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AN EVALUATION OF THE DEFAULT 50 KM/H SPEED LIMITS IN WESTERN AUSTRALIA

by

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An evaluation of the default 50 km/h speed limits in Western Australia

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Abstract:
This report presents the results of an evaluation of the default 50 km/h speed limits introduced in Western Australia on December 1, 2001. The study assessed the effects of the speed limit change in built-up areas on crash frequency, driver speed behaviour and community attitudes over the 24 month period following implementation of the program.

The crash effects of the initiative were measured using Poisson regression under a quasi-experimental design framework. Separate crash analyses were conducted for metropolitan Perth and regional Western Australia for various target groups and severity categories. Results of the metropolitan analysis showed a 20% net reduction in all crashes, a 51% net reduction for all crashes involving pedestrians, and a 19% and 18% net reduction for all crashes involving young and older drivers, respectively. Although no statistically significant results were obtained for fatal or serious injury crashes in any of the analyses, a statistically reliable net reduction of 21% was obtained for all casualty crashes. All major and minor property damage crashes were also reduced by 19% and 29%, respectively. Very few statistically significant results associated with the introduction of the program were obtained for the regional analyses. These included a net decrease of 16% for all crashes, and a net reduction of 52% for crashes involving young drivers. Both of these results were valid for the first year of the program only.

An examination of speed monitoring surveys provided evidence that the intervention was associated with a positive effect on speeding behaviour, achieving statistically significant reductions in excessive speeding in 50 km/h zones in both metropolitan Perth and regional Western Australia. Furthermore, an examination of community attitude surveys conducted in the period prior to and post implementation, showed that support for the initiative had increased throughout this period. Both these findings are consistent with the crash analysis outcomes.

Key Words:
Crash analysis, Poisson regression, evaluation, speed monitoring surveys, community attitudes, statistics

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PREFACE

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EXECUTIVE SUMMARY

Introduction

The default 50 km/h built-up area speed limit was introduced in Western Australia on December 1, 2001. Implemented statewide, the initiative involved extensive education activities which included advertising and informational campaigns both pre and post introduction. Signage informing motorists of the 50 km/h speed limits was limited to courtesy signs at state borders, reminder signs on major arterials and on a small number of roads where the speed limits were possibly unclear. Although a one-month moratorium on enforcement was announced, due to operational policy, limited enforcement of these limits actually occurred.

The primary motivation for introducing this speed reduction program in Western Australia was the expectation that a 20 to 30 per cent reduction in serious crashes could be achieved, benefiting mostly the more vulnerable users of local area road network such as pedestrians, children and bicyclists. This expectation was based on similar gains achieved in both local and overseas jurisdictions.

To determine the initiativeís effectiveness, the Monash University Accident Research Centre (MUARC) was commissioned to undertake a comprehensive evaluation of the program to ascertain its effects in the 24 months following implementation. The evaluation involved an analysis of Police-reported crashes in both metropolitan Perth and regional Western Australia, speed monitoring surveys and community attitude surveys.

Effects on Crashes

The effect of the initiative on crash frequency in Western Australia was measured via an analysis of Police-reported crash data covering the period December 1996 to November 2003. The analysis considered crashes of all severities and those involving various target groups in both metropolitan Perth and regional Western Australia. A quasi-experimental design was employed which utilised a treatment and comparison group to measure the net effect of the program. This design involved assessing the crash effects on 50 and 60 km/h roads combined, relative to crashes on 70 km/h zoned roads.

Most of the statistically significant results obtained in the crash analyses were for metropolitan crashes. Very few statistically significant effects were detected in the regional crash analysis. The most noteworthy results are summarised in the table below along with the estimated crash savings gained over the two-year post implementation period. The statistically significant results obtained for regional Western Australia are applicable for the first year of the program only.

Crash type	Overall Reduction (%)	Estimated Crash Savings Over 2 Years
Metropolitan Perth		
All casualty crashes	21	2,064
Major property damage	19	4,704
Minor property damage	29	2,376
All reported crashes	20	8,448
Pedestrian	51	432
Young driver	19	3,912
Older driver	18	2,176
Regional Western Australia		
All reported crashes	16*	2,136
Young driver - medically treated crashes	52*	335

* In first year of program only.

Although the study was unable to detect any statistically significant reductions associated with fatal and serious injury crashes, it was possible to infer the number of savings in fatalities and seriously injured persons associated with the initiative using the statistically significant estimates obtained for all reported crashes. Based on this approach, it was estimated that, over the first two years of implementation of the 50 km/h default limits in Western Australia, 45 lives were saved on Perth roads and 20 lives were saved on regional roads. The number of people saved from serious injury from road crashes over the two-year period is estimated at 553 in the metropolitan area and 158 in rural Western Australia. Further detail on the method used to infer these numbers can be found in Appendix 6.

Effects on travel speeds

In order to be able to track the effects of the initiative on vehicle travel speeds over time, Main Roads Western Australia (MRWA) conducted baseline speed monitoring surveys in October/November 2000 and February 2001, in metropolitan Perth and regional Western Australia, respectively. These surveys were followed up by three additional speed surveys in June 2002, November 2002 and November 2003 for both regions. An analysis of this data by MRWA produced five speed parameter estimates for each of the survey periods for metropolitan and regional Western Australia. The net change for each speed parameter for 50 km/h roads was then calculated relative to 60 km/h roads from before to after the change in legislation.

An examination of speed monitoring survey data suggested that the intervention was associated with a positive effect on speeding behaviour, achieving statistically significant reductions in excessive speeding[1] in 50 km/h zones. The estimates, all of which were statistically significant, are summarised in the table below and show the net decreases in

[1] Excessive speeding is defined here as exceeding the speed limit in 50 km/h zones by travelling at 61 km/h or more both prior to and after the introduction of the initiative.

the five speed parameters measured from the baseline period to the last surveys in November 2003. Negative estimates indicate a reduction for the parameter of interest.

Net speed reductions in 50 km/h zones relative to 60 km/h zones					
Region	**Mean Speed (km/h)**	**85th percentile speed (km/h)**	**Proportion travelling 61-69 km/h (%)**	**Proportion travelling 70-79 km/h (%)**	**Proportion travelling 80 km/h or more (%)**
Metropolitan Perth	-0.3	-0.8	-16	-15	-15
Regional Centres	-3	-1.6	-38	-48	19

Although the initiative affected travelling speeds in both regions of Western Australia, the results showed that the speed-reduction effects of the initiative were greater in regional centres in Western Australia than in metropolitan Perth.

Effects on Attitudes

The Office of Road Safety Western Australia (ORS) commissioned a market research company Donovan Research (now known as TNS) to assess the level of community support of the proposition to reduce speed limits in built-up areas from 60 km/h to 50 km/h, through a community survey. It also conducted focus groups to further explore the reasons behind the responses of participants. The company also continuously tracked the impact of two statements related to the 50 km/h speed limits from implementation in December 2001 through to March 2004. In addition to this source, data on the level of community approval of the default speed limit was obtained from four community surveys conducted by the Australian Transport Safety Bureau (ATSB) for each of the years 2000 to 2003. Results from all these surveys were used to assess community acceptance of the initiative both before and after the introduction of the program.

The findings from the surveys showed that public approval of the initiative increased by approximately 7% to 14% from the period prior to implementation to (approximately) November 2002. This increasing trend in support was consistent with the statistically significant reductions in crash frequency and in travelling speeds in 2002. A comparison of the Donovan Research and ATSB surveys for 2003, however, showed inconsistent results. For 2003, the Donovan Research survey results showed that support for the initiative remained stable at around 61%, while the ATSB reported that support had risen to 91%. This large increase in support from 2002 to 2003 in the ATSB survey, however, was not reflected in any of the findings of the crash or speed survey analyses.

Discussions in the focus groups, related to the introduction of the default speed limits, focused on the reasons behind opposition or expression of no opinion to the proposition. It was found that those opposing the proposed initiative did so due to a variety of reasons. These included the belief that the initiative would result in increased travelling times, driver frustration, confusion, and that the initiative would simply be a revenue raising exercise. These participants also perceived that lowering the speed limit would not significantly improve safety on roads in built-up areas.

Another objective of holding the focus groups was to determine the intention to comply to the 50 km/h speed limits. Two ëmplementation scenariosí were presented to the participants, which included introducing the default limits with and without police enforcement. All those who opposed the introduction of the initiative indicated that they

would not comply with the 50 km/h speed limits if they were implemented without police enforcement. Their attitude toward compliancy, however, became favourable when presented with the scenario of implementation accompanied by full enforcement.

Conclusions

This evaluation has found statistically reliable evidence to show that the introduction of the default 50 km/h speed limits was associated with a positive effect on driver behaviour on roads in built-up areas. Several statistically significant crash reductions were found to be associated with the program during its first two years as were reductions in travelling speeds. These crash reductions are considered to have stemmed largely from a reduction in excessive speeding in 50km/h zones rather than large reductions in mean or 85th percentile speeds at the affected sites.

When compared with other Australian states, the net percentage crash reductions for casualty crashes were consistent with those achieved in New South Wales and South East Queensland, both of which have been evaluated over a comparable time period.

It is possible that the crash reductions reported here might have been greater had the introduction of the program been accompanied by full enforcement. An evaluation of the 50 km/h speed limits in South East Queensland showed that crash reductions only occurred after the amnesty period had expired and full enforcement of the speed limits commenced. However, even without full enforcement of the default speed limits, the program in Western Australia was able to achieve results of a similar magnitude to other Australian states that expended resources to enforce the default speed limits. Although focus groups prior to the introduction of the initiative showed that attitudes towards compliancy became favourable when full enforcement was proposed, the focus group did not contain numbers large enough for this view to be generalised to the Western Australian population. Therefore it is difficult to conclude whether full enforcement would have contributed further to the success of the initiative.

1 INTRODUCTION AND BACKGROUND

The default 50 km/h built-up area speed limit was introduced in Western Australia on December 1st, 2001. Implemented statewide, the initiative involved extensive education activities including advertising and informational campaigns both pre and post introduction. Signage informing motorists of the 50 km/h speed limits was limited to courtesy signs at state borders, reminder signs on major arterials and on a small number of roads where the speed limits were possibly unclear. Although a one-month moratorium on enforcement was announced, due to operational policy, limited enforcement of these limits actually occurred.

The primary motivation for this speed reduction program in Western Australia was the expectation that a 20 to 30 per cent reduction in serious crashes could be achieved, benefiting mostly the more vulnerable users of local area road network such as pedestrians, children and bicyclists. This expectation was based on similar gains achieved in both local and overseas jurisdictions.

To determine the effectiveness of the initiative, Monash University Accident Research Centre (MUARC) was commissioned to undertake a comprehensive evaluation of the program to ascertain its effects in the 24 months following implementation. In addition to an analysis of the crash effects, intermediate measures used to monitor the initiativeís progress, derived from speed monitoring outcomes and attitudinal surveys, were also examined.

The objectives of this evaluation therefore were threefold:

1. To estimate the net effect of the default 50 km/h speed limits on crash frequency and severity for all crashes combined and for selected target groups.

2. To investigate the effect of the 50 km/h on vehicular speeds using speed monitoring surveys. Speed parameters examined included the mean and 85th percentile speeds, and the proportion of drivers exceeding 60, 70 and 80 km/h in 50 km/h speed zones.

3. To assess the level of community support for the initiative over time using community attitude surveys.

It was also intended that speed enforcement data would be examined to assess driver compliance of the legislation. In the process of gathering the data required for the evaluation, it was revealed that enforcement of the default 50 km/h speed limit through the use of speed cameras was limited and that the data gathered in 50 km/h zones would not be sufficient to conduct a meaningful analysis.

2 METHODS AND DATA

2.1 STUDY DESIGN ñ CRASH ANALYSIS

To measure the effect of the introduction of the initiative on crashes, a quasi-experimental design was applied to crash data covering the period December 1996 to November 2003. This type of analytical framework, which utilises a treatment and control design, is appropriate for measuring the net effects of an intervention such as the default 50 km/h speed limit. Under this design strategy, ideally a control (or comparison) group characteristically similar to the treatment group (but not subject to the intervention) is chosen to represent the influence of factors other than those related to the intervention.

2.1.1 Initial design

The ideal design to have employed in this study for assessing the effects of the initiative on crashes, would have been to compare those crashes that had occurred on roads that had undergone the change from 60 km/h to 50 km/h against those crashes that had occurred on roads that remained 60 km/h. That is, the treatment group, consisting of crashes that had occurred on roads currently zoned 50 km/h, would have been compared to a control group consisting of crashes that had occurred on roads currently zoned 60 km/h. Because a reliable method could not be found to accurately label those crashes belonging to the treatment group, an alternative design was devised and utilised.

2.1.2 Final design

The final design involved a redefinition of the treatment and comparison groups. The treatment group was defined as those crashes that had occurred on either 50km/h and 60km/h roads combined, while the comparison group was defined as all crashes that had occurred on 70km/h roads. The speed limit at the time of the crash was used to define the treatment and comparison groups regardless of when the initiative was introduced. This design compensated for any problems in differentiating crashes on 50 km/h roads and those on 60 km/h roads as well as reflecting any ëspill overí effects of the program resulting from confusion as to where the default speed limits applied. For the regional Western Australia analysis all regional crashes were utilised rather than those from regional centres only, to increase the number of crashes available for analysis.

2.2 CRASH DATA AND ANALYSES

Crash data for the period December 1996 to November 2003 was supplied to MUARC by Main Roads Western Australia (MRWA) for use in this evaluation. This data comprised of statewide Police-reported crashes classified into five severity levels: fatal, serious injury (admitted to hospital), medically treated injury, major property damage only, and minor property damage only.

2.2.1 Hypothesis testing

The null hypothesis tested in this evaluation was that the implementation of the 50 km/h speed limits was not associated with an effect on crash frequency. This was assessed

against the alternative hypothesis that the program was associated with some change on crash counts in Western Australia. In this alternative hypothesis no direction of change was assumed, hence two-tailed tests of significance were used.

To test the above hypothesis, statistical estimates of the crash effects of the program were obtained by applying a Poisson log-linear regression model to the data. This type of model has been applied in many studies evaluating crash data and is based on statistical theory which demonstrates that count data follow a Poisson type distribution (Nicholson, A.J., 1985, Nicholson, A.J., 1985, Maher, M and Summersgill, I. 1996). Furthermore, the evaluation design method and the statistical technique described above have been used to evaluate the 50 km/h speed limits in New South Wales, Victoria and South East Queensland.

2.2.2 Statistical analyses

Analyses of the crash data commenced with simple descriptive statistics. Totals and averages were calculated for the ìbeforeî period (December 1996 to November 2001) and each of the yearly and overall ìafterî periods (December 2001 to November 2003), and are presented in tabular format. The objective of these analyses was to obtain an idea of the general crash trend and to highlight any anomalies in the data. These analyses were followed by statistically robust analyses using Poisson log-linear regression. A Poisson regression model of the following general form was fitted to the monthly series of crash frequency data from the treatment (50 and 60 km/h) and control (70km/h) roads.

$$\ln(y_{mtb}) = \alpha + \beta_t + \gamma_b + \delta_t\, m + \phi_{tb}$$

where

y_{mtb} is the monthly or quarterly crash count in either treatment or control group;

t is an indicator for the treatment or control crash series;

b is an indicator of before, or after 50km/h implementation which can modified depending on the time interval outcome sought (for example, yearly, quarterly);

m is the sequential month of the crash data count;

$\alpha, \beta, \gamma, \delta, \phi$ are parameters of the model.

Separate models were fitted to crashes for each severity level of each target group (including all crashes combined) to obtain yearly and overall crash effects for each relative to changes observed in the comparison group. The overall analysis involved combining both years to obtain an overall estimate of effect for that period. Target groups analysed included pedestrians, young and older drivers, motorcyclists and bicyclists.

In addition to the severity categories described above, two additional severity categories were assessed. Fatal crashes, which typically have low crash count frequencies, even when aggregated on a monthly basis for analytical purposes, were pooled with serious injury crashes to increase crash numbers and hence statistical power. All injury crashes were also

pooled with fatal crashes and analysed. These are referred to as casualty crashes in the tables of the Results section.

As there tends to be a greater number of crashes in metropolitan regions, the metropolitan analysis was conducted using aggregated monthly crash data. Due to much lower frequency counts, crashes in regional Western Australia needed to be aggregated quarterly to provide adequate frequencies of the crash counts.

2.2.3 Target groups

Several road user groups were identified as being likely to benefit to a relatively greater extent from the introduction of the default 50 km/h speed limit. These included pedestrians, older and young drivers, motorcyclists and bicyclists. Crashes involving each of these target groups were identified in the crash data and analysed. These target groups were defined as follows and are not mutually exclusive:

Pedestrians: All crashes involving pedestrians on foot. Although few in number, pedestrians on roller blades and pedestrians on a skateboard were also included.

Young drivers: All crashes involving a driver aged between 17 and 25 years inclusive.

Older drivers: All crashes involving a driver aged 55 years or over.

Motorcyclists: All crashes involving a motorcycle.

Bicyclists: All crashes involving a pedal bicycle.

2.3 SPEED MONITORING DATA

In order to be able to track the effects of the initiative on vehicle travel speeds over time, MRWA conducted a baseline speed monitoring survey during October and November of 2000 in metropolitan Perth. A baseline survey for regional Western Australia was carried out in February 2001. These surveys were followed up by three additional speed surveys in June 2002, November 2002 and November 2003.

MRWA collected and analysed the survey data and reported estimates for five separate speed parameters for both 50 and 60 km/h roads. The parameters included 85^{th} percentile speed, mean speed, and the proportion of drivers travelling in the speed ranges 61 to 69 km/h, 70 to 79 km/h and 80 km/h and over.

Speed parameter changes quoted in the MRWA report were not utilised in this report as these calculations were not representative of net changes in speed on 50 km/h roads relative to 60 km/h roads. Rather, the MRWA report presents speed parameter percentage changes for 50 and 60 speed limit roads separately. MUARC has used the speed parameter estimates provided in the MRWA reports (Radalj, T., 2003, Radalj, T., 2004) to determine the relative change in travel speeds on 50 km/h roads relative to 60 km/h roads.

To measure changes in driver speed behaviour over time, speed parameter estimates in the baseline period were compared to the estimates in each of the survey periods.

For each speed parameter of interest, the relative change was calculated by dividing the treatment parameter estimate in the after period by the treatment parameter estimate in the before period. This result was then divided by the outcome of the quotient of the control parameter estimate in the after period and the control parameter estimate in the before period. The resulting figure was subtracted from unity to determine the net change. For the mean and 85th percentile speed parameters, the net change was then multiplied by the treatment parameter estimate in the before period to determine the net change in terms of kilometres per hour.

2.4 COMMUNITY ATTITUDE SURVEYS

The Office of Road Safety Western Australia commissioned a market research company, Donovan Research, (now known as TNS Consultants) to assess the level of community support of the introduction of the 50 km/h speed limits prior to its introduction through a community attitude survey. In addition, the company continuously tracked the impact of two statements related to the 50 km/h speed limits from implementation in December 2001 through to March 2004 through the use of tracking surveys.

The first survey (Batini, 2000), conducted in November 1999, canvassed the opinions of Perth residents on four key areas of road safety, one of which was the reduction of speed limits in local streets. The responses of the 400 participants (200 from metropolitan Perth and 200 from regional Western Australia) surveyed on this issue were categorised into one of three groups depending on the road type on which the participants resided, i.e. a two or four lane road or highway, a major suburban road or a local area road. Only two questions asked of participants were directly relevant to this evaluation. These were:

1. How often do vehicles passing along the road on which you live exceed the speed limit; and

2. Would you be in favour of, opposed to, or have no opinion either way, in terms of a proposed reduction of speed limits

    a) in your own street from 60 km/h to 50 km/h;

    b) on local roads in your area that mainly service residents and their visitors, from 60 km/h to 50 km/h;

    c) on through roads in your area that mainly carry passing traffic, from 60 km/h to 50 km/h.

