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AN EVALUATION OF THE 50 KM/H DEFAULT SPEED LIMIT IN REGIONAL QUEENSLAND

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An evaluation of the 50km/h default speed limit in regional Queensland.

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Abstract:
The 50km/h default speed limit was introduced on local roads in regional Queensland in February 2003. Following a three-month amnesty period, full enforcement of the 50km/h speed limit commenced in May 2003. The objectives of this report were to evaluate the effect of the 50km/h default speed limit on crash frequencies and vehicle speeds in regional Queensland.

This evaluation has found strong evidence of significant crash reductions associated with implementation of the 50km/h default speed limit in regional Queensland. Crash reductions were estimated both in the amnesty period immediately after implementation and in the subsequent period during which the new speed limit was fully enforced. The evaluation covered the period until the end of May 2004. In the period of full enforcement, the analyses found statistically significant crash reductions of 13.5% for all crashes reported to police. Greater reductions were estimated in higher severity crashes with a reduction of 24.9% estimated for serious casualty crashes (crashes involving death or hospitalisation) and 19.3% for fatal, hospitalisation and medical attention severity crashes combined. Estimated percentage crash reductions in the full enforcement period translated to an estimated saving of 9 casualty crashes, 5 serious casualty crashes and 14 crashes of all severity levels per month

The analyses also found that the 50km/h default speed limit was associated with significant reductions in crashes that involved younger drivers both during the amnesty and full enforcement periods. It also estimated statistically significant reductions in speed related crashes that occurred primarily during the amnesty period. Analysis of speed survey data associated with the program implementation indicates that the reported crash reductions were associated with a reduction in vehicle speeds above 60km/h on roads that became 50km/h subsequent to the default limit introduction.

It was concluded that the 50km/h default speed limit was an effective program in reducing crashes in regional Queensland.

Key Words
Speed limit, crash analysis, speed survey

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Preface

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EXECUTIVE SUMMARY

The 50km/h default speed limit was first introduced in Queensland in South East Queensland in March 1999 and aimed to reduce the frequency and severity of all casualty crashes on local roads. Following the success of this program, the 50km/h default speed limit was extended to local roads in regional Queensland on 1 February 2003. After a three-month amnesty period, full enforcement of 50km/h speed limits on local roads in regional Queensland commenced on 1 May 2003.

Previous studies based on Australian and international initiatives have demonstrated that the introduction of 50km/h speed limits is associated with significant and substantial reductions in casualty crashes. The objective of this study was to evaluate the effectiveness of the introduction of 50km/h speed limits in reducing vehicle speeds and crashes on local roads in regional Queensland. Crashes involving pedestrians, younger and older drivers and speed related crashes have all shown particularly positive benefits from the implementation of 50km/h limits in previous studies (e.g., NSW RTA, 2000). The aim of this study was also to evaluate the effect of the 50km/h default speed limit in regional Queensland on crashes involving these categories of road users.

Crash effects associated with the 50km/h default speed limits were assessed using Poisson regression models of monthly crash data series from January 1998 to May 2004. Models were fitted to reported crash data for each of the 5 crash severity levels separately, and also to a combination of fatal and hospital crashes (serious casualty crashes), fatal, hospital and medical attention crashes (casualty crashes) and the aggregation of all crash severities (all crashes). Additional analyses for crashes involving pedestrians, younger drivers, older drivers, and speed related crashes were also undertaken. Crash reductions were estimated both in the amnesty period immediately after implementation and in the subsequent period during which the new speed limit was fully enforced.

For crashes involving all types of road users in the period of full enforcement, the analyses found statistically significant crash reductions of 13.5% for all crashes reported to police. Greater reductions were estimated in higher severity crashes with a reduction of 24.9% estimated for serious casualty crashes (crashes involving death or hospitalisation) and 19.3% for fatal, hospitalisation and medical attention severity crashes combined. Estimated crash reductions were slightly higher in the amnesty period. Estimated percentage crash reductions in the full enforcement period translated to an estimated saving of 9 casualty crashes, 5 serious casualty crashes and 14 crashes of all severity levels per month.

Significant reductions crashes involving younger drivers and speed related crashes were also associated with the enforcement period of the default 50km/h speed limit. For younger drivers, there was a 17% reduction in all crashes, a 36.5% reduction in serious casualty crashes and a 29.2% reduction in casualty crashes. In the same period, speed related crashes were reduced by 31.3% for all reported crashes. Significant crash reductions also occurred during the amnesty period for speed related crashes, and crashes involving pedestrians and younger drivers.

Speed survey data in regional Queensland was collected on 50km/h and 60km/h zoned roads once before the implementation of the 50km/h default speed limit, once during the amnesty period, and twice after full enforcement of the program. Analyses of speed surveys found that the 50km/h default speed limit was associated with very small changes in both mean speeds and 85th percentile speeds relative to the roads remaining at 60km/h. Large relative reductions were estimated for vehicles exceeding 60km/h on the roads that

became zoned 50km/h under the default limit. Results from the analyses of speed survey data suggest that the estimated crash reductions were due to a reduction in the proportion of vehicles in 50km/h zones travelling in excess of 60km/h, rather than changes in average speeds.

Overall, it was concluded that the 50km/h default speed limit was an effective program in reducing crashes and vehicle speeds in regional Queensland.

1. INTRODUCTION AND BACKGROUND

The 50km/h default speed limit was first introduced in Queensland on local streets in South East Queensland in March 1999 and aimed to reduce the frequency and severity of all casualty crashes on local roads. On 1 February 2003, the 50km/h default speed limit was expanded to cover regional Queensland. Following a three-month amnesty period, full enforcement of the 50km/h speed limit on local roads in regional Queensland commenced on 1 May 2003.

The adoption of the 50km/h default speed limit across Queensland, including both the initial South East Queensland implementation and the regional expansion, was similar in approach to initiatives implemented by other states including Victoria, Western Australia, and more recently Tasmania. In these jurisdictions, the 50km/h speed limit operates on all local streets in built-up areas unless signage is posted indicating a higher or lower speed limit. New South Wales also introduced a 50km/h speed limit on local roads, although its introduction was in selected areas and associated with universal signage.

Previous studies based on Australian and international initiatives have demonstrated that the introduction of 50km/h speed limits is associated with significant and substantial reductions in casualty crashes. The objective of this study was to evaluate the effectiveness of the introduction of 50km/h speed limits in reducing vehicle speeds and crashes on local roads in regional Queensland. Crashes involving pedestrians, vehicles exceeding the speed limit, younger and older drivers have shown particularly positive benefits from the implementation of 50km/h in previous studies (e.g., NSW RTA, 2000), and this study also aimed to evaluate the effect of the 50km/h default speed limit in regional Queensland on crashes involving these categories of road users.

The aim of this study was to evaluate the effectiveness of the 50km/h speed limit with the following specific objectives:

1. Investigate the effect of changing the default speed limit to 50km/h on local roads on crash frequency and crash severity using statistical analyses of regional Queensland crash data,

2. Investigate the effect of the 50km/h default speed limit on vulnerable road users in regional Queensland, and

3. Investigate the effect of the 50km/h speed limit on vehicle speeds on local roads using a descriptive analysis of regional Queensland speed survey data.

2. STUDY DESIGN AND DATA

2.1. STUDY DESIGN

A quasi-experimental design was used to evaluate the effect of the implementation of 50km/h speed limits on all reported crashes in regional Queensland. This design compares crash trends at the sites affected by the implementation (the 'treatment' group) with the crash trends at a suitably chosen set of comparison sites (the 'control' group) over the same time period. The purpose of the control group is to represent the influence of all other factors besides the countermeasure being evaluated on crash trends at the treated sites. The crash effects of the countermeasure are estimates as the relative difference in crashes between the treatment and control areas from before to after program implementation. For this study, the treatment group was defined as the set of roads in regional Queensland that had their speed limit changed to 50km/h under the 50km/h default speed limit. The control group was defined as the set of roads in regional Queensland that remained zoned 60 or 70km/h after the introduction of the 50km/h speed limit. These roads were chosen as the control group because they represented the available roads most similar in characteristic to the roads that had changed to 50km/h after the default limit introduction.

2.2. CRASH DATA

Queensland Transport (QT) provided crash data for the evaluation. It covered all Queensland Police Service (QPS) reported crashes in Queensland that occurred between January 1998 and May 2004 in Queensland. The recorded date of each crash was used to classify all crashes as having occurred in one of three time periods:

(i) before treatment period; defined as the period before implementation of the 50km/h default speed limit from January 1998 to January 2003,

(ii) amnesty period; defined as the three month period from February 2003 to April 2003, and

(iii) after treatment period; defined as the period commencing when the 50km/h speed limit was enforced in March 2003, up to May 2004.

Additional variables in the crash database identified crashes involving four different categories of road user groups: pedestrians, drivers under 26 years of age (younger drivers), drivers over 55 years of age, (older drivers), and speed related crashes.

The crash database provided a variable that identified the LGA where each crash occurred. Crashes that occurred in LGAs in South East Queensland were excluded from the analyses. The remaining crashes were defined as occurring in regional Queensland and were the focus of the evaluation. There is a time lag of approximately three months between the occurrence of a non-fatal crash and the updating of the location that the crash occurred in the data. Consequently, some non-fatal crashes that occurred in the last three months of the data supplied were not represented in the crash database with information about the LGA location. For these crashes, it was necessary to use the QPS region variable to define crashes that occurred in regional Queensland. Since the North Coast QPS region contains LGAs from both South East and regional

Queensland, the relatively small numbers of crashes that were not identified in terms of LGA but were from the North Coast QPS region were excluded from this evaluation in both treatment and control data.

The crash database also classifies crashes into five different severity levels. An itemised description of each severity level is shown in Table 2.1. Preliminary inspection of the regional Queensland crash data revealed that monthly crash counts for each severity level were relatively low. There was some concern that particularly small monthly frequencies for fatal crashes and minor injury crashes may lead to reduce power of the statistical tests to detect an effect of the 50km/h speed limit for these crash types. Indeed, fatal crashes typically had very low crash count frequencies, even when aggregated on an annual basis. An inference based on a statistical test that has insufficient power to detect a treatment effect risks failing to reject the null hypothesis (that the treatment had no effect) when it was indeed false. Such an inference is called Type-II error. In order to avoid the chance of Type-II error in this evaluation, two additional aggregations of individual severity levels were examined as outcome measures:

(i) serious casualty crashes; defined as the sum of fatal and hospital crashes,

(ii) all reported crashes; defined as the sum of all five severity levels, and

(iii) all casualty crashes; defined as the sum of fatal, hospital, and medical attention crashes.

