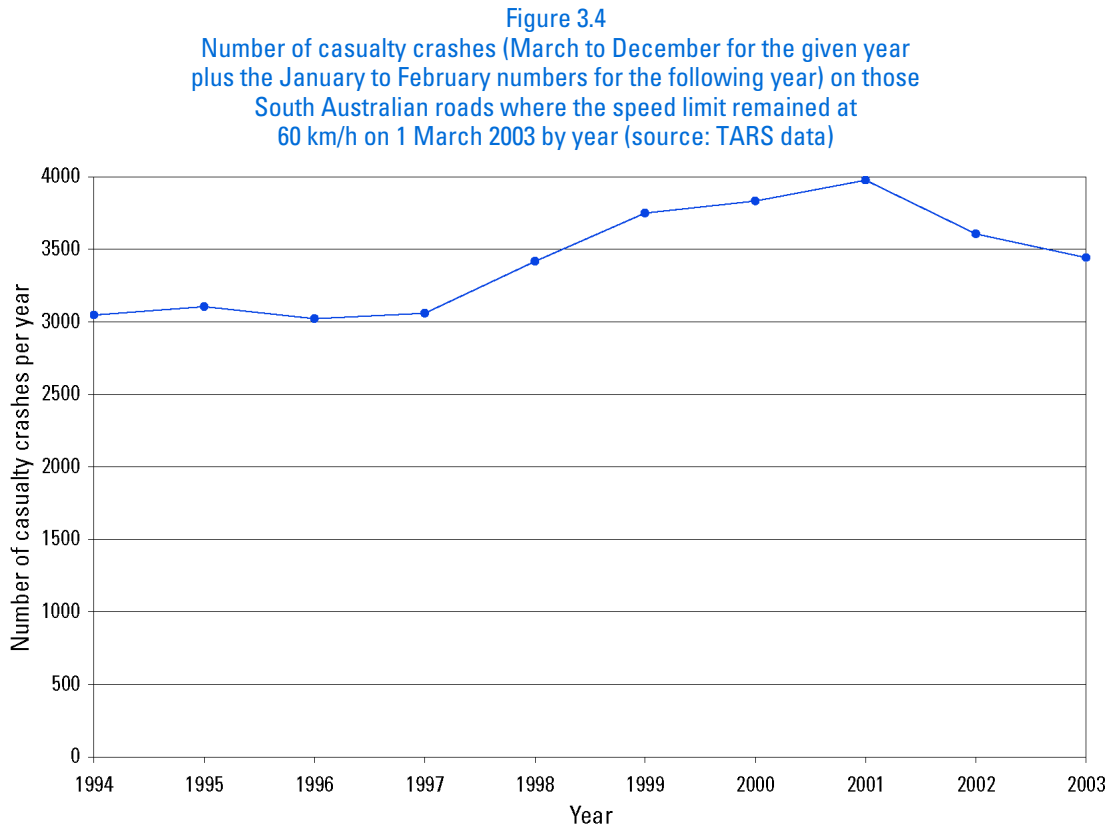
Crash type	Mar 2002 - Feb 2003 60 km/h limit	Mar 2003 - Feb 2004 50 km/h limit	Per cent change	Statistical significance*
Right angle	434	300	-30.9	significant
Hit fixed object	317	286	-9.8	-
Rear end	311	246	-20.9	significant
Hit pedestrian	167	154	-7.8	-
Side swipe	116	87	-25.0	significant
Right turn	96	66	-31.3	significant
Hit parked vehicle	82	69	-15.9	-
Roll over	54	42	-22.2	-
Head on	41	44	7.3	-
Other	33	27	-18.2	-
Left road - out of control	8	8	0.0	-
Hit object on road	7	6	-14.3	-
Hit animal	2	3	50.0	-
<b>Total</b>	<b>1668</b>	<b>1338</b>	<b>-19.8</b>	<b>significant</b>

\* p < 0.05

### 3.3 Casualty crashes on roads remaining at 60 km/h

Since the 50 km/h default limit was introduced on 1 March 2003 casualty crash numbers for March 2003 - February 2004 were compared with the corresponding March - February casualty crash numbers for previous years.