For the first of these questions, the possible responses were ìvery oftenî, ìquite oftenî, ìoccasionallyî, ìnot very oftenî, ìneverî, and ìdonít knowî. Possible responses to the second proposition were ìin favour ofî, ìopposed toî and ìno opinion either wayî. These questions were not followed up with any post introduction surveys, so it was not possible to assess any attitudinal changes from before to after the speed limit change.

Focus groups were conducted soon after the November 1999 survey (Evans and Batini, 2000) using as target groups those that opposed the introduction or expressed no opinion. The objectives of these focus groups were to explore the reasons behind the groupsí point of views, explore their intention to comply with the default speed limits and assess their level of agreement with various road safety statements associated with the 50 km/h speed limits. The results associated with this last objective are presented in Appendix 7.

The tracking surveys commenced in December 2001 and were continued through to March 2004. These tracking surveys sought respondentsí level of agreement or disagreement on the following two statements:

1. *Reducing the speed limit on local area roads from 60 km/h to 50 km/h is a good idea;* and

2. *Driving 10 km/h over the speed limit in the new 50 km/h zones is morally acceptable.*

With regard to statement 1, respondents were able to choose from the following responses: ìagree stronglyî, ìagreeî, ìno opinion either wayî, ìdisagreeî, and ìdisagree stronglyî. In the Results section of this report, responses that showed any level of agreement have been aggregated as have those that showed any level of disagreement. The results that showed those with no opinion either way are also presented.

Results of the tracking survey are presented in Batini (2004). Although this report presented only aggregate scores for the entire period, data in six-monthly periods was obtained through personal communication for use in this evaluation.

In addition to this information, data on the level of community approval of the default speed limit was sourced from four community surveys conducted by the Australian Transport Safety Bureau (ATSB) for each of the years 2000 to 2003. The ATSB is an independent body within the Federal Department of Transport and Regional Services, which in addition to its accident investigations conducts research and data analysis in road safety. The results of the ATSB surveys were compared with those obtained from Donovan Research and detailed in this report.

2.5 SPEED ENFORCEMENT DATA

Another method of measuring speeding behaviour change associated with an initiative such as the introduction of the 50km/h speed limit is to analyse the distribution of driving speeds amongst infringing drivers caught speeding, as well examining the number of infringements. Although an analysis of infringement data comparing speed camera infringements in 50 km/h zones with those in higher speed zones, from the before and after implementation periods, was planned, an examination of the data provided by the Western Australia Police Service (WAPS) found a very small number of infringements had been issued for offences in 50 km/h zones. It was later confirmed by WAPS that, due to operational policy, limited enforcement of the 50 km/h speed limits using speed cameras took place after the introduction of the initiative. Hence the data gathered in 50 km/h zones was not sufficient to conduct a meaningful analysis.

3 RESULTS

This section details the results of the analyses conducted on crash, speed monitoring and community attitudinal survey data. Results of the crash analyses are presented first. These include graphical and descriptive analyses of crashes followed by a presentation of estimates obtained from the Poisson regression analyses. Results of the speed analysis and community attitude surveys are presented later in this section.

3.1 RESULTS OF METROPOLITAN CRASH ANALYSES

3.1.1 All Crash Types

Figure 3-1 shows the monthly number of crashes that occurred in Metropolitan Perth from November 1996 to November 2003 in each of the speed zones recorded at the time of the crash. The graph shows an obvious decrease in the combined number of crashes that occurred on 50 and 60 km/h roads immediately following the introduction of the 50 km/h speed limits. The graph also shows that the decrease was largely sustained for the 24 month period following implementation. Crashes in higher speed zones appear to have remained unaffected by the change.

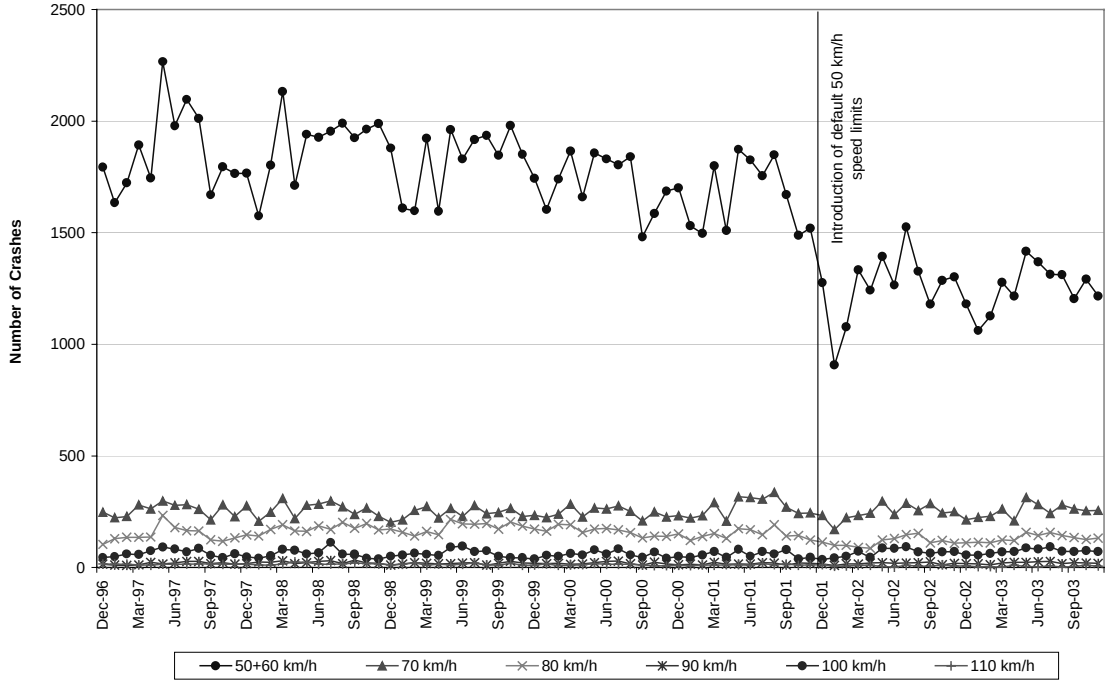

Figure 3-1 Distribution of ALL reported crashes in metropolitan Perth by speed zone ñ December 1996 to November 2003

Table 3-1 presents the total and average monthly numbers of reported crashes prior to implementation and for each of the six-month periods following December 2001, that had occurred on 50 and 60 km/h roads combined and on 70 km/h roads. Statistics are shown for each severity level as well as for all crashes combined.

In comparing post-implementation average monthly figures to those in the pre program period, Table 3-1 shows that average crash frequency in 50 and 60 km/h zones was lower for all crash types. The average number of fatal, serious and minor property damage crashes, however, did show an increasing trend in the second year of the program when compared to the first year.

Table 3-1 Total and average monthly crash numbers by current speed zone before and after the introduction of the 50 km/h speed limit - ALL crash types

	Total Crash Numbers Before and After Introduction of the 50 km/h Default Limit				Average Monthly Crash Numbers Before and After Introduction of the 50 km/h Default Limit			
Crash severity & current speed zone	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-02 (First Year After)**	**Dec-02 to Nov-03 (Second Year After)**	**Dec-01 to Nov-03 (Two-years After)**	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-02 (After)**	**Dec-02 to Nov-03 (After)**	**Dec-01 to Nov-03 (After)**
Fatal Crashes								
50 + 60 km/h	190	19	25	44	3.2	1.6	2.1	1.8
70 km/h	51	10	12	22	0.9	0.8	1.0	0.9
Serious Injury Crashes								
50 + 60 km/h	4,055	665	713	1,378	67.6	55.4	59.4	57.4
70 km/h	788	191	189	380	13.1	15.9	15.8	15.8
Fatal + Serious Injury Crashes								
50 + 60 km/h	4,245	684	738	1,422	70.8	57.0	61.5	59.3
70 km/h	839	201	201	402	14.0	16.8	16.8	16.8
Medically Treated Injury Crashes								
50 + 60 km/h	20,097	2,490	2,236	4,726	335.0	207.5	186.3	196.9
70 km/h	3,767	591	582	1,173	62.8	49.3	48.5	48.9
All Casualty Crashes								
50 + 60 km/h	24,342	3,174	2,974	6,148	405.7	264.5	247.8	256.2
70 km/h	4,606	792	783	1,575	76.8	66.0	65.3	65.6
Property Damage Crashes (Major)								
50 + 60 km/h	62,626	8,917	8,898	17,815	1,043.8	743.1	741.5	742.3
70 km/h	8,557	1,675	1,731	3,406	142.6	139.6	144.3	141.9
Property Damage Crashes (Minor)								
50 + 60 km/h	20,728	3,025	3,112	6,137	345.5	252.1	259.3	255.7
70 km/h	2,136	492	517	1,009	35.6	41.0	43.1	42.0
All Crashes								
50 + 60 km/h	107,696	15,116	14,984	30,100	1,794.9	1,259.7	1,248.7	1,254.2
70 km/h	15,299	2,959	3,031	5,990	255.0	246.6	252.6	249.6

Table 3-2 presents the yearly program effect estimates, measured by the net percentage change in crashes, by severity, on 50 and 60 km/h roads relative to crashes on 70 km/h roads. Overall effect estimates for the entire post period are also given.

These results were obtained using Poisson regression analysis and are presented with their corresponding confidence intervals and statistical significance values. Statistical significance values give the probability of obtaining the estimated crash reduction by chance given the null hypothesis that the implementation has had no real underlying effect on crashes. Low significance probabilities indicate a likely crash effect. Shaded regions in the tables indicate statistically significant results less than 0.05, a threshold value commonly considered to represent a reliable finding. Negative results indicate an estimated net increase in the crash type being considered.

Statistically significant point estimates have been translated into actual crash numbers to provide an indication as to the savings achieved. These were calculated by multiplying the net percentage change by the average monthly number of crashes in the pre-implementation period for the corresponding severity and target group considered. Confidence intervals were similarly translated. This process was carried out only where statistically significant results were obtained.

Confidence intervals have been calculated with a 95% confidence coefficient. The confidence interval gives an indication of how much uncertainty there is in the point estimate provided; the narrower the interval, the more precise the estimate. A very wide interval is an indication that the data is highly variable and more data is required to produce a more certain estimate. Wide confidence intervals commonly result when analysing fatal crash data as this type of data is proportionally highly variable because the number of observations are relatively few.

Referring to Table 3-2, results of the analysis of fatal and serious injury crashes do not show any statistically significant results. An analysis of these two injury categories combined also did not produce any statistically reliable estimates. This outcome is most likely due to the relatively small crash numbers in these categories.

Statistically reliable estimates, however, were obtained for all other severity categories analysed. Over the two-year period following implementation, a 23% reduction was found to be associated with medically treated injury crashes that had occurred on 50 and 60 km/h roads relative to crashes on 70 km/h roads. Looking at the corresponding 95% confidence interval, it can be said that crashes were reduced by as much as 29% and by as little as 10%. This translates into a reduction of between 35 to 98 crashes (with 95% probability). A 21% reduction was found to be associated with all casualty crashes, and major property damage crashes were reduced by 19%. The 50 km/h speed limits had the greatest effect on crashes involving minor property damage where reductions in the order of 29% were obtained. Finally, when all reported crashes were considered, statistically significant reductions of around 20% were observed in the two-year period following the introduction of the initiative.

Table 3-2 Estimated monthly net percentage reduction in crashes in 50 and 60 km/h zones relative to 70 km/h zones in metropolitan Perth ñ ALL crash types. (Also shown is estimated crash savings, in brackets, when the net percentage reduction was statistically significant)

	50 & 60 km/h zones versus 70 km/h zones in Metropolitan Perth			
Crash Severity	**Estimate of Monthly Net Percentage Change/ (Number of Crashes Saved)**	**95% Confidence Interval of Net Percentage Reduction**	**Statistical Significance**	**95% Confidence Interval of Estimated Crash Savings**
Fatal Crashes				
Dec 2001 ñ Nov 2002	31.7%	(75.8%, -92.9%)	0.4717	
Dec 2002 ñ Nov 2003	17.5%	(73.4%, -155.7%)	0.7389	
Dec 2001 ñ Nov 2003	25.2%	(70.6%, -90.5%%)	0.5429	
Serious Injury Crashes				
Dec 2001 ñ Nov 2002	9.4%	(28.9%, -15.5%)	0.4245	
Dec 2002 ñ Nov 2003	-7.6%	(18.8%, -42.4%)	0.6106	
Dec 2001 ñ Nov 2003	3.7%	(23.5%, -21.1%)	0.7451	
Fatal and Serious Injury Crashes				
Dec 2001 ñ Nov 2002	9.5%	(28.5%, -14.5%)	0.4044	
Dec 2002 ñ Nov 2003	-7.1%	(18.4%, -40.6%)	0.6196	
Dec 2001 ñ Nov 2003	3.9%	(23.1%, -20.1%)	0.7277	
Medically Treated Injury Crashes				
Dec 2001 ñ Nov 2002	20.5% (69)	(29.4%, 10.4%)	0.0002	(35, 98)
Dec 2002 ñ Nov 2003	27.3% (91)	(36.5%, 16.7%)	<0.0001	(56, 122)
Dec 2001 ñ Nov 2003	23.3% (78)	(31.2%, 14.4%)	<0.0001	(48, 104)
All Casualty Crashes				
Dec 2001 ñ Nov 2002	20.1% (82)	(28.1%, 11.1%)	<0.0001	(45, 114)
Dec 2002 ñ Nov 2003	22.9% (93)	(31.7%, 13.0%)	<0.0001	(53, 129)
Dec 2001 ñ Nov 2003	21.2% (86)	(28.6%, 13.1%)	<0.0001	(53, 116)
Property Damage Crashes (Major)				
Dec 2001 ñ Nov 2002	18.9% (197)	(24.6%, 12.7%)	<0.0001	(133, 257)
Dec 2002 ñ Nov 2003	18.7% (195)	(25.3%, 11.7%)	<0.0001	(122, 264)
Dec 2001 ñ Nov 2003	18.8% (196)	(24.1%, 13.0%)	<0.0001	(136, 252)
Property Damage Crashes (Minor)				
Dec 2001 ñ Nov 2002	29.3% (101)	(38.6%, 18.6%)	<0.0001	(64, 133)
Dec 2002 ñ Nov 2003	28.3% (98)	(39.0%, 15.8%)	<0.0001	(55, 135)
Dec 2001 ñ Nov 2003	28.7% (99)	(37.5%, 18.5%)	<0.0001	(64, 130)
All Crashes				
Dec 2001 - Nov 2002	19.6% (352)	(24.0%, 15.1%)	<0.0001	(271, 431)
Dec 2002 - Nov 2003	19.5% (350)	(24.5%, 14.3%)	<0.0001	(257, 440)
Dec 2001 - Nov 2003	19.6% (352)	(23.6%, 15.3%)	<0.0001	(275, 425)

NB: Negative estimated percentage reductions indicate a crash increase

Figure 3-2 illustrates the fit of the Poisson regression model to the observed monthly crash count in 50 and 60 km/h speed zones combined and in 70 km/h zones, for all crash types in metropolitan Perth. The estimated step change in the yearly level of crashes in the 50 and 60 km/h zones in the post implementation period is visible in the fitted model. The step change in 70 km/h zones is less obvious. The differences in the two step changes at a particular point in the post implementation period represent the net crash effect of the default speed limit change when compared to the pre implementation period.

The large step change representing crashes that occurred on 50 and 60 km/h roads combined in the year following implementation is equivalent to a 20% reduction in crashes, which was maintained into the second year post introduction.

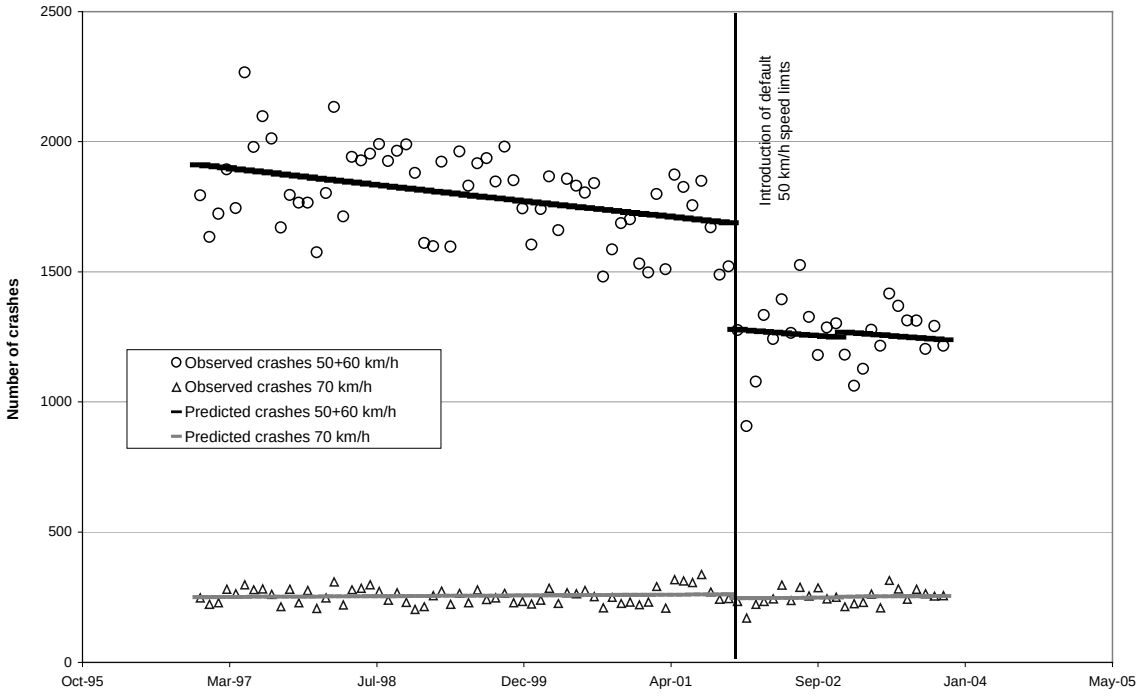

Figure 3-2 Observed and modelled monthly crash frequency in 50 and 60 km/h zones and 70 km/h speed zones ñ ALL crash types combined

3.1.2 Crashes Involving Pedestrians

Table 3-3 shows the total and average monthly numbers of reported crashes involving pedestrians, prior to implementation and for each of the two years commencing December 2001, that occurred on 50 and 60 km/h roads. Statistics are shown for each severity level as well as for all crashes involving pedestrians. Most notable in the table below, are the relatively low numbers of crashes in each of the yearly periods following implementation. This can be seen throughout each of the severity levels and has implications for the Poisson regression analysis results, shown in Table 3-4.

