

**New Zealand Injury Prevention Strategy**  
Rautaki Arai Whara o Aotearoa

December 2010

**A Chartbook of the New Zealand Injury Prevention  
Strategy Serious Injury Outcome Indicators  
for Children: 1994-2009**



**A Chartbook of the New  
Zealand Injury Prevention  
Strategy Serious Injury  
Outcome Indicators for  
Children:  
1994-2009**

**Pauline Gulliver  
Colin Cryer  
Gabrielle Davie**

*Injury Prevention Research Unit  
University of Otago*

*for the*

**New Zealand Injury Prevention Strategy Secretariat  
*Accident Compensation Corporation  
Molesworth Street  
Wellington  
New Zealand***

***Suggested citation***

Gulliver P, Cryer C, Davie G. A Chartbook of the New Zealand Injury Prevention Strategy Serious Injury Outcome Indicators for Children: 1994 – 2009. OR088 Injury Prevention Research Unit (University of Otago) Wellington: New Zealand Injury Prevention Strategy Secretariat, ACC.

Acknowledgements.....	iv
Foreword.....	v
Abbreviations.....	vi
Summary of the charts – key highlights of the chartbook .....	vii
Frequencies .....	vii
Age standardised rates .....	viii
Part 1: Background and Methods.....	1
1.1 The New Zealand Injury Prevention Strategy .....	2
1.2 What is a serious injury?.....	2
1.3 The indicators.....	3
1.4 What the chartbook comprises.....	3
1.5 Frequently Asked Questions.....	3
1.6 Interpretation of the charts.....	7
Part 2: The charts .....	8
2.1 All injury.....	9
2.2 Assault.....	12
2.3 Falls.....	13
2.4 Motor vehicle traffic crashes (MVTC) .....	15
2.4 Motor vehicle traffic crashes (MVTC) .....	15
2.4.1 Pedestrian.....	18
2.4.2 Car Occupant .....	19
2.5 Intentional (Assault and Self-Harm).....	20
References.....	22
Appendix: Tables .....	23

## Acknowledgements

This study was funded and supported by the [Accident Compensation Corporation](#), Wellington, New Zealand. The authors acknowledge [Analytical Services at the Ministry of Health](#) and [Statistics New Zealand](#) as sources of data used in the calculation of indicators presented in this chartbook.

## Foreword

Presented here is a chartbook of the New Zealand Injury Prevention Strategy serious injury outcome indicators for children aged 0-14 years. This is the third in a series of chartbooks. The development of the indicators on which they were based was described in the report:

Cryer C, Langley J, Stephenson S. Developing valid injury indicators. [A report for the New Zealand Injury Prevention Strategy. Injury Prevention Research Unit Occasional Report OR 049, Dunedin: University of Otago, September 2004](#)

The Chartbooks have been developed to provide a measure of New Zealand's progress in reducing the incidence and annual rates of injury since the introduction of the New Zealand Injury Prevention Strategy. The main foci of the Chartbooks are the charts. These charts provide a diagrammatic representation of the changes in the annual incidence and rates of injury, both overall and for each of the six New Zealand Injury Prevention Strategy priority areas. Because the charts are intended to be the main focus of the chartbooks, we have intentionally limited the description of the background and methods surrounding the development of these charts. For more technical detail, please refer to the "[The New Zealand Injury Prevention Strategy Serious Injury Outcome Indicators: Technical Report](#)"

## Abbreviations

ACC	Accident Compensation Corporation
Cryer 2004 report	Developing valid injury outcome indicators. A report for the New Zealand Injury Prevention Strategy.
ICD	WHO International Classification of Diseases
ICD-9	WHO International Classification of Diseases 9 <sup>th</sup> revision
ICD-9-CM	WHO International Classification of Diseases 9 <sup>th</sup> revision, Clinical Modification
ICD-10	WHO International Classification of Diseases 10 <sup>th</sup> revision
ICD-10-AM	WHO International Classification of Diseases 10 <sup>th</sup> revision, Australian Modification
ICISS	ICD-based Injury Severity Score
IPRU	Injury Prevention Research Unit, University of Otago, New Zealand
MoH	Ministry of health
MVTC	Motor Vehicle Traffic Crashes
NMDS	Ministry of Health National Minimum Data Set of hospital discharges
NZIPS	New Zealand Injury Prevention Strategy
StatsNZ	Statistics New Zealand
SRR	Survival Risk Ratio
WHO	World Health Organisation

## Summary of the charts – key highlights of the chartbook

Below is a summary of the overall changes from baseline in the frequency and age standardised rates of serious non-fatal injury and death for ‘all injury’ and four of the six NZIPS priority areas. In response to a request from SafeKids, indicators have also been produced for car occupant and pedestrian injuries.

### Frequencies

The frequency of injury details the number of fatalities or hospitalisations resulting from injury, thereby describing the impact of injury on society.

Injury Area	Fatal trends to 2007	Serious non-fatal trends to 2009	Serious (fatal and non-fatal) trends to 2007
<a href="#"><u>All injury</u></a>	I11: No evidence of change from baseline of around 100.	I01: No evidence of a change from baseline of around 800 per year.	I21: No evidence of a change from baseline of around 880 serious injuries per year.
<a href="#"><u>Assault</u></a>	No indicators presented	No indicators presented	A21: No evidence of a change from baseline
<a href="#"><u>Falls</u></a>	No indicators presented	F01: Weak evidence of an increase from baseline in 2009.	F21: No evidence of a reduction from baseline in 2006 and 2007.
<a href="#"><u>MVTC</u></a>	M11: No evidence of a change from baseline in 2006.	M01: No evidence of a change from baseline in 2009.	M21: No evidence of a change from baseline in 2007.
<a href="#"><u>Pedestrian</u></a>	No indicators presented	No indicators presented	P21 (provisional indicators): No change from baseline.
<a href="#"><u>Car Occupant</u></a>	No indicators presented	No indicators presented	C21 (provisional indicators): No detectable change from baseline in 2006.
<a href="#"><u>Intentional</u></a>	No indicators presented	In01: Evidence of an increase from baseline in the 2008 estimate.	In21: Weak evidence of an increase from baseline in the 2006 estimate.



## Age standardised rates

Age standardised rates provide an estimate of an individuals' average annual risk of being injured.

Injury Area	Fatal trends to 2007	Serious non-fatal trends to 2009	Serious (fatal and non-fatal) trends to 2007
<u>All injury</u>	I12: No evidence of a change from baseline.	I02: No evidence of a change from baseline in 2009	I22: Weak evidence of a decrease from baseline in 2007.
<u>Assault</u>	No indicators presented	No indicators presented	A22: No evidence of a change from baseline.
<u>Falls</u>	No indicators presented.	F02: No change from baseline in 2009.	F22: Evidence of a reduction in 2004 and 2005; no change from baseline in 2007.
<u>MVTC</u>	M12: No evidence of a change from baseline in 2006.	M02: No evidence of a change from baseline in 2009	M22: No evidence of a change from baseline in 2007.
<u>Pedestrian</u>	No indicators presented	No indicators presented	P22 (provisional indicator): No evidence of a change from baseline.
<u>Car Occupant</u>	No indicators presented	No indicators presented	C22 (provisional indicator): No change from baseline in the 2006 estimate.
<u>Intentional</u>	No indicators presented	In02: Clear evidence of an increase from baseline in the 2008 estimate.	In22: Weak evidence of an increase in the 2006 estimate.

# **Part 1: Background and Methods**

## 1.1 The New Zealand Injury Prevention Strategy

The [New Zealand Injury Prevention Strategy \(NZIPS\)](#) is an expression of the Government's commitment to working with organisations and groups in the wider community to improve the country's injury prevention performance.

The broad structure of the Strategy includes a vision, principles, goals, objectives and actions. The vision is "a safe New Zealand, becoming injury free", which is supported by two goals:

- to achieve a positive safety culture, and
- to create safe environments.

Ten key objectives are identified which are designed to address the vision and goals of NZIPS. (For further details see [www.nzips.govt.nz](http://www.nzips.govt.nz).)

Six priority areas are referred to in the objectives and actions. These priority areas are:

- Assault,
- Workplace injuries,
- Suicide and deliberate self harm,
- Falls,
- Motor vehicle traffic crashes, and
- Drowning and near-drowning.

Serious injury outcome indicators, that include fatal, serious non-fatal and serious (fatal and serious non-fatal) injury indicators, have been developed for these areas as the main means of measuring performance in reducing injury. This chartbook presents an adaptation of the [NZIPS serious injury indicators](#) for children aged 0-14 years, for four of these priority areas covering the period 1994-2009. Workplace injuries, drowning and near drowning have been excluded, see section 1.5. Assault has been considered on its own, as well as in combination with intentional self harm to produce "Intentional" injury indicators (see section 1.5, "*Why aren't all priority areas covered in this Chartbook*").

## 1.2 What is a serious injury?

Serious injuries were those that resulted in death, or an admission to hospital that was associated with at least a 6% chance of death (serious non-fatal injury). Amongst first discharges from hospital (i.e. excluding those who are readmitted for the same injury) with a primary diagnosis of injury, approximately 5% of children aged 0-14 years have at least a 6% chance of death. The methods by which cases of fatal and serious non-fatal injury were identified are described briefly in the accompanying [Technical Report](#).

### 1.3 The indicators

The development of the NZIPS indicators is described in the Cryer 2004 [report](#)<sup>1</sup>.

The NZIPS fatal and serious non-fatal injury indicators are one of the key indicators to measure the Strategy's progress and impact. In April 2010, lead agencies for the six NZIPS priority areas signed a 'Protocol for government agency reporting on serious injury' (developed by Statistics NZ) which ensures that lead agencies adopt consistent, high level injury measures when reporting on injury trends.

The high threshold of 6% or greater threat to life used to define serious non-fatal injury, described above, was chosen for the non-fatal injury indicators to reduce the likelihood of producing misleading time trends. For discussion and illustration of this point, see the Cryer 2004 report<sup>1</sup>.

The detailed methods used to produce the charts in this chartbook and the indicator specifications are presented in the accompanying [Technical Report](#). These methods and specifications have been adapted from those presented in the Cryer 2004 [report](#)<sup>1</sup>.

### 1.4 What the chartbook comprises

Part 2 presents the charts for the NZIPS fatal and serious non-fatal injury indicators for children 0-14 years for 'all injury', for four priority areas, and for the additional areas of car occupant and pedestrian injury. Each chart contains a baseline to allow for comparisons over time (see section 1.5 for an explanation of how to interpret the charts). These charts speak largely for themselves, and so only a brief commentary is provided for each. The figures from which the charts are derived have been reproduced as Appendices at the end of this document.

### 1.5 Frequently Asked Questions

*Q What are the validated NZIPS serious injury indicators for all injury?*

**A** The validated<sup>a</sup> NZIPS fatal, serious non-fatal injury, and serious (fatal and non-fatal) indicators for 'all injury' are as follows:

- Frequency of injury deaths
- Age-standardised injury mortality rate, per 100,000 person-years at risk
- Frequency of serious non-fatal injuries
- Age-standardised serious non-fatal injury incidence rate, per 100,000 person-years at risk

---

<sup>a</sup> The terms 'validity' and 'validated' refer to the extent that the indicators measure what they are intended to measure (incidence of injury) rather than measuring other factors that may influence injury (admission criteria, funding, hospital policies etc)

- Frequency of serious (fatal and non-fatal) injuries
- Age-standardised serious (fatal and non-fatal) injury incidence rate, per 100,000 person years at risk.