Figure 3.4 shows the number of casualty crashes from March through February for the last 10 years on the set of roads that remained at 60 km/h on 1 March 2003. An upward trend is apparent up from 1997 to 2001 with a reduction in 2002 and 2003.



It is not clear why there was a reduction from 2001 to 2002. It may have been due to lower speeds on main roads in anticipation of a reduction in the default speed limit.

The monthly casualty and casualty crash numbers from January 1994 to June 2004 were examined. To allow for months of different lengths, each month's numbers were divided by the number of days in that month to get an average casualty or casualty crash rate per day for that month. Underlying monthly variations were corrected for by dividing that rate by the average casualty or casualty crash rate per day for that month in the years 1981 to 2002 and multiplying by the overall average casualty or casualty crash rate per day.

The resultant monthly rate for casualty crashes is shown in Figure 3.5 and the resultant monthly rate for casualties is shown in Figure 3.6.

Figure 3.5  
 Average number of casualty crashes per day for each month from January 1994 to June 2004  
 on those South Australian roads where the speed limit remained  
 at 60 km/h on 1 March 2003 (corrected for underlying monthly variations)

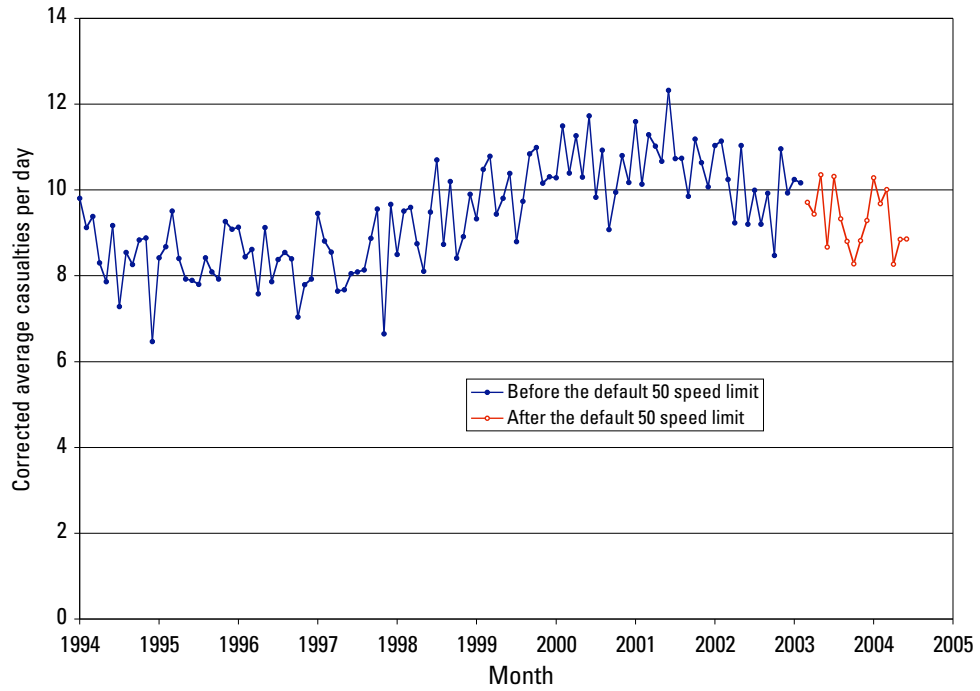


Figure 3.6  
 Average number of casualties per day for each month from January 1994 to June 2004  
 on those South Australian roads where the speed limit remained  
 at 60 km/h on 1 March 2003 (corrected for underlying monthly variations)

