ROAD SAFETY ISSUES IN CENTRAL REGION

(Presenter) **James King** , MEngSc(UNSW), BE(EngSc)(Auck)
Senior Engineer Performance Information, NZ Transport Agency
<james.king@nzta.govt.nz>

Dr Nabin Pradhan, PhD, MSc Highway Engineering, CE (Civil), CPEng, IntPE, MIPENZ
Manager Performance Information, NZ Transport Agency
<nabin.pradhan@nzta.govt.nz>

ABSTRACT: Analysis of various data sources related to road crashes has shown that there is an increase in the number of crashes in the Central Region (Central and Lower North Island of New Zealand) in the last five years. This increase is mainly related to an increase in minor injury crashes.

Analysis of crash data in Crash Analysis System (CAS) shows that although safety issues within each local road network are quite specific, definite patterns related to the crash types, factors and road users involved are still depended on the speed environment (urban vs. rural areas). Loss of control crashes were more prominent in the rural areas, whereas crossing or turning and rear end crashes are more prominent in the urban areas. For vulnerable road users the motorcyclist crash rate is increasing faster than the cyclist rate, with pedestrian incidents more or less static.

A review of specific enforcement data indicated either steady or some reduction in the offences related to alcohol, speed and restraint use, however there are some wide variations evident.

The paper also includes an overview of various safety initiatives in place with some discussions on possible opportunities for improvements.

1 INTRODUCTION

The statistics indicate that road crashes reported by the Police to the New Zealand Transport Agency (NZTA) and held in the Crash Analysis System (CAS) database have been increasing in recent years. Hence, it has become important to understand the pattern of the crashes and identify potential remedial options that could be undertaken by the road controlling authorities(RCA) to reduce the consequential trauma and social cost to the country.

This paper includes the findings of a desktop analysis of the data from CAS database and made available from various other sources including hospitalisations and police enforcement for the Central Region. Most of the analysis is based on last 5 years data (2003 to 2007), although up to 10 years data have been used where relevant.

2 CHARACTERISTICS OF THE STUDY AREA.

2.1 Roading Networks

The Central Region (the Region) comprises 23 road controlling authorities (RCAs) (city and district councils) in the central and lower North Island of New Zealand. Table 2.1 lists these authorities and gives an overview of the characteristic of the Regions network.

Local Authorities	Road Length in Km			Pop. in 2006	5 years Average VKT	Injury Crashes[1] 2003-2007				
	State high ways	Urban local Roads	Rural local Roads			F	S	M	Total	Rate/ 1000 pop
Gisborne Region										
Gisborne District	331	229	1624	44460	186933	20	116	416	552	12
Hawkes Bay Region										
Central Hawkes Bay Dist.	74	68	1194	12957	61034	19	57	122	198	15
Hastings District	224	293	1330	70842	433826	60	260	1017	1337	19
Napier District		294	58	55359	266299	21	132	541	694	13
Wairoa District	171	59	807	8481	39860	13	50	127	190	22
Taranaki Region										
New Plymouth District	160	307	955	68901	209067	29	177	780	986	14
South Taranaki District	160	137	1477	26481	103846	17	78	303	398	15
Stratford District	113	41	541	8892	31835	6	22	82	110	12
Manuatu Wanganui Reg										
Horowhenua District	87	162	401	29868	177404	24	93	304	421	14
Manawatu District	115	142	1288	28251	210441	29	117	326	472	17
Palmerston North City	54	316	153	75540	312619	17	157	673	847	11
Rangitikei District	129	93	1130	14712	71317	19	68	191	278	19
Ruapehu District	321	112	1193	13572	52140	17	66	200	283	21
Tararua District	116	86	1871	17631	83975	18	87	211	316	18
Wanganui District	106	224	614	42639	163343	21	111	299	431	10
Greater Wellington Reg										
Carterton District	15	27	406	7098	32876	8	26	74	108	15
Kapiti Coast District	46	230	154	46200	140029	19	102	304	425	9
Hutt City	33	446	30	97701	497709	22	164	774	960	10
Masterton District	30	112	685	22623	122322	13	53	256	322	14
Porirua City	97	194	43	48546	188173	12	94	410	516	11
South Wairarapa District	45	54	560	8889	44290	9	36	114	159	18
Upper Hutt City	28	152	82	38415	127870	10	68	246	324	8
Wellington City	67	626	56	179466	717624	22	305	1609	1936	11
TOTAL	**2522**	**4404**	**16652**	**967524**	**4274832**	**445**	**2439**	**9379**	**12263**	**13**

Note: 1 Injury crashes severity: F – Fatal S – Serious Injury M – Minor Injury

Table 2.1: Characteristics of the Road Network in Central Region

Analysis has shown that the crash characteristics and factors are primarily associated with the speed environment, and, hence, due importance is given to separately analysing crashes in urban and rural environments.

2.2 Hospitalisation

The Region is represented by five District Health Boards (DHB). Prior to the start of 2001 the trend in deaths and all hospitalisations as a result of road crashes for all these DHBs was downwards. This downwards trend was in line with the Government initiated targets for deaths and all hospitalisations to be achieved by 2010.

The trend in the Gisborne DHB zone continued downwards in line with the targets until mid 2003 and is now showing a rising trend above the suggested target numbers.

The numbers in the Hawkes Bay DHB zone showed significant gains in reducing road crash trauma but since mid 2005 the trend has reversed and numbers are now slightly above the desired trend line.

In the Manawatu-Wanganui DHB zone the number of road crash trauma cases initially dipped below the desired trend line but since the beginning of 2005 the numbers have jumped significantly above the target line and appears to be increasing.

The number of road crash trauma cases in the Taranaki DHB zone is fluctuating about the target trend line and is expected to meet the 2010 targets.

Road trauma cases in the Wellington DHB zone have followed the target trend line until late in 2005 and now suggest either a flat or increasing number of cases.