Age standardisation is a process of adjusting the rates of injury to account for changes in the age structure of a population over time. It allows comparison of the rates of injury from one year to another, taking into account changing population structure.

The methodology for the derivation of the NZIPS fatal, serious non-fatal and serious (fatal and non-fatal) injury indicators for the priority areas included in this Chartbook are based on those for ‘all injury’ (refer [‘Technical Report’](#) for more detail).

*Q Why is there a serious (fatal and non-fatal) injury indicator?*

**A** We have supplemented the original NZIPS fatal and serious non-fatal injury indicators with “serious injury indicators”, for which the numerators are the sum of the relevant fatal and the serious non-fatal injury indicators – see the Technical Report. The reason for including these additional indicators is as follows. Where there is a decline in the rates or numbers of fatal injury, one explanation could be improved case-fatality rates, eg. improved emergency medical systems resulting in more cases of serious injury surviving than before. If this is the case, then there would be a shift of cases from the fatal category to serious non-fatal. In order to present a more complete picture, the trends in serious injury (fatal and serious non-fatal injury) have also been presented.

*Q What data are the indicators based on?*

**A** All of the child indicators are based on the Ministry of Health’s Mortality Collection<sup>2</sup> and National Minimum Data Set (NMDS)<sup>3</sup> of hospital inpatient data.

*Q What do the frequencies and rates reflect?*

**A** Frequencies reflect the societal burden of injury<sup>b</sup>, while rates reflect individual risk of being injured.

*Q Why are there provisional indicators?*

**A** Where valid indicators could not be identified, provisional indicators were developed (see Cryer 2004 report)<sup>1</sup>. The provisional serious injury indicators were candidate NZIPS indicators, but had some identifiable threats to validity. In these cases it was considered that the count of injuries based on the data available could be impacted by factors such as reporting behaviour (people being more willing to report the true cause of an injury because of an increased awareness) or monitoring behaviour (more cases being identified because of increased policing, or a cause of injury becoming more of a public health priority).

---

<sup>b</sup> In this context, the societal burden of injury is considered to be related to the number of deaths and hospitalisations associated with injury. The majority of injury discharges from hospitals in New Zealand are publicly funded. For 2002 it was estimated that 99% of all hospital injury discharges were publicly funded.

Prior to the 2010 update of the Chartbook, the serious non-fatal assault and self-harm indicators were considered provisional. However, in an investigation conducted in 2009, it became apparent that there had been no detectable change in the way either assault or self-harm was captured or recorded in the NMDS between 2001 and 2007. As a result, the provisional status for these indicators has been removed.

*Q What is the period presented in the charts?*

**A** Wherever possible, the period presented for serious non-fatal injuries is 1994 to 2009. For fatal injuries, the period presented is 1994 to 2007. Because many cases of injury related death are required to be reviewed by a Coroner, there is a time delay in the recording of the cause of fatal injury. Hence, 2007 is the most recent year available for the mortality data.

*Q What is the coding scheme used for diagnosis of injury?*

**A** The coding system used for classifying injury diagnosis and cause of injury in the Mortality Collection and NMDS is the World Health Organisation (WHO) International Classification of Diseases (ICD)<sup>4</sup>. During the period considered in these charts, the ICD was substantially revised, and a new version of the coding scheme was introduced (from ICD-9 to ICD-10, refer Technical Report). This change has resulted in differences in the number of deaths and hospitalisations attributable to injury<sup>5</sup>. That is, it is apparent that, for some of the charts, the years before 1999 cannot be compared with the years after 1999.

Readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data. Accordingly, the commentary will focus on the trends since the implementation of the newest revision ICD-10, ie. from the year 2000 onwards.

*Q Why include the years before 2000 in the charts, given that commentary is only provided from 2000 onwards?*

**A** For some of the priority areas, the effect of the changeover is discernable, in others it is not. Since the effects vary for each priority area, we have elected to present the whole of the period from 1994 onwards and let the reader make their own judgments about trends in the period before 2000, and their relevance to the trends from 2000 onwards.

*Q Why aren't all priority areas covered in this chartbook?*

**A** As this Chartbook is produced specifically to report trends in injury frequencies and rates for children aged 0-14 years, for workplace injuries, drowning and near drowning there were insufficient numbers of cases to permit the calculation of indicators with acceptable levels of precision. Due to small numbers of cases, two priority areas, 'Assault' and 'Intentional Self-Harm', have been combined into one 'Intentional' indicator. Following input from SafeKids, two additional traffic related indicators, not present in the All Population Chartbook have been included for children. Both of these indicators are subsets of motor vehicle traffic crashes; pedestrian injuries and car occupant injuries. Indicators presented in this report, for which there were considered to be adequate numbers, are shown in Table 1 below:

**Table 1: Indicators for children aged 0-14 years**

Area	Fatals	Serious non-fatals	Serious (fatal + non-fatal)
All injury	✓	✓	✓
Assault	X	X	✓
Work related	X	X	X
Intentional self-harm	X	X	X
Falls	X	✓	✓
Motor vehicle traffic crashes	✓	✓	✓
Pedestrian	X	X	✓
Car occupant	X	X	✓
Drowning and near drowning	X	X	X
Intentional (assault and self-harm combined)	X	✓	✓

✓ = number of cases per year makes the indicators viable

X = small numbers of cases makes the indicators non-viable

**Q** What is the significance of the various colours used in the charts?

**A** The colours used in the charts have been chosen in order to signal the different status of the indicators (NZIPS compared with provisional), as well as the data used to generate the bars in the charts (ICD-9 vs ICD-10 coded data).

- Blue: NZIPS fatal, serious non-fatal and serious (fatal and non-fatal) injury indicator (ICD-9).
- Green: NZIPS fatal, serious non-fatal and serious (fatal and non-fatal) injury indicator (ICD-10).
- Light brown: Provisional fatal, serious non-fatal and serious (fatal and non-fatal) indicator (ICD-9).
- Brown: Provisional fatal, serious non-fatal and serious (fatal and non-fatal) injury indicator (ICD-10).

An intermediate colour (teal) was used for the bars for 1999 for indicators based on hospitalisation data, because 1999 was a transitional year when both ICD-9 and ICD-10 coding systems were used.

**Q** Why are some of the injury indicators presented as a 3-year moving average? What does this mean?

**A** For some of the fatal, serious non-fatal and serious (fatal and non-fatal) injury indicators, the numbers attributable to specific causes of death or morbidity, fall below 100 per year. In these instances, the numbers fluctuate substantially on a year-to-year basis. Such fluctuations may hide trends in the numbers and rates of injury. In order to overcome this effect, three year moving averages have been estimated. This means, for example, that data from 1994, 1995 and 1996 are used to estimate an indicator value for 1995. Consequently, for the serious non-fatal injury indicators and the serious (fatal and non-fatal) injury indicators, when using 3-year moving averages, the indicator values for 1998 (which use data from 1997, 1998 and 1999), 1999 (which use data from 1998, 1999 and 2000) and 2000 (which uses data from 1999, 2000, and 2001) are presented using an intermediate colour as they are based on both ICD-9 and ICD-10 coded hospitalisation data. For the fatal injury indicators, when using 3-

year moving averages, the indicator values for 1999 (which use data from 1998, 1999 and 2000) and 2000 (which uses data from 1999, 2000, and 2001) are presented using an intermediate colour as they are based on both ICD-9 and ICD-10 coded mortality data (ICD9 in 1998 and 1999, ICD10 in 2000 and 2001). For similar reasons, the final years presented in this Chartbook for indicators based on moving averages are: mortality – 2006; serious non-fatal – 2008; serious – 2006.

*Q What is the ‘baseline’?*

**A** The ‘baseline’ (horizontal line half way up the graphs) provides a point from which to compare the frequencies and rates of injuries. It is the average count or rate of injury for the three years leading up to the launch of NZIPS (2001-2003). For those indicators where moving averages were used, the baseline is the average count or rate of injury for the five years closest to the launch of NZIPS (2000-2004). The line has been extended across the graphs to provide an easy point of reference for the description of any injury trends. It is this line on which the commentary in this chartbook is based.

*Q What are the red lines shown on the graphs and what do these mean?*

**A** Each bar on each chart has confidence intervals shown in red. These give an indication of the amount of random variation associated with a single year’s indicator value. Narrow confidence intervals indicate little random variability; wide confidence intervals indicate a large amount of random variability. Where wide confidence intervals are displayed, little weight should be given to the variation from one year to the next – it could be due to chance alone.

Confidence intervals are useful when gauging change from one point to another. They may also be useful when examining the frequency or rate of injury in a given year. When considering trends, the amount of overlap of the confidence intervals for individual years is important. Confidence intervals that do not overlap from one year to another are indicative of a change. Similarly, confidence intervals that do not overlap the baseline (the years immediately preceding the baseline) are indicative of a change from baseline that is unlikely to be due to chance alone.

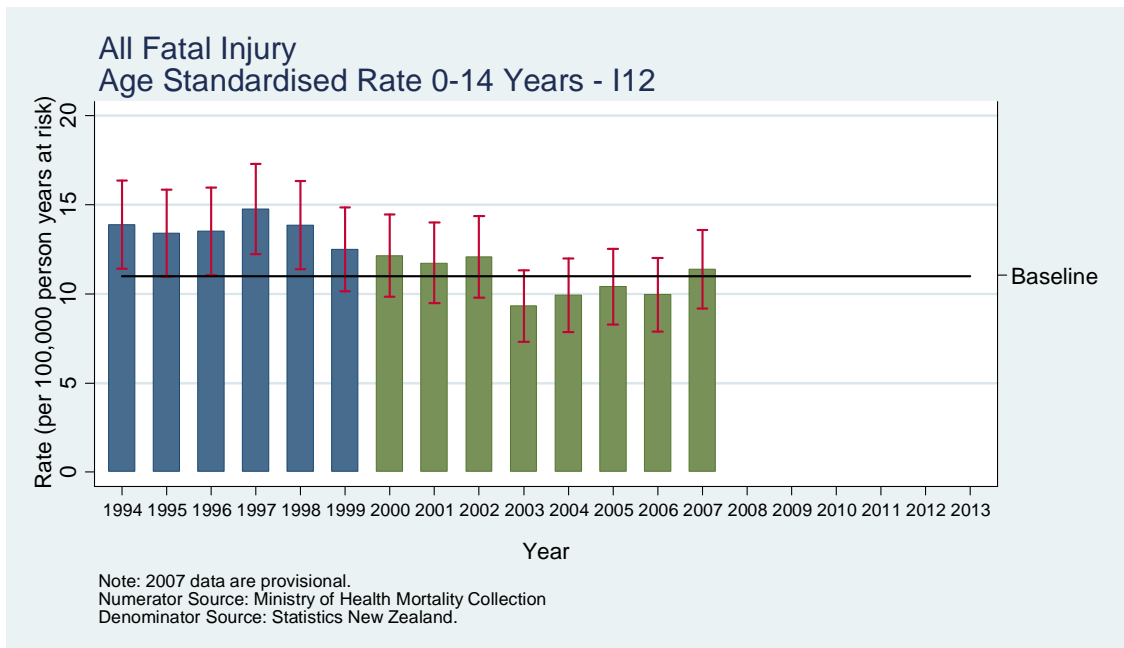
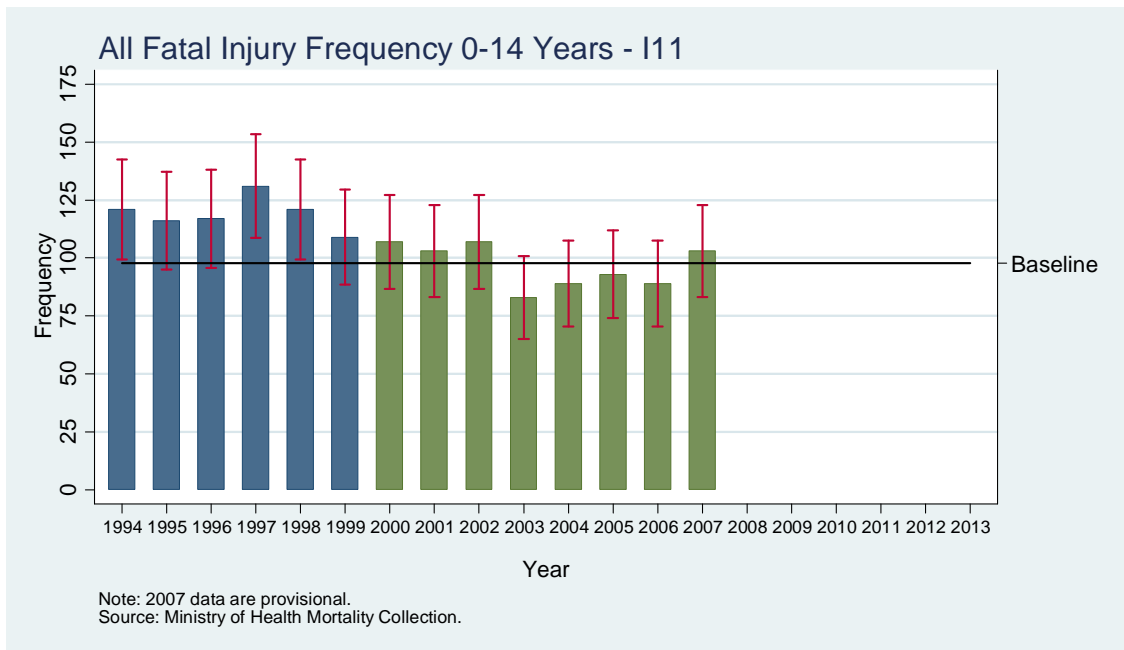
## **1.6 Interpretation of the charts**