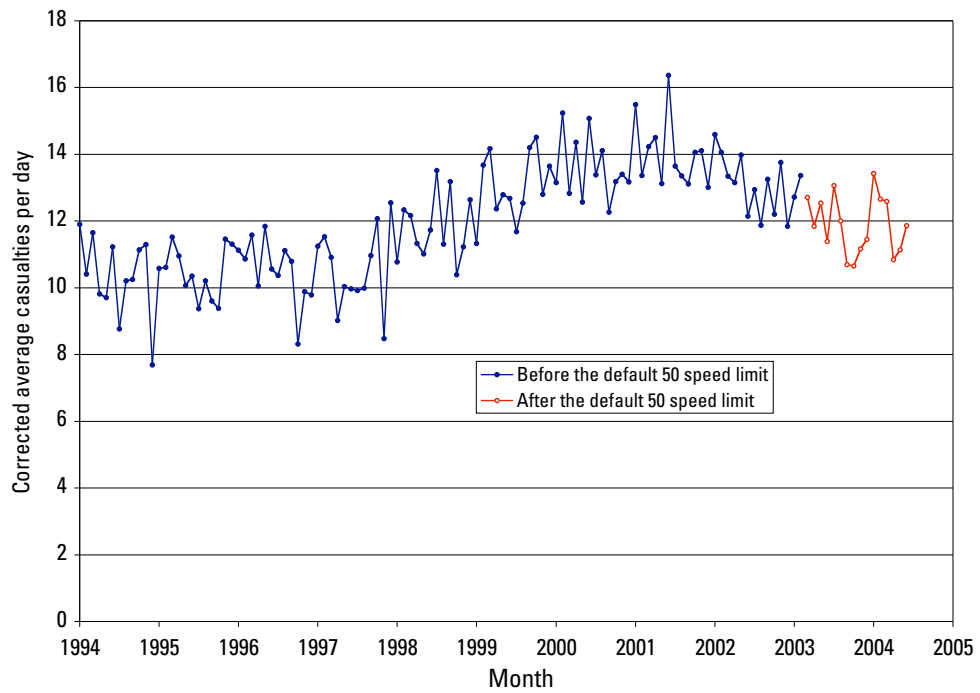


Table 3.6 breaks down the casualty crashes by the severity of the most severely injured person involved in the crash and compares the year after the default limit was reduced to the year before. The number of cases in all levels of injury severity, except treatment by private doctor, fell after the speed limit was reduced although only hospital treated crashes and total casualty crashes showed statistically significant changes.

**Table 3.6**  
**Number of casualty crashes on those South Australian roads**  
**where the speed limit remained at 60 km/h on 1 March 2003**  
**by crash severity and time period (source: TARS data)**

Crash injury severity	Mar 2002 - Feb 2003 60 km/h limit	Mar 2003 - Feb 2004 50 km/h limit	Per cent change	95% confidence limits of % change
Private doctor	1505	1506	0.1	-7.1, 7.2
Hospital treated	1686	1545	-8.4	-15.0, -1.8
Hospital admitted	385	367	-4.7	-18.6, 9.3
Fatal	31	24	-22.6	-69.5, 24.3
Total casualty crashes	3607	3442	-4.6	-9.1, -0.0

Table 3.7 examines individual casualty numbers by the severity of the injury to the casualty and compares the year after the default limit was reduced to the year before. The number of cases in all levels of injury severity fell after the speed limit was reduced although only "hospital treated casualties" and "total casualties" showed statistically significant reductions. The reductions in the number of casualties were all greater than for the corresponding reductions in the number of casualty crashes indicating that, on average, fewer people were as severely injured per crash following the speed limit reduction.

**Table 3.7**  
**Number of casualties on those South Australian roads**  
**where the speed limit remained at 60 km/h on 1 March 2003**  
**by casualty severity and time period (source: TARS data)**

Casualty severity	Mar 2002 - Feb 2003 60 km/h limit	Mar 2003 - Feb 2004 50 km/h limit	Per cent change	95% confidence limits of % change
Private doctor	1841	1793	-2.6	-9.0, 3.8
Hospital treated	2349	2109	-10.2	-15.8, -4.6
Hospital admitted	477	447	-6.3	-18.8, 6.2
Fatal	35	26	-25.7	-69.5, 18.0
Total casualties	4702	4375	-7.0	-10.9, -3.0

The reductions in casualty crash and casualty numbers in the first year after the default limit was introduced compared to the year before are presented in Table 3.8.

**Table 3.8**  
**First year reductions on those South Australian roads where the**  
**speed limit was remained at 60 km/h on 1 March 2003**

Measure	First year reduction
Total number of casualty crashes	165
Number of private doctor crashes	-1
Number of hospital treatment crashes	141
Number of hospital admission crashes	18
Number of fatal crashes	7
Total number of casualties	327
Number of private doctor casualties	48
Number of hospital treated casualties	240
Number of hospital admissions	30
Number of fatalities	9

These reductions in casualties were then converted into a monetary saving to the South Australian community using the Bureau of Transport Economics (2000) human capital method updated to 2004 dollars (Australian Bureau of Statistics, 2004). The results are shown in Table 3.9.