Table 3-3 Total and average monthly crash numbers by current speed zone before and after the introduction of the 50 km/h speed limit ñ crashes involving PEDESTRIANS

	Total Crash Numbers Before and After Introduction of the 50 km/h Default Limit				Average Monthly Crash Numbers Before and After Introduction of the 50 km/h Default Limit			
Crash severity & current speed zone	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-02 (First Year After)**	**Dec-02 to Nov-03 (Second Year After)**	**Dec-01 to Nov-03 (Two-years After)**	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-02 (First Year After)**	**Dec-02 to Nov-03 (Second Year)**	**Dec-01 to Nov-03 (Two-years After)**
Fatal Crashes								
50 + 60 km/h	60	9	6	15	1.0	0.8	0.5	0.6
70 km/h	12	2	1	3	0.2	0.2	0.1	0.1
Serious Injury Crashes								
50 + 60 km/h	619	85	89	174	10.3	7.1	7.4	7.3
70 km/h	41	8	16	24	0.7	0.7	1.3	1.0
Fatal + Serious Injury Crashes								
50 + 60 km/h	679	94	95	189	11.3	7.8	7.9	7.9
70 km/h	53	10	17	27	0.9	0.8	1.4	1.1
Medically Treated Injury Crashes								
50 + 60 km/h	821	67	52	119	13.7	5.6	4.3	5.0
70 km/h	42	5	7	12	0.7	0.4	0.6	0.5
All Casualty Crashes								
50 + 60 km/h	1,500	161	147	308	25.0	13.4	12.3	12.8
70 km/h	95	15	24	39	1.6	1.3	2.0	1.6
Property Damage Crashes (Major)								
50 + 60 km/h	66	7	8	15	1.1	0.6	0.7	0.6
70 km/h	2	2	1	3	0.0	0.2	0.1	0.1
Property Damage Crashes (Minor								
50 + 60 km/h	483	73	62	135	8.1	6.1	5.2	5.6
70 km/h	8	7	5	12	0.1	0.6	0.4	0.5
All Crashes								
50 + 60 km/h	2,049	241	217	458	34.2	20.1	18.1	19.1
70 km/h	105	24	30	54	1.8	2.0	2.5	2.3

Table 3-4 shows the yearly and overall program effect estimates of the net percentage change in crashes by severity, relative to crashes in 70 km/h speed zones for crashes involving pedestrians in metropolitan Perth. The estimates, which are presented with their corresponding confidence intervals, significance values and translated crash savings, follow the same interpretation as for results of all crash types, shown in Table 3-2.

Results in Table 3-4 show a statistically significant crash reduction estimate of 51% over the two-year period following the introduction of the default 50 km/h speed limits for all crashes involving pedestrians, relative to crashes in 70 km/h zones. In the first year following implementation, a 46% reduction was found, however, the significance value associated with this result suggests that it is borderline significant. A statistically reliable 61% reduction was found in the second year post implementation. No statistically significant results were obtained when each of the injury categories was analysed separately, however, a statistically reliable result was obtained when these injury categories were pooled. This occurred in the second year following implementation where a statistically significant reduction of 61% was achieved.

The absence of statistically significant results in the various injury categories does not necessarily imply that the initiative did not have any effect on crashes involving pedestrians. There may be insufficient evidence to suggest that the program was effective for injury crashes of this crash type. The absence of statistically significant results could stem from the relatively low monthly crash frequency counts in this subset of crashes, resulting in highly variable data. The wide confidence intervals are also suggestive of large variation in the data.

Table 3-4 Estimated net percentage change in crashes in 50 and 60 km/h zones relative to 70 km/h zones ñcrashes involving PEDESTRIANS

	50 & 60 km/h zones versus 70 km/h zones in Metropolitan Perth			
Crash Severity	**Estimate of Monthly Net Percentage Change/ (Number of Crashes Saved)**	**95% Confidence Interval of Net Percentage Reduction**	**Statistical Significance**	**95% Confidence Interval of Estimated Crash Savings**
Fatal Crashes				
Dec 2001 ñ Nov 2002	45.2%	(94.3%, -429.0%)	0.6035	-
Dec 2002 ñ Nov 2003	36.8%	(96.7%, -1137.4%)	0.7624	-
Dec 2001 ñ Nov 2003	44.0%	(-414.6%, 93.9%)	0.6080	-
Serious Injury Crashes				
Dec 2001 ñ Nov 2002	11.8%	(69.5%, -155.0%)	0.8167	-
Dec 2002 ñ Nov 2003	50.6%	(83.8%, -50.7%)	0.2155	-
Dec 2001 ñ Nov 2003	27.4%	(-84.1%, 71.3%)	0.5005	-
Fatal and Serious Injury Crashes				
Dec 2001 ñ Nov 2002	19.2%	(69.0%, -110.5%)	0.6627	-
Dec 2002 ñ Nov 2003	50.5%	(82.2%, -37.5%)	0.1772	-
Dec 2001 ñ Nov 2003	31.2%	(-61.2%, 70.7%)	0.3887	-
Medical Injury Crashes				
Dec 2001 ñ Nov 2002	27.9%	(77.2%, -127.6%)	0.5767	-
Dec 2002 ñ Nov 2003	59.4%	(87.7%, -34.6%)	0.1406	-
Dec 2001 ñ Nov 2003	43.4%	(-51.8%, 78.9%)	0.2582	-
All Casualty Crashes				
Dec 2001 ñ Nov 2002	31.2%	(66.7%, -42.1%)	0.3122	-
Dec 2002 ñ Nov 2003	60.6% (8)	(81.6%, 15.5%)	0.0167	(4, 20)
Dec 2001 ñ Nov 2003	44.5%	(70.6%, -4.9%)	0.0701	-
Property Damage Crashes (Major)				
Dec 2001 ñ Nov 2002	88.7%	(99.72%, -348.44%	0.2456	-
Dec 2002 ñ Nov 2003	73.7%	(99.8%, -2783.5%	0.5774	-
Dec 2001 ñ Nov 2003	86.1%	(99.8%, -450.1%)	0.2735	-
Property Damage Crashes (Minor)				
Dec 2001 ñ Nov 2002	76.7%	(96.0%, -34.8%)	0.1038	-
Dec 2002 ñ Nov 2003	69.4%	(96.6%, -176.7%)	0.2918	-
Dec 2001 ñ Nov 2003	60.3%	(-36.6%, 96.3%)	0.1048	-
All Crashes				
Dec 2001 - Nov 2002	46.2% (16)	(71.3%, -0.8%)	0.0529	(0, 24)
Dec 2002 - Nov 2003	60.7% (21)	(80.6%, 20.5%)	0.0094	(7, 28)
Dec 2001 - Nov 2003	51.3% (18)	(72.8%, 12.8%)	0.0155	(4, 25)

NB: Negative estimated percentage changes indicate a crash increase

Figure 3-3 illustrates the fit of the Poisson regression model to the observed monthly crash count in 50 and 60 km/h speed zones for all crashes involving pedestrians. Interpretation of this figure is analogous to Figure 3-2.

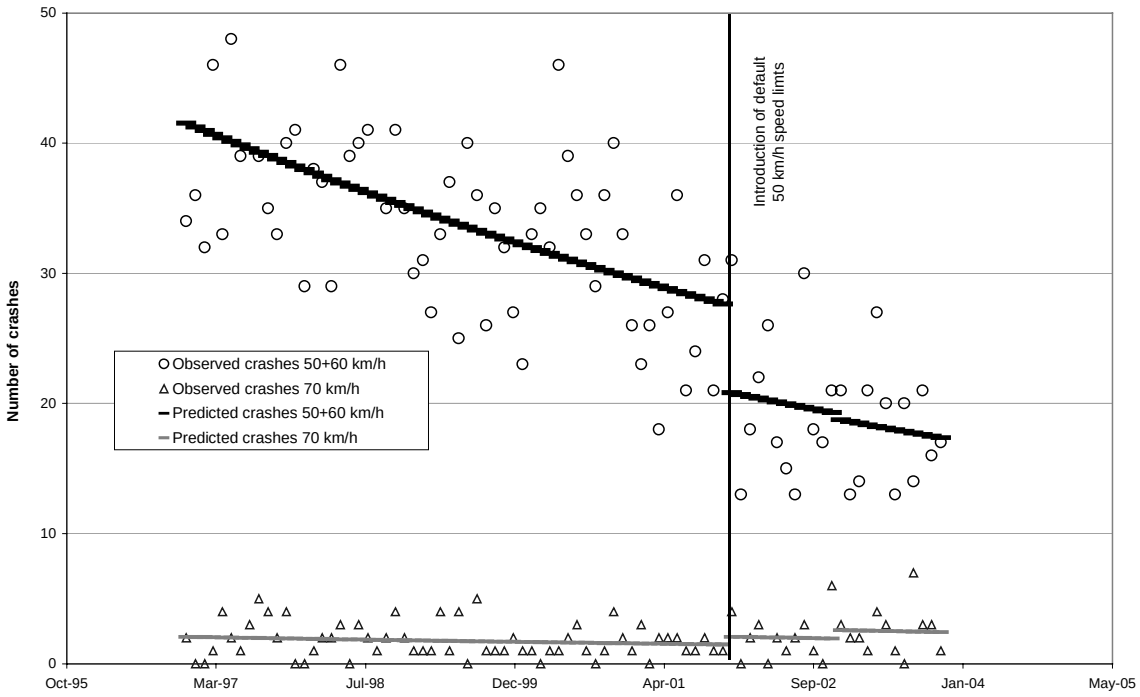

Figure 3-3 Observed and modelled monthly crash frequency in 50 and 60 km/h zones versus 70 km/h speed zones ñ crashes involving PEDESTRIANS

3.1.3 Crashes Involving Young Drivers

Table 3-5 presents the total and average monthly numbers of reported crashes involving young drivers. Young driver crashes are defined as those crashes which involved a driver aged 17 to 25 years. Statistics are shown for each severity level as well as for all crashes involving young drivers.

In comparison to the pre implementation period, average monthly crashes of all categories in 50 and 60 km/h zones combined, decreased following the introduction of the 50 km/h speed limits. The average monthly crash frequency on 70 km/h zones remained stable throughout this period.

Table 3-5 Total and average monthly crash numbers by current speed zone before and after the introduction of the 50 km/h speed limit ñ crashes involving YOUNG drivers

	Total Crash Numbers Before and After Introduction of the 50 km/h Default Limit				Average Monthly Crash Numbers Before and After Introduction of the 50 km/h Default Limit			
Crash severity & current speed zone	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-02 (First Year After)**	**Dec-02 to Nov-03 (Second Year After)**	**Dec-01 to Nov-03 (Two-years After)**	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-02 (First Year After)**	**Dec-02 to Nov-03 (Second Year)**	**Dec-01 to Nov-03 (Two-years After)**
Fatal Crashes								
50 + 60 km/h	100	9	15	24	1.7	0.8	1.3	1.0
70 km/h	28	5	5	10	0.5	0.4	0.4	0.4
Serious Injury Crashes								
50 + 60 km/h	2,148	333	357	690	35.8	27.8	29.8	28.8
70 km/h	431	103	105	208	7.2	8.6	8.8	8.7
Fatal + Serious Injury Crashes								
50 + 60 km/h	2,248	342	372	714	37.5	28.5	31.0	29.8
70 km/h	459	108	110	218	7.7	9.0	9.2	9.1
Medical Injury Crashes								
50 + 60 km/h	10,661	1,255	1,094	2,349	177.7	104.6	91.2	97.9
70 km/h	2,105	313	320	633	35.1	26.1	26.7	26.4
All Casualty Crashes								
50 + 60 km/h	12,909	1,597	1,466	3,063	215.2	133.1	122.2	127.6
70 km/h	2564	421	430	851	42.7	35.1	35.8	35.5
Property Damage Crashes (Major)								
50 + 60 km/h	30,023	4,032	3,898	7,930	500.4	336.0	324.8	330.4
70 km/h	4,413	797	810	1,607	73.6	66.4	67.5	67.0
Property Damage Crashes (Minor)								
50 + 60 km/h	7,338	1,060	1,060	2,120	122.3	88.3	88.3	88.3
70 km/h	860	198	177	375	14.3	16.5	14.8	15.6
All Crashes								
50 + 60 km/h	50,270	6,689	6,424	13,113	837.8	557.4	535.3	546.4
70 km/h	7,837	1,416	1,417	2,833	130.6	118.0	118.1	118.0

Table 3-6 shows the yearly and overall program effect estimates of the net percentage change in crashes by severity, relative to crashes in 70 km/h speed zones for crashes involving young drivers. The estimates, which are presented with their corresponding confidence intervals and significance values, follow the same interpretation as for results of all crash types, shown in Table 3-2.

Results in Table 3-6 show statistically significant results were obtained for all severity levels except fatal, serious injury and fatal and serious injury crashes combined. The greatest effects of the 50 km/h speed limits in the young driver target group were observed in medical crashes where a net reduction estimate of 28% was obtained over the two-year period following the introduction of the program. A 26% reduction was observed overall for all casualty crashes involving younger drivers. Major and minor property damage crashes decreased by around 18% and 23%, respectively. When all crashes involving young drivers were considered, a net reduction estimate of 19% was observed during the two-year period post implementation.

Table 3-6 Estimated net percentage change in crashes in 50 and 60 km/h zones relative to 70 km/h zones ñcrashes involving YOUNG drivers

	50 & 60 km/h zones versus 70 km/h zones in Metropolitan Perth			
Crash Severity	**Estimate of Monthly Net Percentage Change/ (Number of Crashes Saved)**	**95% Confidence Interval of Net Percentage Reduction**	**Statistical Significance**	**95% Confidence Interval of Estimated Crash Savings**
Fatal Crashes				
Dec 2001 ñ Nov 2002	23.1%	(82.1%, -230.9%)	0.7240	-
Dec 2002 ñ Nov 2003	-46.9%	(70.2%, -624.5%)	0.6367	-
Dec 2001 ñ Nov 2003	-2.5%	(72.3%, -278.7%)	0.9703	-
Serious Injury Crashes				
Dec 2001 ñ Nov 2002	11.7%	(36.6%, -22.9%)	0.4605	-
Dec 2002 ñ Nov 2003	-2.3%	(30.1%, -49.6%)	0.9075	-
Dec 2001 ñ Nov 2003	6.7%	(31.7%, 27.4%)	0.6609	-
Fatal and Serious Injury Crashes				
Dec 2001 ñ Nov 2002	11.2%	(35.6%, -22.5%)	0.4688	-
Dec 2002 ñ Nov 2003	-4.7%	(27.6%, -51.6%)	0.8056	-
Dec 2001 ñ Nov 2003	5.6%	(30.3%, -27.8%)	0.7100	-
Medical Injury Crashes				
Dec 2001 ñ Nov 2002	23.4% (42)	(34.9%, 9.8%)	0.0014	(17, 62)
Dec 2002 ñ Nov 2003	35.4% (63)	(46.3%, 22.3%)	<0.0001	(40, 82)
Dec 2001 ñ Nov 2003	28.4% (50)	(38.2%, 16.9%,)	<0.0001	(30, 68)
All Casualty Crashes				
Dec 2001 ñ Nov 2002	22.8% (49)	(33.3%, 10.8%)	0.0005	(23, 72)
Dec 2002 ñ Nov 2003	30.1% (65)	(40.7%, 17.6%)	<0.0001	(38, 88)
Dec 2001 ñ Nov 2003	25.7% (55)	(35.0%, 15.2%,)	<0.0001	(33, 75)
Property Damage Crashes (Major)				
Dec 2001 ñ Nov 2002	17.2% (86)	(25.4%, 8.0%)	0.0004	(40, 127)
Dec 2002 ñ Nov 2003	18.4% (92)	(27.6%, 8.0%)	0.0009	(40, 138)
Dec 2001 ñ Nov 2003	17.6% (88)	(25.2%, 9.2%,)	<.0001	(46, 126)
Property Damage Crashes (Minor)				
Dec 2001 ñ Nov 2002	27.0% (33)	(41.6%, 8.8%)	0.0057	(11, 51)
Dec 2002 ñ Nov 2003	14.2%	(34.0%, -11.5%)	0.2506	-
Dec 2001 ñ Nov 2003	23.0% (28)	(25.1%, 13.3%,)	0.0162	(16, 31)
All Crashes				
Dec 2001 - Nov 2002	19.1% (160)	(25.3%, 12.4%)	<0.0001	(104, 212)
Dec 2002 - Nov 2003	19.9% (167)	(26.9%, 12.3%)	<0.0001	9103, 225)
Dec 2001 - Nov 2003	19.4% (163)	(25.1%, 13.3%,)	<0.0001	(111, 210)

NB: Negative estimated percentage changes indicate a crash increase

Figure 3-4 illustrates the fit of the Poisson regression model to the observed monthly crash count in 50 and 60 km/h speed zones for all crashes involving young drivers. Interpretation of this figure is analogous to that of Figure 3-2. The difference between the large step change representing 50 and 60 km/h crashes below, and the less apparent step change representing all crashes in 70 km/h zones immediately after the change, is equivalent to a 19% reduction in all crashes in 50 and 60 km/h zones involving young drivers.

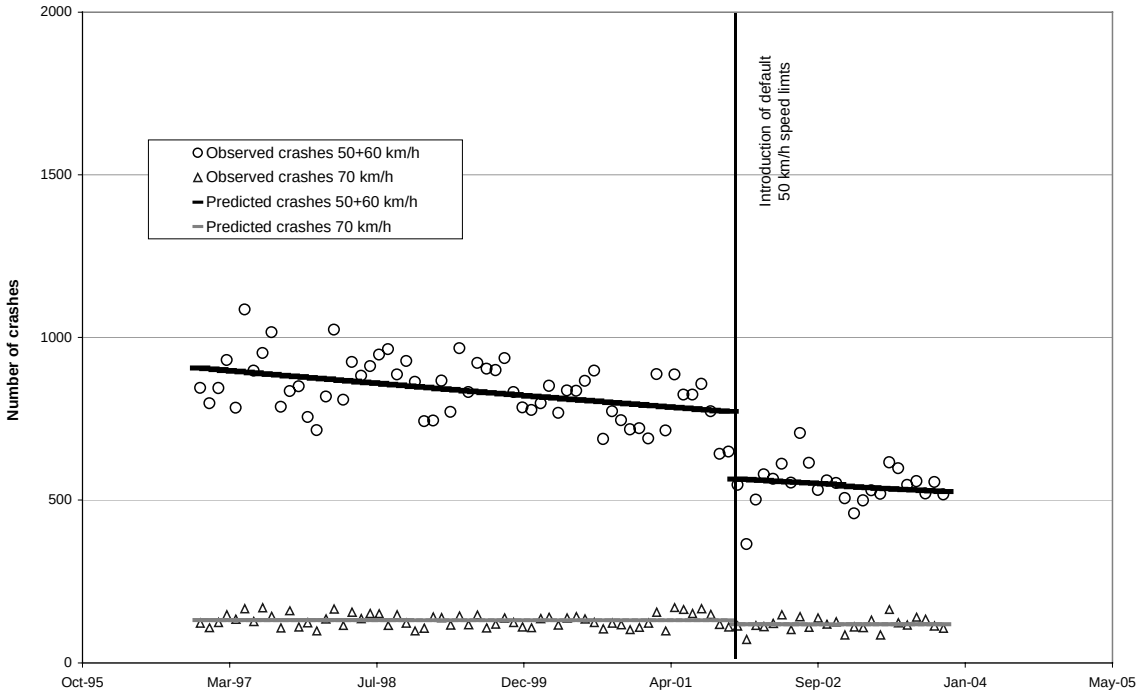

Figure 3-4 Observed and modelled monthly crash frequency in 50 and 60 km/h zones versus 70 km/h speed zones ñ crashes involving YOUNG drivers

3.1.4 Crashes Involving Older Drivers

Table 3-7 shows the total and average monthly numbers of reported crashes involving older drivers. Older driver crashes are defined as those crashes that involved a driver aged 55 years or over. Statistics are shown for each severity level as well as for all crashes involving older drivers.

The average monthly crash frequencies in Table 3-7 show a downward trend for all crashes involving older drivers in 50 and 60 km/h zones after the program was introduced. These averages, however, rose slightly in the second year of the program for fatal, serious, and fatal and serious injury crashes combined when compared to the monthly averages of the first year. Crashes in 70 km/h remained constant throughout the post introduction period.