Brief comments on each chart are provided at the foot of each page in Part 2. The interpretations provided are based on a visual inspection (as opposed to formal statistical trend analysis). Within a chart, where the confidence limits do not overlap the baseline, this is indicative of a change from baseline that is unlikely to be due to chance alone. This is likely to represent a real change unless some threats to validity of the indicator have been identified.

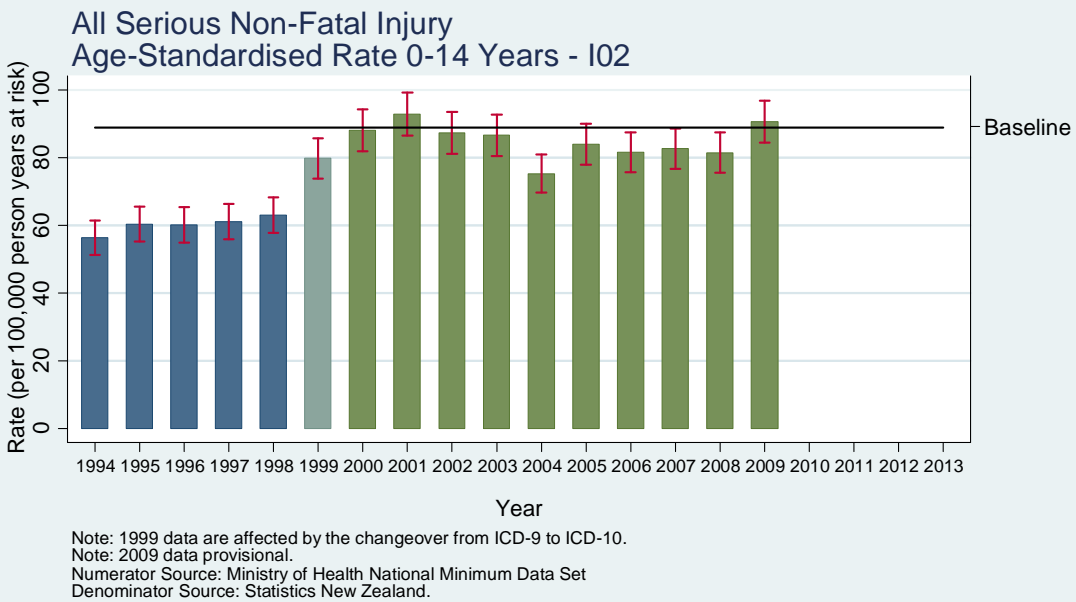
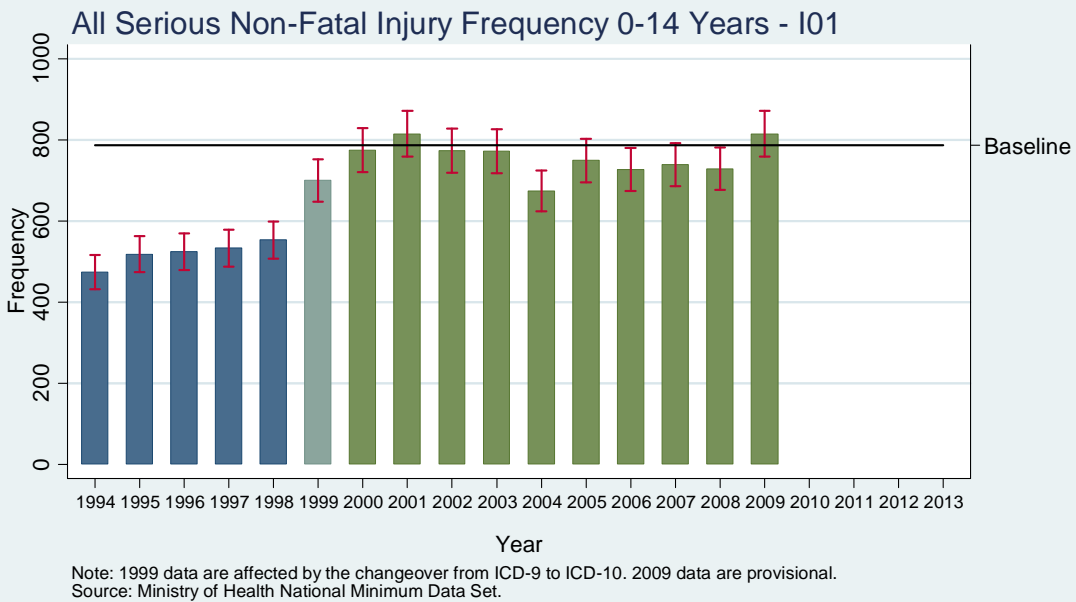


## **Part 2: The charts**

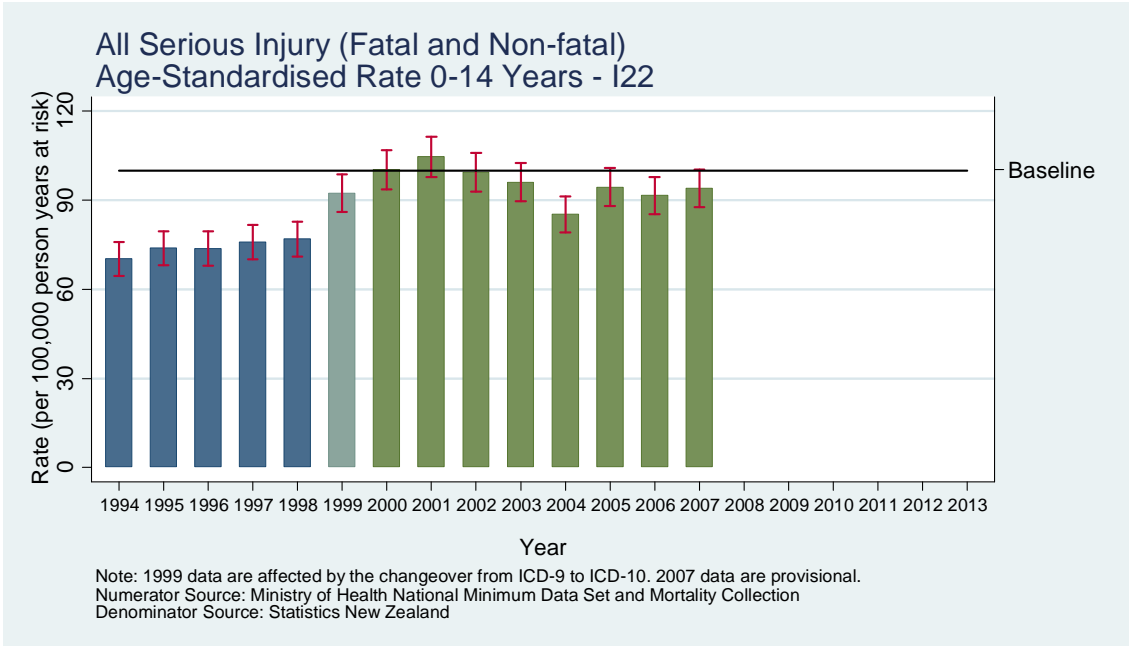
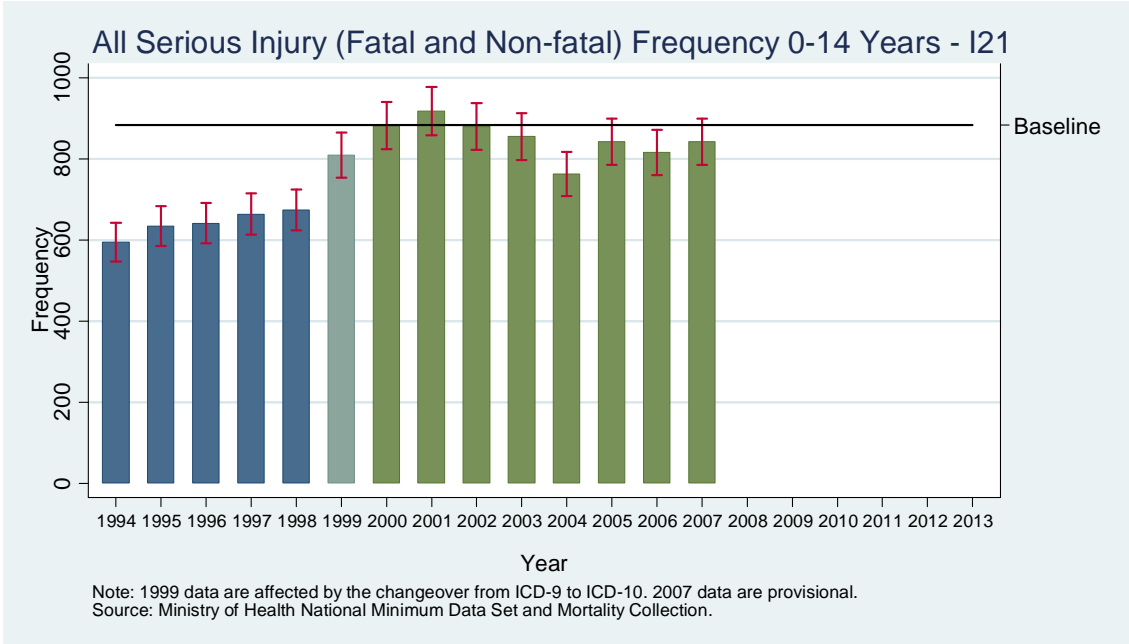
## 2.1 All injury



There is no evidence of a change from baseline in either the frequencies (I11) or rates (I12) of fatal injury for children.