**Table 3.9**  
**First year casualty dollar savings on those South Australian roads**  
**where the speed limit remained at 60 km/h on 1 March 2003**

Casualty severity	Number of casualties saved in first year	Cost per casualty in 2004 dollars	Total savings
Minor casualties	288	\$14,434	\$4,156,992
Serious casualties	30	\$390,922	\$11,727,660
Fatalities	9	\$1,804,257	\$16,238,313
<b>Total</b>			<b>\$32,122,965</b>

As noted above, the Bureau of Transport Economics method takes into account the following costs: lost labour in the workplace, household and community; hospital and other medical; long term care; legal; workplace disruption; vehicle damage; emergency services; property damage; travel delays; and quality of life. Willingness-to-pay methods, which attempt to include all intangible costs, typically give somewhat higher costs for injuries and double or triple the cost for a fatality.

Table 3.10 shows the crash types and compares the year after the default limit was reduced to the year before. All crash types except "roll over", "hit animal" and "hit object on road" showed reductions although only "hit pedestrian" and the total of all of these showed a statistically significant change.

**Table 3.10**  
**Number of casualty crashes on those South Australian roads**  
**where the speed limit remained at 60 km/h on 1 March 2003**  
**by type of crash and time period (source: TARS data)**

Crash type	Mar 2002 - Feb 2003 60 km/h limit	Mar 2003 - Feb 2004 50 km/h limit	Per cent change	Statistical significance*
Rear end	1515	1461	-3.6	-
Right angle	694	692	-0.3	-
Right turn	435	408	-6.2	-
Hit fixed object	299	298	-0.3	-
Side swipe	224	188	-16.1	-
Hit pedestrian	224	184	-17.9	significant
Hit parked vehicle	82	68	-17.1	-
Head on	61	59	-3.3	-
Other	36	31	-13.9	-
Roll over	26	38	46.2	-
Left road - out of control	9	7	-22.2	-
Hit animal	1	1	0.0	-
Hit object on road	1	7	600.0	-
<b>Total</b>	<b>3607</b>	<b>3442</b>	<b>-4.6</b>	<b>significant</b>

\* p < 0.05



## 4 Discussion

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### 4.1 Reductions on roads going from 60 km/h to 50 km/h

#### 4.1.1 Speed reductions

The average speed of vehicles on roads where the speed limit was reduced from 60 km/h to 50 km/h was observed to drop by 2.3 km/h from just before the introduction of the default 50 km/h speed limit to a year later.

One possible factor for lower vehicle speeds unrelated to the default 50 km/h speed limit is greater traffic congestion leading to lower average vehicle speeds. Indeed a 4.9 per cent increase in traffic volume was observed on these roads between the two surveys along with a corresponding reduction from 88.7 to 86.0 in the percentage of vehicles travelling at a free speed (ie those vehicles with a four second or greater gap to the vehicle in front of them).

However, analysis of just the free speed vehicles from both surveys found a 2.2 km/h drop in average vehicle free speed. The closeness of this figure to that for all vehicles along with the relatively high percentage of vehicles travelling at free speeds on these roads suggests that the great majority of reduction in vehicle speeds can be attributed to changed driver behaviour as opposed to increased traffic congestion.

Unfortunately, historical data is not available to indicate any underlying trends in vehicle speeds on these roads so we cannot ascertain if speeds were trending down before the default 50 km/h speed limit was introduced nor how speeds changed between the two surveys.

Evaluations in other Australian states where the default 50 km/h speed limit was introduced also found similar reductions in vehicle speeds (Kidd, Radalj, 2003; Green, Gunatillake, Styles, 2003; RTA, 2000).

Overall, it appears reasonable to attribute the bulk of the observed speed reductions directly to the introduction of the default 50 km/h speed limit.

#### 4.1.2 Casualty crash reductions

The number of casualty crashes on roads where the speed limit was reduced from 60 km/h to 50 km/h decreased by 19.8 per cent in the year after the introduction of the default 50 km/h speed limit compared to the year before. The 95 per cent confidence limits on this percentage reduction were 13.3 and 26.2 per cent indicating that it was very unlikely to have occurred due to chance alone.