Table 2.1. Description of severity levels for Queensland crash database.

Level	Crash Severity	Description
1.	Fatal	At least one fatality in the crash
2.	Hospitalisation	The most seriously injured person(s) in the crash required hospitalisation
3.	Medical Attention	The most seriously injured person(s) in the crash required medical attention
4.	Minor Injury	The most seriously injured person(s) in the crash did not require medical attention
5.	Property Damage	Reported crashes where no one was injured but a car was towed away or property damage exceeded $2500

In order to compare crashes at treatment and control sites before and after implementation of the default 50km/h speed limit, it was necessary to define a treatment group of crashes that occurred on roads where the speed limit had changed to 50km/h as a default. The method of identifying these crashes was identical to the method used by QT to label treatment crashes for the evaluation of the 50km/h default speed limit in South East Queensland (Hoareau, Newstead, Oxley, & Cameron, 2002). Specifically, a unique number is used in the Queensland crash database to identify roads on which each crash occurs. This database also indicates the speed zone of the road for each crash site at the time of the crash and the identity of the road where

crashes occurred in 50km/h zones after implementation of the 50km/h default speed limit. These crashes were then flagged using an indicator variable in the crash database using a binary classification of either "on" or "off" 50km/h roads.

Both 'treatment' and 'control' areas for the study were identified using a combination of road identification number and speed limit at the crash site recorded by police. The 'treatment' areas were identified as all those roads in regional Queensland where the road identification number had a crash recorded as occurring in a 50km/h speed zone in the after implementation period (February 2003 onwards). However, it excluded those road segments that had a crash with a speed limit above 70km/h recorded anywhere along their length. The 'control' areas were all roads in regional Queensland not in the defined 'treatment' area but again excluded those road segments that had a crash with a speed limit above 70km/h recorded anywhere along their length.

The purpose of excluding roads with any crashes at sites with reported speed limits above 70km/h was to isolate the evaluation to those roads within rural population centres. Using the road identification number and reported speed limits at the crash site was the most viable way of identifying such roads. The only negative to using this approach was that it will exclude some 50km/h road segments in regional Queensland towns that are part of long highway stretches that also run between towns (and are zoned at 100km/h or over) but have the same road identification number and hence cannot be separated. It should be noted that because roads with high speed sections are also excluded from the 'control' areas that the 50km/h segments not included in the 'treatment' area will not become part of the 'control' areas. Hence both 'treatment' and 'control' roads chosen for the study should both be in population centres of regional Queensland.

2.3. SPEED SURVEY DATA

In order to evaluate the effect of the 50km/h speed limit program on vehicle speeds, speed survey data was collected by QT at both treatment and control sites located in regional Queensland. Similar to the crash analysis, treatment sites were roads that changed their speed from 60km/h to 50km/h by default as part of the 50km/h default speed limit. Control sites were those that remained at 60km/h throughout the period of analysis. Speed surveys were conducted in five regional Queensland Police Service (QPS) regions during daylight hours and on weekdays only, excluding public holidays and school holiday periods. Free speed data was collected at four separate times: (i) two months before implementation of the 50km/h speed limit program (October 2002 - November 2002), (ii) during the amnesty period of the 50km/h program (March 2003), (iii) three months after the full enforcement of the 50km/h speed limit program (August 2003), and (iv) nine months after full enforcement of the program (February 2004). Speed survey data was collected at a total of 148 sites belonging to 21 LGAs within regional Queensland. A total of 122 treatment sites and 26 control sites were surveyed. The number of vehicles surveyed for each treatment and control site for each LGA and QPS region are shown in Tables 2.2 and 2.3.

Table 2.2. Number of LGAs, streets, and vehicles surveyed for each QPS region in control (60km/h) zones at each survey time interval.

			Number of Vehicles Surveyed			
QPS REGION	**Total LGAs**	**Number of Streets Surveyed**	**Nov-02**	**Mar-03**	**Aug-03**	**Feb-04**
North Coast	3	4	75011	74627	76148	80180
Southern	1	2	37652	38838	37583	39277
Central	5	11	146943	177130	156347	190319
Far Northern	1	1	23505	23209	23096	37320
Northern	2	8	179558	170328	192033	207158
Total Regional QLD	12	26	462669	484132	485207	554254

Table 2.3. Number of LGAs, streets, and vehicles surveyed for each QPS region in treatment (50km/h) zones for each survey time interval.

			Number of Vehicles Surveyed			
QPS REGION	**Total LGAs**	**Number of Streets Surveyed**	**Nov-02**	**Mar-03**	**Aug-03**	**Feb-04**
North Coast	5	19	82890	98737	96146	92544
Southern	4	34	66316	60331	67580	65067
Central	5	35	181517	230678	185166	200365
Far Northern	1	4	9426	9122	9195	7623
Northern	6	30	121879	110670	114860	117314
Total Regional QLD	21	122	462028	509538	472947	482913

2.4. DATA CAVEATS

Two important caveats that have been noted in the evaluation of the 50km/h default speed limit in South East Queensland (Hoareau et al., 2002) should also be noted when interpreting this study. Firstly, crashes that occurred on intersections between 50km/h roads and roads with higher speed limits were not included in the treatment group because the intersecting road with a higher speed may have had a confounding effect on crash risks at these intersections. Secondly, some 50km/h roads may not have recorded a crash after the implementation of the default speed limit. Hence, crashes that occurred on these roads prior to the implementation of the 50km/h speed limit would have been allocated to the control group. This misclassification would most likely lead to conservative estimates of the effect of the 50km/h speed limit on crashes, with the assumption that crashes on the unidentified roads were affected in the same way as those on roads that were identified.

3. METHODS

3.1. CRASH FREQUENCY ANALYSIS

3.1.1. Descriptive Analysis

Descriptive analyses were performed in order to provide a preliminary evaluation of the effect of the 50km/h default speed limit on the frequency of crashes. These analyses included calculations of the total number and average monthly number of crashes for both the pre and post implementation periods in regional Queensland. Descriptive analyses were also performed for each crash severity level individually as well as for all reported crashes and all casualty crashes. The objective of these analyses was to provide information about general crash trends in the data.

3.1.2. Poisson Regression Analysis

Formal evaluation of the crash effects of the default 50km/h speed limit in regional Queensland was carried out using Poisson regression analysis. The null hypothesis being tested in this evaluation is that the implementation of the 50km/h default speed limit in regional Queensland had no association with crash frequency changes. The alternative hypothesis was that the 50km/h default speed limit was associated with a change in crash frequency in regional Queensland. The direction of change was not assumed in the alternate hypothesis; hence, two-tailed tests of significance were used. To test the above hypotheses, statistical estimates of the crash effects of the 50km/h default speed limit 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 the assumption that count data follow a Poisson type distribution (Nicholson, 1985; Nicholson, 1986; Maher & Summersgill, 1996).

Statistical properties of count data include: skewness of the distribution of the events (crashes) over a given time interval, independence of events, a mean that varies with the variance, and restriction to non-negative values. Traditional linear regression assumes that the data is symmetric, has a constant variance, and allows negative crash frequencies to be predicted. A Poisson regression model does not have these assumptions because it applies a log transformation to the crash count data to ensure predicted values are non-negative as well as allowing the error distribution of the crash counts to be Poisson rather than normal. A maximum likelihood method was used to estimate the coefficients of the explanatory variables. Suitable parameterisation of the model allows direct estimation of the association between program implementation and crash frequency change and its standard error. Statistical significance of the program effect estimate is assessed against the corresponding probability value that indicates the likelihood of obtaining the estimate by chance given no reduction in crash frequency. A Poisson regression model was also used to successfully evaluate the effects of the 50km/h default speed limit on crash frequency in South East Queensland (Hoareau et al., 2001).

A Poisson regression model of the general form described in Equation 1 was fitted to the monthly series of crash frequency data from the treatment (50km/h) and control (60-70km/h) zones.

(Equation 1)

where

y_{mtb}	is the monthly crash count in either treatment or control group,
t	is an indicator for 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 (e.g., yearly, quarterly, amnesty period),
m	is the sequential month of the crash data count, and
$\alpha, \beta, \gamma, \delta, \phi$	are parameters of the model.

Separate Poisson regression models were fitted to crashes for each severity level (including all crashes, serious casualty crashes, and casualty crashes) and yearly and quarterly crash data for treatment zones were analysed relative to observed changes in control zones. Additional analyses were conducted on crashes involving pedestrians, vehicles exceeding the speed limit, younger drivers, and older drivers.

3.1.3. Speed survey analysis

Descriptive statistical analyses were used to estimate five speed parameters. These parameters include mean speed, 85th percentile speed, and the percentage of motorists exceeding 60km/h, 70km/h and 80km/h. Average speeds for the control and treatment sites were calculated for each of the parameters followed by the overall change for each parameter in the treatment sites relative the control sites. Results are presented graphically and in tabular format.

4. RESULTS

4.1. CRASH ANALYSIS

4.1.1. Descriptive Analysis

Figure 4.1 shows the monthly number of crashes that occurred in regional Queensland on roads that were zoned 50km/h (treatment), and 60-70km/h (control) after the implementation of the 50km/h default speed limit. Data plotted covers the period January 1998 and May 2004. Crashes that occurred on intersections of 50km/h roads and roads with greater than 50km/h speed limits (both pre and post implementation), which QT did not define as having occurred on a road currently operating with a default 50 km/h speed limit, have not been included. As can be seen in Figure 4.1, there was a trend to decreasing number of crashes on 50km/h roads following implementation of the 50km/h default speed limit. This decrease remained relatively stable from the implementation to the final month of the analysis in May 2004. In contrast, the number of crashes on roads that retained 60-70km/h speed limits after implementation of the default 50km/h speed limit continued to increase gradually following the implementation of the lower default speed limit.