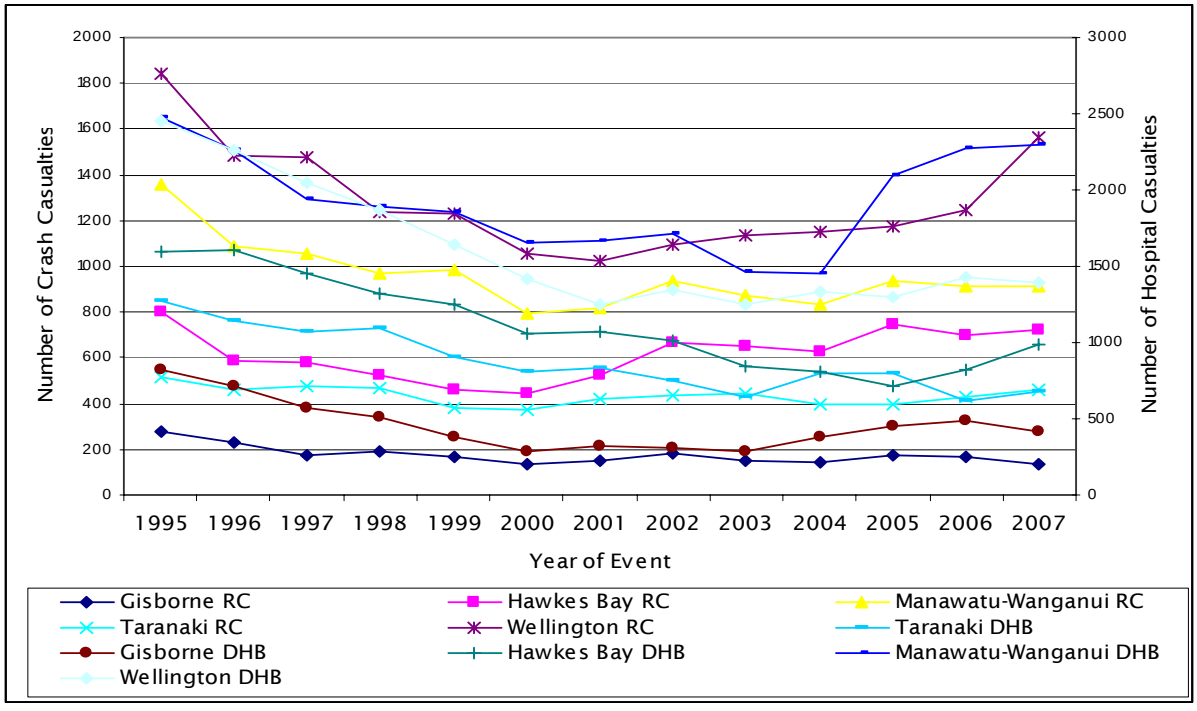


Table 2.2: Comparison of Reported Hospital and Crash Casualties

2.3 Vehicle Accessibility

The accessibility to vehicles in the Region is not easy to gauge, though the size of the national vehicle fleet has been increasing steadily for a number of years, hence it is reasonable to assume that the number of vehicle accessible to the Regions population would be reflective of the Regions population. However, the reported number of new vehicle registrations in the Region, for the last 3 years, has been going down, but with an increasing number of motorcycle and moped registrations.

3. ROAD CRASHES

3.1 Background

Road crashes in the Region have resulted in a social cost to the country in 2007 of $1092 million.

		Central Region	New Zealand
Local roads	urban	$384.27	$1,609.18
	rural	$231.98	$891.74
State highways	urban	$92.38	$323.26
	rural	$383.25	$1,533.31
Total		**$1,091.88**	**$4,357.48**

Table 3.1: Social Cost of Road Crashes

This social cost is accompanied by an increase in the population based crash and casualty rates over the last 5 years. The crash rate has increased from 24/10000 to 28/10000 and the casualty rate from 33/10000 to 38/10000. These rates have been below the national rates but are now comparable to the national rates of 26/10000 and 36/10000.

Comparison of crashes and casualties results of various regions is shown in Table 3.2.

Region name	Crashes per 100 million vehicle kilometres travelled					Casualties per 100 million vehicle kilometres travelled					2007 Population	% of rural crashes
	Population (5 year average)	Local roads		State highways		Population (5 year average)	Local roads		State highways			
		Urban	Rural	Urban	Rural		Urban	Rural	Urban	Rural		
Auckland	23	34	28	50	13	30	43	40	69	19	1394000	28
Bay of Plenty	21	26	25	25	17	31	33	39	35	28	267700	49
Gisborne	24	36	20	34	23	33	44	29	52	35	45900	47
Hawkes Bay	32	44	31	32	21	45	55	48	45	34	152500	48
Manawatu Wanganui	27	36	22	28	17	39	43	35	37	27	229000	54
Nelson Marlborough	77	44	17	29	19	103	53	26	36	28	44400	51
Southland	45	72	34	51	26	69	103	54	71	44	93000	49
Greater Wellington	20	33	29	38	11	26	40	41	51	17	470300	29
Canterbury	24	34	18	22	13	32	43	26	29	19	546900	31
Chathams	75	n/a	n/a	n/a	n/a	94	n/a	n/a	n/a	n/a	640	n/a
Northland	33	35	32	34	26	48	46	46	47	39	153800	69
Otago	44	70	44	47	24	66	98	67	66	38	201700	45
Taranaki	28	42	30	32	23	39	56	44	40	35	107200	52
Waikato	30	39	21	25	16	42	50	29	35	26	398600	59
West Coast	34	31	16	34	20	50	44	24	45	30	32200	74
All New Zealand	26	36	26	32	16	36	46	38	43	25	4227700	41

Source: NZTA (2008)

Table 3.2: Comparison of Regional Crash and Casualty rates

3.2 Crash Trend

The number of injury crashes in both rural and urban areas in the Region has shown an increasing trend since year 2000, but with a greater increase in the crash rates for urban areas.

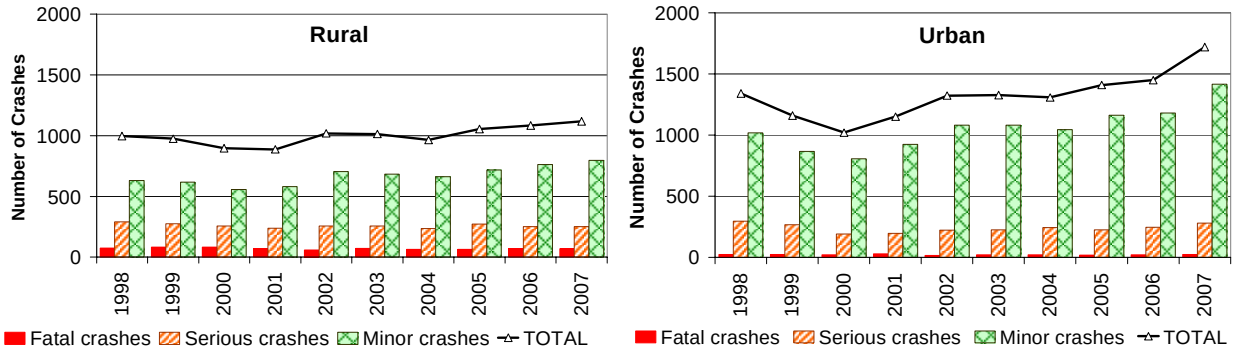


Figure 3.1: Central Region Crash Trend 2003 - 2007

3.3 Crash Severity.

The proportion of fatal and serious injury crashes (of all injury crashes) is higher in rural areas (due to higher speed environment) than in urban areas.