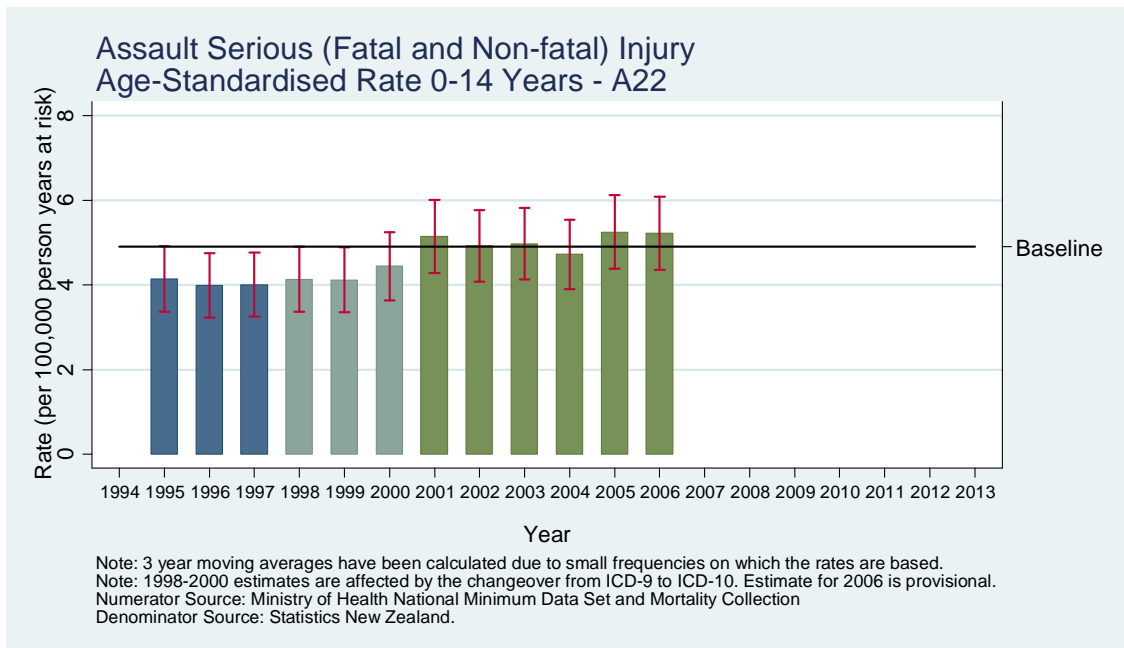
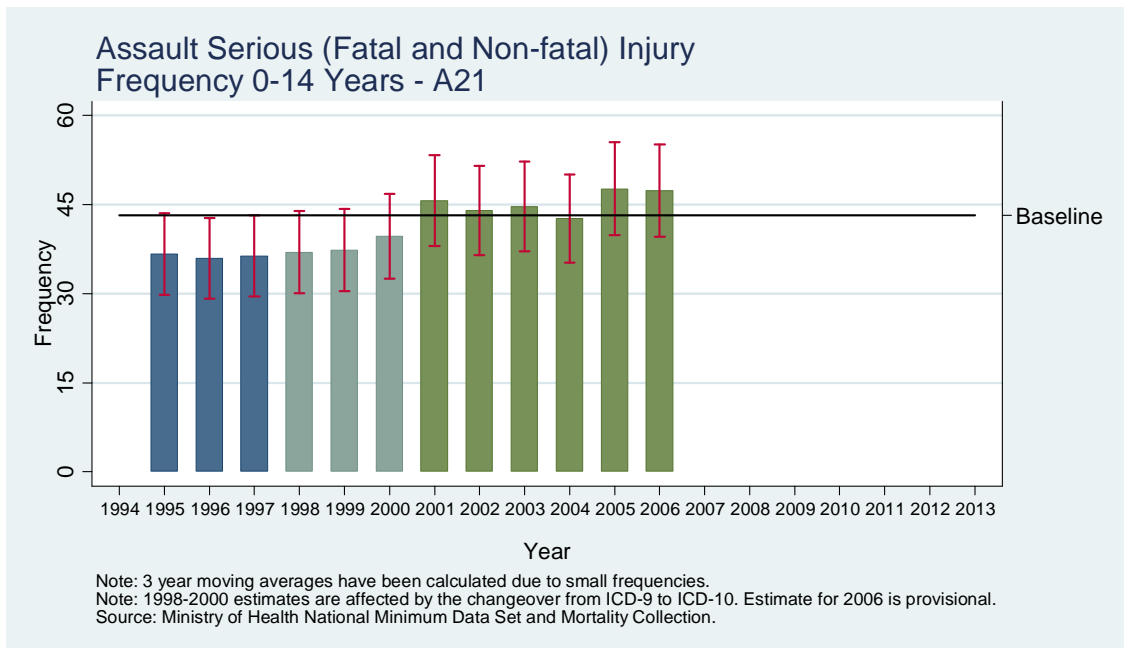


For 2009, there is no evidence of a change from baseline in the annual frequencies (I01) and rates (I02) of serious non-fatal injury for children.



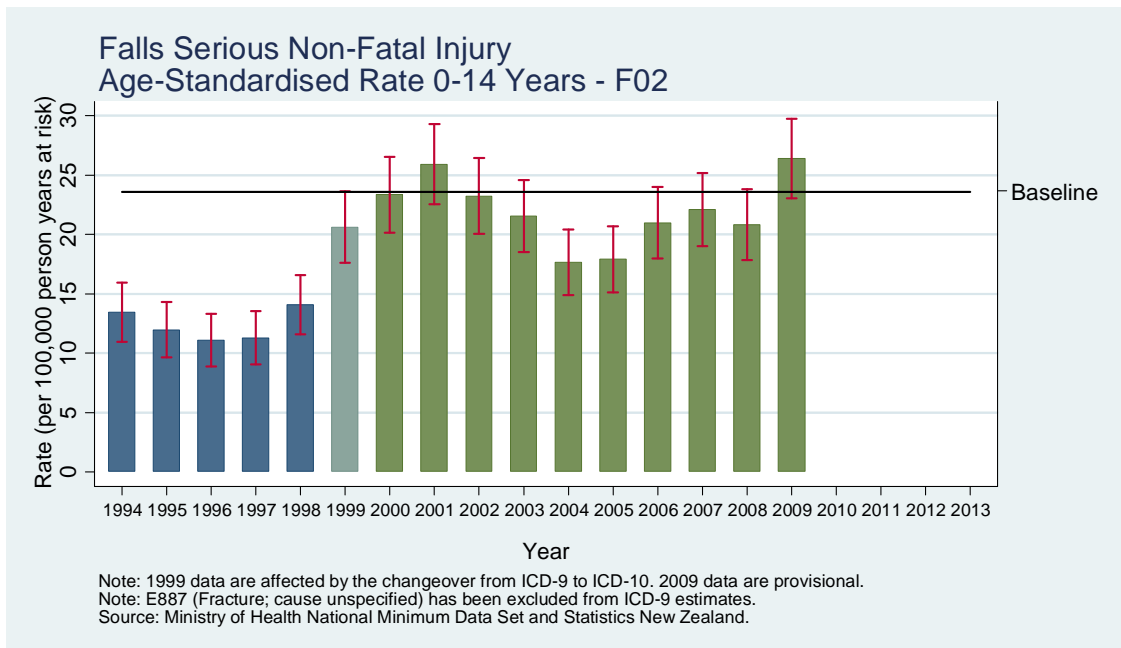
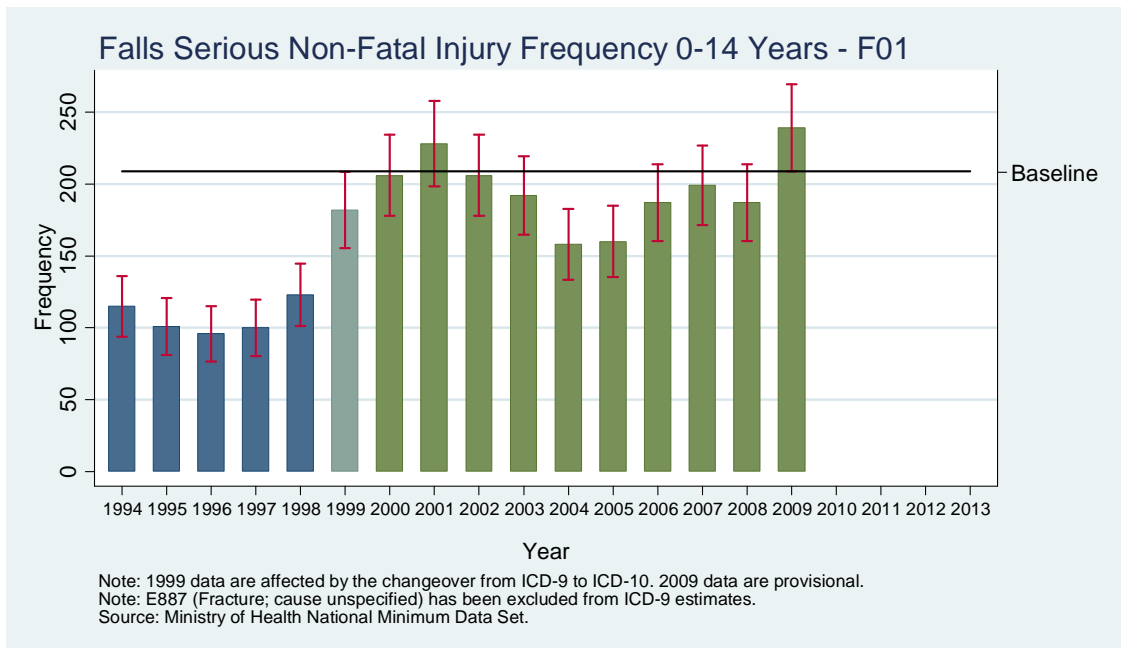
The frequencies (I21) and rates (I22) of serious (fatal and non-fatal) injury for children are variable. There is no evidence of a change in the frequencies from baseline in 2007, but there is weak evidence of a decrease in the rates from baseline.