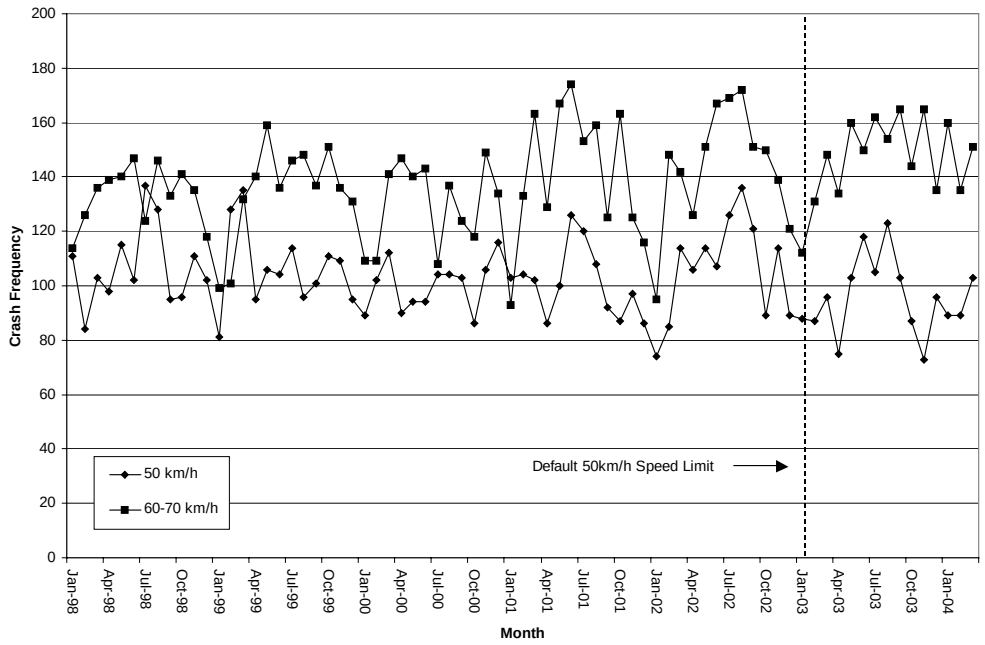

Figure 4.1. Number of all reported crashes in regional Queensland by speed limit at time of the month plotted– January 1998 to May 2004.

Figure 4.2 shows the percentage distribution of all crashes that occurred in 50km/h and 60-70km/h and above speed zones following implementation of the 50km/h default speed limit. This graph differs from the previous graph in that it shows the change in percentage crash frequency in a particular speed zone, relative the total crashes in all speed zones rather than the absolute crash counts. As can be seen in Figure 4.2, the trends for crashes in 50 km/h, and 60-70 km/h and above speed zones are very similar to those in Figure 4.1.

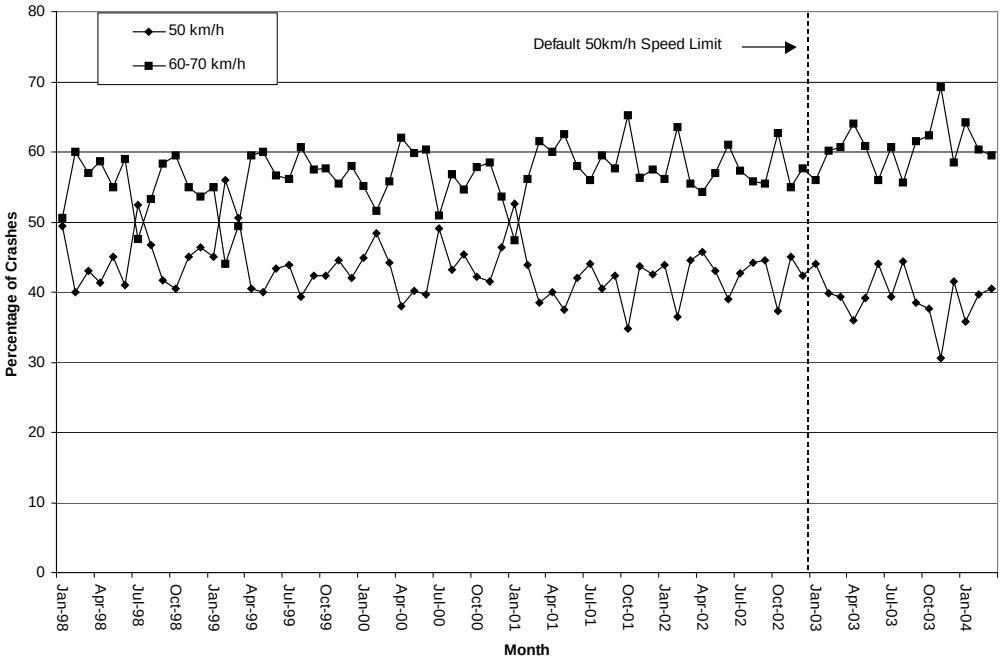

Figure 4.2. Percentage distribution of all reported crashes in regional Queensland by speed limit at time of month plotted – January 1998 to May 2004.

Table 4.1 shows the total number of crashes and average monthly crashes per month at each level of severity that occurred in 50km/h and 60-70km/h speed zones before and after the implementation of the 50km/h default speed limit in regional Queensland. As can be seen in Table 4.1, there has been a reduction in average monthly crash numbers on current 50 km/h speed zone roads for all crash severity types following implementation of the 50km/h default speed limit. In contrast, average monthly crash numbers for roads that have remained 60-70km/h following the 50km/h implementation has increased, remained relatively unchanged, or decreased at a considerably lesser rate.

Table 4.1. Total and average monthly crash numbers in regional Queensland by crash severity and current speed zone before and after the implementation of the 50km/h default speed limit (excluding enforcement amnesty period).

Crash Severity and Current Speed Zone	Total Crash Numbers		Average Monthly Crash Numbers	
	Jan-98 to Jan-03 (Before)	May-03 to May-04 (After)	Jan-98 to Jan-03 (Before)	May-03 to May-04 (After)
Fatal Crashes				
50	55	3	0.9	0.2
Control	46	12	0.8	0.9
Serious Casualty Crashes				
50	1272	206	20.9	15.8
Control	1349	291	22.1	22.4
Casualty Crashes				
50	2747	438	45.0	33.7
Control	3208	634	52.6	48.8
All Crashes				
50	6331	1108	103.8	85.2
Control	8149	1649	133.6	126.8
Hospital Crashes				
50	1217	203	20.0	15.6
Control	1303	279	21.4	21.5
Medical Attention Crashes				
50	1475	232	24.2	17.8
Control	1859	343	30.5	26.4
Minor Injury Crashes				
50	812	143	13.3	11.0
Control	1134	240	18.6	18.5
Property Damage Crashes				
50	2772	527	45.4	40.5
Control	3807	775	62.4	59.6

4.1.2. Poisson Regression Analysis

Tables 4.2 and 4.3 show the estimated percentage reductions in crashes associated with the implementation of the 50km/h speed limit program in 50km/h zones relative to changes in the control speed zones. Results are given for the time period consisting of the amnesty period and the year following full implementation of the 50km/h default speed limit and for the time period consisting of the amnesty and quarter intervals after implementation respectively. All estimates were obtained using the Poisson regression model described in the Methods section and are shown with their corresponding statistical significance values and 95% confidence limits. Negative estimates indicate a reduction in the crash type being considered in 50km/h zones relative to changes in crash frequency in 60km/h zones. Statistical significance values indicate the probability of obtaining the estimated crash reduction given the null hypothesis that the 50km/h speed limit program had no effect on crashes. Significance probabilities less than 0.05 indicate that there is less than 5% chance that the estimate

is due to chance variability and that the null hypothesis should be rejected; that is, that introduction of the 50km/h default speed limit was associated with a statistically significant change in the number of crashes for each severity type on roads currently zoned at 50 km/h.

Estimates of the effectiveness of the 50km/h speed limit program for the three-month amnesty period immediately after implementation of the program and the full 1-year period after enforcement commenced for all levels of crash severity are shown in Table 4.2. During the amnesty period, the 50km/h default speed limit was associated with statistically significant reductions in crash frequencies, including an estimated 38.9% reduction for serious casualty crashes, 27.8% for casualty crashes, 36% for crashes involving hospitalisation, and 17.2% for all crashes. The estimates crash changes for all other crash types in the amnesty period were not significant due to insufficient data quantities. Any reported non-significant effects should be interpreted with caution.

For the year following the amnesty, where full enforcement of the 50km/h default speed limit was undertaken, the same crash classifications that had statistically significant reductions in the amnesty remained significant. The 50km/h default speed limit was associated with an estimated 24.9% reduction in serious casualty crashes, 19.3% decrease in casualty crashes, 22.1% decrease in crashes involving hospitalisation, and a 13.5% reduction in all crashes. Comparing point estimates of relative crash reductions across the different severity levels, it appears that introduction of the default 50km/h speed limit was associated with higher crash reductions at higher crash severity levels. However, due to the overlap in the confidence limits on the estimates, differences between the point estimates across crash severities are generally not statistically significant and observed trends should be interpreted with care.

Table 4.3 shows the estimates of associated crash effects of the 50km/h speed limit program on all crashes and all casualty crashes during the amnesty period, and for quarter-year intervals following full implementation of the program. The results show statistically significant estimated crash reductions were found for all crashes, serious casualty crashes, casualty crashes, and hospital crashes that occurred primarily during the amnesty period, and during the third quarter following full implementation of the 50km/h default speed limit. There were also significant reductions in medical attention crashes during the third quarter only. Low frequency of fatal crashes during the quarterly intervals analysed meant the analysis models were unstable and hence statistical significance values were not obtained. The absence of significant reductions for minor injury crashes and property damage crashes are likely to be due to the smaller estimated crash effect sizes for these reported crash types in conjunction with the amount of available data. There is some suggestion of increasing crash reductions from the amnesty period to the third quarter after implementation. This observation and all observations concerning crash effect trends over time must be treated with some caution however, as the overlap in confidence limits on the quarterly point estimates means that the observed trends are not statistically significant for any of the crash severity levels considered.

Table 4.2 Estimated crash reductions for 50km/h zones relative to 60km/h zones by crash severity level during amnesty and period of full enforcement.