Table 3-7 Total and average monthly crash numbers by current speed zone before and after the introduction of the 50 km/h speed limit ñ crashes involving OLDER drivers

	Total Crash Numbers Before and After Introduction of the 50 km/h Default Limit				Average Monthly Crash Numbers Before and After Introduction of the 50 km/h Default Limit			
Crash severity & current speed zone	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-02 (First Year After)**	**Dec-02 to Nov-03 (Second Year After)**	**Dec-01 to Nov-03 (Two-years After)**	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-02 (First Year After)**	**Dec-02 to Nov-03 (Second Year)**	**Dec-01 to Nov-03 (Two-years After)**
Fatal Crashes								
50 + 60 km/h	54	6	9	15	0.9	0.5	0.8	0.6
70 km/h	8	5	3	8	0.1	0.4	0.3	0.3
Serious Injury Crashes								
50 + 60 km/h	913	138	177	315	15.2	11.5	14.8	13.1
70 km/h	172	33	55	88	2.9	2.8	4.6	3.7
Fatal + Serious Injury Crashes								
50 + 60 km/h	967	144	186	330	16.1	12.0	15.5	13.8
70 km/h	180	38	58	96	3.0	3.2	4.8	4.0
Medical Injury Crashes								
50 + 60 km/h	4157	545	509	1,054	69.3	45.4	42.4	43.9
70 km/h	853	139	126	265	14.2	11.6	10.5	11.0
All Casualty Crashes								
50 + 60 km/h	5,124	689	695	1,384	85.4	57.4	57.9	57.7
70 km/h	1,033	177	184	361	17.2	14.8	15.3	15.0
Property Damage Crashes (Major)								
50 + 60 km/h	13,125	1,874	1,865	3,739	218.8	156.2	155.4	155.8
70 km/h	1,825	358	390	748	30.4	29.8	32.5	31.2
Property Damage Crashes (Minor)								
50 + 60 km/h	3,549	571	571	1,142	59.2	47.6	47.6	47.6
70 km/h	357	79	106	185	6.0	6.6	8.8	7.7
All Crashes								
50 + 60 km/h	21,800	3,134	3,131	6,265	363.3	261.2	260.9	261.0
70 km/h	3,215	614	680	1,294	53.6	51.2	56.7	53.9

Table 3-8shows the yearly program effect estimates of the net percentage change in crashes by severity, relative to crashes in 70 km/h speed zones for crashes involving older drivers.

Results in Table 3-8 show statistically significant results were achieved for some of the severity categories analysed. Net percentage reductions of 21% and 30% were obtained for major and minor property damage crashes, respectively. These results refer to the overall effect of the default speed limits in the two-year period following implementation. A statistically significant reduction estimate of 18% was also observed for all crashes involving older drivers over this same period. No statistically reliable results were obtained for any of the injury categories in this analysis.

Table 3-8 Estimated net percentage change in crashes in 50 and 60 km/h zones relative to 70 km/h zones ñ crashes involving OLDER drivers

	50 & 60 km/h zones versus 70 km/h zones in Metropolitan Perth			
Crash Severity	**Estimate of Monthly Net Percentage Change/ (Number of Crashes Saved)**	**95% Confidence Interval of Net Percentage Reduction**	**Statistical Significance**	**95% Confidence Interval of Estimated Crash Savings**
Fatal Crashes				
Dec 2001 ñ Nov 2002	65.4%	(95.2%, -151.9%)	0.2948	-
Dec 2002 ñ Nov 2003	-8.8%	(90.5%, -1145.1%))	0.9460	-
Dec 2001 ñ Nov 2003	54.2	(93.7%, -234.6%)	0.4419	-
Serious Injury Crashes				
Dec 2001 ñ Nov 2002	-3.7%	(40.0%, -79.2%)	0.8954	-
Dec 2002 ñ Nov 2003	13.1%	(51.5%, -55.6%)	0.6369	-
Dec 2001 ñ Nov 2003	2.2%	(39.9%, -59.2%)	0.9282	-
Fatal and Serious Injury Crashes				
Dec 2001 ñ Nov 2002	5.6%	(44.0%, -59.3%)	0.8290	-
Dec 2002 ñ Nov 2003	12.6%	(50.4%, -54.1%)	0.6424	-
Dec 2001 ñ Nov 2003	6.9%	(42.0%, -49.4%)	0.7675	-
Medical Injury Crashes				
Dec 2001 ñ Nov 2002	15.4%	(34.0%, -8.5%)	0.1884	-
Dec 2002 ñ Nov 2003	11.2%	(33.4%, -18.3%)	0.4158	-
Dec 2001 ñ Nov 2003	14.0%	(31.7%, -8.1%)	0.1957	-
All Casualty Crashes				
Dec 2001 ñ Nov 2002	13.5%	(30.9%, -8.1%)	0.2025	-
Dec 2002 ñ Nov 2003	13.3%	(32.7%, -11.6%)	0.2675	-
Dec 2001 ñ Nov 2003	13.4%	(29.5%, -6.3%)	0.1677	-
Property Damage Crashes (Major)				
Dec 2001 ñ Nov 2002	19.5% (43)	(31.3%, 5.7%)	0.0074	(12, 68)
Dec 2002 ñ Nov 2003	24.0% (53)	(36.4%, 9.0%)	0.0028	(20, 80)
Dec 2001 ñ Nov 2003	21.1% (46)	(31.9%, 8.6%)	0.0016	(19, 70)
Property Damage Crashes (Minor)				
Dec 2001 ñ Nov 2002	23.9%	(46.2%, -7.7%)	0.1237	-
Dec 2002 ñ Nov 2003	42.4% (25)	(60.8%, 15.4%)	0.0050	(9, 36)
Dec 2001 ñ Nov 2003	30.4% (18)	(49.4%, 4.2%)	0.0264	(2, 29)
All Crashes				
Dec 2001 - Nov 2002	16.4% (60)	(25.9%, 5.6%)	0.0037	(2, 94)
Dec 2002 - Nov 2003	21.9% (80)	(31.8%, 10.5%)	0.0004	(38, 116)
Dec 2001 - Nov 2003	18.3% (64)	(27.0%, 8.7%)	0.0004	(32, 98)

NB: Negative estimated percentage changes indicate a crash increase

Figure 3-5 illustrates the fit of the Poisson regression model to the observed monthly crash count in 50 and 60 km/h speed zones for all crashes involving older drivers. Interpretation of this figure is analogous to that of Figure 3-2. Once again, the graph shows a comparatively large crash reduction on 50 and 60 km/h after the default speed limit introduction compared to 70 km/h roads leading to the estimated net decrease in crashes on the 50 and 60 km/h roads of around 18%.

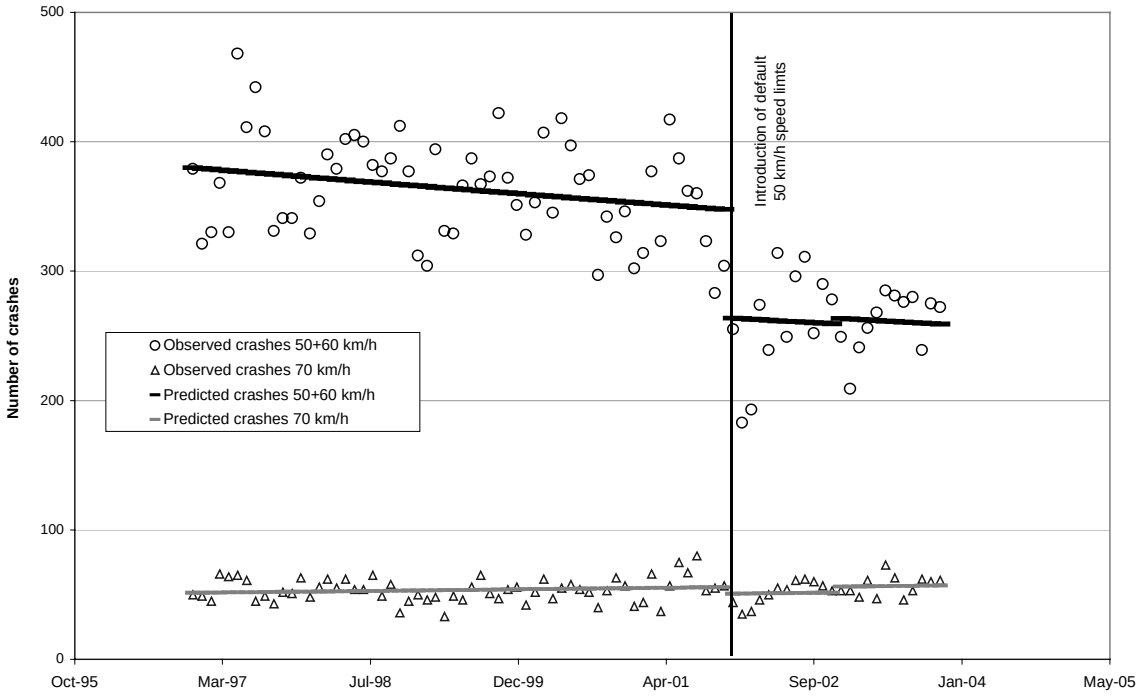

Figure 3-5 Observed and modelled monthly crash frequency in 50 and 60 km/h zones versus 70 km/h speed zones ñ crashes involving OLDER drivers

3.1.5 Crashes Involving Motorcycles

Table 3-9 shows the total and average monthly numbers of reported crashes involving motorcycles, prior to implementation and for each of the yearly periods following December 2001, that had occurred on 50 and 60 km/h roads combined and 70 km/h roads. Statistics are shown for each severity level as well as for all crashes involving motorcycles.

Most notable in Table 3-9 are the low crash frequency counts for each of the severity levels. The table also shows a decrease in the average monthly crash frequencies for crashes of all severity levels on 50 and 60 km/h roads combined. Interestingly, average monthly crash frequencies in 70 km/h zones increased in the first year following implementation for serious injury crashes, all casualty crashes, major property damage crashes and all crashes involving motorcycles. These averages decreased in the second year of the program. This increase and decrease is visible in the predicted trend line in Figure 3-6 representing all crashes in 70 km/h zones.

Table 3-9 Total and average monthly crash numbers by current speed zone before and after the introduction of the 50 km/h speed limit ñ crashes involving MOTORCYCLES

	Total Crash Numbers Before and After Introduction of the 50 km/h Default Limit				Average Monthly Crash Numbers Before and After Introduction of the 50 km/h Default Limit			
Crash severity & current speed zone	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-02 (First Year After)**	**Dec-02 to Nov-03 (Second Year After)**	**Dec-01 to Nov-03 (Two-years After)**	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-02 (First Year After)**	**Dec-02 to Nov-03 (Second Year)**	**Dec-01 to Nov-03 (Two-years After)**
Fatal Crashes								
50 + 60 km/h	31	3	7	10	0.5	0.3	0.6	0.4
70 km/h	11	2	3	5	0.2	0.2	0.3	0.2
Serious Injury Crashes								
50 + 60 km/h	567	100	97	197	9.5	8.3	8.1	8.2
70 km/h	85	29	20	49	1.4	2.4	1.7	2.0
Fatal + Serious Injury Crashes								
50 + 60 km/h	598	103	104	207	10.0	8.6	8.7	8.6
70 km/h	96	31	23	54	1.6	2.6	1.9	2.3
Medical Injury Crashes								
50 + 60 km/h	1037	113	95	208	17.3	9.4	7.9	8.7
70 km/h	141	19	18	37	2.4	1.6	1.5	1.5
All Casualty Crashes								
50 + 60 km/h	1635	216	199	415	27.3	18.0	16.6	17.3
70 km/h	237	50	41	91	4.0	4.2	3.4	3.8
Property Damage Crashes (Major)								
50 + 60 km/h	854	136	119	255	14.2	11.3	9.9	10.6
70 km/h	78	20	19	39	1.3	1.7	1.6	1.6
Property Damage Crashes (Minor)								
50 + 60 km/h	453	56	58	114	7.6	4.7	4.8	4.8
70 km/h	35	15	5	20	0.6	1.3	0.4	0.8
All Crashes								
50 + 60 km/h	2,942	408	376		49.0	34.0	31.3	32.7
70 km/h	350	85	65		5.8	7.1	5.4	6.3

Table 3-10 shows the yearly and overall program effect estimates of the net percentage change in crashes by severity, relative to crashes in 70 km/h speed zones for crashes involving motorcycles. The estimates, which are presented with their corresponding confidence intervals and significance values, follow the same interpretation as for results of all crash types, shown in Table 3-2. Only one statistically significant estimate was found for crashes involving motorcycles. This was achieved for minor property damage crashes where a 68% reduction was found, however, this was statistically significant for the first year of the program only.

Table 3-10 Estimated net percentage change in crashes in 50 and 60 km/h zones relative to 70 km/h zones ñcrashes involving MOTORCYCLES

	50 & 60 km/h zones versus 70 km/h zones in Metropolitan Perth			
Crash Severity	**Estimate of Monthly Net Percentage Change/ (Number of Crashes Saved)**	**95% Confidence Interval of Net Percentage Reduction**	**Statistical Significance**	**95% Confidence Interval of Estimated Crash Savings**
Fatal Crashes				
Dec 2001 ñ Nov 2002	5.4%	(90.2%, -815.5%)	0.9616	-
Dec 2002 ñ Nov 2003	-84.8%	(81.3%, -1727.3%)	0.5994	-
Dec 2001 ñ Nov 2003	-33.0%	(80.9%, -824.6%)	0.7729	-
Serious Injury Crashes				
Dec 2001 ñ Nov 2002	14.9%	(56.1%, -64.9%)	0.6329	-
Dec 2002 ñ Nov 2003	-40.8%	(37.8%, -218.8%)	0.4118	-
Dec 2001 ñ Nov 2003	3.1%	(49.8%, -87.0%)	0.9264	-
Fatal and Serious Injury Crashes				
Dec 2001 ñ Nov 2002	7.1%	(50.3%, -73.9%)	0.8184	-
Dec 2002 ñ Nov 2003	-51.9%	(29.3%, -226.4%)	0.2839	-
Dec 2001 ñ Nov 2003	-6.7%	(42.4%, -97.8%)	0.8367	-
Medical Injury Crashes				
Dec 2001 ñ Nov 2002	-7.4%	(42.3%, -99.7%)	0.8220	-
Dec 2002 ñ Nov 2003	-5.1%	(48.2%, -113.4%)	0.8900	-
Dec 2001 ñ Nov 2003	-6.6%	(39.2%, -86.8%)	0.8234	-
All Casualty Crashes				
Dec 2001 ñ Nov 2002	8.7%	(40.6%, -40.4%)	0.6778	-
Dec 2002 ñ Nov 2003	-16.6%	(30.2%, -94.6%)	0.5573	-
Dec 2001 ñ Nov 2003	1.0%	(34.2%, -49.0%)	0.9627	-
Property Damage Crashes (Major)				
Dec 2001 ñ Nov 2002	36.9%	(68.7%, -27.5%)	0.2000	-
Dec 2002 ñ Nov 2003	41.5%	(74.4%, -33.7%)	0.2035	-
Dec 2001 ñ Nov 2003	38.9%	(68.9%, -19.9%)	0.1520	-
Property Damage Crashes (Minor)				
Dec 2001 ñ Nov 2002	67.6% (5)	(88.3, 10.8)	0.0291	(1, 7)
Dec 2002 ñ Nov 2003	-4.2%	(74.3, -322.0%)	0.9540	-
Dec 2001 ñ Nov 2003	60.2%	(86.2%, -14.2)	0.0867	-
All Crashes				
Dec 2001 - Nov 2002	24.6%	(46.4%, -6.0%)	0.1037	-
Dec 2002 - Nov 2003	0.3%	(34.0%, -50.7%)	0.9890	-
Dec 2001 - Nov 2003	18.1%	(41.0%, -13.9%)	0.2359	-

NB: Negative estimated percentage changes indicate a crash increase

Figure 3-6 illustrates the fit of the Poisson regression model to the observed monthly crash count in 50 and 60 km/h speed zones for all crashes involving motorcycles. Interpretation of this figure is analogous to that of Figure 3-2. Similar relative shifts in the number of crashes on 50km/h and 60km/h roads after the default limit introduction are observed for crashes involving motorcycles as for the crash types previously considered.

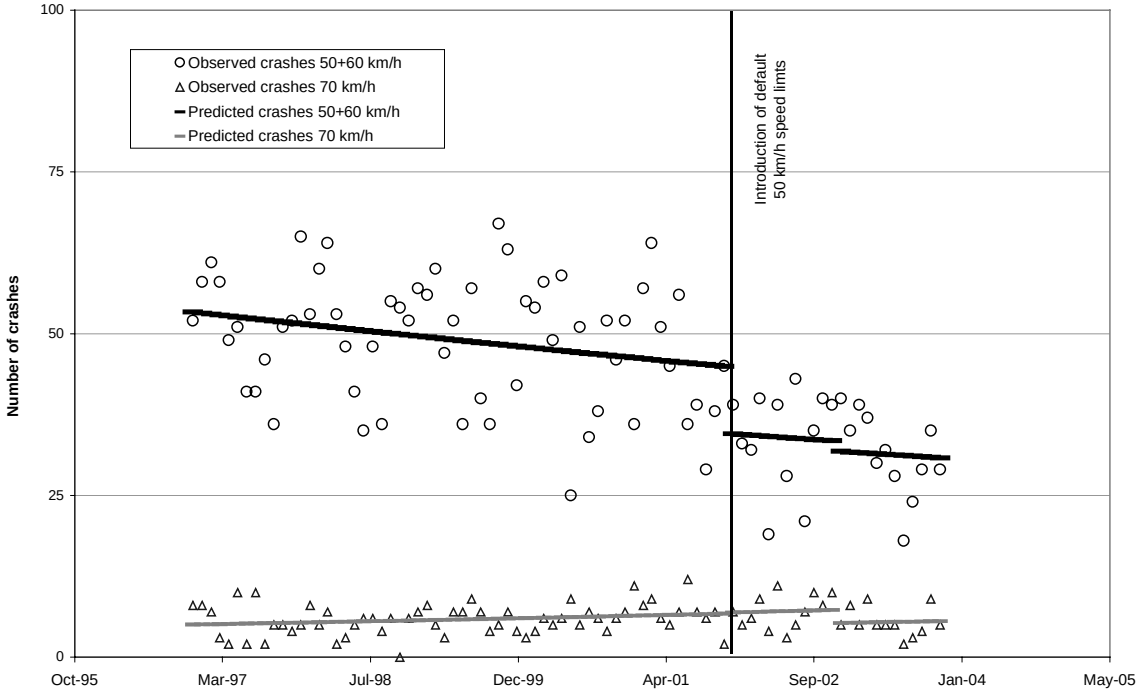

Figure 3-6 Observed and modelled monthly crash frequency in 50 and 60 km/h zones versus 70 km/h speed zones ñ crashes involving MOTORCYCLES

3.1.6 Crashes Involving Bicycles

Table 3-11 presents total and average crash numbers prior to the initiative and for each year following implementation for all crashes involving bicycles and for each level of severity. The table shows that the average crash frequency on 50 km/h and 60 km/h roads has decreased in the post period for medical injury crashes, minor property damage crashes and for all crashes involving bicycles. Serious injury crashes, however, continued on an upward trend throughout the post introduction period.

As was the case with crashes involving motorcycles, low frequency counts are also notable in crashes involving bicycles as shown in Table 3-11. This has implications for the Poisson regression analysis, which follows.

Table 3-11 shows a decrease in the average monthly crash frequencies for crashes of all severity levels on 50 and 60 km/h roads in the post program period. Crashes on 70 km/h roads also decreased in the first year of the initiative but increased slightly in some severity categories in the second year.