Fatal crashes have constituted about 4% of the crashes in the Region with expected number being about 90/year, three quarters of these will likely occur in a rural environment. There may be a slight upward trend in fatal crash numbers.

Serious injury crashes have increased during the last 5 years but are a reducing percentage of reported crashes. The increase in numbers is principally in urban environments.

Minor injury crashes have seen a significant increase in numbers reported particularly in urban environments but they remain steady at 80% of reported injury crashes.

Damage only crashes constitute 70% of all reported crashes and the reporting of these crashes, particularly in urban areas, is increasing where they represent 3 of every 4 reported crashes. In rural areas the ratio is approximately 3 of every 5.

	2003	2004	2005	2006	2007	Total	%
All Roads							
Fatal crashes	95	86	82	92	94	**449**	4%
Serious crashes	481	480	500	498	532	**2491**	20%
Minor crashes	1765	1707	1882	1944	2213	**9511**	76%
Total injury crashes	**2341**	**2273**	**2464**	**2534**	**2839**	**12451**	**100%**
Non-injury crashes	5534	5914	6070	6417	7153	31088	
Urban Roads							
Fatal crashes	22	21	19	22	24	108	1%
Serious crashes	225	244	227	246	280	1222	17%
Minor crashes	1081	1044	1164	1182	1417	5888	82%
Total injury crashes	**1328**	**1309**	**1410**	**1450**	**1721**	**7218**	**100%**
Non-injury crashes	3961	4204	4357	4683	5395	22600	
Rural Roads							
Fatal crashes	73	65	63	70	70	341	7%
Serious crashes	256	236	273	252	252	1269	24%
Minor crashes	684	663	718	762	796	3623	69%
Total injury crashes	**1013**	**964**	**1054**	**1084**	**1118**	**5233**	**100%**
Non-injury crashes	1573	1710	1713	1734	1758	8488	

Table 3.3: Crash numbers and severity 2003 to 2007

3.4 Casualty Severity.

In general the casualty severity is reflective of the crash severity, however, while the number of fatalities has remained relatively static, the number of serious and minor injuries reported is increasing, which suggests crashes are becoming more survivable (see Table 3.4).

3.5 Casualty Types.

Drivers constitute 60% of the casualties in the Region's crashes of which 3 in every 5 are male; passengers are 25% of the casualties with just over half being female; these proportions have remained relatively static for the last 5 years, however the number of motorcyclists injured has increased from 1 in 14 (7%) to 1 in 8 (12%) drivers.

Pedestrians and cyclists, individually, constitute about 7% of the casualties, principally in the major urban areas of the Region, with slightly greater numbers of male pedestrians injured than female but three quarters of the injured cyclists being male.

Other casualties reported include various other motorised vehicles, skateboarders, mobility carts and horse riders though their numbers are not high.

	2003	2004	2005	2006	2007	Total	%
All Roads							
Fatal casualties	108	105	106	104	101	524	3%
Serious casualties	598	585	632	624	661	3100	18%
Minor casualties	2542	2462	2691	2731	3008	13434	79%
Total casualties	**3248**	**3152**	**3429**	**3459**	**3770**	**17058**	**100%**
Urban Roads							
Fatal casualties	24	21	22	22	25	114	1%
Serious casualties	259	266	260	262	318	1365	15%
Minor casualties	1356	1347	1488	1491	1782	7464	83%
Total casualties	**1639**	**1634**	**1770**	**1775**	**2125**	**8943**	**100%**
Rural Roads							
Fatal casualties	84	84	84	82	76	410	5%
Serious casualties	339	319	372	362	343	1735	21%
Minor casualties	1186	1115	1203	1240	1226	5970	74%
Total casualties	**1609**	**1518**	**1659**	**1684**	**1645**	**8115**	**100%**

Table 3.4 Casualty numbers and severity 2003 to 2007

3.6 Movement category

The analysis of the data showed that movement categories *Lost of control/ Head on* (both at bends or on straights) are more prominent in the rural environment, whereas *Crossing/Turning, Pedestrian vs. Vehicle* and *Rear end/obstruction* are more prominent in urban environments.

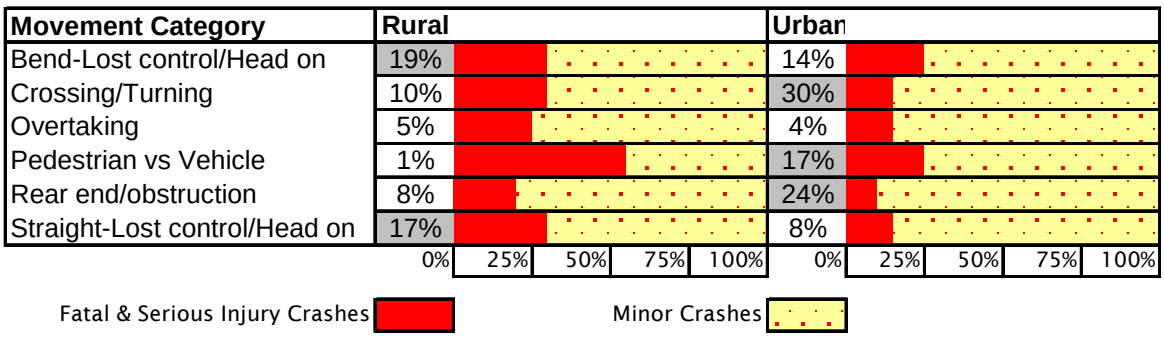


Figure 3.2: Crash Movement Category Distribution

3.7 Crash Factors

A good correlation between speed environment and contributor factors for injury crashes has been observed (See Fig. 3.3). Factors like *Alcohol, Too fast, Poor Handling, Poor Observation, Fatigue, Road Factors* etc. are found to be prominent in rural area, whereas *Failed Give Way/Stop, Poor Observation, Poor Judgement, Disabled/old/ill user, Pedestrian Factors* etc. are prominent in urban area.