## 2.2 Assault

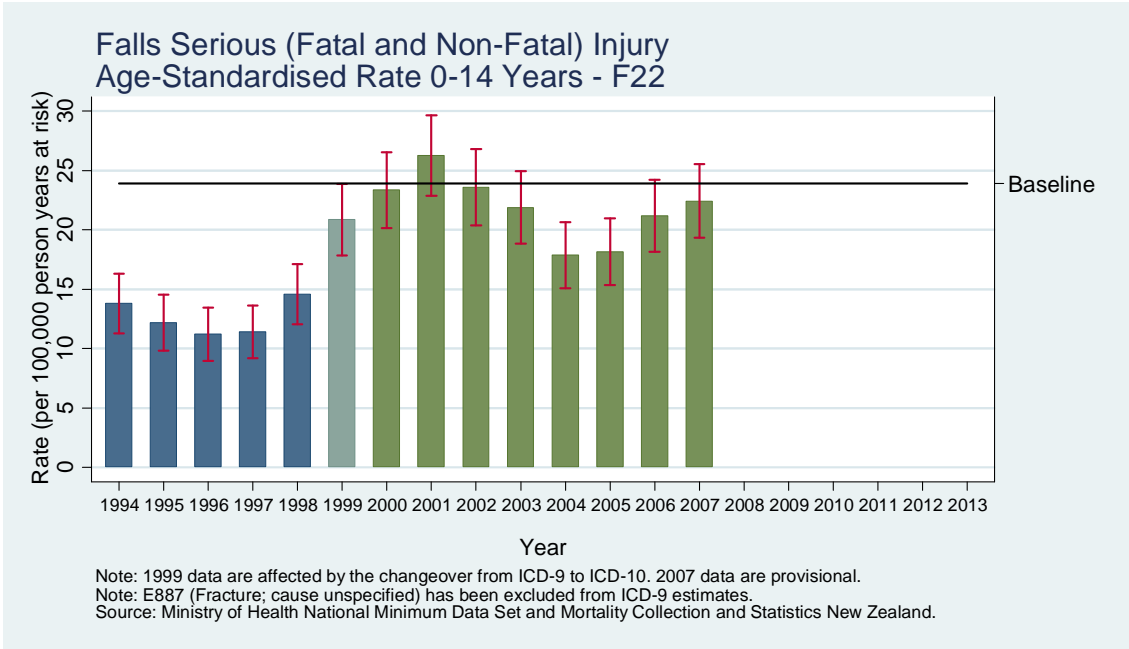
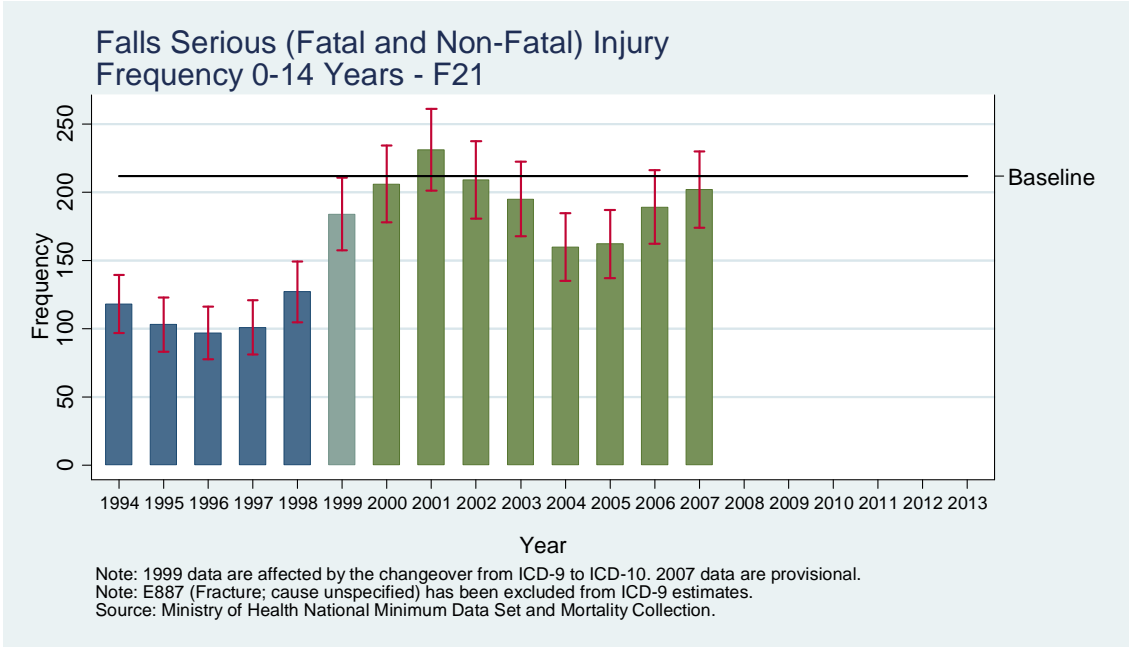


For children, there has been no obvious change in the frequencies (A21) and rates (A22) of serious (fatal and non-fatal) assaultive injuries since 2000.

## 2.3 Falls

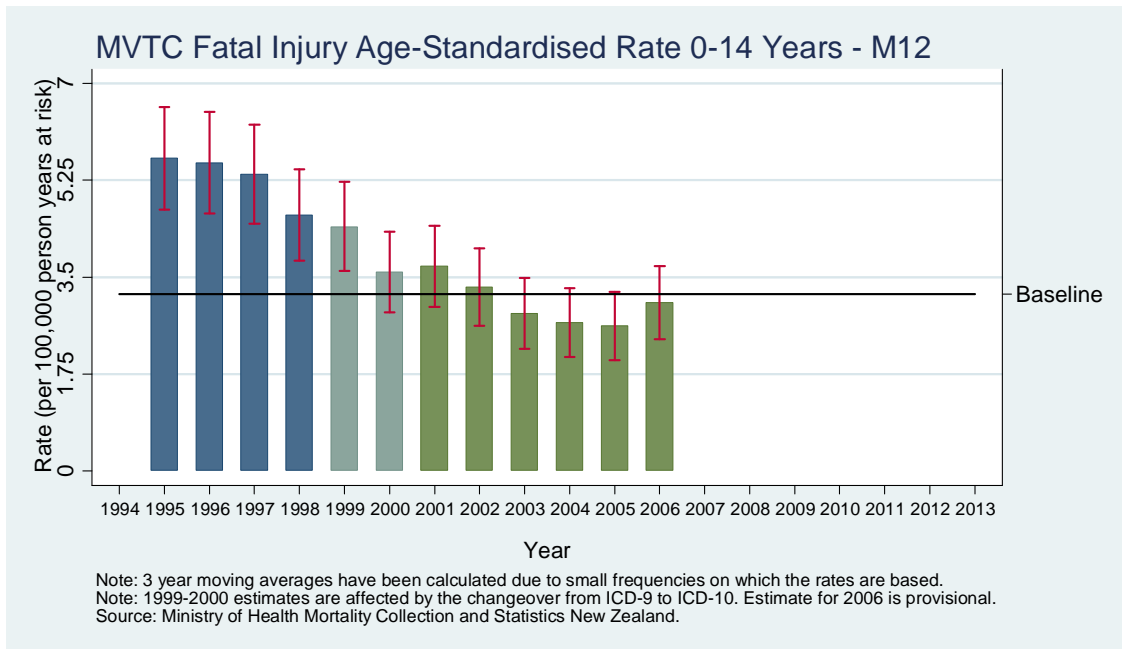
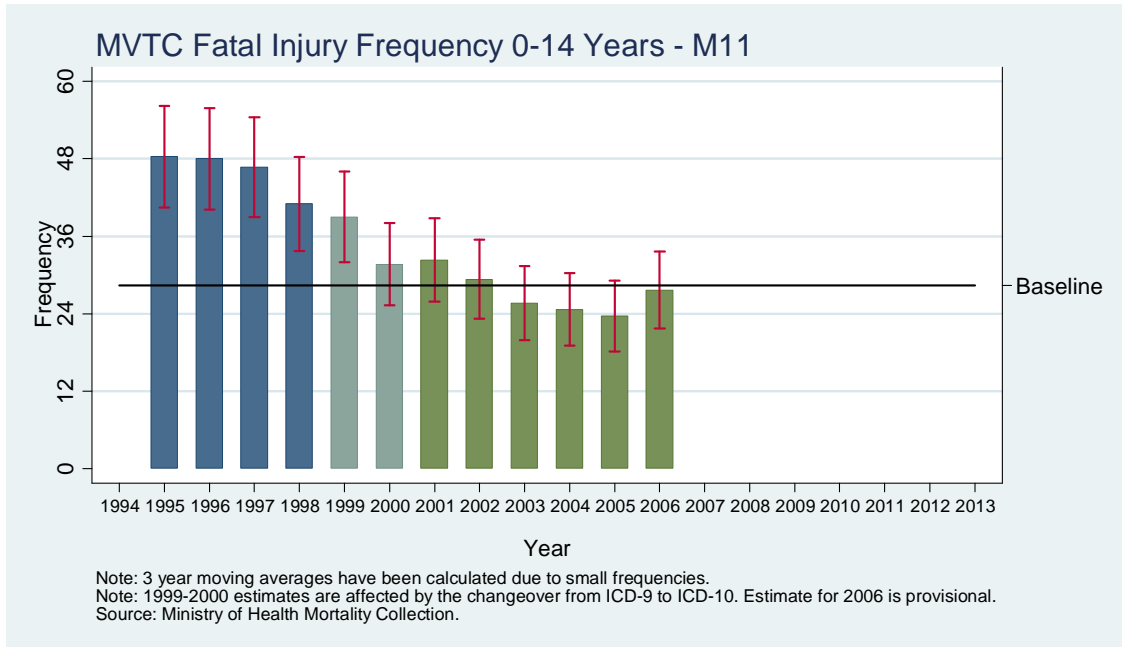


For children, there was clear evidence of a reduction from baseline in the frequencies (F01) and rates (F02) of serious non-fatal falls in 2004 and 2005. Since that time the annual frequencies and rates have increased. In 2009, there was weak evidence of an increase from baseline in the frequency of serious non-fatal falls.