Table 3-11 Total and average monthly crash numbers by current speed zone before and after the introduction of the 50 km/h speed limit ñ crashes involving BICYCLES

	Total Crash Numbers Before and After Introduction of the 50 km/h Default Limit				Average Monthly Crash Numbers Before and After Introduction of the 50 km/h Default Limit			
Crash severity & current speed zone	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-02 (First Year After)**	**Dec-02 to Nov-03 (Second Year After)**	**Dec-01 to Nov-03 (Two-years After)**	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-02 (First Year After)**	**Dec-02 to Nov-03 (Second Year)**	**Dec-01 to Nov-03 (Two-years After)**
Fatal Crashes								
50 + 60 km/h	10	1	1	2	0.2	0.1	0.1	0.1
70 km/h	3	0	0	0	0.1	0.0	0.0	0.0
Serious Injury Crashes								
50 + 60 km/h	314	41	47	88	5.2	3.4	3.9	3.7
70 km/h	33	3	8	11	0.6	0.3	0.7	0.5
Fatal + Serious Injury Crashes								
50 + 60 km/h	324	42	48	90	5.4	3.5	4.0	3.8
70 km/h	36	3	8	11	0.6	0.3	0.7	0.5
Medical Injury Crashes								
50 + 60 km/h	866	92	71	163	14.4	7.7	5.9	6.8
70 km/h	71	4	7	11	1.2	0.3	0.6	0.5
All Casualty Crashes								
50 + 60 km/h	1190	134	119	253	19.8	11.2	9.9	10.5
70 km/h	107	7	15	22	1.8	0.6	1.3	0.9
Property Damage Crashes (Major)								
50 + 60 km/h	129	21	18	39	2.2	1.8	1.5	1.6
70 km/h	15	1	2	3	0.3	0.1	0.2	0.1
Property Damage Crashes (Minor)								
50 + 60 km/h	733	91	96	187	12.2	7.6	8.0	7.8
70 km/h	42	4	4	8	0.7	0.3	0.3	0.3
All Crashes								
50 + 60 km/h	2052	246	233	479	34.2	20.5	19.4	20.0
70 km/h	164	12	21	33	2.7	1.0	1.8	1.4

Table 3-12 shows the yearly and overall program effect estimates of the net percentage change in crashes by severity, relative to crashes in 70 km/h speed zones for crashes involving bicycles. The estimates, which are presented with their corresponding confidence intervals and significance values, follow the same interpretation as for results of all crash types, shown in Table 3-2.

Results in Table 3-12 show that no statistically significant results were found in the crash analysis for crashes involving bicycles. It is likely that this has resulted from insufficient monthly data for this target group. Again, the absence of statistically significant results is not necessarily an indication that the initiative has not had an effect on crashes involving bicycles. There may be insufficient evidence to provide reliable estimates of the program effect.

Table 3-12 Estimated net percentage change in crashes in 50 and 60 km/h zones relative to 70 km/h zones ñcrashes involving BICYCLES

	50 & 60 km/h zones versus 70 km/h zones in Metropolitan Perth		
Crash Severity	**Estimate of Monthly Net Percentage Change/ (Number of Crashes Saved)**	**95% Confidence Interval of Net Percentage Reduction**	**Statistical Significance**
Fatal Crashes			
Dec 2001 - Nov 2002	N/A	N/A	N/A
Dec 2002 - Nov 2003	N/A	N/A	N/A
Dec 2001 - Nov 2003	N/A	N/A	N/A
Serious Injury Crashes			
Dec 2001 - Nov 2002	10.7%	(80.9%, -317.3%)	0.8858
Dec 2002 - Nov 2003	66.5%	(92.2%, -43.7%)	0.1410
Dec 2001 - Nov 2003	42.0%	(83.0%, -97.6%)	0.3839
Fatal and Serious Injury Crashes			
Dec 2001 - Nov 2002	3.3%	(78.8%, -339.9%)	0.9651
Dec 2002 - Nov 2003	63.9%	(91.2%, -48.5%)	0.1580
Dec 2001 - Nov 2003	38.2%	(81.3%, -103.4%)	0.4281
Medical Injury Crashes			
Dec 2001 - Nov 2002	-82.1%	(42.0%, -471.8%)	0.3046
Dec 2002 - Nov 2003	20.6%	(72.3%, -127.0%)	0.6666
Dec 2001 - Nov 2003	-23.2%	(48.5%, -195.0%)	0.6389
All Casualty Crashes			
Dec 2001 - Nov 2002	-41.0%	(42.6%, -246.4%)	-246.4%
Dec 2002 - Nov 2003	45.2%	(75.6%, -23.4%)	-23.4%
Dec 2001 - Nov 2003	11.0%	(55.2%, -76.7%)	10.42%
Property Damage Crashes (Major)			
Dec 2001 - Nov 2002	-25.3%	(90.3%, -1517.4%)	0.8626
Dec 2002 - Nov 2003	55.4%	(96.16%, -417.8%)	0.5186
Dec 2001 - Nov 2003	19.8%	(89.7%, -526.8%)	0.8336
Property Damage Crashes (Minor)			
Dec 2001 - Nov 2002	-43.2%	(58.7%, -396.1%)	0.5714
Dec 2002 - Nov 2003	-55.6%	(60.4%, -512.2%)	0.5267
Dec 2001 - Nov 2003	-47.7%	(50.1%, -337.5%)	0.4814
All Crashes			
Dec 2001 - Nov 2002	-40.0%	(30.34%, -181.4%)	0.3448
Dec 2002 - Nov 2003	27.9%	(62.90%, -40.2%)	0.3349
Dec 2001 - Nov 2003	-2.4%	(41.3%, -78.6%)	0.9323

NB: Negative estimated percentage changes indicate a crash increase

Figure 3-7 illustrates the fit of the Poisson regression model to the observed monthly crash count in 50 and 60 km/h speed zones for all crashes involving bicycles. Interpretation of this figure is analogous to that of Figure 3-2.

The modelled trend line in Figure 3-7 shows that all crashes involving bicycles in 50 and 60 km/h crashes decreased in the period following the introduction of the default speed limits. The results in Table 3-12, however, show that this decrease was not found to be statistically significant.

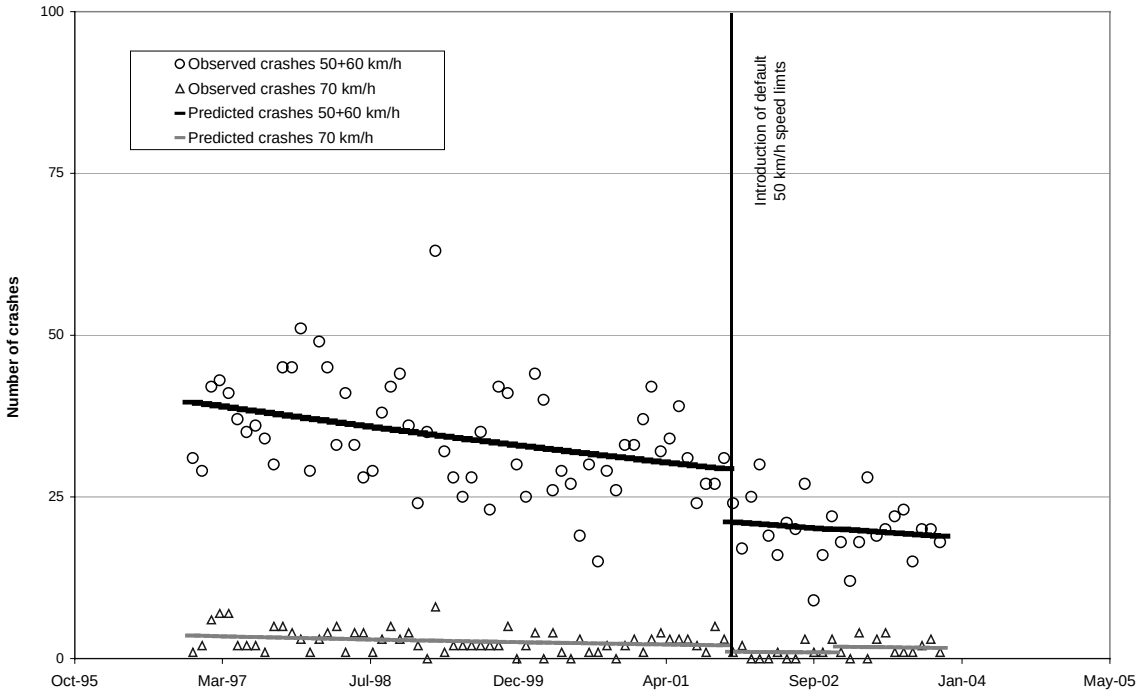

Figure 3-7 Observed and modelled monthly crash frequency in 50 and 60 km/h zones versus 70 km/h speed zones ñ all crashes involving BICYCLES

3.2 RESULTS OF REGIONAL CRASH ANALYSES

This section details the results of the analyses conducted on all crash types in regional Western Australia[2]. The layout and presentation is identical to that presented for the metropolitan crash analyses. Results of the analyses of each of the target groups are also similarly presented, however, due to the absence of statistically significant results for any of these groups, these have been placed in the Appendix section of the report. The only exception to these results was a statistically significant estimate for medical crashes involving young drivers, showing a reduction of 52% for the first year of the program only.

3.2.1 All Crash Types

Table 3-13 presents total and average crash numbers prior to the initiative and for each year following implementation for all crashes and for each level of severity in regional Western Australia. The table shows that the average crash frequency on 50 and 60 km/h roads has decreased since the introduction of the default 50 km/h speed limits for all severity categories examined.

[2] Metropolitan Perth is defined as Local Government Authorities (LGAs) 101 to 119, 121 to 131 and 150 to 155. The remainder of LGAs are defined as regional Western Australia.

Table 3-13 Total and average monthly crash numbers by current speed zone before and after the introduction of the 50 km/h speed limit - ALL crash types in Regional Western Australia

	Total Crash Numbers Before and After Introduction of the 50 km/h Default Limit				Average Monthly Crash Numbers Before and After Introduction of the 50 km/h Default Limit			
Crash severity & current speed zone	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-03 (After)**	**Dec-01 to Nov-02 (After)**	**Dec-02 to Nov-03 (After)**	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-03 (After)**	**Dec-01 to Nov-02 (After)**	**Dec-02 to Nov-03 (After)**
Fatal Crashes								
50 + 60 km/h	173	39	23	16	2.9	1.6	1.9	1.3
70 km/h	41	16	6	10	0.7	0.7	0.5	0.8
Serious Injury Crashes								
50 + 60 km/h	2,346	601	340	261	39.1	25.0	28.3	21.8
70 km/h	186	58	34	24	3.1	2.4	2.8	2.0
Fatal + Serious Injury Crashes								
50 + 60 km/h	2,519	640	363	277	42.0	26.7	30.3	23.1
70 km/h	227	74	40	34	3.8	3.1	3.3	2.8
Medical Injury Crashes								
50 + 60 km/h	4,983	1,115	612	503	83.1	46.5	51.0	41.9
70 km/h	412	118	72	46	6.9	4.9	6.0	3.8
All Casualty Crashes								
50 + 60 km/h	7,502	1,755	975	780	125.0	73.1	81.3	65.0
70 km/h	639	192	112	80	10.7	8.0	9.3	6.7
Property Damage Crashes (Major)								
50 + 60 km/h	18,224	4,843	2,523	2,320	303.7	201.8	210.3	193.3
70 km/h	1,071	345	199	146	17.9	14.4	16.6	12.2
Property Damage Crashes (Minor)								
50 + 60 km/h	7,402	1,815	946	869	123.4	75.6	78.8	72.4
70 km/h	287	92	43	49	4.8	3.8	3.6	4.1
All Crashes								
50 + 60 km/h	33,128	8,413	4,444	3,969	552.1	350.5	370.3	330.8
70 km/h	1,997	629	354	275	33.3	26.2	29.5	22.9

Table 3-14 shows the yearly and overall program effect estimates of the net percentage change in crashes by severity, relative to crashes in 70 km/h speed zones for crashes in regional Western Australia. The estimates, which are presented with their corresponding confidence intervals, significance values and translations into crash savings, follow the same interpretation as for results of all crash types in metropolitan Perth, shown in Table 3-2.

Very few statistically significant results were obtained for this analysis. Statistically reliable results were achieved for minor property damage crashes and for all crash types combined. The introduction of the 50 km/h speed limits appears to have had the greatest effect on minor property crashes, achieving a net reduction of 43% in the second year of the program. Overall, a 33% decrease was obtained over the two-year period for this severity category.

The only other statistically significant result obtained was for the analysis of all crash types. In this category, a net reduction of 16% was found in the first year following the introduction of the default speed limits.

Table 3-14 Estimated net percentage change in crashes in 50 and 60 km/h zones relative to 70 km/h zones in Regional Western Australia ñALL crash types

	50 & 60 km/h zones versus 70 km/h zones in Regional Western Australia			
Crash Severity	**Estimate of Monthly Net Percentage Change/ (Number of Crashes Saved)**	**Confidence Interval**	**Statistical Significance**	**Estimated Crash Savings**
Fatal Crashes				
Dec 2001 ñ Nov 2002	-26.83%	(61.0%, -311.9%)	0.6925	-
Dec 2002 ñ Nov 2003	40.76%	(83.2%, -108.3%)	0.4144	-
Dec 2001 ñ Nov 2003	6.25%	(66.6%, -163.2%)	0.9025	-
Serious Injury Crashes				
Dec 2001 ñ Nov 2002	5.08%	(42.27%, -56.1%)	0.8373	-
Dec 2002 ñ Nov 2003	-9.34%	(40.67%, -101.5%)	0.7746	-
Dec 2001 ñ Nov 2003	21.58%	(38.5%, -59.5%)	0.9685	-
Fatal + Serious Injury Crashes				
Dec 2001 ñ Nov 2002	-2.8%	34.8%, -61.9%)	0.9065	-
Dec 2002 ñ Nov 2003	0.7%	42.0%, -70.0%)	0.9794	-
Dec 2001 ñ Nov 2003	19.6%	(33.8%, -55.7%)	0.9447	-
Medical Injury Crashes				
Dec 2001 ñ Nov 2002	21.0%	43.4%, -10.1%)	0.1635	-
Dec 2002 ñ Nov 2003	-5.7%	30.4%, -60.5%)	0.7949	-
Dec 2001 ñ Nov 2003	15.0%	(37.2%, -18.7%)	0.3652	-
All Casualty Crashes				
Dec 2001 ñ Nov 2002	14.0%	(34.2%, -12.5%)	0.2713	-
Dec 2002 ñ Nov 2003	-1.3%	(27.1%, -40.7%)	0.9404	-
Dec 2001 ñ Nov 2003	9.6%	(29.9%, -16.7%)	0.4391	-
Property Damage Crashes (Major)				
Dec 2001 ñ Nov 2002	15.63%	31.02%, -3.2%)	0.0979	-
Dec 2002 ñ Nov 2003	-10.20%	13.78%, -40.9%)	0.4379	-
Dec 2001 ñ Nov 2003	7.94%	(24.0%, -11.6%)	0.3991	-
Property Damage Crashes (Minor)				
Dec 2001 ñ Nov 2002	26.5%	(51.6%, -11.8%)	0.1506	-
Dec 2002 ñ Nov 2003	43.4% (54)	(64.4%, 10.1%)	0.0159	(12, 79)
Dec 2001 ñ Nov 2003	33.3% (41)	(54.3%, 2.5%)	0.0366	(3, 67)
All Crashes				
Dec 2001 - Nov 2002	16.20% (89)	(27.9%, 2.6%)	0.0208	(14, 154)
Dec 2002 - Nov 2003	0.35%	(16.8%, -19.3%)	0.9698	-
Dec 2001 - Nov 2003	11.32%	(23.0%, -2.2%)	0.0971	-

Figure 3-8 illustrates the fit of the Poisson regression model to the observed monthly crash count in 50 and 60 km/h speed zones for all reported crashes. Interpretation of this figure is analogous to that of Figure 3-2.

The modelled trend line in Figure 3-8 shows that all crashes in 50 and 60 km/h zones decreased in the period following the introduction of the default speed limits. This step change, at the point representing the first year of the program is equivalent to a 16% net reduction in all crash types in regional Western Australia.

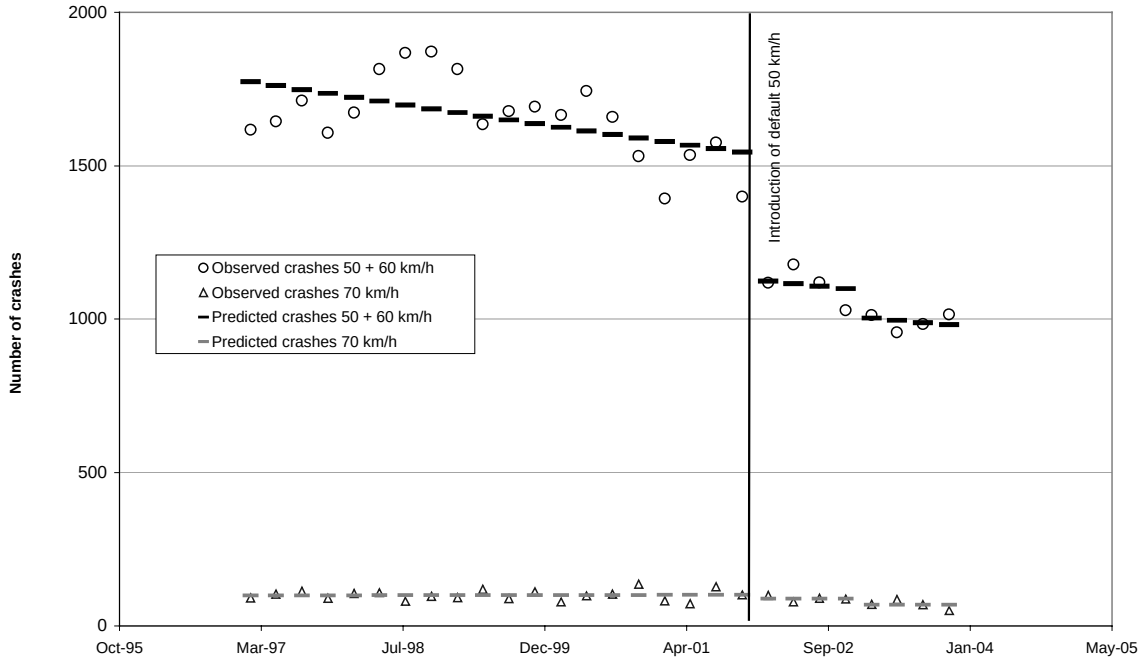

Figure 3-8 Observed and predicted monthly crash frequency in 50 and 60 km/h zones in Regional Western Australia ñ ALL crash types

3.3 RESULTS OF SPEED SURVEYS

Estimates for five different speed parameters are presented in Table 3-15 and Table 3-16 as measures of speed trends for control and treatment roads for metropolitan Perth and regional Western Australia, respectively. These parameters include the mean speed, 85th percentile speed, and the proportions of drivers checked travelling at or exceeding 61 km/h by up to 8 km/h, and 70 km/h by up to 9 km/h. The proportion of motorists travelling at or exceeding 80 km/h was also estimated. Control roads are those that have remained 60 km/h while treatment roads are those on which speed limits have been reduced from 60 km/h to 50 km/h as a result of the speed limit change.

The relative change for each speed parameter was calculated for each ëafterí survey period using as baseline measures the results from surveys conducted in October/November 2000 and February 2001, for the metropolitan and regional areas, respectively. Net relative effects for each parameter are presented for each of the three surveys conducted following the baseline survey. A negative value indicates a reduction for the parameter being measured. All net changes reported were found to be statistically significant.

3.3.1 Metropolitan Speed Survey Results

Table 3-15 below, presents the relative change in each of the speed parameters measured in the surveys for metropolitan Perth.