Proportion of fatal and serious injury crashes in total injury crashes are higher in rural environment than in urban area.

It has been observed that majority of the at-fault drivers in Lost of control crashes are relatively young drivers of age group less than 30 years. In the contrary majority of at-fault drivers in Crossing/Turning related crashes are found to be more matured drivers.

It has been observed that younger drivers are more involved with alcohol related crashes. Percentage of at-fault drivers involved in injury crashes without restricted or full NZ driving licence is about 40%, with the highest (60 %) in Napier City.

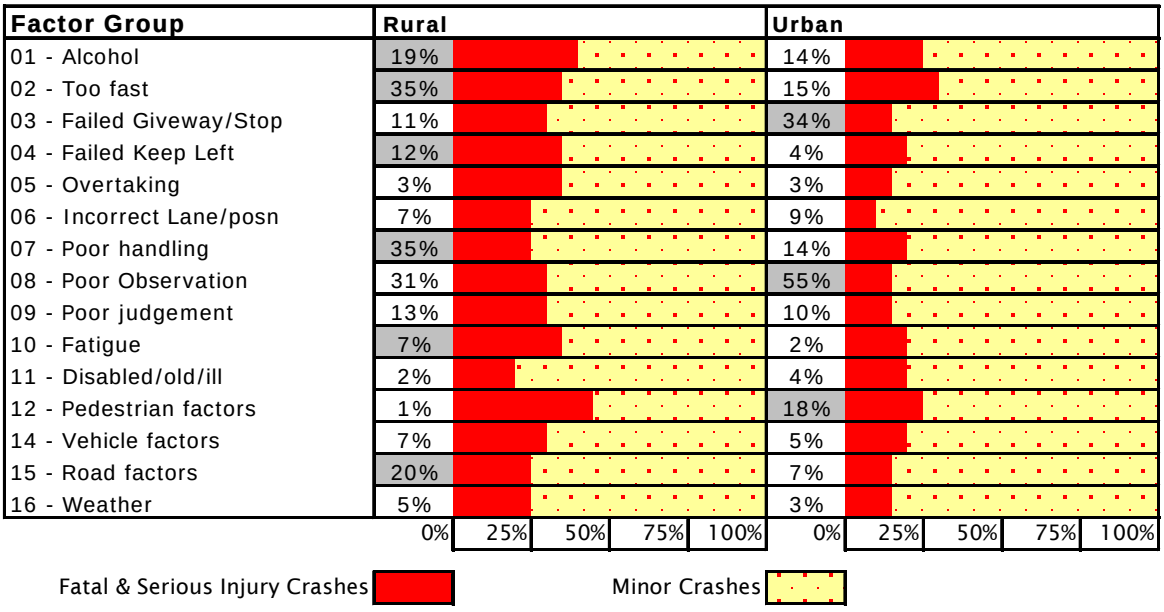


Figure 3.3: Crash Factor Group Distribution

3.8 Road Users

In the Region drivers and passengers of cars are the greater proportion of injured road users followed by SUV/Van occupants. Vulnerable road users are a significant proportion of those injured in cities (i.e. Wellington, Hutt, Upper Hutt, Napier etc.) and districts with a State Highway passing through the main town centre (i.e. Masterton and Carterton Districts etc.).

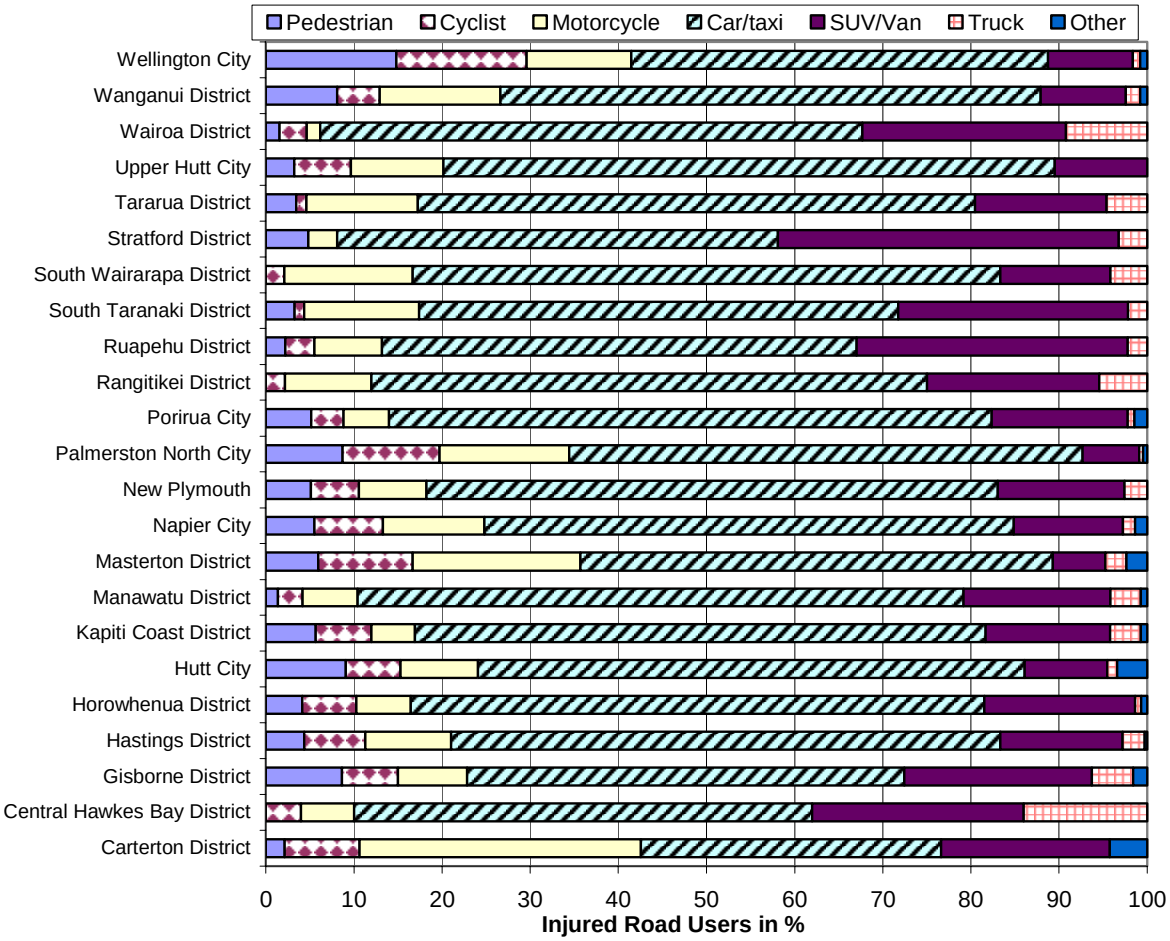
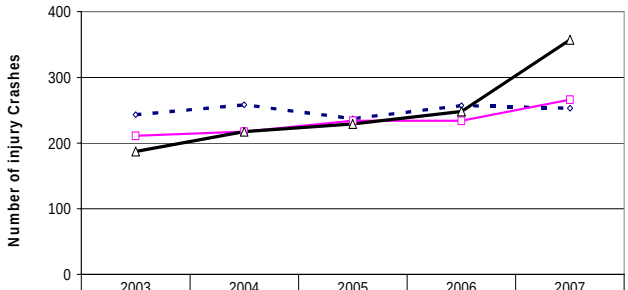