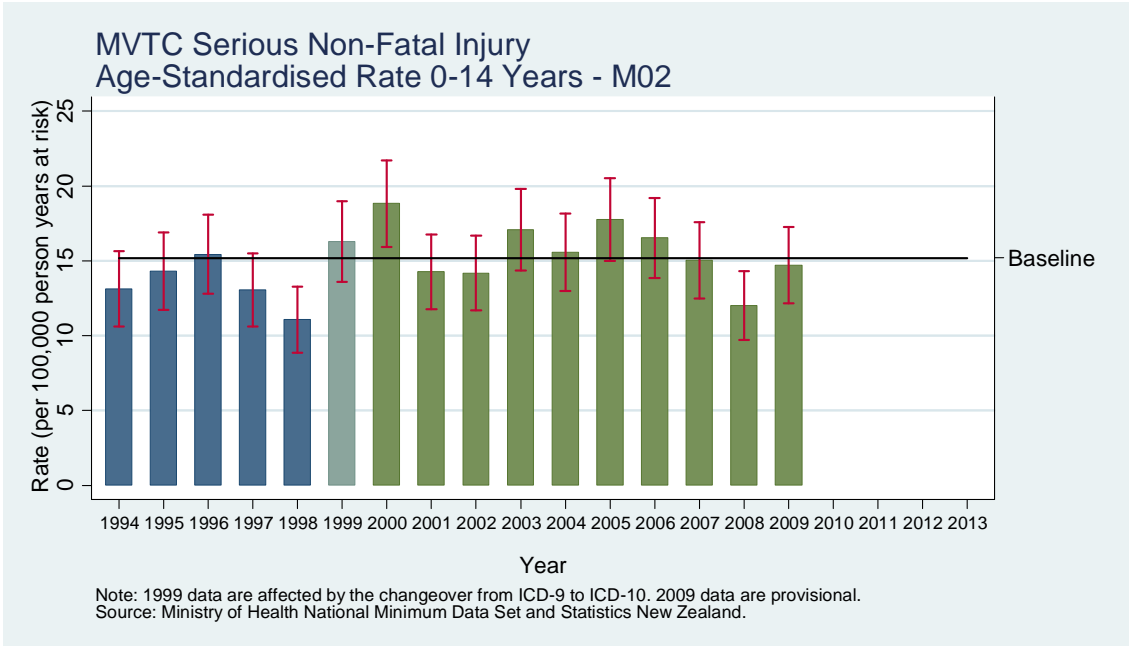
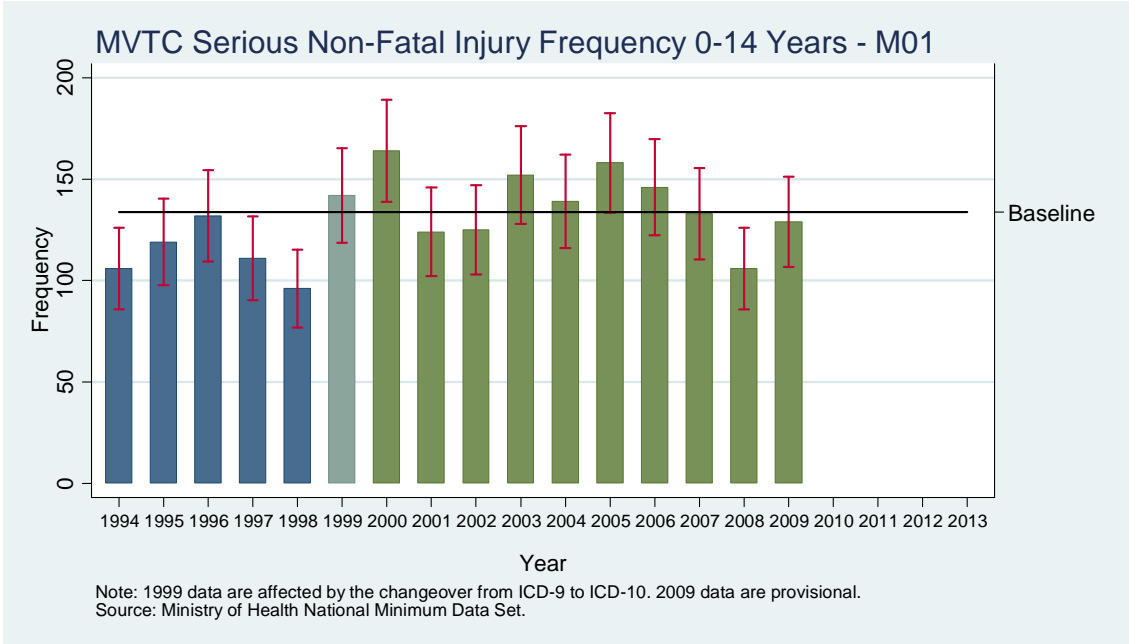
For children, there was clear evidence of a reduction from baseline in the frequencies (F21) and rates (F22) of serious falls in 2004 and 2005 but not in 2006 and 2007.

## 2.4 Motor vehicle traffic crashes (MVTC)

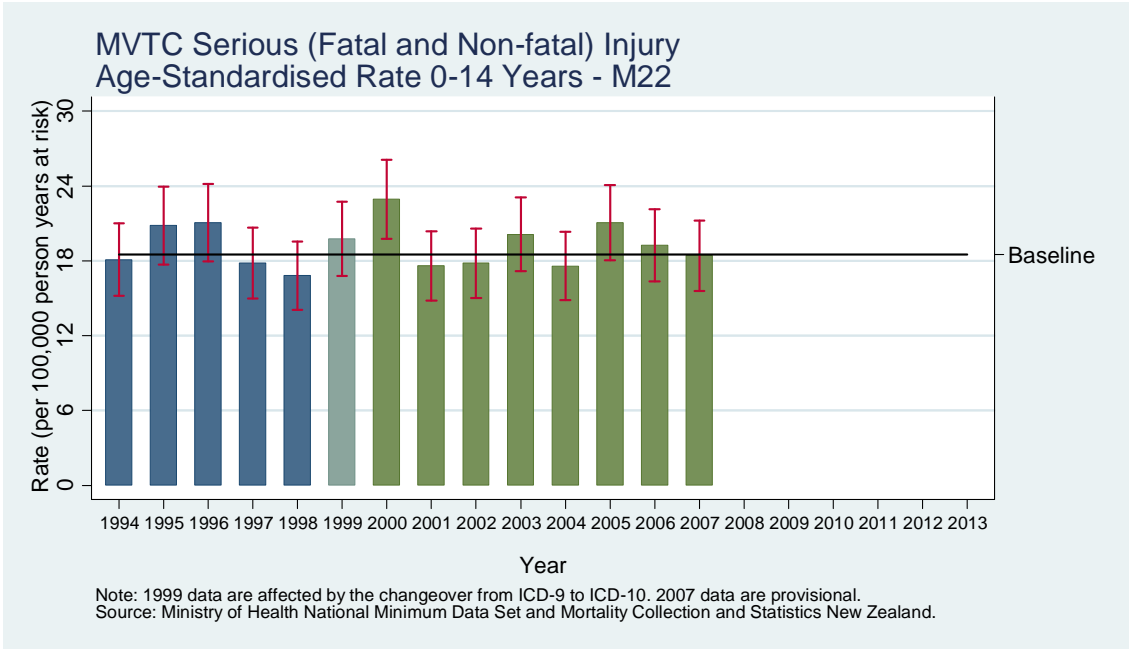
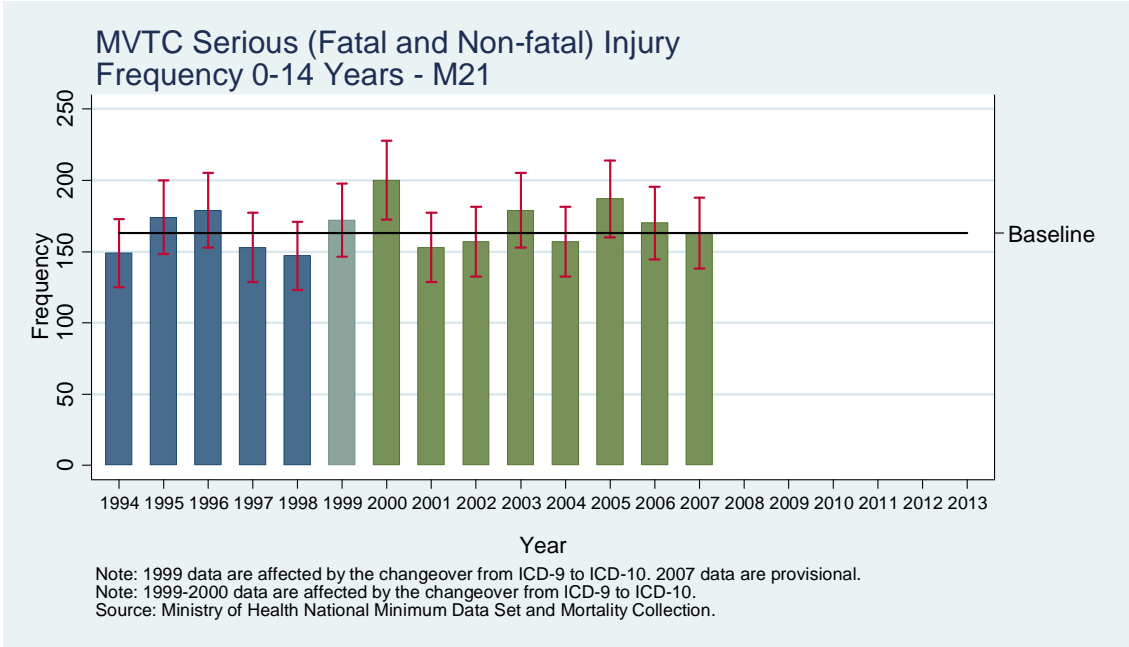


Until 2005, there was a consistent reduction in the frequencies and rates of fatal MVTC injuries in children. The 2006 estimates for the frequency (M11) and rate (M12) of fatal MVTC injuries for children aged 0-14 years provide no evidence of a reduction from baseline.



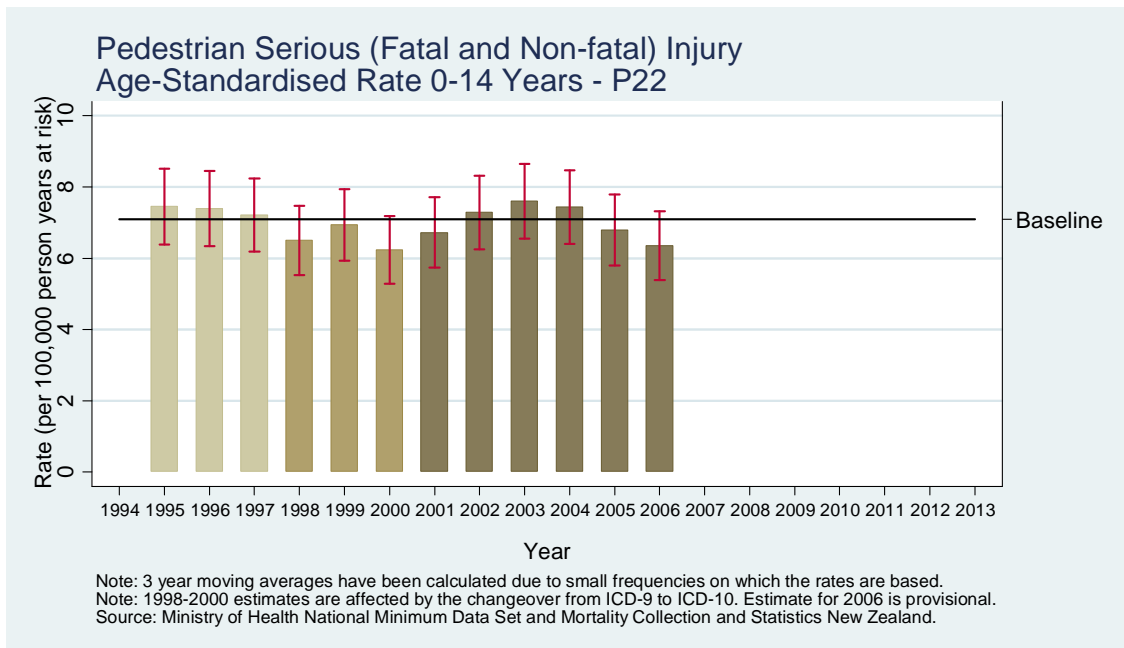
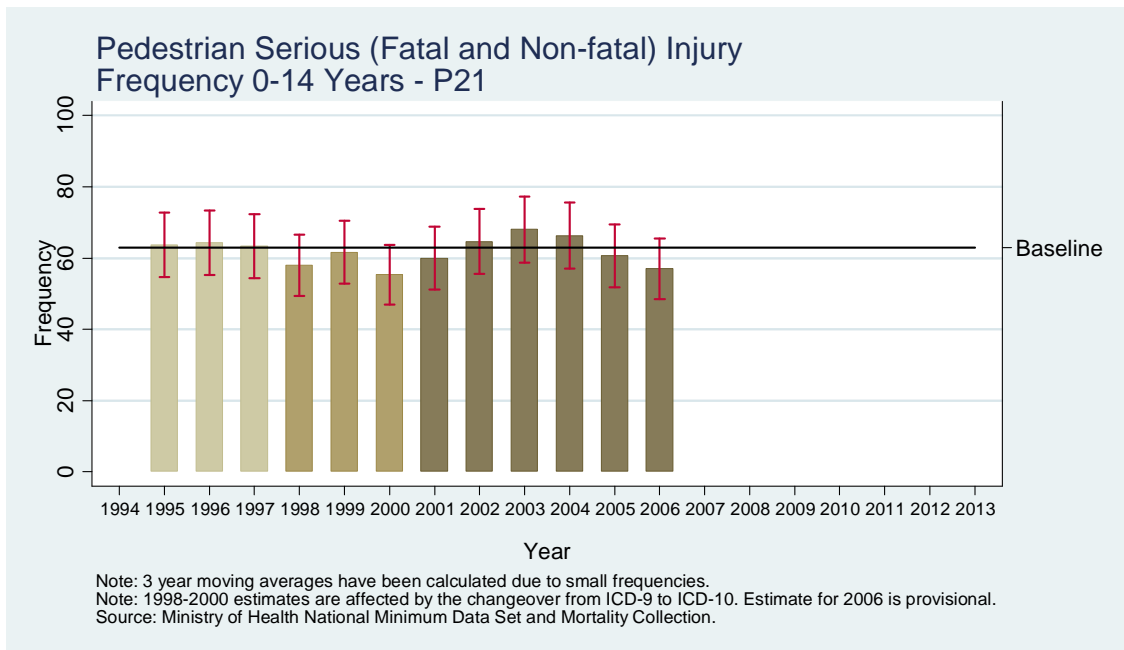


The frequencies (M01) and rates (M02) of serious non-fatal MVTC injury in children are variable. In 2009, there was no evidence of a reduction from baseline.