	50km/h Zones vs 60km/h Zones in Regional Queensland			
Crash Severity & Level of Program Implementation	**Crash Reduction Estimate**	**95% Confidence Intervals**		**Statistical Significance**
		Lower	**Upper**	
All Crashes				
Amnesty Period	-17.2	-29.4	-2.8	0.021
Full Enforcement	-13.5	-20.4	-6.0	<.001
Fatal + Hospital Crashes				
Amnesty Period	-38.9	-57.3	-12.4	0.007
Full Enforcement	-24.9	-38.2	-8.8	0.004
Fatal + Hospital + Medical Attention Crashes				
Amnesty Period	-27.8	-43.9	-7.1	0.011
Full Enforcement	-19.3	-29.3	-7.9	0.001
Fatal Crashes				
Amnesty Period	-100.0	-100.0	-100.0	N/A
Full Enforcement	-79.1	-79.1	-79.1	N/A
Hospital Crashes				
Amnesty Period	-36.0	-55.5	-8.1	0.016
Full Enforcement	-22.1	-36.0	-5.1	0.013
Medical Attention Crashes				
Amnesty Period	-16.5	-41.4	18.9	0.318
Full Enforcement	-14.8	-28.8	2.1	0.082
Minor Injury Crashes				
Amnesty Period	-8.9	-43.0	45.5	0.696
Full Enforcement	-16.8	-33.6	4.3	0.111
Property Damage Crashes				
Amnesty Period	-8.9	-27.7	14.7	0.427
Full Enforcement	-6.6	-17.2	5.4	0.268

N/A = Analysis model did not converge due to insufficient data. Results should be interpreted with caution.

Table 4.3. Estimated quarterly crash reductions in 50km/h zones relative to 60km/h zones by crash severity level

	50km/h Zones vs 60km/h Zones in Regional Queensland			
Crash Severity & Level of Program Implementation	**Crash Reduction Estimate**	**95% Confidence Intervals**		**Statistical Significance**
		Lower	**Upper**	
All Crashes				
Amnesty Period	-17.2	-29.4	-2.8	0.021
1st Quarter	-8.0	-20.5	6.5	0.264
2nd Quarter	-9.9	-22.3	4.5	0.169
3rd Quarter	-25.4	-36.2	-12.7	<.001
4th Quarter	-9.8	-24.6	7.9	0.260
Fatal + Hospital Crashes				
Amnesty Period	-38.9	-57.3	-12.4	0.007
1st Quarter	-14.7	-38.3	18.0	0.337
2nd Quarter	-20.5	-44.6	14.1	0.214
3rd Quarter	-40.6	-59.6	-12.7	0.008
4th Quarter	-25.6	-50.7	12.3	0.159
Fatal + Hospital + Medical Attention Crashes				
Amnesty Period	-27.8	-43.9	-7.1	0.011
1st Quarter	-14.5	-31.6	6.8	0.167
2nd Quarter	-9.8	-29.2	14.8	0.402
3rd Quarter	-35.7	-50.4	-16.8	<.001
4th Quarter	-16.3	-37.4	11.9	0.229
Fatal Crashes				
Amnesty Period	-100.0	-100.0	-100.0	N/A
1st Quarter	-100.0	-100.0	-100.0	N/A
2nd Quarter	67.3	67.3	67.3	N/A
3rd Quarter	-100.0	-100.0	-100.0	N/A
4th Quarter	-58.2	-58.2	-58.2	N/A
Hospital Crashes				
Amnesty Period	-36.0	-55.5	-8.1	0.016
1st Quarter	-10.8	-35.6	23.7	0.494
2nd Quarter	-21.6	-45.6	13.1	0.193
3rd Quarter	-34.8	-55.9	-3.6	0.032
4th Quarter	-24.1	-50.0	15.3	0.196
Medical Attention Crashes				
Amnesty Period	-16.5	-41.4	18.9	0.318
1st Quarter	-15.2	-37.6	15.2	0.292
2nd Quarter	-0.3	-28.0	38.0	0.983
3rd Quarter	-31.6	-51.7	-3.2	0.032
4th Quarter	-7.7	-38.7	38.9	0.700
Minor Injury Crashes				
Amnesty Period	-8.9	-43.0	45.5	0.696
1st Quarter	-4.7	-36.0	41.9	0.813
2nd Quarter	-27.2	-51.6	9.4	0.126
3rd Quarter	-30.2	-54.5	7.1	0.100
4th Quarter	4.7	-35.3	69.6	0.851
Property Damage Crashes				
Amnesty Period	-8.9	-27.7	14.7	0.4266
1st Quarter	-2.7	-22.0	21.4	0.8091
2nd Quarter	-3.0	-21.5	19.9	0.7796
3rd Quarter	-13.7	-30.9	7.9	0.1965
4th Quarter	-7.2	-28.3	20.1	0.5706

N/A = Analysis model did not converge due to insufficient data. Results should be interpreted with caution.

Figure 4.3 shows the fit of the Poisson regression model for the analysis of the amnesty period and average post amnesty period crash effects model (Table 2) for all reported crashes. Both the observed (actual) and predicted (modelled) crash series are shown on the figure with the vertical line indicating the implementation date of the 50km/h speed limit program. The monthly variation in the predicted crash series reflects that the month of the crash was treated as a categorical variable in the analysis model.

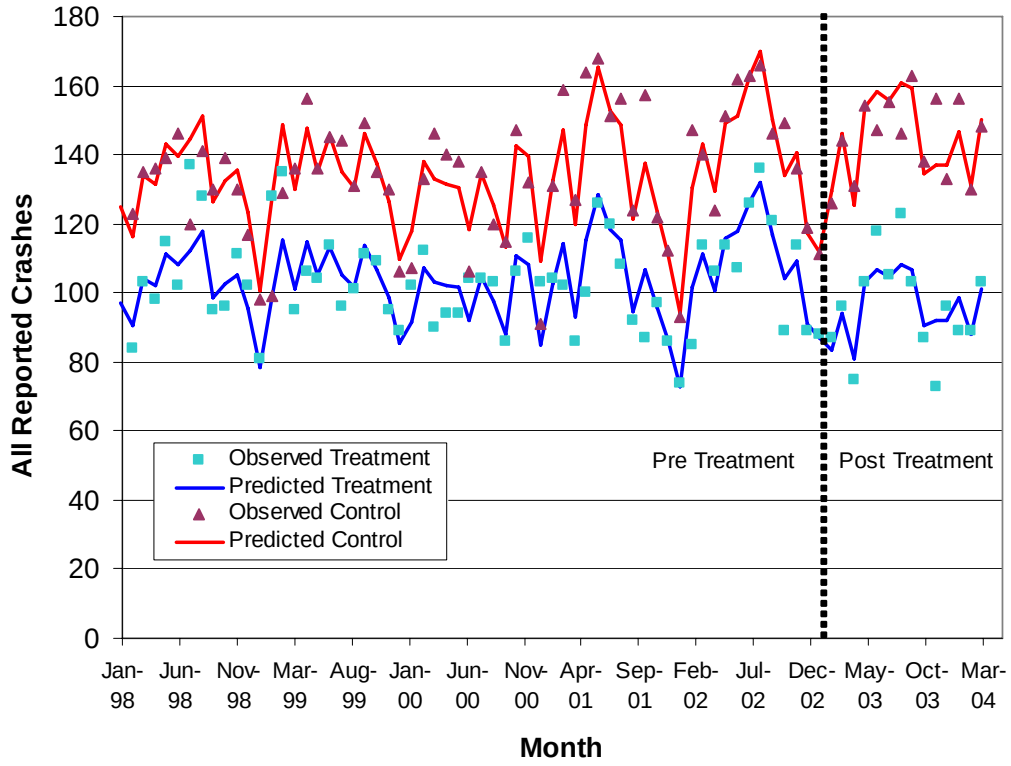

Figure 4.3. Observerved and predicted monthly crash frequency for all reported crashes in 50km/h and 60km/h zones for period prior to implementation of 50km/h speed limit, amnesty, and period of full enforcement.

Analogous results to Figure 4.3 are shown in Figure 4.4 but using predicted crash numbers from the Poisson regression model estimating crash effects in each quarter after the amnesty period.

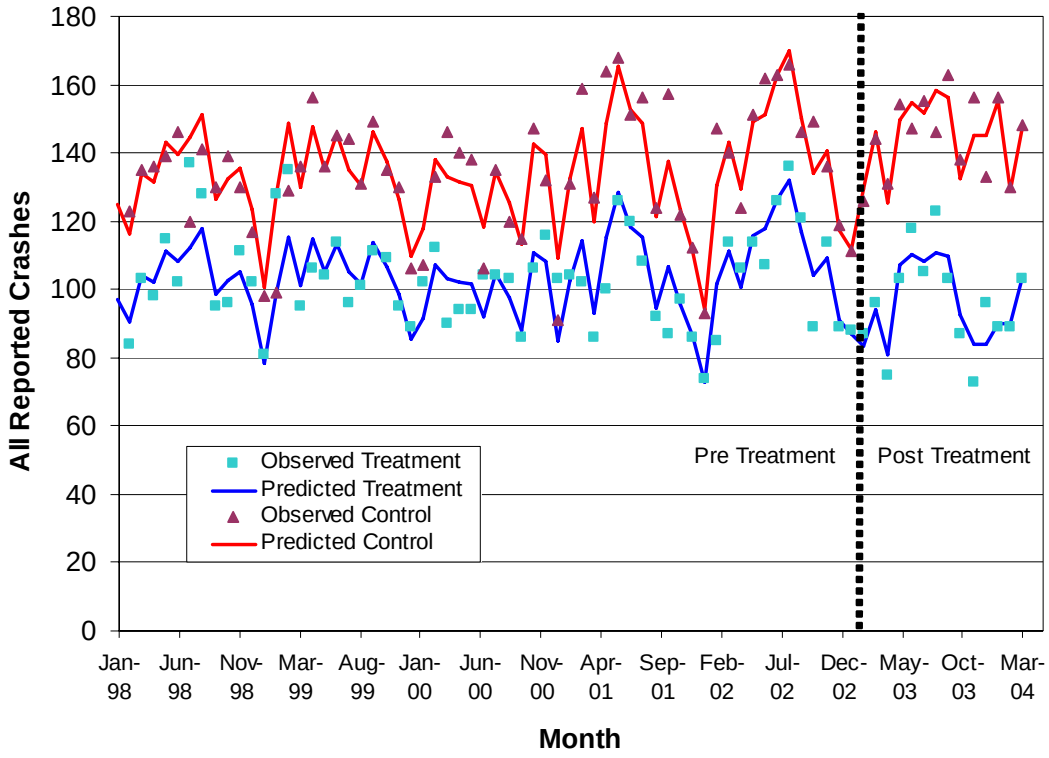

Figure 4.4. Observerved and predicted monthly crash frequency for all reported crashes in 50km/h and 60km/h zones for period prior to implementation of 50km/h speed limit, amnesty, and quarter-year intervals following full enforcement.