Figure 3.4: Injured Road User Distribution

The data analysis indicates that the number of cyclist and, notably, motorcyclist crashes in the Region are increasing whereas pedestrian incident are steady.

The increasing number of cyclists and motorcyclist commuting to work in recent years suggests their crash rate may not have increased, however, unless the road safety situation for this type of road user improves it will difficult to make these modes of commuting more popular for sustainable transport development.

Further analysis of the motorcyclists' ages showed two distinct groups of motorcyclists: Inner city commuter and long distance rider. Inner city commuters involved in crashes are generally less than 30 years of age. Long distance riders are generally matured group of age 40 year or over. More than half of the injured motorcyclists from Tararua, Stratford, South Wairarapa, Central Hawkes Bay were more than 40 years of age.



	2003	2004	2005	2006	2007
Pedestrian	243	258	237	257	253
Cyclist	211	217	234	234	266
Motorcyclist	187	217	229	248	357

Figure 3.5: Vulnerable Road Users Crash Trends

4. SAFETY RELATED ENFORCEMENTS

4.1 Alcohol Enforcement.

Alcohol is one of the national issues in relation to driving with 14% of crashes involving alcohol. Enforcement information for the analysis period suggests offences are being detected more often in the central sub-regions on population and distance based measures. However there is a wide disparity across the Region when comparing the number of (alcohol) offences to crashes from a high of 32:1 to the low of 1:1 with the average being 9:1 in the individual local authority areas.

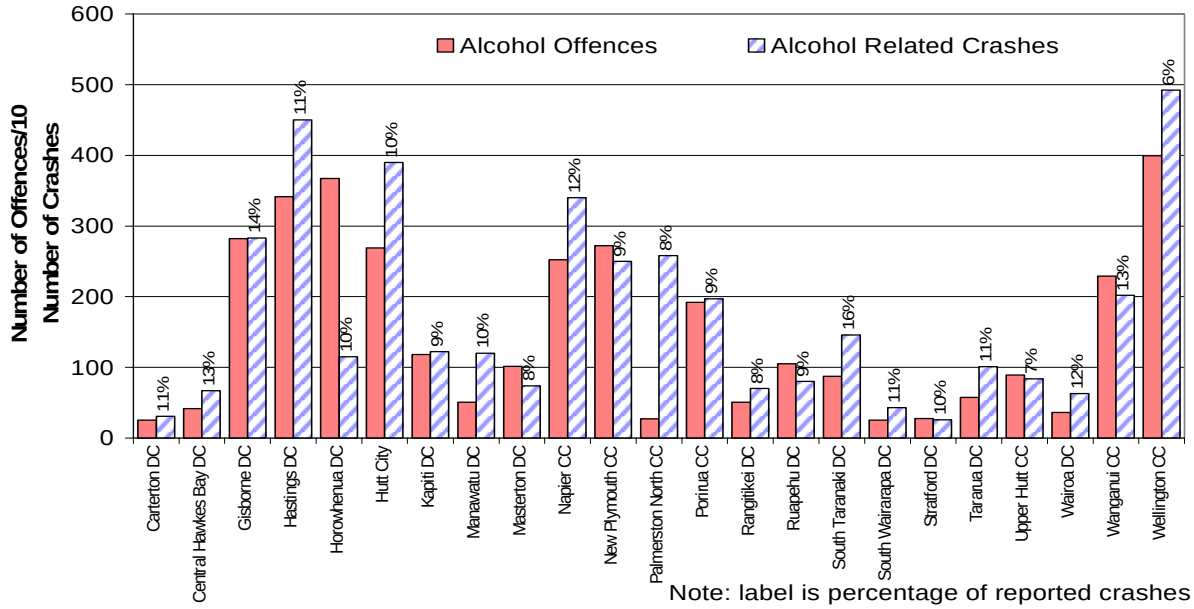


Figure 4.1: Alcohol Related Crashes and Offences by Local Authorities 2003 -2207

In general alcohol enforcement is largely undertaken in the major urban areas of the Region with one apparently notable exception (Palmerston North). Regional level data shows that enforcement relative to population has generally increased over the last 5 years with the exception of Gisborne and Taranaki regions.

In relation to distance travelled (vehicle kilometres travelled – vkt) enforcement in Gisborne region has reduced but increased in Wellington region, with other regions being steady.

The percentage of crashes involving alcohol has, in general, been reducing in last five years, however the reduction is not as large as desirable (i.e. approx. 1 percentage point in Urban areas and 3 percentage points in the rural areas).