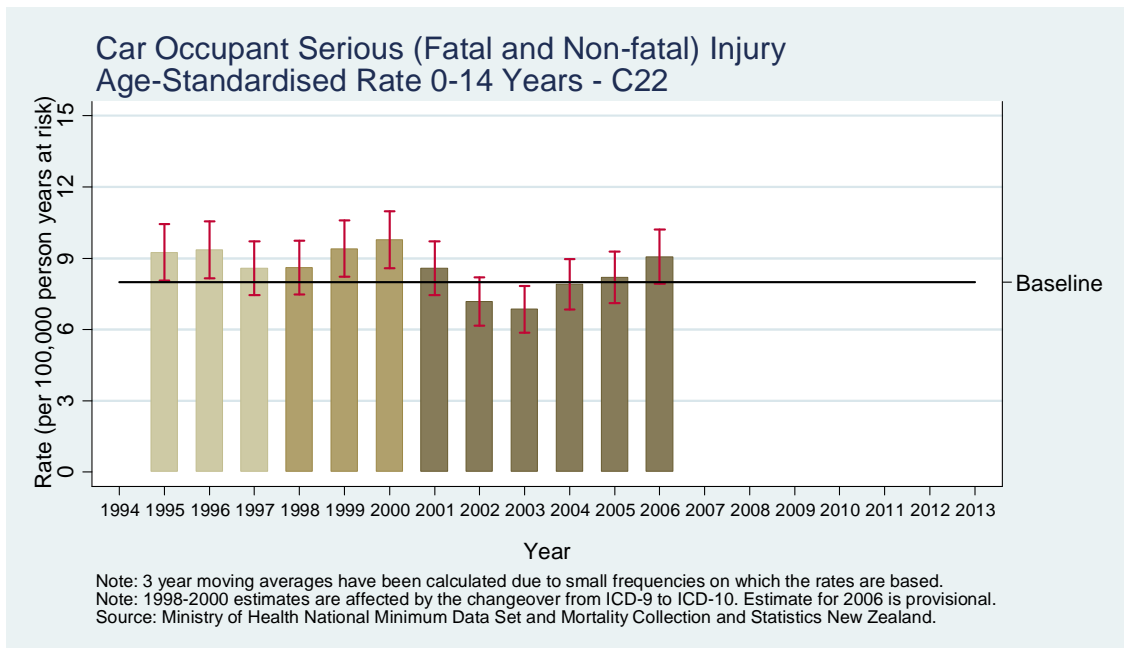
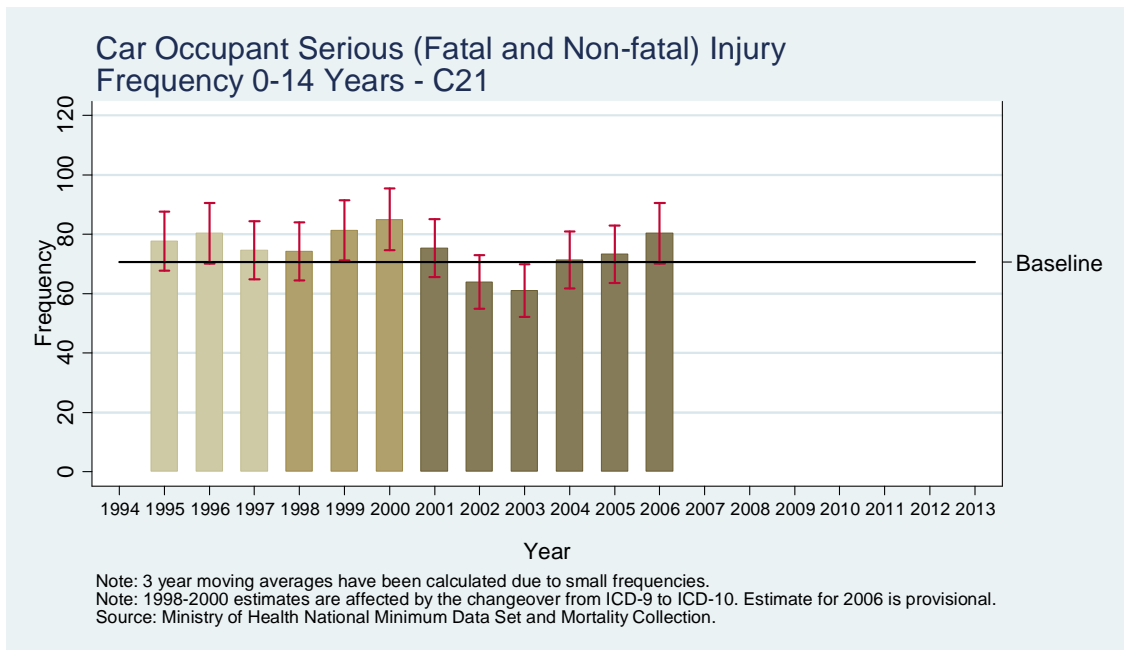
There is no evidence of a change from baseline in serious MVTC injury for children for the years up to and including 2007.

## 2.4.1 Pedestrian



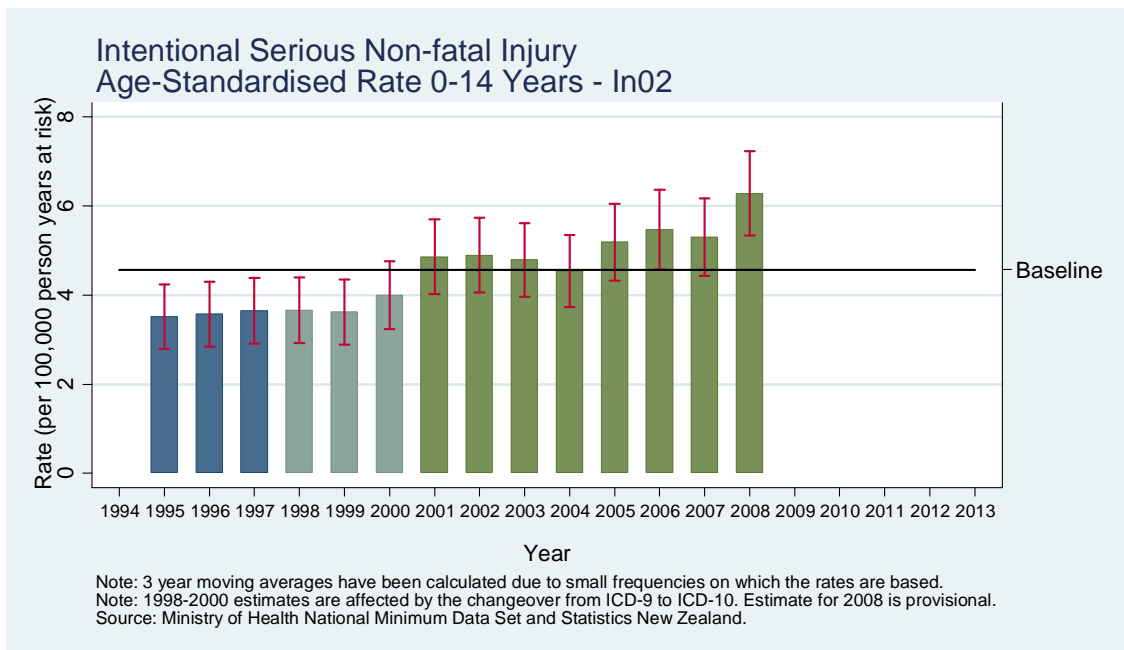
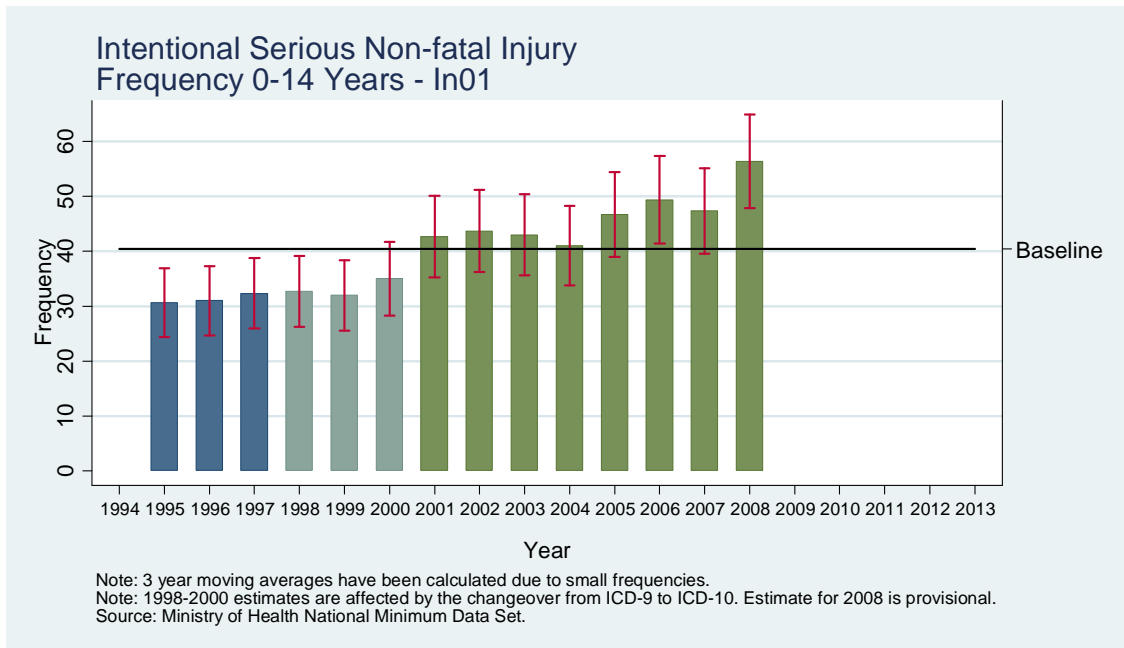
There has been no clear change from baseline in the frequencies (P21) and rates (P22) of serious (fatal and non-fatal) pedestrian injuries for children.