4.2. CRASH ANALYSIS BY ROAD USER GROUP

Separate Poisson regression analyses were performed separately on four different sub-groups of interest drawn from the total crash population. The crash sub-groups are not necessarily mutually exclusive and are defined as follows:

(i) Crashes involving a younger driver: defined as drivers under 26 years of age,

(ii) Crashes involving older drivers: defined as drivers over 55 years of age,

(iii) Crashes involving pedestrians: defined as crashes between a vehicle and pedestrian, and

(iv) Speed related crashes: crashes defined by Queensland Transport where speed is likely to have been a contributing factor.

Table 4.4. Estimated crash reductions and significance values for crashes involving older drivers, younger drivers, pedestrians, and speeding vehicles in 50km/h zones relative to 60km/h zones for all crash severity levels.

Crash Severity & Level of Program Implementation	Older Drivers		Younger Drivers		Pedestrians		Speed Related	
	Crash Reduction Estimate	Statistical Significance	Crash Reduction Estimate	Statistical Significance	Crash Reduction Estimate	Statistical Significance	Crash Reduction Estimate	Statistical Significance
All Crashes								
Amnesty Period	-3.24	0.844	-28.29	0.003	-46.15	0.059	-56.98	0.012
Full Enforcement	15.94	0.078	-16.97	0.001	-11.72	0.516	-31.29	0.037
Fatal + Hospital Crashes								
Amnesty Period	-20.73	0.493	-43.00	0.018	-65.75	0.020	-82.86	0.031
Full Enforcement	21.11	0.311	-36.47	0.001	-31.51	0.170	-53.85	0.085
Fatal + Hospital + Medical Attention Crashes								
Amnesty Period	-13.23	0.559	-29.88	0.035	-51.62	0.041	-82.95	0.002
Full Enforcement	9.71	0.471	-29.19	0.000	-16.08	0.411	-44.92	0.053
Fatal Crashes								
Amnesty Period	NA		NA		NA		NA	
Full Enforcement	NA		NA		NA		NA	
Hospital Crashes								
Amnesty Period	-18.91	0.539	-41.28	0.025	-64.57	0.026	-82.97	0.031
Full Enforcement	20.48	0.330	-33.95	0.003	-38.08	0.090	-40.41	0.277
Medical Attention Crashes								
Amnesty Period	-3.88	0.910	-15.85	0.470	-11.56	0.835	-83.10	0.031
Full Enforcement	0.69	0.969	-23.04	0.034	14.45	0.693	-36.29	0.296
Minor Injury Crashes								
Amnesty Period	76.92	0.213	-28.03	0.310	17.30	0.864	NA	
Full Enforcement	2.56	0.909	-17.77	0.207	9.48	0.840	NA	
Property Damage Crashes								
Amnesty Period	-12.89	0.614	-27.38	0.051	NA		22.32	0.694
Full Enforcement	27.51	0.058	-4.17	0.600	NA		-24.35	0.252

NA = Analysis model did not converge due to insufficient data. Results should be interpreted with caution.

Table 4.4 shows the estimates of crash change associated with introduction of the 50km/h default speed limit for all levels of crash severity for each road user group during the three-month amnesty period, and the period after enforcement commenced as a whole. The relatively low number of fatal crashes for older drivers, younger drivers, pedestrians, and speed related crashes resulted in the regression model being unable to converge on an estimate. Hence, estimates of changes in crash frequency and statistical significance involving these user groups are not reported in Table 4.4 for fatal crashes, nor for speed related crashes involving minor injuries and pedestrian crashes involving property damage. Crash reductions reported in Table 4.4 that were not statistically significant should be interpreted with caution.

4.2.1. Crashes involving younger drivers

Table 4.4 shows that for crashes involving younger drivers there were statistically significant reductions in various categories of crash severities during the amnesty period and for the period of full enforcement of the 50km/h default speed limit. For the amnesty period, there was a 43.0% reduction in serious casualty crashes, a 29.9% reduction in casualty crashes, a 41.3% reduction in hospital crashes, and a 28.3% reduction in all crashes. There were no other statistically significant reductions for the other crash severities during the amnesty period. For the period following the amnesty, statistically significant reductions were a 36.5% decrease in serious casualty crashes, 29.2% decrease in casualty crashes, 35% reduction in hospital crashes, 23% reduction in crashes resulting in medical attention, and a 17% reduction in all crashes. None of the reductions in crash severities during the full-enforcement period were statistically significant.

4.2.2. Crashes involving older drivers

There were no statistically significant reductions in any of the crash severities for older drivers during both the amnesty and full-enforcement periods.

4.2.3. Speed related crashes

The main effects of the 50k/h default speed limit on reducing speed related crashes occurred during the amnesty period. Statistically significant reductions in crashes were a 82.9% decrease in serious casualty crashes, 83% reduction in casualty crashes, 83.0% decrease in hospital crashes, 83.1% reduction in medical attention crashes, and a 57.0% reduction in all crashes. During the period of full enforcement, the only statistically significant reduction was a 31.29% reduction in all crashes.

4.2.4. Crashes involving pedestrians

The only statistically significant reduction in pedestrian related crashes occurred during the amnesty period, where there was a 65.8% reduction in serious casualty crashes, a 51.6% reduction in casualty crashes, and a 64.6% reduction in all crashes.

4.3. SPEED SURVEY ANALYSIS

Analyses of the speed survey data consisted of calculating estimates of various speed parameters including mean speed, 85th percentile speed, and the percentage of vehicles exceeding 60km/h, 70km/h, and 80km/h, for each of four separate survey times. The percentages of vehicles exceeding 60km/h, 70km/h, and 80km/h have been calculated both before and after the default speed limit introduction. These measures have been used instead of measures of exceeding the speed limit at the time of survey by set amounts because they reflect changes in high-end absolute speed rather than changes in speed relative to the set limit. Studies of 50km/h default speed limits in other jurisdictions (for example NSW RTA, 2000) have suggested the biggest behavioural changes due to the program are in reducing the proportion of high-end speeders.

Table 4.5 shows the average speed measures across all surveyed sites for treatment and control areas in each survey separately. The speed measurements given in Table 4.5 are calculated averages across all sites surveyed weighted by the relative number of vehicles surveyed at each site. An estimate of the association between the 50km/h speed limit program and observed vehicle speeds was also provided by calculating the relative change in speed parameters for treatment (50km/h roads) zones relative to control zones (60km/h roads). A negative estimate for relative change in a speed parameter indicates a decrease associated with the 50km/h speed limit program. Speed parameters for each survey period by treatment and control area are shown in Figures 4.5 and 4.6 and estimates of relative change are shown in Table 4.5.

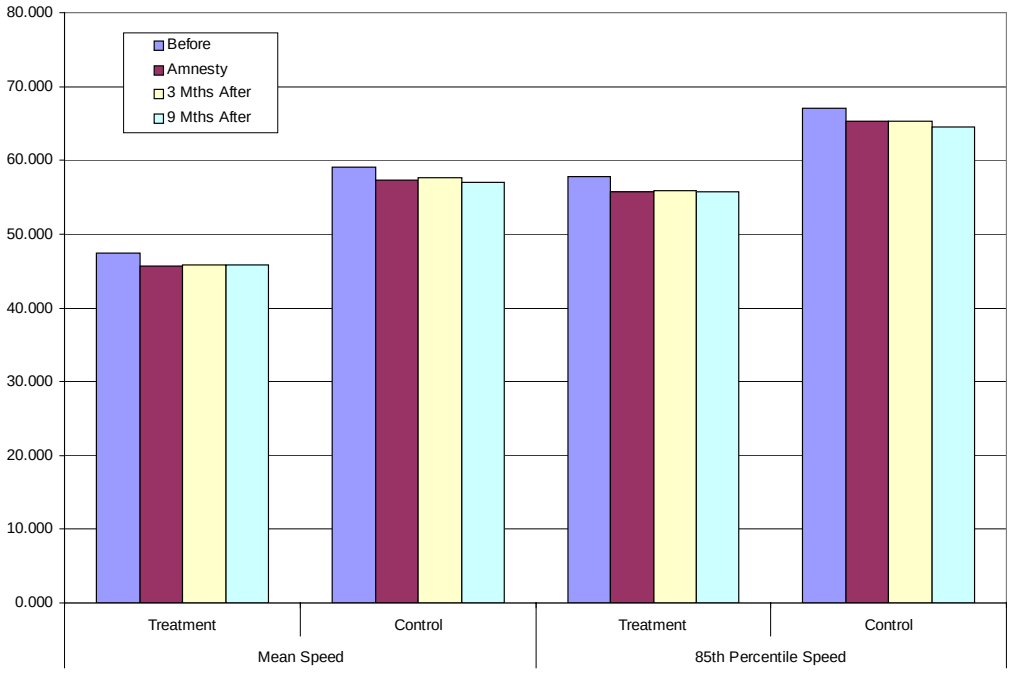

Figure 4.5. Mean speeds and 85th percentile speeds for treatment and control zones surveyed befor implementation, during amnesty, and after implementation of 50km/h default speed limit.