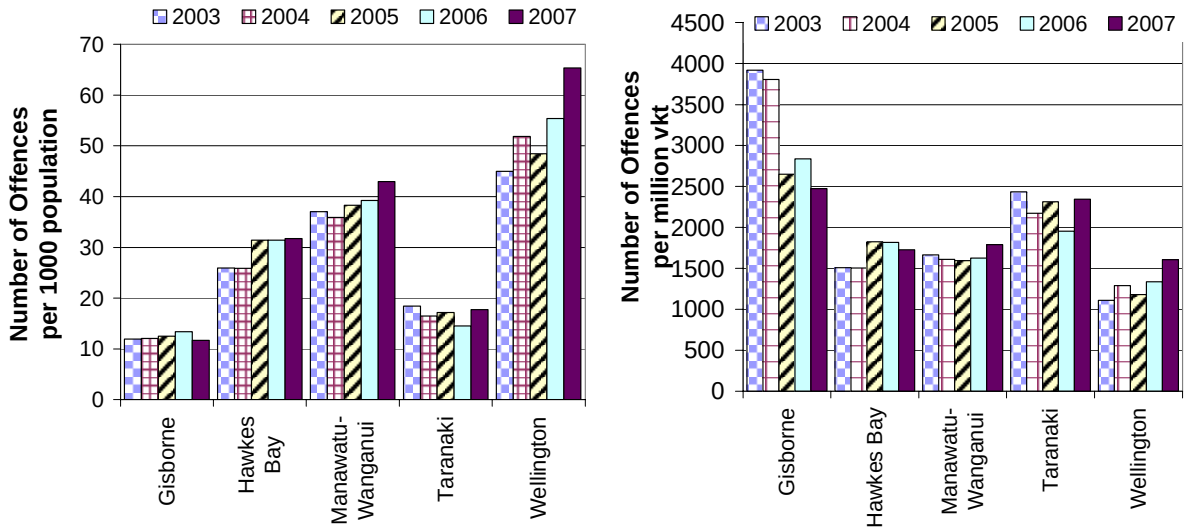


Figure 4.2: Alcohol Enforcement Rate by Population and vkt

4.2 Speed Enforcement.

Travelling too fast for the conditions is an increasing [10% (2003) - 14% (2007)] factor in urban crashes and a steady [21%] factor in rural crashes.

Enforcement data suggests that the number of drivers exceeding the posted speed limits may be declining both on a population basis and also on distance travelled.

Comparisons between the level of enforcement and the occurrence of speed related crashes by RCA suggest that there may be 1 crash for every 75 speed offence detected across the Region but this varies from a low of 1:390 to a high of 1:18, with the proviso that enforcement might not necessarily be appropriate or achievable in some areas.

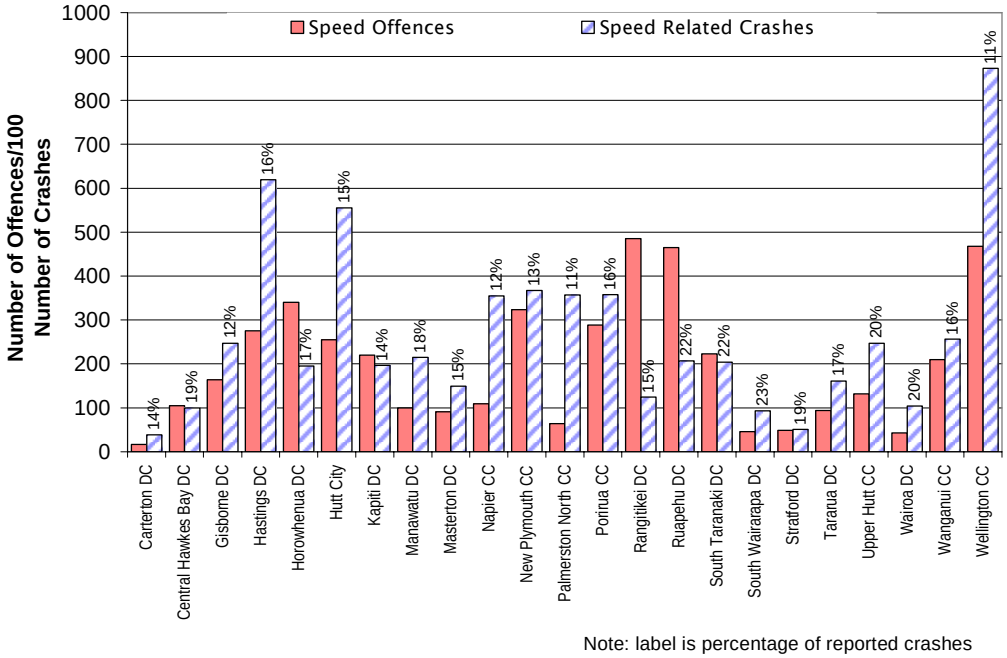


Figure 4.3: Speed Related Crashes and Offences by Local Authority 2003-2007

Speed enforcement rate by population seems significant high in the case of Rangitikei and Ruapehu districts, mainly due to significant length of State highways with major through traffic for relatively small populations in those districts.