Table 3-15 Speed parameter estimates pre and post implementation - Metropolitan

Survey Period	85th percentile (km/h)		Mean speed (km/h)		Proportion travelling 61-69 km/h (%)		Proportion travelling 70-79 km/h (%)		Proportion travelling at 80 km/h or over (%)	
	T	C	T	C	T	C	T	C	T	C
Oct/Nov 2000	64.4	69.0	54.15	61.17	23.79	45.56	4.60	10.95	0.91	1.77
June 2002	61.8	66.8	52.29	59.29	17.01	40.06	2.66	6.86	0.59	1.16
Nov 2002	62.4	67.8	52.87	60.07	18.78	43.06	2.98	8.55	0.64	1.49
Nov 2003	62.0	67.3	52.54	59.64	17.74	40.57	2.76	7.71	0.62	1.42
Relative change between survey periods										
Relative change from Oct/Nov 00 to Jun 2002	*-0.56 km/h*		*-0.20 km/h*		*-18.7%*		*-7.7%*		*-1.1%*	
Relative change from Oct/Nov 00 to Nov 2002	*-0.90 km/h*		*-0.31 km/h*		*-16.5%*		*-17.0%*		*-16.5%*	
Relative change from Oct/Nov 00 to Nov 2003	*-0.83 km/h*		*-0.26 km/h*		*-16.3%*		*-14.8%*		*-15.1%*	
T = ëTreatmentí roads, C = ëControlí roads										
All net changes are statistically significant with p<0.000										

Mean and 85th percentile speeds reduced by 0.2 km/h and 0.56 km/h, respectively relative to the control group, during the period October/November 2001 to June 2002. Interestingly during this period, the decrease in these speed measures in both the control and treatment groups was of a similar magnitude suggesting a contamination of treatment effect. Results for these two parameters show that the initiative resulted in only small net decreases over the course of the initiative to November 2003. Relative to the baseline survey, the mean and 85th percentile speeds decreased by only 0.26% and 0.83% respectively.

Analysis results show reductions across all speed parameters for each survey period relative to the baseline survey. The greatest reduction was achieved in the proportion of drivers travelling at 61-69 km/h. A net decrease of 18.7% for this speed parameter was associated with the introduction of the initiative in the first six months. Throughout the next 18 months, the reduction stabilised at around 16%.

The reduced speed limits had a lesser effect on the proportion of drivers exceeding 70 km/h by up to 9 km/h (7.7% reduction) and little effect on the proportion of drivers exceeding 80 km/h (1.1% reduction) in the first six months post implementation. By November 2002, the proportion of drivers exceeding 70 km/h by up to 9 km/h decreased further by approximately 10%. Results of the final survey in November 2003 showed that the proportion of these infringing drivers increased slightly by approximately 2%.

Although a small improvement was found in the proportion of drivers exceeding the 80 km/h speed limits in the first six months following implementation, a much greater

reduction, in the order of 16.5%, was found by the second survey in November 2002. It was found that this decrease had been largely maintained (at 15%) when the final survey was conducted in November 2003.

3.3.2 Regional Speed Survey Results

Table 3-16 below, presents the relative change in each of the speed parameters measured in the surveys for regional centres in Western Australia.

Table 3-16 Speed parameter estimates pre and post implementation ñ Regional centres in Western Australia

Survey Period	85th percentile (km/h)		Mean speed (km/h)		Proportion travelling 61-69 km/h (%)		Proportion travelling 70-79 km/h (%)		Proportion travelling at 80 km/h or over (%)	
	T	C	T	C	T	C	T	C	T	C
Feb 2001	65.1	66.30	55.74	58.79	28.52	34.78	4.94	5.64	0.85	2.56
Jun 2002	60.9	64.80	52.09	57.45	15.27	31.89	2.11	4.47	0.45	0.88
Nov 2002	60.7	64.9	51.97	57.94	14.85	34.61	1.96	4.3	0.43	0.68
Nov 2003	60.7	64.8	52.49	57.03	15.04	30.23	1.96	4.62	0.38	0.96
Relative change between survey periods										
Relative change from Feb 2001 to Jun 2002	*-2.79 km/h*		*-2.44 km/h*		*-41.6%*		*-46.1%*		*54.0%*	
Relative change from Feb 2001 to Nov 2002	*-3.09 km/h*		*-3.01 km/h*		*-54.6%*		*-48.0%*		*90.4%*	
Relative change from Feb 2001 to Nov 2003	*-2.99km/h*		*-1.63 km/h*		*-38.4%*		*-47.9%*		*19.2%*	
T = ëTreatmentí roads, C = ëControlí roads										
All net changes are statistically significant with p<0.000										

The results above show that the greatest reductions in mean and 85th percentile speeds occurred in first six months following the introduction of the default 50 km/h speed limits. During this time the mean and 85th percentile speeds decreased by 2.44 km/h and 2.79 km/h, respectively, on the 50 km/h roads relative to changes on the control roads. Although further reductions were observed in the following six months for both parameters, the effect on the 85th percentile speed only was maintained into 2002. In comparison to the baseline results, the mean speed increased, relatively, by 1.36 km/h in 2002 after a reduction of 3 km/h in 2001.

The proportion of drivers exceeding 60 km/h on 50 km/h roads also decreased relative to 60 km/h roads. By June 2002, this proportion of drivers decreased, relatively, by 42% and by a further 13% by November 2002.

The reduced speed limits appeared to have had a more consistent effect on the proportion of drivers exceeding 70 km/h by up to 9 km/h. The greatest effect, a relative reduction of 46%, was seen within the first seven months of the initiative and maintained for the following 18 months.

In contrast, the small proportion of drivers driving at or exceeding 80 km/h, increased by 54% in the period to June 2002 and a further 36.4% to 90.4% by November 2002. The results from the survey conducted in November 2003, however, showed that this proportion of drivers had decreased to 19.2%.

3.4 RESULTS OF COMMUNITY ATTITUDE SURVEYS

Table 3-17 presents the results obtained from the survey conducted by Donovan Research in November 1999. The table shows that the greatest support for reduced speed limits in local areas came from those residing either on a local street or within close proximity to local streets, while those most opposed to the proposal were residents in close proximity to through roads.

Table 3-17 Response to proposition of introduction of default 50 km/h speed limits

	Your own street	Local Roads in your Area	Through Roads in your Area
Response to proposition	%	%	%
In favour of	47	46	19
Opposed to	30	36	65
No opinion either way	23	18	16

A focus group carried out as a qualitative follow-up study to the November 1999 survey sought to explore and identify reasons for the stance taken by ëopposersí and those with no opinion on a variety of road safety issues (Evans and Batini, 2000). Only opinions canvassed on the proposition of the introduction of the default speed limits were examined for this evaluation.

Reasons given for expressing opposition to the proposed initiative included increased travelling time, driver frustration, confusion and that the initiative would simply be a revenue raising exercise. The participants also perceived that lowering the speed limit would not significantly improve safety on roads in built-up areas.

Another objective of holding the focus group was to determine the intention to comply with the 50 km/h speed limits. Two ëimplementation scenariosí were presented to the participants, which included introducing the default limits with and without police enforcement. All those who opposed the introduction of the initiative indicated that they would not comply with the 50 km/h speed limits if they were implemented without police enforcement. If, however, the introduction was to be accompanied by full enforcement, participants responded that they would comply with the legislation.

Those focus group participants who did not hold an opinion on the proposition of introducing the initiative held this view because they did not consider speeding on local streets a major issue, and that the money associated with introducing the initiative could be better spent elsewhere. This group also felt that reducing the local speed limits would be a futile exercise, as they perceived that the legislation would be difficult to enforce, and result in an increase in crashes due to travel speed variability.

Opinions were also canvassed on the subject of crash causation. Interestingly, none of participants in the focus groups spontaneously cited vehicle speed to be a cause of crashes on local roads. Inexperience, distractions and unpredictable road users (that is, cyclists and pedestrians) were perceived to be the main causes of crashes on local roads.

The results of the surveys for the two statements tracked over 24 months post implementation by Donovan Research are presented below. The percentages presented are the average for the six monthly period considered. As the tracking surveys commenced after the initiative was introduced, the results could not be compared to a baseline period.

The findings in Table 3-18 show that support for the initiative increased by 5% in the 18 months following the introduction and fell by 2% by November 2003. The level of disagreement fell by a total of 4% by November 2003. The number of respondents who did not have any opinion either way remained constant over the 24 month period. 2003 results were obtained through personal communication with Chris Batini.

Table 3-18 Results of responses to statement *ì Reducing the speed limit on local area roads from 60 km/h to 50 km/h is a good ideaî* for each six-monthly period following implementation

	17th Dec 2001 to 27 May 2002	3rd Jun 2002 to 25 Nov 2002	2nd Dec 2002 to 26 May 2003	2 Jun 2003 to 24 Nov 2003
Agree	58%	61%	63%	61%
Disagree	35%	32%	31%	31%
No opinion	7%	7%	7%	8%

In the first year following implementation, Table 3-19 shows that three out of every four people felt it was morally unacceptable to exceed the limit by more than 10 km/h. In the second year post introduction, the communityís stance on this issue strengthened. This behaviour was considered unacceptable by four out of five people. One in five people considered it morally acceptable to drive 10 km/h over the 50 km/h speed limit. Only 3% of people surveyed did not have strong feelings on this issue either way.

Table 3-19 Results of responses to statement *ì It is morally acceptable to drive 10 km/h over the speed limit in the new 50 km/h zonesî* for each six-monthly period following implementation.

	17th Dec 2001 to 27 May 2002	3rd Jun 2002 to 25 Nov 2002	2nd Dec 2002 to 26 May 2003	2 Jun 2003 to 24 Nov 2003
Agree	22%	21%	18%	18%
Disagree	76%	76%	80%	80%
No opinion	3%	2%	1%	2%

The community attitude survey results sourced from the ATSB are presented in Table 3-20, below. These surveys sought to track the level of community approval for reducing the local area speed limits from 60 km/h to 50 km/h for the period 2000 to 2003. The surveys conducted in 2000, 2001 and 2002 show comparable findings to those obtained by Donovan Research, (shown in Table 3-17). ATSB results for 2003, however, show a 22% increase in approval from the previous year, an increase inconsistent with the Donovan survey. The ATSB maintains the accuracy of this result though this outcome may be due to chance fluctuation.

Table 3-20 Community approval over time for lowering local area speed limits to 50 km/h in Western Australia ñ ATSB surveys

	Year of survey			
	2000	**2001**	**2002**	**2003**
Approve	60%	62%	69%	91%
Disapprove	38%	33%	26%	3%
No opinion/donít know	3%	6%	5%	6%

4 DISCUSSION

The intention of the design of the crash analysis component of the evaluation was to assess the effect of the introduction of the 50 km/h default speed limits on roads affected by the change relative to some suitably chosen control area. The intention of using the control area is to represent changes in the treatment series that would have occurred during the study period in the absence of the intervention being assessed. The initial design conceived for the evaluation was to compare crash trends on roads that changed from 60 km/h to 50 km/h upon introduction of the 50 km/h default urban speed limit with those that were 60 km/h both before and after the default limit introduction. Roads that remained at 60 km/h following the speed limit change were thought likely to be the closest in key characteristics to the roads that changed to 50 km/h to serve as the most representative controls. There were, however, a number of problems in implementing such a design.

The primary problem was a pragmatic one in that it proved impossible to reliably identify the roads that changed from a 60 km/h to 50 km/h speed limit, following the change in default urban speed limit, from the road inventory information that existed in Western Australia at the time of the study. Secondly, there was also some concern about how unaffected the 60 km/h roads were by the default speed limit change. Anecdotal evidence suggested that there was an element of confusion amongst the public as to where the 50 km/h default limit applied, particularly because the roads on which the new lower default limit applied were generally not indicated by the placement of speed zone signs. If this was the case, it was possible that motorist also adopted lower travel speeds on roads with speed limits above 50 km/h, and particularly on roads zoned 60 km/h due to their physical similarities. Consequently, there was some danger that roads that remained at 60km/h after the default limit change were not unaffected by the default limit change making them unsuitable for use as controls in making an unbiased evaluation of the "treatment" effect.

To overcome these problems, it was decided to define the "treated" area in the analysis design as all roads zoned either 50 km/h or 60 km/h over the study period and the "control" roads as those zoned 70 km/h. This design was considered the most robust for obtaining accurate estimates of the crash effects of the default urban speed limit change. Roads zoned at 70 km/h were considered to be similar enough in characteristic to those zoned 60 km/h to serve as suitable controls in the analysis. Specifically, it was considered that the 70 km/h roads would adequately represent those major factors other than the default speed limit change affecting crash trends, such as population and travel growth and other more widespread road safety campaigns such as speed camera enforcement. Defining the "treatment" area as a combination of 50 km/h and 60 km/h roads was also felt not to compromise the analysis. If crash trends on the roads remaining at 60 km/h were affected by the default speed limit change, this design would measure this effect. If the roads remaining at 60 km/h were unaffected by the default limit change, loss of statistical analysis power resulting from the smaller percentage crash effects across the combined area would be offset by the statistical power gains resulting from the larger monthly crash counts across the combined speed zones.

This last point raises issues about the interpretation of the crash analysis results presented in this study. The percentage crash reductions due to the default speed limit change estimated in this study are changes in the combined 50 km/h and 60 km/h zones relative to corresponding changes observed in the 70 km/h zones over the study period. That is, the percentage crash changes are an average across the 50 and 60 km/h roads. If the true crash

changes were isolated completely or largely to those roads that changed to 50 km/h, the estimated percentage crash reductions will be smaller than if only the roads changing to 50 km/h were defined as the ëtreatmentí area. For this reason, it is probably most relevant in assessing the success of the default speed limit change to focus primarily on the absolute crash savings derived from the percentage reduction estimates. The absolute crash savings reflect both the relative percentage crash reduction and the size of the ëtreatmentí group and hence will be relatively invariant to the specific definition of the ëtreatmentí area.

The statistically significant results obtained in the crash analyses indicated that the introduction of the default 50 km/h speed limits was associated with a considerable net decrease in crash frequency in 50 and 60 km/h zones relative to 70 km/h zones in Metropolitan Perth. No statistically significant results were obtained for fatal or serious injury crashes in any of the analyses, however, casualty crashes in metropolitan Perth were found to have decreased by 20%. This effect was greater than that observed in Victoria, where the program was associated with a 12 to 13% reduction in casualty crashes in the five months following implementation (Newstead and Hoareau 2002). No results were available for Victoria beyond the first five months at the time of writing. The Perth result compares to that apparently achieved in NSW (NSW RTA, 2000) and South East Queensland (Hoareau, Newstead, Oxley and Cameron, 2003) where 22% and 23% reductions in casualty crashes were observed, respectively.

The greatest gains in implementing the default speed limits in Western Australia were expected in fatal and serious injury crashes involving pedestrians. While statistically significant results were not obtained for these severity categories, the analysis was able to detect a 51% decrease for all reported crashes involving pedestrians in metropolitan Perth. This compares with an identical finding in NSW and was one of the largest net reductions obtained in this evaluation. Statistically reliable estimates were not obtained in the Victorian analysis for this target group.

The regional crash analysis produced only a few statistically significant results, and none could be detected for any of the target groups examined. The only exception was a net reduction of 52% for medically treated injury crashes involving young drivers in the first year of the program. This result suggests that the initiative had greater success with young drivers in regional Western Australia than in metropolitan Perth, where there was a reduction of 28% for young driver crashes of the same severity level. The absence of statistically significant results does not necessarily suggest that the program was less effective in regional Western Australia. There may have been insufficient evidence to conclude that the program was effective for these target groups. This outcome could have been the result of relatively few crash data, which was not surprising considering the lower population density in regional Western Australia when compared to metropolitan Perth.

It was clear from the results of both the crash analyses and speed monitoring surveys that the introduction of the 50 km/h speed limits was associated with an effect on speed behaviour in Western Australia. Results of speed survey data analysis associated with the program implementation suggested these crash reductions stemmed largely from a reduction in excessive speeding in 50km/h zones rather than large reductions in mean speeds at the affected sites. The results also showed that the effects of the initiative on travelling speeds were greater in regional centres in Western Australia than in metropolitan Perth.

There were no results from Donovan Research which allowed a direct comparison of attitudes to the proposed initiative and attitudes following implementation. However, if

responses to the proposition of implementing the initiative on the participantsí street or on local roads in their area (in Table 3-17), are taken as a proxy for measuring the overall acceptability of the proposal, it can be surmised that approval increased by approximately 14% by November 2002, when compared with post-introduction survey results. In comparison, the ATSB reported higher levels of approval prior to implementation, however, the magnitude with which approval increased in 2002 was half that of the increase found in the Donovan Research results (that is 7%). This increasing trend in support, found in both surveys, was consistent with the reductions in crash frequency and in travelling speeds in 2002. The large increase in support from 2002 to 2003 in the ATSB survey, however, was not reflected in any of the findings of the crash or speed survey analyses.

It is possible that the crash reductions reported here may have been greater had the introduction of the program been accompanied by full enforcement. An evaluation of the 50 km/h speed limits in South East Queensland showed that crash reductions only occurred after the amnesty period had expired and full enforcement of the speed limits commenced (Hoareau et al, 2003). However, even without full enforcement of the default speed limits, the program in Western Australia was able to achieve results of a similar magnitude to other states which did expend resources to enforce the default speed limits. Although community survey results prior to the initiative showed that attitudes towards compliancy became favourable when full enforcement was proposed, the focus group did not contain numbers large enough for this view to be generalised to the Western Australian population. Therefore it is difficult to conclude whether full enforcement would have further contributed to the statistically significant reductions found to be associated with the initiative.

5 QUALIFYING REMARKS

The validity of the results shown in this report is based on the following assumptions:

- The crash data supplied by MRWA contains accurate crash severity and speed zone information.
- The statistical models employed to estimate the net effect of the initiative have been adequately specified.
- The error structure of the models follows the Poisson distribution.
- The speed parameter estimates supplied by MRWA are correct.
- No assumption about the direction of change has been assumed. The hypothesis tested was based on a two-tailed test of significance. To obtain a one-tailed level of significance, the significance levels should be halved.