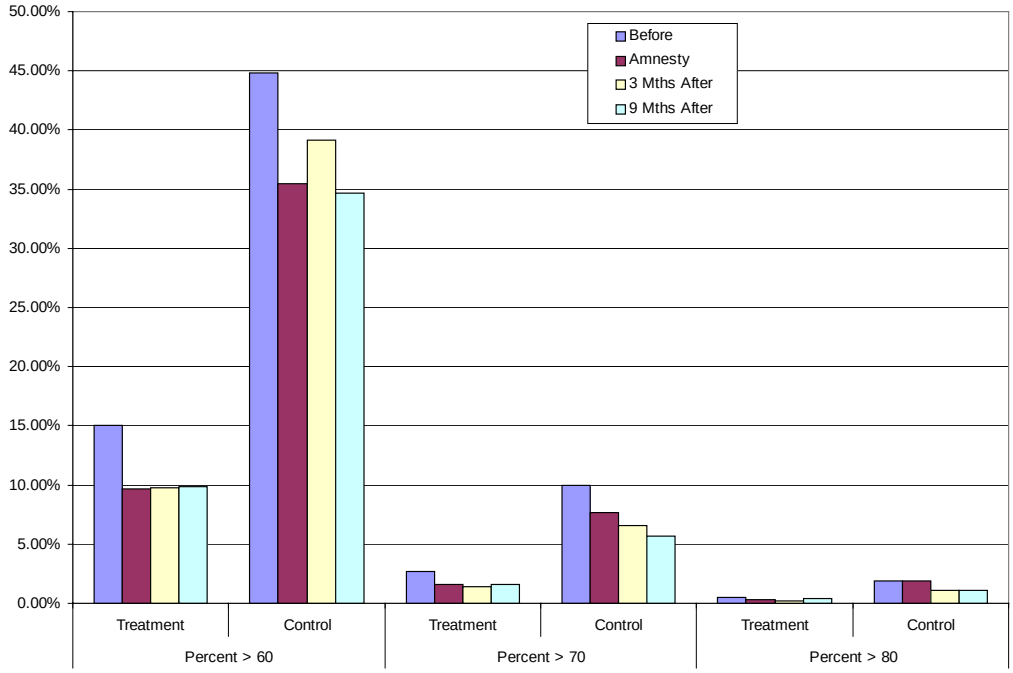

Figure 4.6. Percentage of vehicles exceeding 60km/h, 70km/h, and 80km/h in treatment and control zones surveyed before implementation, during amnesty, and after implementation of 50km/h default speed limit.

As can be seen in Figure 4.5, there were small reductions in mean speed and 85th percentile speed following implementation of the 50km/h speed limit. These reductions occurred in both treatment and control zones albeit to different degrees and in different steps. Similarly, Figure 4.6 shows that the percentage of vehicles exceeding 60km/h, 70km/h, and 80km/h decreased following implementation of the 50km/h speed limit program. Again, reductions in these parameters occurred in both treatment and control speed zones but to different degrees and at different times.

Estimates of relative change between treatment and control roads for the period before implementation of the 50km/h speed limit program, the amnesty period, and the two periods after enforcement are shown in Table 4.5. Results indicate negligible relative changes in mean speeds and 85th percentile speeds. However, the relative percentages of vehicles exceeding 60km/h, 70km/h, and 80km/h changed considerably following implementation of the 50km/h default speed limit. Large reductions in the percentage of vehicles exceeding 60km/h on roads that became 50km/h with the default limit introduction were consistently found over each of the three post-implementation time periods. Analyses of the percentage of vehicles exceeding 70km/h and 80km/h on 50km/h roads showed significant relative decreases for the amnesty period and three months after enforcement. However, nine months after enforcement, there was a slight increase in the relative percentage of vehicles exceeding 70km/h, and an increase in the relative percentage of vehicles exceeding 80km/h.

Table 4.5. Overall change in speed parameters in 50km/h zones relative to 60km/h zones.

Period	Road Type	Mean (km/h)	85th Percentile (km/h)	%>60km/h	%>70km/h	%>80km/h
Before implementation	Control	59.03	67.06	44.79%	10.01%	1.89%
	Treatment	47.36	57.84	15.06%	2.66%	0.48%
Amnesty Period	Control	57.36	65.30	35.42%	7.69%	1.92%
	Treatment	45.68	55.73	9.70%	1.62%	0.33%
3 months after	Control	57.72	65.23	39.14%	6.60%	1.05%
	Treatment	45.87	55.88	9.73%	1.43%	0.22%
9 months after	Control	57.02	64.55	34.62%	5.70%	1.14%
	Treatment	45.75	55.68	9.86%	1.58%	0.38%
Before vs Amnesty *	Relative Change: Treatment vs Control	-0.35	-0.61	-18.53%	-20.63%	-32.57%
Before vs 3 months*	Relative Change: Treatment vs Control	-0.45	-0.39	-26.03%	-18.28%	-17.10%
Before vs 9 months*	Relative Change: Treatment vs Control	0.01	0.01	-15.28%	4.79%	31.60%

NB: A negative number indicates a reduction of relative speed for that parameter

Since vehicles travelling at extreme speeds have a far greater risk of crashing, and an increased likelihood of more severe injury outcomes in those crashes, the associated reductions in vehicle speeds for the percentage of vehicles exceeding 60km/h, 70km/h and 80km/h is a positive outcome of the 50km/h speed limit program. However, the results of the speed survey analysis with respect to the effect of the 50km/h speed limit program on vehicle speeds should be interpreted with caution.

The scope of this report did not include an inferential analysis of vehicle speeds. Therefore, any reported changes in speed parameters over time may not have been due to chance variability although the typical number of vehicles observed in the speed surveys is high reducing the likelihood the results were due to chance variation alone. Although a large number of vehicle speeds were surveyed for both treatment and control sites at each survey time, the relatively small number of roads surveyed overall, and within each QPS region, may not provide a representative sample of the population of vehicle speeds in regional Queensland, and hence may only represent localised variations in vehicle speeds. The number of streets surveyed and vehicle counts for both control and treatment zones for each QPS region are presented in Tables 2.2 and 2.3 and the results of speed parameter analyses for each QPS region in regional Queensland are presented in Appendix A (Figures A1 to A5).

5. DISCUSSION

This study has evaluated the effectiveness of the 50km/h default speed limit on crash frequencies on local roads in regional Queensland. The objectives were to investigate the net effect of the 50km/h default speed limit on

(i) all categories of crash severities for all reported crashes and for crashes involving vulnerable road users, and

(ii) vehicle speeds on roads that had changed their speed limit to 50km/h.

5.1. THE EFFECT OF THE 50KM/H DEFAULT SPEED LIMIT ON CRASH FREQUENCY

Results from the crash analyses found that the introduction of the 50km/h default speed limit was associated with statistically significant reductions in crash frequencies serious casualty crashes, casualty crashes, crashes involving hospitalisation, and all crashes in both the amnesty period, and during the period following full enforcement of the program. Furthermore, this evaluation found that the 50km/h default speed limit introduction was associated with reductions in crashes that involved younger drivers and speeding vehicles for most categories of crash severity, including serious casualty crashes, casualty crashes, and hospital crashes. These findings provide strong evidence in support of the effectiveness of the 50km/h default speed limit in reducing crash frequencies in regional Queensland. The crash analyses also found that following implementation of the 50km/h default speed limit, all reported crashes on treatment roads remained substantially lower than the period prior to the implementation. The consistency of the reduction in crashes indicates the robustness of the effect of the 50km/h default speed limit in reducing crashes.

5.1.1. Absolute crash savings

Estimates of the overall percentage crash reduction associated with the 50km/h default speed limit have been converted to absolute crash savings by multiplying the percentage crash effect estimated by the average monthly crash frequency in the period prior to the implementation of the 50km/h default speed limit (January 1998 to January 2003). Table 4 shows the average monthly crash counts for the pre-implementation period and the average monthly crash savings for each severity level associated with the 50km/h default speed limit. Only crash severity levels where statistically significant or marginally statistically significant reductions were measured are presented. Statistically significant crash reductions associated with the 50km/h default speed limit were estimated to have saved 5 serious casualty crashes, 9 casualty crashes, 4 hospital crashes, and 14 all crashes per month. While not statistically significant, it was also estimated that 1 fatal crash was saved per month as an indicative value.

Table 5.1. Estimated absolute monthly crash savings associated with the 50km/h default speed limit.

Crash Severity	Average Monthly Crashes Pre 50km/h Speed Limit	Estimated Monthly Crash Savings	Statistical Significance
Fatal	0.9	1	N/A
Hospital	20.0	4	0.013
Medical Attention	24.2	4	0.082
Fatal + Hospital + Medical Attention	45.0	9	0.001
Fatal + Hospital	20.9	5	0.004
All Crashes	103.8	14	<0.001

N/A = Analysis model did not converge due to insufficient data. Results should be interpreted with caution.

5.2. THE EFFECT OF THE 50KM/H DEFAULT SPEED LIMIT ON VEHICLE SPEEDS

Results from the speed analyses found reductions in all speed parameters following implementation of the 50km/h default speed limit on both treatment roads that changed from 60km/h to 50km/h, and control roads that retained a 60km/h speed limit. This finding suggests that the implementation of the 50km/h default speed limit may have resulted in drivers reducing speed culture more broadly beyond the intended area of effect. A similar finding was reported in the evaluation of the 50km/h default speed limit in South East Queensland (Hoareau et al., 2002).

The analyses of changes in speed parameters on 50km/h roads relative to control roads found that while there was very little change in mean speeds and 85th percentile speeds, there were significant reductions in the percentage of vehicles exceeding the speed limit by 60km/h or greater during the amnesty period and the periods three and nine months after enforcement. The decrease in relative percentages of vehicles travelling at excessive speeds in 50km/h zones is likely to be associated with the significant reductions in crashes associated with implementation of the 50km/h default speed limit in South East Queensland, and provides further support for the effectiveness of this initiative.

Since crashes at excessive speeds are likely to result in higher crash severity, the greater relative speed reductions found on 50km/h roads for vehicles exceeding the speed limit by 60km/h or greater supports the proposition of Hoareau et al. (2002) that extending the 50km/h default speed limit to a greater number of sites throughout Queensland may have a substantial crash reduction benefit. However, the finding that the percentage of vehicles travelling at speeds above 70km/h is reduced by a larger amount in 60km/h zones relative to 50km/h zones at nine months after enforcement of the 50km/h speed limit indicates that either (i) there is a floor effect to speed reductions on 50km/h roads such that 60km/h roads will show greater speed reductions following road safety initiatives that aim to reduce vehicle speeds, or (ii) further initiatives are required to maintain relative reductions in excessive speeds on 50km/h roads that will prevent the potential crashes associated with vehicles travelling at those speeds.