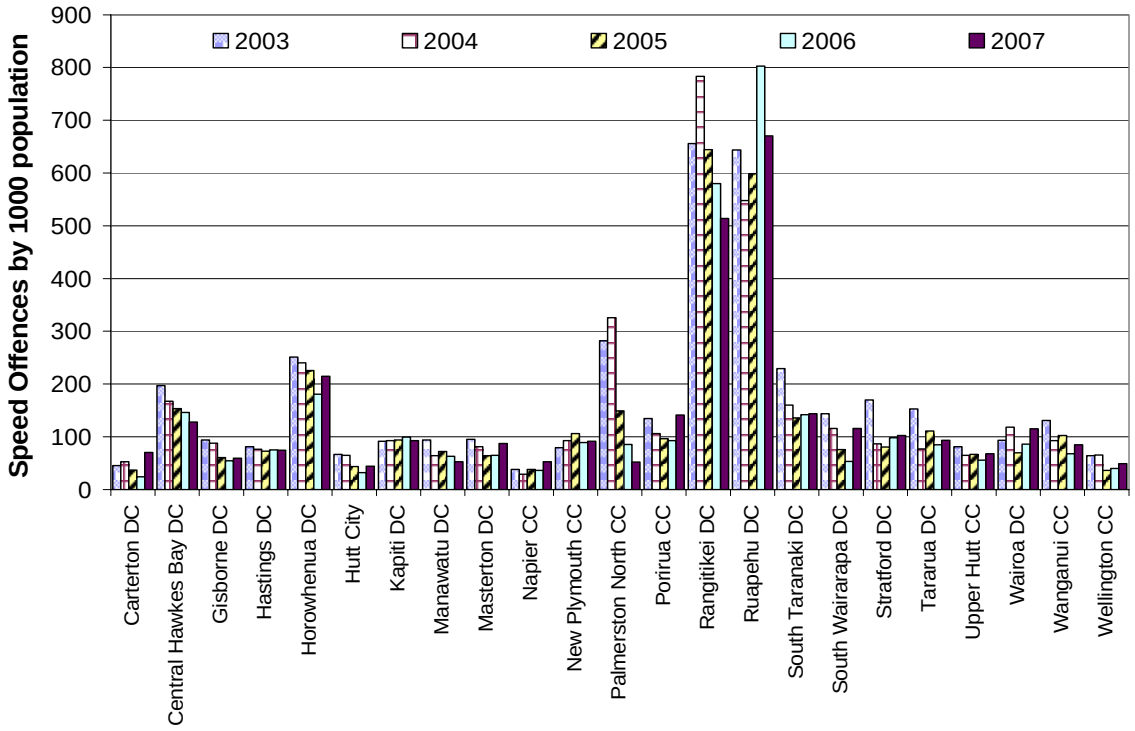


Figure 4.4: Speed Enforcement Rate by Population 2003-2007

4.3 Un-Licenced Driver Enforcement.

Un-licenced drivers are involved in 2% of the reported injury crashes across the Region, though they are not necessarily the driver at fault. As such enforcement of driver licence matters may revolve around known parties or be the result of a the investigation of specific incidents, however, 5 un-licenced driver offences are detected per 1000 population with a range from 3 to 18 across the Region. The majority of these offences are reported from the major urban areas of the Region.

No data was to hand in regards to other licensing enforcement, however, the data in Figure 4.7 indicates the licence categories of at fault drivers in injury crashes by RCA.

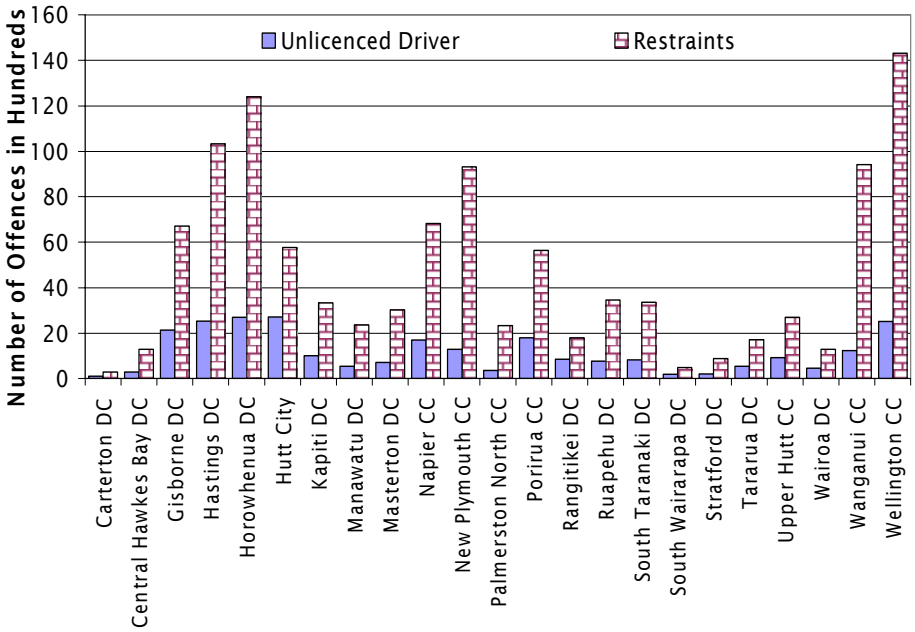


Figure 4.5: Unlicensed and Restraint Offences by RCAs (2003 - 2007)