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APPENDIX 1

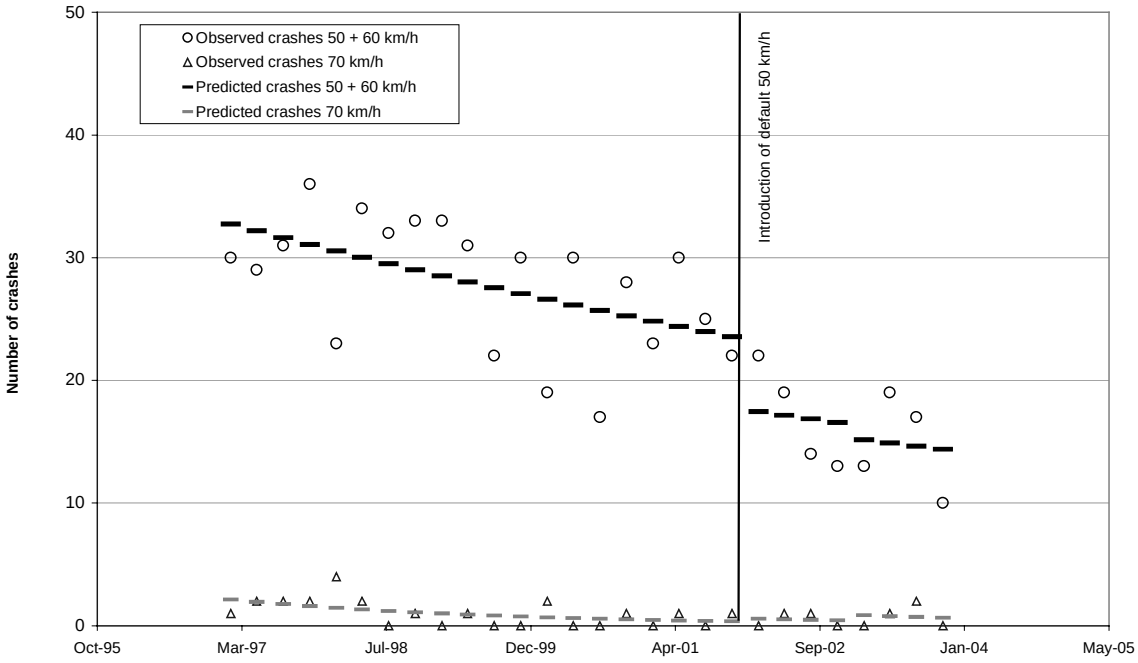
CRASHES INVOLVING PEDESTRIANS IN REGIONAL WESTERN AUSTRALIA

Total and average monthly crash numbers by current speed zone before and after the introduction of the 50 km/h speed limit ñ crashes involving pedestrians

	Total Crash Numbers Before and After Introduction of the 50 km/h Default Limit				Average Monthly Crash Numbers Before and After Introduction of the 50 km/h Default Limit			
Crash severity & current speed zone	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-03 (After)**	**Dec-01 to Nov-02 (After)**	**Dec-02 to Nov-03 (After)**	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-03 (After)**	**Dec-01 to Nov-02 (After)**	**Dec-02 to Nov-03 (After)**
Fatal Crashes								
50 + 60 km/h	36	3	0	3	0.6	0.1	0.0	0.3
70 km/h	3	2	2	0	0.1	0.1	0.2	0.0
Serious Injury Crashes								
50 + 60 km/h	236	59	29	30	3.9	2.5	2.4	2.5
70 km/h	15	1	0	1	0.3	0.0	0.0	0.1
Fatal + Serious Injury Crashes								
50 + 60 km/h	272	62	29	33	4.5	2.6	2.4	2.8
70 km/h	18	3	2	1	0.3	0.1	0.2	0.1
Medical Injury Crashes								
50 + 60 km/h	174	57	38	19	2.9	2.4	3.2	1.6
70 km/h	3	0	0	0	0.1	0.0	0.0	0.0
All Casualty Crashes								
50 + 60 km/h	446	119	67	52	7.4	5.0	5.6	4.3
70 km/h	21	3	2	1	0.4	0.1	0.2	0.1
Property Damage Crashes (Major)								
50 + 60 km/h	13	6	1	5	0.2	0.3	0.1	0.4
70 km/h	0	0	0	0	0.0	0.0	0.0	0.0
Property Damage Crashes (Minor)								
50 + 60 km/h	132	40	28	12	2.2	1.7	2.3	1.0
70 km/h	4	1	0	1	0.1	0.0	0.0	0.1
All Crashes								
50 + 60 km/h	558	127	68	59	9.3	5.3	5.7	4.9
70 km/h	20	5	2	3	0.3	0.2	0.2	0.3

Estimated net percentage change in crashes in 50 and 60 km/h zones relative to 70 km/h zones ñcrashes involving PEDESTRIANS in Regional Western Australia

	50 & 60 km/h zones versus 70 km/h zones in Regional Western Australia		
Crash Severity	**Estimate of Monthly Net Percentage Change**	**Confidence Interval**	**Statistical Significance**
Fatal Crashes			
Dec 2001 - Nov 2002	N/A	N/A	N/A
Dec 2002 - Nov 2003	N/A	N/A	N/A
Dec 2001 - Nov 2003	N/A	N/A	N/A
Serious Injury Crashes			
Dec 2001 - Nov 2002	N/A	N/A	N/A
Dec 2002 - Nov 2003	N/A	N/A	N/A
Dec 2001 - Nov 2003	99.63%	(2888.6%, 78.7%)	0.4634
Fatal and Serious Injury Crashes			
Dec 2001 - Nov 2002	50.8%	(92.8%, -238.3%)	0.4711
Dec 2002 - Nov 2003	8.4%	(92.9%, -1086.6%)	0.9467
Dec 2001 - Nov 2003	39.3%	(280.5%, 90.3%)	0.5941
Medical Injury Crashes			
Dec 2001 - Nov 2002	N/A	N/A	N/A
Dec 2002 - Nov 2003	N/A	N/A	N/A
Dec 2001 - Nov 2003	N/A	N/A	N/A
All Casualty Crashes			
Dec 2001 - Nov 2002	39.1%	(90.9%, -306.0%)	0.6088
Dec 2002 - Nov 2003	28.3%	(94.3%, -803.0%)	0.7968
Dec 2001 - Nov 2003	36.6%	(285.0%, 89.6%)	0.6207
Property Damage Crashes (Major)			
Dec 2001 - Nov 2002	N/A	N/A	N/A
Dec 2002 - Nov 2003	N/A	N/A	N/A
Dec 2001 - Nov 2003	N/A	N/A	N/A
Property Damage Crashes (Minor)			
Dec 2001 - Nov 2002	N/A	N/A	N/A
Dec 2002 - Nov 2003	N/A	N/A	N/A
Dec 2001 - Nov 2003	N/A	N/A	N/A
All Crashes			
Dec 2001 - Nov 2002	58.36%	(93.9%, -186.0%)	0.3728
Dec 2002 - Nov 2003	82.38%	(97.6%, -30.9%)	0.0898
Dec 2001 - Nov 2003	69.62%	(-59.9%, 94.2%)	0.1597



Observed and modelled monthly crash frequency in 50 and 60 km/h zones combined and 70 km/h zones ñ All crashes involving PEDESTRIANS in Regional Western Australia

APPENDIX 2

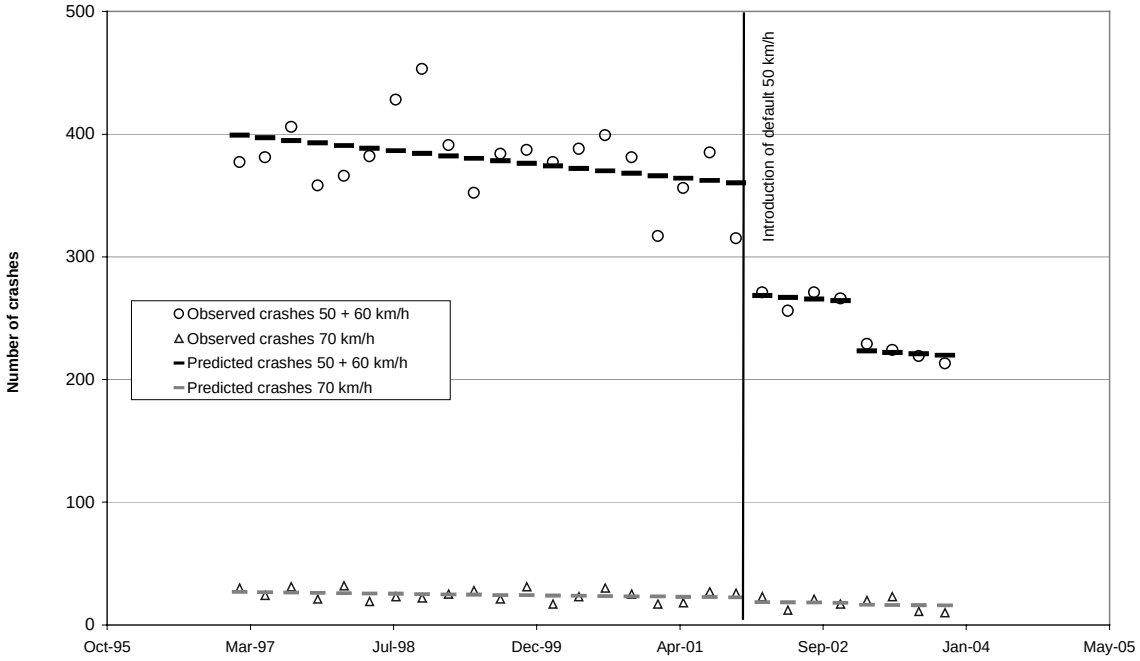
CRASHES INVOLVING YOUNG DRIVERS IN REGIONAL WESTERN AUSTRALIA

Total and average monthly crash numbers by current speed zone before and after the introduction of the 50 km/h speed limit ñ crashes involving young drivers

	Total Crash Numbers Before and After Introduction of the 50 km/h Default Limit				Average Monthly Crash Numbers Before and After Introduction of the 50 km/h Default Limit			
Crash severity & current speed zone	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-03 (After)**	**Dec-01 to Nov-02 (After)**	**Dec-02 to Nov-03 (After)**	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-03 (After)**	**Dec-01 to Nov-02 (After)**	**Dec-02 to Nov-03 (After)**
Fatal Crashes								
50 + 60 km/h	36	8	5	3	0.6	0.3	0.4	0.3
70 km/h	11	3	2	1	0.2	0.1	0.2	0.1
Serious Injury Crashes								
50 + 60 km/h	531	139	80	59	8.9	5.8	6.7	4.9
70 km/h	46	11	6	5	0.8	0.5	0.5	0.4
Fatal + Serious Injury Crashes								
50 + 60 km/h	567	147	85	62	9.5	6.1	7.1	5.2
70 km/h	57	14	8	6	1.0	0.6	0.7	0.5
Medical Injury Crashes								
50 + 60 km/h	1092	247	139	108	18.2	10.3	11.6	9.0
70 km/h	92	25	16	9	1.5	1.0	1.3	0.8
All Casualty Crashes								
50 + 60 km/h	1659	394	224	170	27.7	16.4	18.7	14.2
70 km/h	149	39	24	15	2.5	1.6	2.0	1.3
Property Damage Crashes (Major)								
50 + 60 km/h	4406	1174	627	547	73.4	48.9	52.3	45.6
70 km/h	273	83	40	43	4.6	3.5	3.3	3.6
Property Damage Crashes (Minor)								
50 + 60 km/h	1518	381	213	168	25.3	15.9	17.8	14.0
70 km/h	68	15	9	6	1.1	0.6	0.8	0.5
All Crashes								
50 + 60 km/h	7583	1949	1064	885	126.4	81.2	88.7	73.8
70 km/h	490	137	73	64	8.2	5.7	6.1	5.3

Estimated net percentage change in crashes in 50 and 60 km/h zones relative to 70 km/h zones ñcrashes involving YOUNG drivers in Regional Western Australia

	50 & 60 km/h zones versus 70 km/h zones in Regional Western Australia			
Crash Severity	**Estimate of Monthly Net Percentage Change/ Number of Crashes**	**Confidence Interval**	**Statistical Significance**	**Estimated Crash savings**
Fatal Crashes				
Dec 2001 ñ Nov 2002	-30.9%	(86.5%, -1171.8%)	0.8164	-
Dec 2002 ñ Nov 2003	-86.6%	(90.9%, -3742.9%)	0.6861	-
Dec 2001 ñ Nov 2003	-45.8%	(84.1%, 10.4%)	0.7392	-
Serious Injury Crashes				
Dec 2001 - Nov 2002	21.6%	(59.9%, -268.6%)	0.7301	-
Dec 2002 - Nov 2003	-9.3%	(70.3%, -302.7%)	0.8937	-
Dec 2001 - Nov 2003	-17.6%	(57.7%, 9.5%)	0.7566	-
Fatal and Serious Injury Crashes				
Dec 2001 ñ Nov 2002	-22.2%	(54.0%, -225.0%)	0.6879	-
Dec 2002 ñ Nov 2003	-23.9%	(62.0%, -303.8%)	0.7216	-
Dec 2001 ñ Nov 2003	-23.2%	(50.7%, 18.1%)	0.6548	-
Medical Injury Crashes				
Dec 2001 ñ Nov 2002	51.8% (9)	(76.7%, 0.5%)	0.0485	(2, 335)
Dec 2002 ñ Nov 2003	42.1%	(77.3%, -47.9%)	0.2538	-
Dec 2001 ñ Nov 2003	50.3%	(75.4%, 97.7%)	0.0516	-
All Casualty Crashes				
Dec 2001 ñ Nov 2002	33.9%	(63.0%, -18.3%)	0.1634	-
Dec 2002 ñ Nov 2003	25.7%	(64.3%, -54.8%)	0.4282	-
Dec 2001 ñ Nov 2003	32.2%	(61.2%, 84.6%)	0.1717	
Property Damage Crashes (Major)				
Dec 2001 ñ Nov 2002	-3.9%	(32.1%, -58.9%)	0.8612	
Dec 2002 ñ Nov 2003	13.8%	(46.3%, -38.4%)	0.5387	
Dec 2001 ñ Nov 2003	3.2%	(34.1%, 3.0%)	0.8681	
Property Damage Crashes (Minor)				
Dec 2001 ñ Nov 2002	15.6%	(65.7%, -107.7%)	0.7127	
Dec 2002 ñ Nov 2003	7.0%	(69.5%, -183.8%)	0.8991	-
Dec 2001 ñ Nov 2003	13.1%	(62.7%, 9.5%)	0.7459	-
All Crashes				
Dec 2001 - Nov 2002	10.46%	(35.0%, -23.3%)	0.4980	-
Dec 2002 - Nov 2003	16.45%	(42.4%, -21.3%)	0.3445	-
Dec 2001 - Nov 2003	12.77%	(35.1%, 56.0%)	0.3655	-



Observed and modelled monthly crash frequency in 50 and 60 km/h zones combined and 70 km/h zones ñ All crashes involving YOUNG DRIVERS in Regional Western Australia

APPENDIX 3

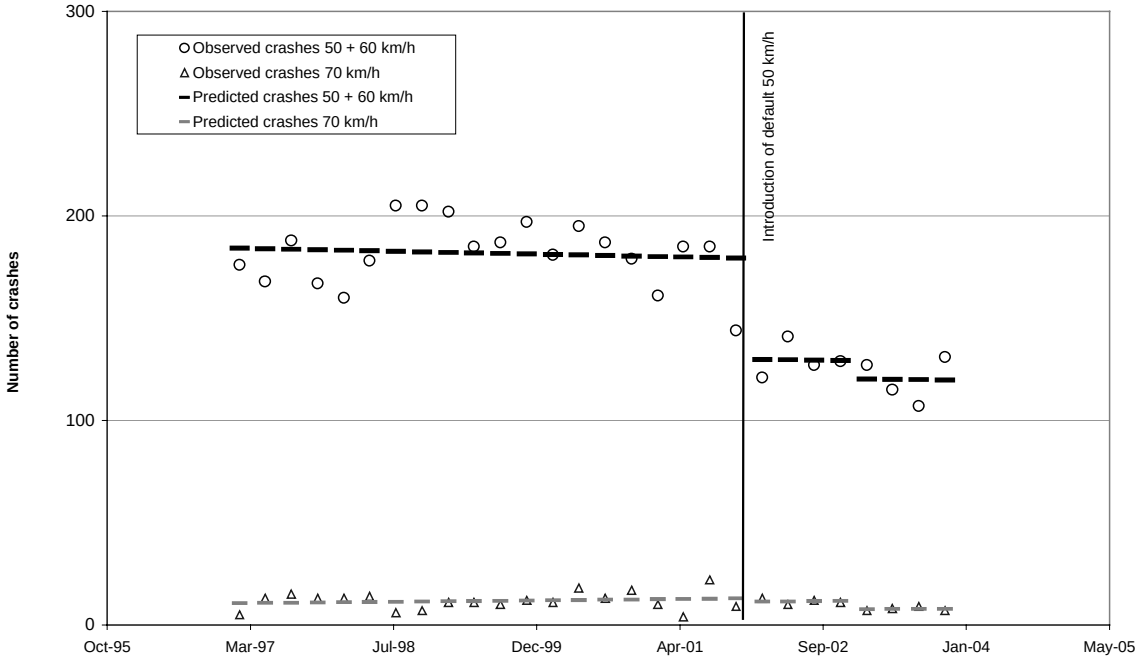
CRASHES INVOLVING OLDER DRIVERS IN REGIONAL WESTERN AUSTRALIA

Total and average monthly crash numbers by current speed zone before and after the introduction of the 50 km/h speed limit ñ crashes involving older drivers

	Total Crash Numbers Before and After Introduction of the 50 km/h Default Limit				Average Monthly Crash Numbers Before and After Introduction of the 50 km/h Default Limit			
Crash severity & current speed zone	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-03 (After)**	**Dec-01 to Nov-02 (After)**	**Dec-02 to Nov-03 (After)**	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-03 (After)**	**Dec-01 to Nov-02 (After)**	**Dec-02 to Nov-03 (After)**
Fatal Crashes								
50 + 60 km/h	16	2	1	1	0.3	0.1	0.1	0.1
70 km/h	5	2	2	0	0.1	0.1	0.2	0.0
Serious Injury Crashes								
50 + 60 km/h	237	64	37	27	4.0	2.7	3.1	2.3
70 km/h	20	5	3	2	0.3	0.2	0.3	0.2
Fatal + Serious Injury Crashes								
50 + 60 km/h	253	66	38	28	4.2	2.8	3.2	2.3
70 km/h	25	7	5	2	0.4	0.3	0.4	0.2
Medical Injury Crashes								
50 + 60 km/h	498	109	57	52	8.3	4.5	4.8	4.3
70 km/h	39	12	7	5	0.7	0.5	0.6	0.4
All Casualty Crashes								
50 + 60 km/h	751	175	95	80	12.5	7.3	7.9	6.7
70 km/h	64	19	12	7	1.1	0.8	1.0	0.6
Property Damage Crashes (Major)								
50 + 60 km/h	2,121	618	314	304	35.4	25.8	26.2	25.3
70 km/h	140	45	29	16	2.3	1.9	2.4	1.3
Property Damage Crashes (Minor)								
50 + 60 km/h	763	205	109	96	12.7	8.5	9.1	8.0
70 km/h	30	13	5	8	0.5	0.5	0.4	0.7
All Crashes								
50 + 60 km/h	3,635	998	518	480	60.6	41.6	43.2	40.0
70 km/h	234	77	46	31	3.9	3.2	3.8	2.6

Estimated net percentage change in crashes in 50 and 60 km/h zones relative to 70 km/h zones ñcrashes involving OLDER drivers in Regional Western Australia

	50 & 60 km/h zones versus 70 km/h zones in Regional Western Australia		
Crash Severity	**Estimate of Monthly Net Percentage Change**	**Confidence Interval**	**Statistical Significance**
Fatal Crashes			
Dec 2001 - Nov 2002	72.8%	(99.0%, -670.8%)	0.4458
Dec 2002 - Nov 2003	N/A	N/A	N/A
Dec 2001 - Nov 2003	57.4%	(98.5%, 22.1%)	0.6144
Serious Injury Crashes			
Dec 2001 - Nov 2002	29.15%	(86.4%, -269.3%)	0.6825
Dec 2002 - Nov 2003	31.17%	(91.1%, -433.0%)	0.7206
Dec 2001 - Nov 2003	30.27%	(85.5%, 18.1%)	0.6532
Fatal and Serious Injury Crashes			
Dec 2001 - Nov 2002	40.2%	(84.9%, -137.6%)	0.4656
Dec 2002 - Nov 2003	-2.7%	(85.0%, -603.4%)	0.9786
Dec 2001 - Nov 2003	32.6%	(83.0%, 27.4%)	0.5744
Medical Injury Crashes			
Dec 2001 - Nov 2002	39.7%	(79.5%, -77.8%)	0.3595
Dec 2002 - Nov 2003	24.4%	(79.8%, -183.4%)	0.6785
Dec 2001 - Nov 2003	35.42%	(76.9%, 49.8%)	0.4045
All Casualty Crashes			
Dec 2001 - Nov 2002	40.9%	(74.7%, -38.0%)	0.2238
Dec 2002 - Nov 2003	18.4%	(72.4%, -141.6%)	0.7137
Dec 2001 - Nov 2003	35.59%	(71.7%, 66.7%)	0.2950
Property Damage Crashes (Major)			
Dec 2001 - Nov 2002	14.28%	(49.9%, -46.7%)	0.5741
Dec 2002 - Nov 2003	-60.10%	(20.5%, -222.6%)	0.1879
Dec 2001 - Nov 2003	-3.97%	(38.6%, 2.0%)	0.8851
Property Damage Crashes (Minor)			
Dec 2001 - Nov 2002	-26.6%	(62.1%, -323.3%)	0.7018
Dec 2002 - Nov 2003	20.6%	(77.6%, -181.4%)	0.7210
Dec 2001 - Nov 2003	-5.07%	(63.7%, 1.0%)	0.9272
All Crashes			
Dec 2001 - Nov 2002	16.67%	(45.5%, -27.3%)	0.3989
Dec 2002 - Nov 2003	-20.09%	(29.1%, -103.4%)	0.4957
Dec 2001 - Nov 2003	6.40%	(37.8%, 9.5%)	0.7512