When compared to results of the crash outcome analyses, the results of analysis of the speed data from nine months after enforcement of the 50km/h speed limit appear to be slightly anomalous when considering the excessive speeding measures. Analysis of crash effects in each quarter after the amnesty period showed crash reductions in the third quarter

that were associated with the default limit at most crash severity levels. In contrast, the percentage of speeders exceeding 70 and 80km/h actually rose on 50km/h streets compared to the control streets. The lack of sustained reduction in percentage of high end excessive speeders in the third post implementation survey period does not necessarily accord with the sustained crash reductions estimated. However, it should be noted that the percentage of vehicles exceeding 60km/h in 50km/h streets dropped relative to the control. This implies that whilst the total proportion of drivers exceeding 60km/h on 50km/h streets has dropped the proportion of these doing very excessive speeds has risen. Estimated sustained crash effects in the third quarter after program implementation suggests the key speed parameter related to crash reductions due to the 50km/h default speed limit is the proportion of vehicles exceeding 60km/h rather than those doing very excessive speeds. However, this hypothesis should be tempered by the noted concern that the speed survey data may not be entirely representative of general speed behaviour because of the limited number of speed survey sites available in each area of regional Queensland (see Tables 2.2 and 2.3), particularly for the control speed survey sites (Table 2.2). This could explain the apparently anomalous results in high end speeding measures in the third survey, particularly considering the proportion of vehicles travelling at excessive speeds is relatively small.

5.3. POTENTIAL BIASES AFFECTING CRASH AND SPEED PARAMETER REDUCTION ESTIMATES

Three sources of potential bias may have influenced the net change in the monthly level of crashes between the 50km/h speed zones and other speed zones. Firstly, crashes on roads currently zoned 50 km/h were only included in the treatment group if additional crashes had occurred on the same roads after implementation of the 50km/h default speed limit. Hence, if a crash had not occurred on a 50km/h road since the implementation, it will not have been identified as belonging to the treatment group. Excluding these crashes from the treatment group would have resulted in a conservative estimate of crash reduction, that is, lower estimates of crash reductions than did actually occur since it would exclude streets where the countermeasure was 100% effective.

The second possible bias involves the crashes in 50 km/h speed zones that occurred at the intersection between a 50km/h road and one of higher speed limit and were not included in the treatment group. If the 50km/h limit has had crash reduction effects at these intersections greater than on the road sections analysed, estimated program effects reported in this evaluation will also be conservative since these effects have not been included in the results of this analysis. Not including these intersections in the analysis also means the estimated absolute crash savings in Table 5.1 are again potentially conservative.

5.4. COMPARISON OF REDUCTIONS OF SPEED PARAMETERS AND CRASHES IN REGIONAL AND SOUTH EAST QUEENSLAND.

Table 5.2 shows the estimated associated effect of the 50km/h default speed limit on crash frequencies in both regional Queensland and South East Queensland. While both regions reported large reductions in serious casualty crashes on treatment 50km/h roads relative to control 60km/h roads, reductions in all reported crashes in regional Queensland were less than in South East Queensland. It is difficult to explain why effects of the program on all reported crashes in regional Queensland might be less that in South East Queensland, except that there was possibly a lower risk of crashes in regional Queensland prior to program implementation allowing less scope for the program to be effective. The

comparison must be tempered by noting that the relatively wide confidence limits on the estimated crash reductions in regional Queensland mean the observed differences between regions are not statistically significant.

Table 5.2. Comparison of the effect of a 50km/h default speed limit on crashes in regional Queensland and South East Queensland

Queensland Region	Reduction in Fatal Crashes	Reduction in Fatal, Hospital, and Medical Attention Crashes	Reduction in All Reported Crashes
South East*	23%	22%	23%
Regional**	NA	19.30%	13.50%

** Average yearly reduction*

*** Estimated reduction during full enforcement period.*

Table 5.3 shows the changes in speed parameters associated with the 50km/h default speed limit in South East Queensland and regional Queensland. A positive value indicates a net reduction in a parameter whilst a negative value indicates a net increase. Whilst both regions reported relatively small changes in mean speed and 85th percentile speeds, there were large reductions in the relative change in the percentage of vehicles exceeding 60km/h in South East Queensland overall, and both survey periods after enforcement of the 50km/h speed limit in regional Queensland. Decreases in all speed parameters were greater in south east Queensland than regional Queensland correlating to the greater crash reductions associated with the default 50km/h speed limit in south east Queensland. Reductions in high end excessive speeding in regional Queensland were also less than in south east Queensland following program implementation further correlating with the estimated crash effects. For the reasons described above, caution on the interpretation of the regional speed analysis results is again made.

Table 5.3. Comparison of the effect of the 50km/h default speed limit on speed parameters in regional Queensland and South East Queensland

Queensland Region	Reduction in Mean Speed (km/h)	Reduction in 85th Percentile Speed (km/h)	Reduction in Vehicles Exceeding 60km/h	Reduction in Vehicles Exceeding 70km/h	Reduction in Vehicles Exceeding 80km/h
South East	2.2	1.5	53.10%	68.30%	62.50%
Regional (3 Months Post)	0.45	0.39	26.03%	18.28%	17.10%
Regional (9 Months Post)	-0.01	-0.01	15.30%	-4.80%	-31.60%

NB: Negative reductions indicate an estimated net increase

6. CONCLUSION

This evaluation has found strong evidence of significant crash reductions associated with implementation of the 50km/h default speed limit in regional Queensland. Crash reductions were estimated both in the amnesty period immediately after implementation and in the subsequent period during which the new speed limit was fully enforced. The evaluation covered the period until the end of May 2004.

In the period of full enforcement, the analyses found statistically significant crash reductions of 13.5% for all crashes reported to police. Greater reductions were estimated in higher severity crashes with a reduction of 24.9% estimated for serious casualty crashes (crashes involving death or hospitalisation) and 19.3% for fatal, hospitalisation and medical attention severity crashes combined. Estimated percentage crash reductions in the full enforcement period translated to an estimated saving of 9 casualty crashes, 5 serious casualty crashes and 14 crashes of all severity levels per month.

The analyses also found that the 50km/h default speed limit was associated with significant reductions in crashes that involved younger drivers both during the amnesty and full enforcement periods. It also estimated statistically significant reductions in speed related crashes that occurred primarily during the amnesty period. Analysis of speed survey data associated with the program implementation indicates that the reported crash reductions were associated with a reduction in vehicle speeds above 60km/h on roads that became 50km/h subsequent to the default limit introduction.

6.1. ASSUMPTIONS AND QUALIFYING REMARKS

The findings of this evaluation are based on the following qualifications and assumptions:

- Crashes that occurred on current 50km/h roads both before and after program implementation were correctly identified.
- Crash severity is accurately recorded in database of police report crashes in Queensland.
- Crashes on intersections between 50km/h and higher speed zone roads were not analysed.
- The form of the study design and statistical analysis model used was the most appropriate for the evaluation
- Speed data analysed was broadly representative of speeds on treatment and control roads across regional Queensland
- No assumption about the direction of the direction of influence the program may have had on has been assumed in testing the statistical null hypothesis of no program crash effects. The hypothesis tested was based on a two-tailed test of significance. To obtain a one-tailed level of significance, the significance levels detailed in the report should be halved.

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APPENDIX A

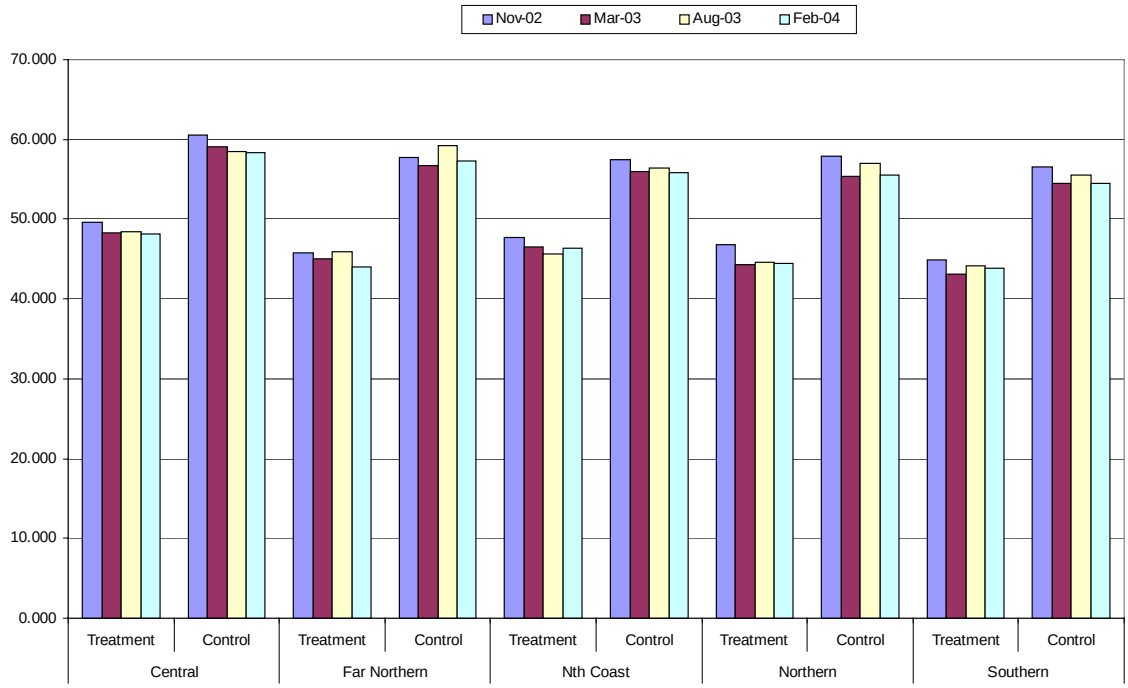

Figure A.1. Mean speeds in treatment (50km/h) and control (60km/h) zones by QPS region in regional Queensland.