The annual number of casualty crashes in the nine years preceding the speed limit being reduced from 60 km/h to 50 km/h shows little variation and a slight upward trend. The monthly figures show an immediate and sustained reduction in casualty crash numbers associated with the introduction of the default 50 km/h speed limit, allowing for considerable monthly variation.

We are not aware of any factors other than the reduction in speed limit that could be expected to have changed casualty crash frequency on these roads around the time of the introduction of the default 50 km/h speed limit.

There are also sound physical (ie: stopping distance and crash energy both increase with the square of speed) and epidemiological (eg: Kloeden, McLean, Glonek, 2002) reasons for believing that small reductions in vehicle speeds will lead to large reductions in casualty crash frequency.

Furthermore, evaluations in other Australian states where the default 50 km/h speed limit has been introduced also found similar reductions in casualty crash numbers as well as in vehicle travelling speeds (Kidd, Radalj, 2003; Green, Gunatillake, Styles, 2003; RTA, 2000; Newstead, Hoareau, Cameron, 2002).

It therefore appears reasonable to attribute the bulk of the observed casualty crash reductions to the speed reductions brought on primarily by the introduction of the default 50 km/h speed limit.

The hypothesis that the change in the default limit caused drivers to reduce their speeds which in turn caused a reduction in casualty crash numbers is thus strongly supported.

## 4.2 Reductions on roads remaining at 60 km/h

### 4.2.1 Speed reductions

The average speed of vehicles on roads where the speed limit remained at 60 km/h was observed to drop by 0.9 km/h from just before the introduction of the default 50 km/h speed limit to a year later.

This is curious given that the speed limit on these roads did not change but this has been observed in other Australian states and territories (Kidd, Radalj, 2003; Green, Gunatillake, Styles, 2003) and may be related to a general higher awareness of speed and speed limits surrounding the introduction of the default 50 km/h speed limit.

Greater traffic congestion leading to lower average vehicle speeds may also play a role. A 2.8 per cent increase in traffic volume was observed on these roads between the two surveys along with a corresponding reduction from 49.5 to 48.1 in the percentage of vehicles travelling at a free speed (4 second or greater headway).

Analysis of just the free speed vehicles from both surveys found a 0.7 km/h drop in average vehicle free speed. The relatively large reduction in this figure from that for all vehicles along with the relatively low percentage of vehicles travelling at free speeds on these roads suggests that the lowering of all vehicle speeds can be attributed to both increased traffic congestion and changed driver behaviour.

Unfortunately, historical data is not available to indicate any underlying trends in vehicle speeds on these roads so we cannot ascertain if speeds were trending down before the default 50 km/h speed limit was introduced nor how speeds changed between the two surveys. Nevertheless, it appears reasonable to attribute some of the observed speed reductions directly to a behavioural side effect of the introduction of the default 50 km/h speed limit and some to increased traffic congestion.

### 4.2.2 Casualty crash reductions

The number of casualty crashes on roads where the speed limit remained at 60 km/h was decreased by 4.6 per cent in the year after the introduction of the default 50 km/h speed limit compared to the year before. The 95 per cent confidence limits on this percentage were zero and 9.1 indicating that a reduction of the observed size was unlikely to have occurred by chance alone.

The annual number of casualty crashes in the nine years preceding the speed limit being reduced from 60 km/h to 50 km/h shows an upward trend from 1997 to 2001 and a trend downward in 2002. The monthly figures show a continuation of the downward trend after the introduction of the default 50 km/h speed limit.

The lack of historical speed data prevent us from determining if the observed downward trend in casualty crashes was associated with a continuing lowering of vehicle speeds, however, we are not aware of any factors other than speed reductions that could be

expected to have contributed substantially to the observed reduction in casualty crash frequency on these roads.

The sound physical and epidemiological evidence for believing that small reductions in vehicle speeds will lead to large reductions in casualty crash frequency also suggests that at least part of the reduction in casualty crashes was due to lower vehicle speeds.

So, while the size and context of the observed reduction in vehicle speeds and casualty crash numbers on roads that remained at 60 km/h make any conclusions tentative, it does seem reasonable to conclude that at least some of the observed reductions were due to a positive side effect of the default 50 km/h speed limit.

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

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