Observed and modelled monthly crash frequency in 50 and 60 km/h zones combined and 70 km/h zones ñ All crashes involving OLDER DRIVERS in Regional Western Australia

APPENDIX 4

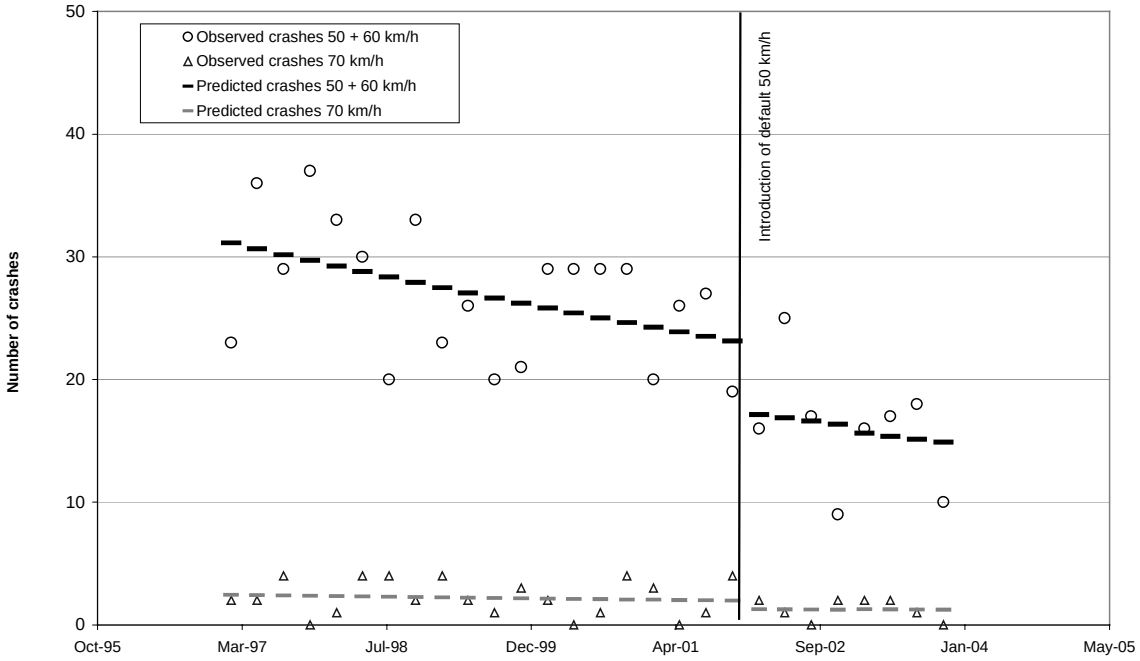
CRASHES INVOLVING MOTORCYCLES IN REGIONAL WESTERN AUSTRALIA

Total and average monthly crash numbers by current speed zone before and after the introduction of the 50 km/h speed limit ñ crashes involving motorcycles

	Total Crash Numbers Before and After Introduction of the 50 km/h Default Limit				Average Monthly Crash Numbers Before and After Introduction of the 50 km/h Default Limit			
Crash severity & current speed zone	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-03 (After)**	**Dec-01 to Nov-02 (After)**	**Dec-02 to Nov-03 (After)**	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-03 (After)**	**Dec-01 to Nov-02 (After)**	**Dec-02 to Nov-03 (After)**
Fatal Crashes								
50 + 60 km/h	11	4	2	2	0.2	0.2	0.2	0.2
70 km/h	3	1	1	0	0.1	0.0	0.1	0.0
Serious Injury Crashes								
50 + 60 km/h	160	37	22	15	2.7	1.5	1.8	1.3
70 km/h	18	4	3	1	0.3	0.2	0.3	0.1
Fatal + Serious Injury Crashes								
50 + 60 km/h	171	41	24	17	2.9	1.7	2.0	1.4
70 km/h	21	5	4	1	0.4	0.2	0.3	0.1
Medical Injury Crashes								
50 + 60 km/h	179	48	31	17	3.0	2.0	2.6	1.4
70 km/h	13	4	2	2	0.2	0.2	0.2	0.2
All Casualty Crashes								
50 + 60 km/h	350	89	55	34	5.8	3.7	4.6	2.8
70 km/h	34	9	6	3	0.6	0.4	0.5	0.3
Property Damage Crashes (Major)								
50 + 60 km/h	127	37	16	21	2.1	1.5	1.3	1.8
70 km/h	8	2	0	2	0.1	0.1	0.0	0.2
Property Damage Crashes (Minor)								
50 + 60 km/h	88	29	17	12	1.5	1.2	1.4	1.0
70 km/h	8	1	1	0	0.1	0.0	0.1	0.0
All Crashes								
50 + 60 km/h	539	128	67	61	9.0	5.3	5.6	5.1
70 km/h	44	10	5	5	0.7	0.4	0.4	0.4

Estimated net percentage change in crashes in 50 and 60 km/h zones relative to 70 km/h zones ñcrashes involving MOTORCYCLES in Regional Western Australia

	50 & 60 km/h zones versus 70 km/h zones in Regional Western Australia		
Crash Severity	**Estimate of Monthly Net Percentage Change**	**Confidence Interval**	**Statistical Significance**
Fatal Crashes			
Dec 2001 - Nov 2002	-253.18%	(91.8%, -15132.3%)	0.5112
Dec 2002 - Nov 2003	N/A	N/A	N/A
Dec 2001 - Nov 2003	-565.52%	(87.4%, 58.5%)	0.3489
Serious Injury Crashes			
Dec 2001 - Nov 2002	-14.21%	(78.0%, -492.6%)	0.8743
Dec 2002 - Nov 2003	-159.63%	(78.2%, -2997.9%)	0.4506
Dec 2001 - Nov 2003	-42.43%	(72.3%, 16.5%)	0.6722
Fatal and Serious Injury Crashes			
Dec 2001 - Nov 2002	-18.1%	(73.0%, -416.8%)	0.8250
Dec 2002 - Nov 2003	-290.4%	(64.9%, -4241.9%)	0.2678
Dec 2001 - Nov 2003	-58.44%	(64.5%, 30.2%)	0.5468
Medical Injury Crashes			
Dec 2001 - Nov 2002	48.4%	(93.7%, -323.4%)	0.5381
Dec 2002 - Nov 2003	77.6%	(98.0%, -152.5%)	0.2262
Dec 2001 - Nov 2003	60.15%	(94.4%, 57.3%)	0.3565
All Casualty Crashes			
Dec 2001 - Nov 2002	10.4%	(72.9%, -196.0%)	0.8574
Dec 2002 - Nov 2003	-11.0%	(77.5%, -447.7%)	0.8977
Dec 2001 - Nov 2003	5.50%	(70.7%, 1.0%)	0.9246
Property Damage Crashes (Major)			
Dec 2001 - Nov 2002	N/A	N/A	N/A
Dec 2002 - Nov 2003	-32.80%	(88.4%, -1420.6%)	0.8196
Dec 2001 - Nov 2003	-147.49%	(73.2%, 47.3%)	0.4245
Property Damage Crashes (Minor)			
Dec 2001 - Nov 2002	-19.4%	(91.5%, -1580.7%)	0.8956
Dec 2002 - Nov 2003	N/A	N/A	N/A
Dec 2001 - Nov 2003	-84.65%	(88.6%, 17.3%)	0.6662
All Crashes			
Dec 2001 - Nov 2002	-15.05%	(64.0%, -268.1%)	0.8132
Dec 2002 - Nov 2003	-6.47%	(70.9%, -289.6%)	0.9246
Dec 2001 - Nov 2003	-11.61%	(60.4%, 3.9%)	0.8353



Observed and modelled monthly crash frequency in 50 and 60 km/h zones combined and 70 km/h zones ñ All crashes involving MOTORCYCLES in Regional Western Australia

APPENDIX 5

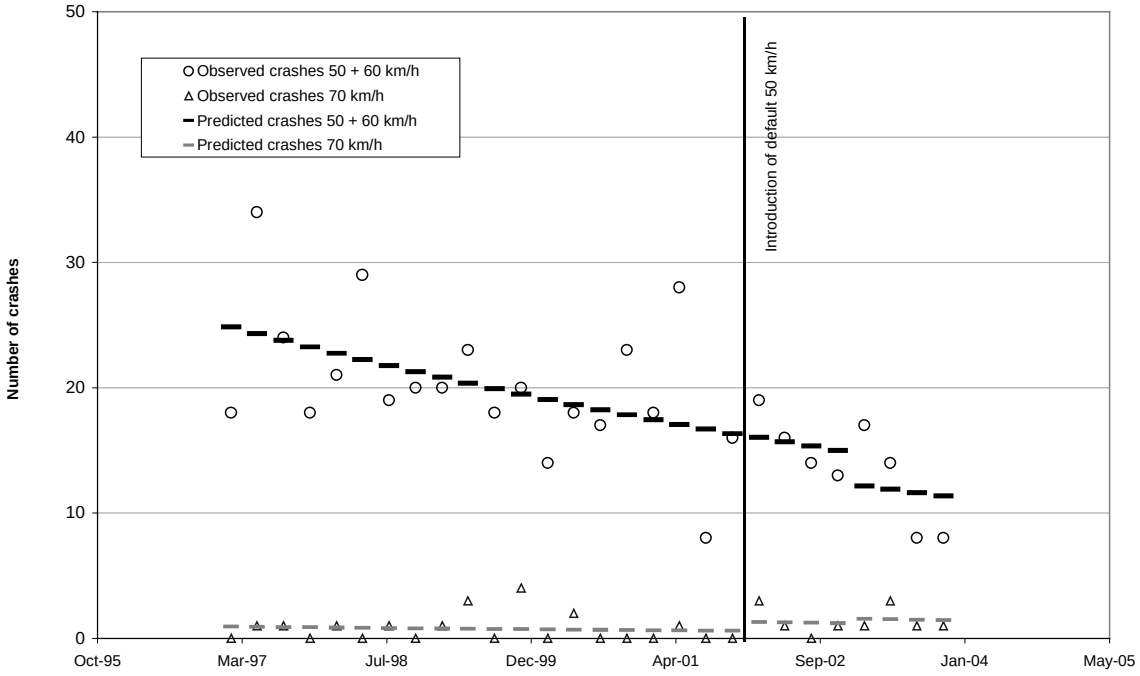
CRASHES INVOLVING BICYCLES IN REGIONAL WESTERN AUSTRALIA

Total and average monthly crash numbers by current speed zone before and after the introduction of the 50 km/h speed limit ñ crashes involving bicycles

	Total Crash Numbers Before and After Introduction of the 50 km/h Default Limit				Average Monthly Crash Numbers Before and After Introduction of the 50 km/h Default Limit			
Crash severity & current speed zone	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-03 (After)**	**Dec-01 to Nov-02 (After)**	**Dec-02 to Nov-03 (After)**	**Dec-96 to Nov-01 (Before)**	**Dec-01 to Nov-03 (After)**	**Dec-01 to Nov-02 (After)**	**Dec-02 to Nov-03 (After)**
Fatal Crashes								
50 + 60 km/h	4	0	0	0	0.1	0.0	0.0	0.0
70 km/h	0	1	1	0	0.0	0.0	0.1	0.0
Serious Injury Crashes								
50 + 60 km/h	66	31	22	9	1.1	1.3	1.8	0.8
70 km/h	6	3	1	2	0.1	0.1	0.1	0.2
Fatal + Serious Injury Crashes								
50 + 60 km/h	70	31	22	9	1.2	1.3	1.8	0.8
70 km/h	6	4	2	2	0.1	0.2	0.2	0.2
Medical Injury Crashes								
50 + 60 km/h	142	36	21	15	2.4	1.5	1.8	1.3
70 km/h	6	2	2	0	0.1	0.1	0.2	0.0
All Casualty Crashes								
50 + 60 km/h	212	67	43	24	3.5	2.8	3.6	2.0
70 km/h	12	6	4	2	0.2	0.3	0.3	0.2
Property Damage Crashes (Major)								
50 + 60 km/h	23	7	3	4	0.4	0.3	0.3	0.3
70 km/h	0	0	0	0	0.0	0.0	0.0	0.0
Property Damage Crashes (Minor)								
50 + 60 km/h	171	35	16	19	2.9	1.5	1.3	1.6
70 km/h	3	5	1	4	0.1	0.2	0.1	0.3
All Crashes								
50 + 60 km/h	406	109	62	47	6.8	4.5	5.2	3.9
70 km/h	15	11	5	6	0.3	0.5	0.4	0.5

Estimated net percentage change in crashes in 50 and 60 km/h zones relative to 70 km/h zones ñcrashes involving BICYCLES in Regional Western Australia

	50 & 60 km/h zones versus 70 km/h zones in Regional Western Australia		
Crash Severity	**Estimate of Monthly Net Percentage Change**	**Confidence Interval**	**Statistical Significance**
Fatal Crashes			
Dec 2001 - Nov 2002	N/A	N/A	N/A
Dec 2002 - Nov 2003	N/A	N/A	N/A
Dec 2001 - Nov 2003	N/A	N/A	N/A
Serious Injury Crashes			
Dec 2001 - Nov 2002	-334.66%	(72.4%, -6745.0%)	0.2962
Dec 2002 - Nov 2003	-13.78%	(93.5%, -1900.3%)	0.9297
Dec 2001 - Nov 2003	-196.7%	(73.1%, 54.6%)	0.3746
Fatal and Serious Injury Crashes			
Dec 2001 - Nov 2002	-108.2%	(80.2%, -2091.6%)	0.5416
Dec 2002 - Nov 2003	-10.0%	(93.5%, -1769.2%)	0.9476
Dec 2001 - Nov 2003	-86.0%	(81.6%, 24.4%)	0.5994
Medical Injury Crashes			
Dec 2001 - Nov 2002	75.1%	(98.1%,-224.2%)	0.2887
Dec 2002 - Nov 2003	N/A	N/A	N/A
Dec 2001 - Nov 2003	69.5%	(98.2%,49.8%)	0.4069
All Casualty Crashes			
Dec 2001 - Nov 2002	36.4%	(88.6%, -254.5%)	0.6058
Dec 2002 - Nov 2003	28.0%	(92.5%, -595.8%)	0.7768
Dec 2001 - Nov 2003	37.2%	(89.2%, 23.7%)	0.6033
Property Damage Crashes (Major)			
Dec 2001 - Nov 2002	N/A	N/A	N/A
Dec 2002 - Nov 2003	N/A	N/A	N/A
Dec 2001 - Nov 2003	N/A	N/A	N/A
Property Damage Crashes (Minor)			
Dec 2001 - Nov 2002	81.3%	(99.5%, -572.3%)	0.3587
Dec 2002 - Nov 2003	95.1%	(99.9%, -132.2%))	0.1255
Dec 2001 - Nov 2003	82.3%	(99.0%, 75.1%)	0.2389
All Crashes			
Dec 2001 - Nov 2002	55.0%	(90.4%, -110.1%)	0.3098
Dec 2002 - Nov 2003	71.7%	(95.3%, -68.8%)	0.1659
Dec 2001 - Nov 2003	60.3%	(90.9%, 77.9%)	0.2191



Observed and modelled monthly crash frequency in 50 and 60 km/h zones combined and 70 km/h zones ñ All crashes involving BICYCLES in Regional Western Australia

APPENDIX 6 INFERRED FATALITY AND SERIOUS INJURY SAVINGS

The crash analysis conducted showed statistically significant crash reductions associated with the default 50 km/h speed limit program over the 24-month period following its introduction. These statistically significant reductions were obtained only when crashes of various severities were pooled. As shown in Chapter 3, the crash analyses did not produce any statistically significant results associated with fatal or serious injury crashes when these crash types were analysed separately. However, by using the statistically significant crash reduction estimates obtained for pooled severities, it is possible to infer the number of persons saved from fatal or serious injury. These inferred numbers and the method used to generate them are given below.

Metropolitan Perth

Number of persons saved from fatal injury = 45

Number of persons saved from serious injury = 553

Regional Western Australia

Number of persons saved from fatal injury = 20

Number of persons saved from serious injury = 158

Method

To calculate the number of lives saved from death or serious injury since the introduction of the default speed limits, the crash severity profile was calculated for the period prior to implementation. This was obtained by dividing the number of crashes in each severity category by the total number of crashes. The resulting proportions were then multiplied by the absolute number of crashes saved for all reported crashes, to obtain the inferred number of crashes saved for each severity level. The absolute numbers of crashes saved were 8,448 and 2,136 in metropolitan Perth and regional Western Australia, respectively. To obtain the number of fatalities and serious injuries saved, the inferred number of crashes for each crash severity was multiplied by the average number of fatalities and seriously injured persons in each crash severity level.

The inferred number of fatalities and serious injury savings are subject to the following caveats.

- The proportion of crashes in each severity category (crash severity profile) has not changed from the before period to the after period.
- The greatest percentage reductions associated with the default speed limits are likely to have been experienced at the fatal and serious injury level of the injury severity scale. This has been shown to be the case in the results of evaluations of the 50 km/h speed limits in NSW and SE Qld. Because this evaluation has been unable to show a similar change in the crash severity profile (due to small data quantities), the above estimates are likely to be conservative.

APPENDIX 7 COMMUNITY SURVEY RESULTS ñ FOCUS GROUPS

A follow up survey to that conducted in November 1999, aimed to investigate further the reasons behind the responses of two target groups identified in the first survey; participants who opposed the proposed introduction of reduced speed limits and those who had not expressed an opinion on this subject. This follow-up survey was designed to gauge the reactions of these target groups when told of the likely benefits of the reduced limits. A further aim was to assess how firmly they held their views.

The total number of opposing participants re-interviewed totalled 22, while the total number of those with no opinion were 15. It was found that those respondents who were opposed to the reduction in speed limits from 60 km/h to 50 km/h believed that driving at 60 km/h on local roads did not present a danger. Their responses to various statements are presented in the tables below. A follow-up study post implementation was not conducted with these groups and it is therefore unknown if their position on these statements changed over time.

Level of agreement with road safety statements by those opposed to the introduction of the default 50 km/h speed limits

Statement	% in agreement with statement	% who disagree with statement	% who did not express an opinion
60 km/h is a safe speed in my local area	95	5	0
People in my street generally drive carefully	82	18	0
Pedestrians, children and cyclists are safe using my local streets	41	45	14
More speed enforcement is needed on local streets	32	54	14
There would be less crashes if people drove 10 km/h slower	18	82	0
Each 5 km/h speed increase doubles crash risk	18	82	0
Speed limits on local roads should be decreased to 50 km/h	0	100	0

Level of agreement with road safety statements by those who did not have an opinion on the introduction of the default 50 km/h speed limits

Statement	% in agreement with statement	% who disagree with statement	% who did not express an opinion
60 km/h is a safe speed in my local area	80	13	7
People in my street generally drive carefully	86	7	7
Pedestrians, children and cyclists are safe using my local streets	53	40	7
More speed enforcement is needed on local streets	33	40	27
There would be less crashes if people drove 10 km/h slower	47	20	33
Each 5 km/h speed increase doubles crash risk	53	20	27
Speed limits on local roads should be decreased to 50 km/h	20	53	27