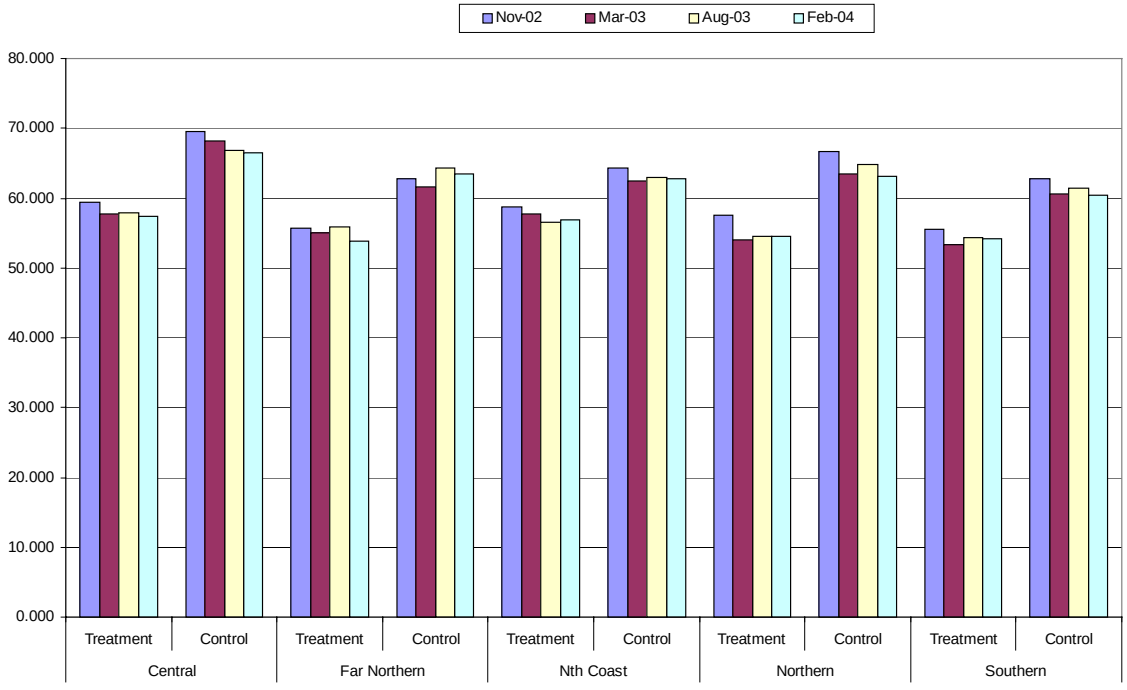

Figure A.2. 85th percentile speeds in treatment (50km/h) and control (60km/h) zones by QPS region in regional Queensland.

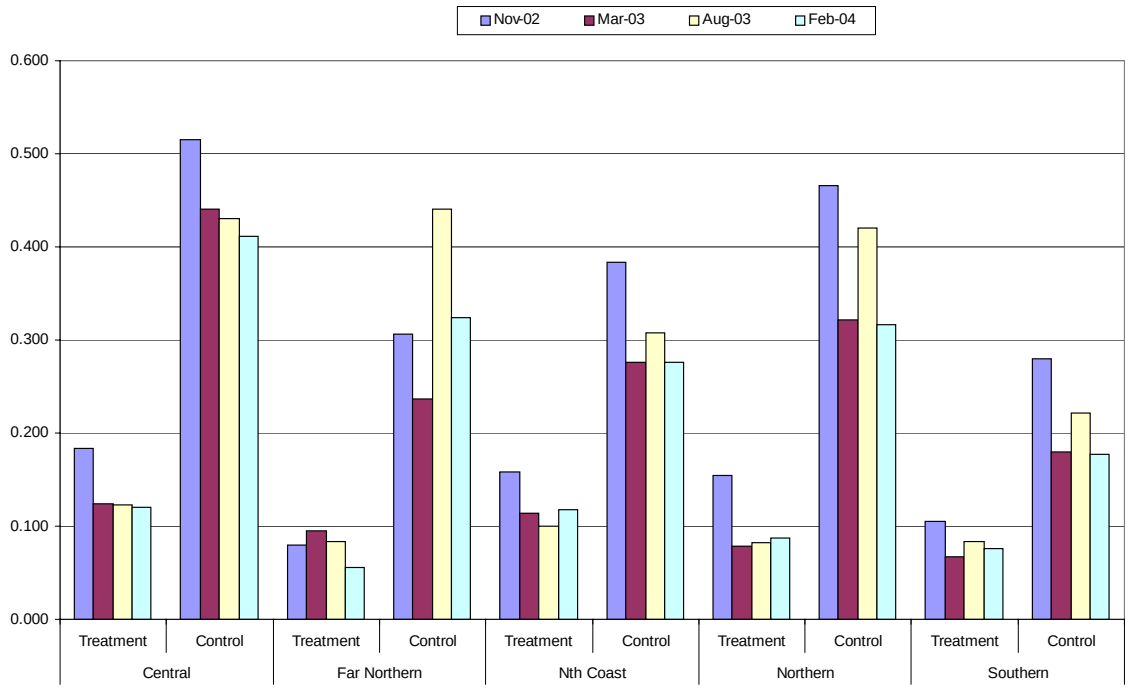

Figure A.3. Proportion of vehicles exceeding 60km/h in treatment (50km/h) and control (60km/h) zones by QPS region in regional Queensland.

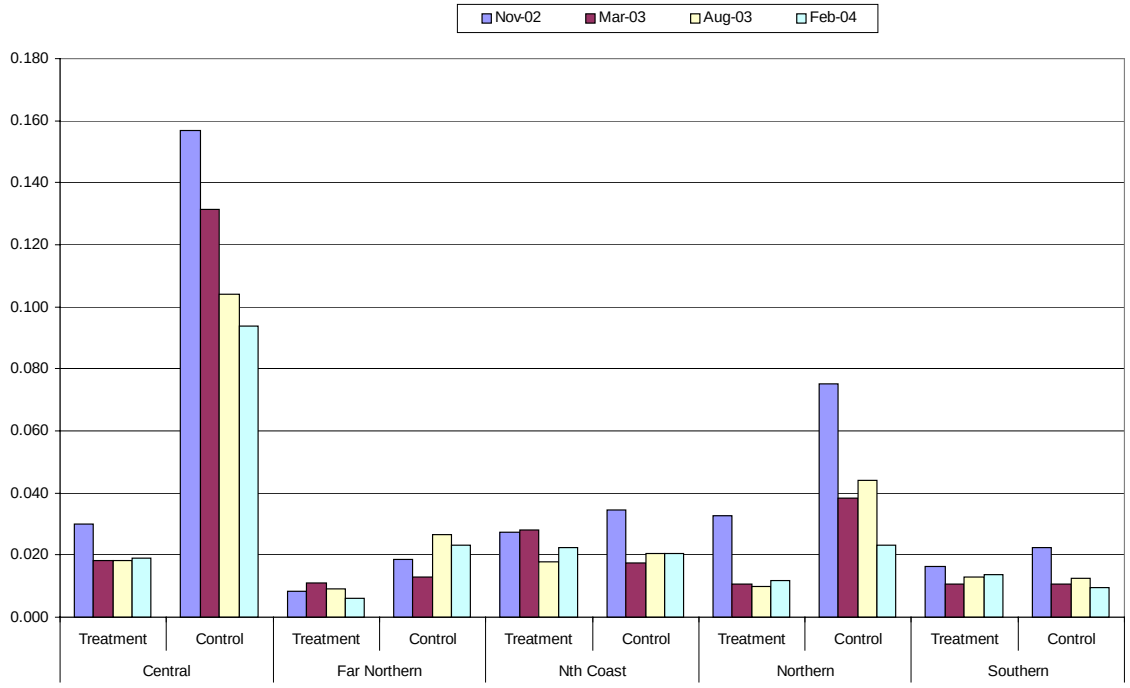

Figure A.4. Proportion of vehicles exceeding 70km/h in treatment (50km/h) and control (60km/h) zones by QPS region in regional Queensland.

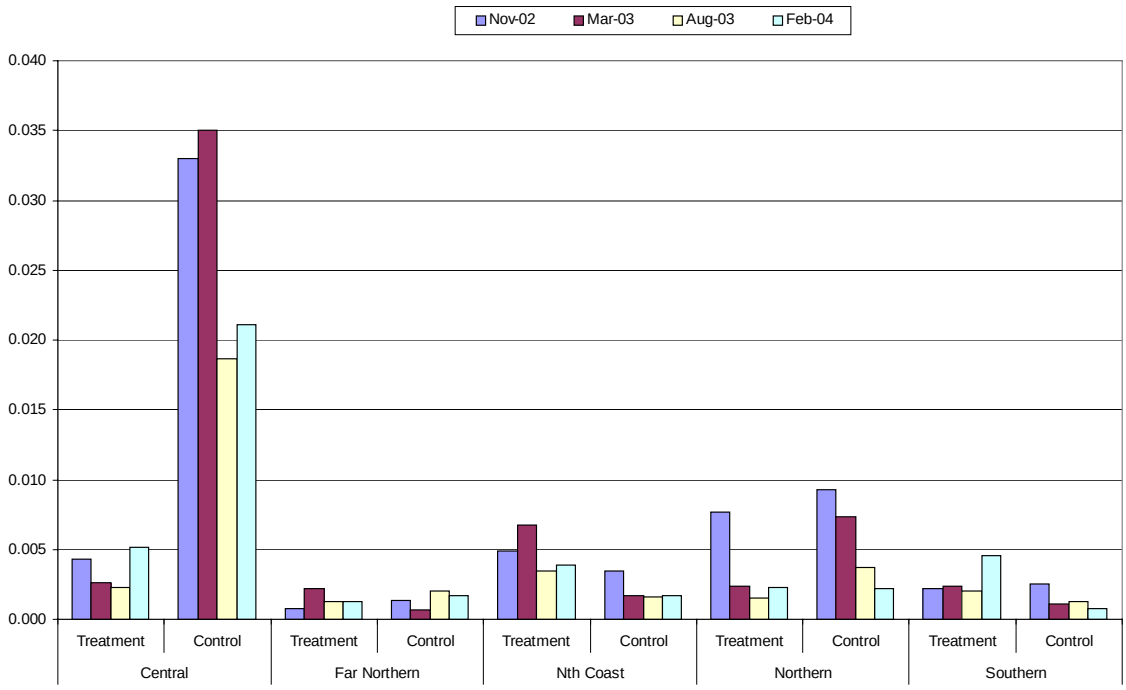

Figure A.5. Proportion of vehicles exceeding 80km/h in treatment (50km/h) and control (60km/h) zones by QPS region in regional Queensland.