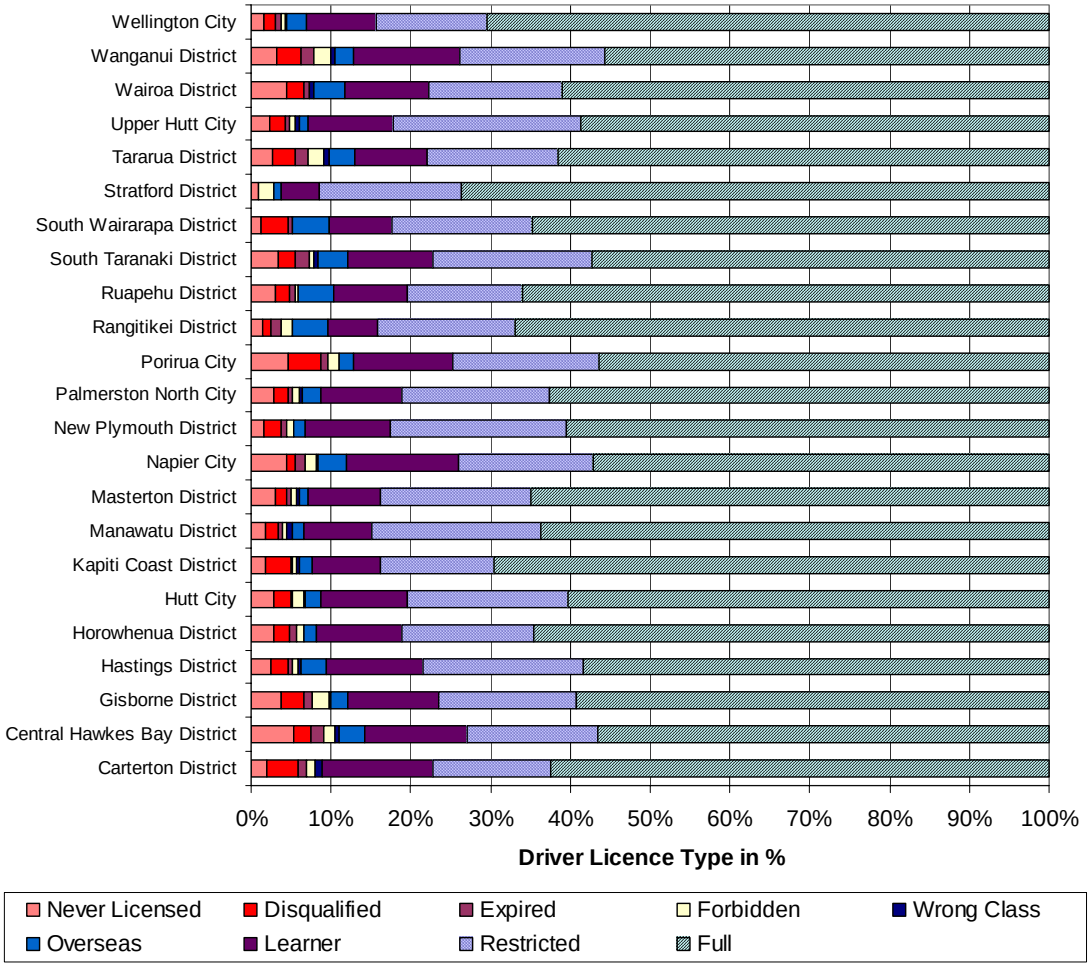


Figure 4.7 Licence Status of At Fault Drivers in Injury Crashes

4.4 Restraint Enforcement.

The use of restraints is surveyed by the Ministry of Transport who publish results that indicate greater than 90% usage of front seat belts, 85% usage of back seat belts and 90% usage of child restraints in the Region. Enforcement returns indicate that an average of 22 offences per 1000 population are being detected across the Region (range 8 to 80).

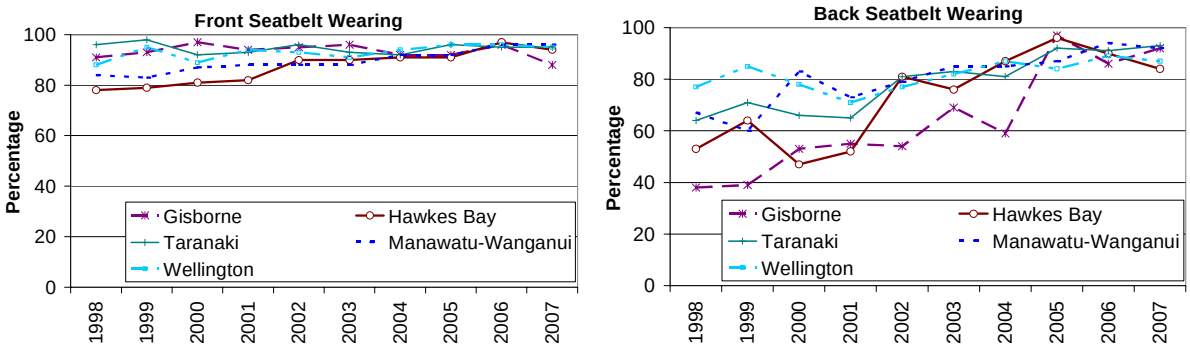


Figure 4.6a: Front and Back Seat Restraint Information

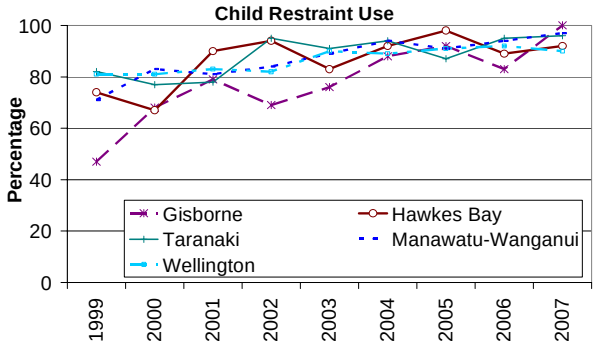


Figure 4.6b: Child Seat Restraint Information

The use of restraints does not easily translate into crash savings but may result in less serious consequences in the crash which seems to be indicated in the hospitalisation data (see 3.3 above).

5 SAFETY IMPROVEMENT ACTIVITIES

Various safety improvement activities undertaken in the Central Region, existing issues and opportunities are discussed in the section below.

5.1 Road Safety Action Plan

Road Safety Action Plans (RSAP) have been an effective tool for operational programming of the safety related activities. Road safety co-ordinators from RCAs, education advisors and area engineer from NZTA, as well as representatives from ACC and the Police attend the meetings related to RSAP.

More work is being undertaken to include performance measure to make it possible to monitor the progress of various activities undertaken. This would help over time to define the efficiency of the activities undertaken.

In recent years after establishment of earlier government transport authorities (Land Transport NZ [Land Transport Safety Authority, Transfund NZ]) leadership on planning of safety activities on local road networks has been gradually handed over to the representative of the territorial RCAs. This hand over will continue to be supported under the auspices of the NZTA, such that where some planning issues on safety related activities have surfaced, in a number of RCAs, they can be resolved.

5.2 Safety Activities

Various safety related activities are undertaken by RCAs including:

- Improvement of alignment and intersections
- Speed limit
- Adding signs and signals
- Road safety promotion

Data available in the CAS is utilised by the RCAs to identify the road sections and intersections with major issues, and NZTA also produces reports for the RCAs from the CAS data that assist in their formulation of road safety activities.

5.3 Deficiency Database and Prioritisation

The territorial RCAs are encouraged to have deficiency database with all the safety related issues identified. A simplified template for network level prioritising of the activities has been prepared by NZTA and is made available to RCAs. Not all the RCAs have implemented deficiency database and network level prioritising tools.

6 CONCLUSIONS

1. Crash data available in the CAS database shows that crashes as well as casualties, in Central Region, have increased in the last 5 years. Most of the increase in casualties have been resulted from urban crashes.
2. Movement category *Lost of control* is more prominent in the crashes in the rural area whereas *Crossing/turning*, *Pedestrian vs. Vehicle* and *Rear end/obstructions* are more predominant in the urban area. A lower percentage of the fatal and serious injury crashes in the total injury crashes occur in urban area in comparison with rural areas.
3. Among the vulnerable road users the number of cyclist and motorcyclist crashes are increasing while pedestrian incidents are steady.
4. Some evidence suggests that police enforcement has been uneven across the Region.
5. The percentage of crashes involving alcohol has been reducing in the last 10 years although no change in the number of crashes have been observed.
6. With gradual improvement in the last five years restraint use may have peaked and most probably can only stay at the same level in future.

7. The number as well as percentage of speed related crashes is increasing in Urban areas. In rural areas, a reduction in percentage of crashes has been observed but the number are steady over last five years.
8. Various safety improvement measures are in place. There are still some opportunities to improve the planning and implementation process.

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