## 2.4.2 Car Occupant



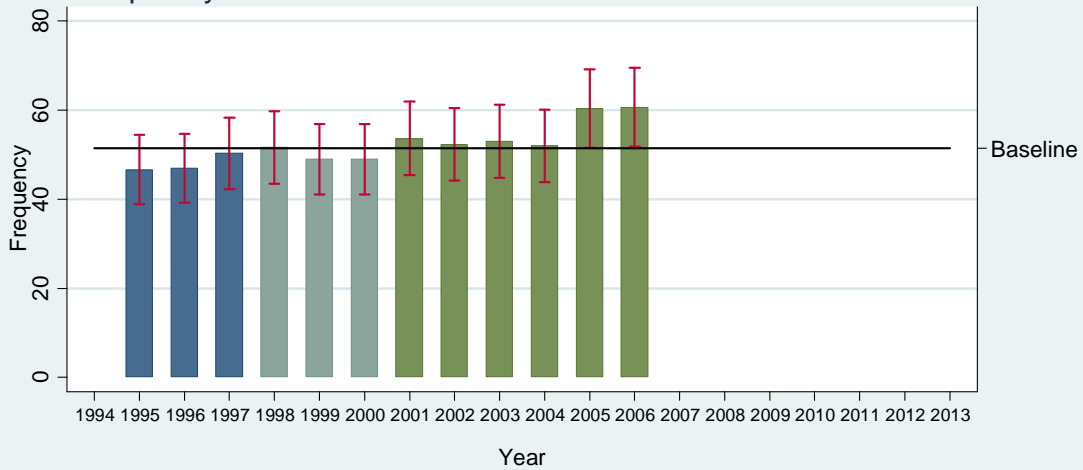
The frequencies (C21) and rates (C22) of serious (fatal and non-fatal) car occupant injuries for children aged 0-14 years are variable. There is no evidence of an increase from baseline in the moving average frequency and rate in 2006.

## 2.5 Intentional (Assault and Self-Harm)



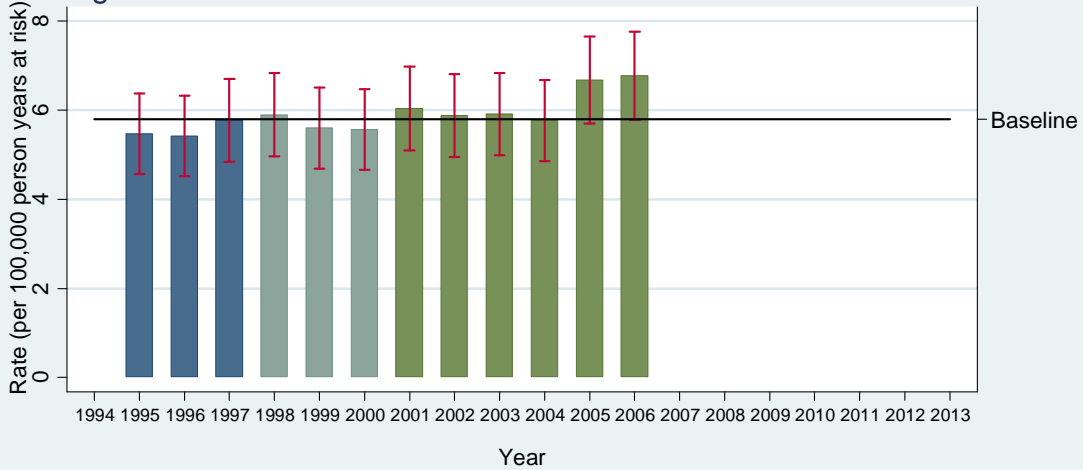
There was a clear increase from baseline in the moving average frequency (In01) and rate (In02) of serious non-fatal intentional injury for 2008.

### Intentional Serious (Fatal and Non-fatal) Injury Frequency 0-14 Years - In21



Note: 3 year moving averages have been calculated due to small frequencies.  
 Note: 1998-2000 estimates are affected by the changeover from ICD-9 to ICD-10. Estimate for 2008 is provisional.  
 Source: Ministry of Health National Minimum Data Set and Mortality Collection.

### Intentional Serious (Fatal and Non-fatal) Injury Age-Standardised Rate 0-14 Years - In22



Note: 3 year moving averages have been calculated due to small frequencies on which the rates are based.  
 Note: 1998-2000 estimates are affected by the changeover from ICD-9 to ICD-10. Estimate for 2006 is provisional.  
 Source: Ministry of Health National Minimum Data Set and Mortality Collection and Statistics New Zealand.

There is weak evidence of an increase from baseline in both the moving average frequency (In21) and rate (In22) of serious (fatal and non-fatal) intentional injuries for children aged 0-14 years for 2006.

## References

1. Cryer C, Langley J, Stephenson S. Developing Valid Injury Outcome Indicators: A report for the New Zealand Injury Prevention Strategy. Dunedin: University of Otago, 2004:1-141.
2. Ministry of Health. Mortality Collection Data Dictionary: Version 1.3. Wellington: Ministry of Health, July 2009.
3. Ministry of Health. National Minimum Data Set (Hospital Events). Version 7.1 ed. Wellington: National Health Board Business Unit, Ministry of Health, January 2010.
4. World Health Organization. ICD-10 International Statistical Classification of Diseases and Related Health Problems: Volume 1. Geneva: World Health Organization, 1992:1-1243.
5. Anderson R, Minino A, Hoyert D, Rosenberg H. Comparability of cause of death between ICD-9 and ICD-10: preliminary estimates. *National Vital Statistics Reports* 2001;49(2):1-32.

## Appendix: Tables

Year	Estimate	Frequency		Age standardised rates (per 100,000 person years)		
		Lower CI	Upper CI	Estimate	Lower CI	Upper CI
<i>All injury</i>						
Fatal: I11				I12		
1994	121	99	143	14	11	16
1995	116	95	137	13	11	16
1996	117	96	138	14	11	16
1997	131	109	153	15	12	17
1998	121	99	143	14	11	16
1999	109	89	129	13	10	15
2000	107	87	127	12	10	14
2001	103	83	123	12	9	14
2002	107	87	127	12	10	14
2003	83	65	101	9	7	11
2004	89	71	107	10	8	12
2005	93	74	112	10	8	13
2006	89	71	107	10	8	12
2007	103	83	123	11	9	14
Baseline = 98				Baseline = 11		
Serious non-fatal: I01				I02		
1994	474	431	517	56	51	61
1995	518	473	563	60	55	66
1996	524	479	569	60	55	65
1997	533	488	578	61	56	66
1998	553	507	599	63	58	68
1999	700	648	752	80	74	86
2000	775	720	830	88	82	94
2001	815	759	871	93	86	99
2002	773	719	827	87	81	94
2003	772	718	826	87	81	93
2004	674	623	725	75	70	81
2005	749	695	803	84	78	90
2006	727	674	780	82	76	88
2007	739	686	792	83	77	89
2008	729	676	782	82	76	87
2009	815	759	871	91	84	97
Baseline = 787				Baseline = 89		



Year	Frequency			Age standardised rates (per 100,000 person years)		
	Estimate	Lower CI	Upper CI	Estimate	Lower CI	Upper CI
	<i>All injury</i>					
	Serious (fatal and non-fatal): I21			I22		
1994	595	547	643	70	65	76
1995	634	585	683	74	68	80
1996	641	591	691	74	68	79
1997	664	613	715	76	70	82
1998	674	623	725	77	71	83
1999	809	753	865	92	86	99
2000	882	824	940	100	94	107
2001	918	859	977	105	98	111
2002	880	822	938	99	93	106
2003	855	798	912	96	90	102
2004	763	709	817	85	79	91
2005	842	785	899	94	88	101
2006	816	760	872	92	85	98
2007	842	785	899	94	88	100
	Baseline = 884			Baseline = 100		

Year	Frequency			Age standardised rates (per 100,000 person years)		
	Estimate	Lower CI	Upper CI	Estimate	Lower CI	Upper CI
	<i>Assault</i>					
	Serious (fatal and non-fatal): A21 (moving averages)			A22 (moving averages)		
1994						
1995	36.7	29.8	43.5	4.1	3.4	4.9
1996	36.0	29.2	42.8	4.0	3.2	4.8
1997	36.3	29.5	43.2	4.0	3.3	4.8
1998	37.0	30.1	43.9	4.1	3.4	4.9
1999	37.3	30.4	44.2	4.1	3.4	4.9
2000	39.7	32.5	46.8	4.4	3.6	5.2
2001	45.7	38.0	53.3	5.1	4.3	6.0
2002	44.0	36.5	51.5	4.9	4.1	5.8
2003	44.7	37.1	52.2	5.0	4.1	5.8
2004	42.7	35.3	50.1	4.7	3.9	5.5
2005	47.7	39.9	55.5	5.3	4.4	6.1
2006	47.3	39.5	55.1	5.2	4.4	6.1
2007						
	Baseline = 43.2			Baseline = 4.9		

Year	Frequency			Age standardised rates (per 100,000 person years)		
	Estimate	Lower CI	Upper CI	Estimate	Lower CI	Upper CI
<i>Falls</i>						
Serious non-fatal: F01				F02		
1994	115	94	136	13	11	16
1995	101	81	121	12	10	14
1996	96	77	115	11	9	13
1997	100	80	120	11	9	14
1998	123	101	145	14	12	17
1999	182	156	208	21	18	24
2000	206	178	234	23	20	27
2001	228	198	258	26	23	29
2002	206	178	234	23	20	26
2003	192	165	219	22	19	25
2004	158	133	183	18	15	20
2005	160	135	185	18	15	21
2006	187	160	214	21	18	24
2007	199	171	227	22	19	25
2008	187	160	214	21	18	24
2009	239	209	269	26	23	30
Baseline = 209				Baseline = 24		
Serious (fatal and non-fatal): F21				F22		
1994	118	97	139	14	11	16
1995	103	83	123	12	10	15
1996	97	78	116	11	9	13
1997	101	81	121	11	9	14
1998	127	105	149	15	12	17
1999	184	157	211	21	18	24
2000	206	178	234	23	20	27
2001	231	201	261	26	23	30
2002	209	181	237	24	20	27
2003	195	168	222	22	19	25
2004	160	135	185	18	15	21
2005	162	137	187	18	15	21
2006	189	162	216	21	18	24
2007	202	174	230	22	19	26
Baseline = 212				Baseline = 24		

Year	Estimate <i>MVTC</i>	Frequency		Age standardised rates (per 100,000 person years)		
		Lower CI	Upper CI	Estimate	Lower CI	Upper CI
		Fatal: M11 (moving averages)		M12 (moving averages)		
1994						
1995	48.3	40.5	56.2	5.6	4.7	6.6
1996	48.0	40.2	55.8	5.6	4.7	6.5
1997	46.7	38.9	54.4	5.4	4.5	6.3
1998	41.0	33.8	48.2	4.6	3.8	5.4
1999	39.0	31.9	46.1	4.4	3.6	5.2
2000	31.7	25.3	38.0	3.6	2.9	4.3
2001	32.3	25.9	38.8	3.7	3.0	4.4
2002	29.3	23.2	35.5	3.3	2.6	4.0
2003	25.7	19.9	31.4	2.8	2.2	3.5
2004	24.7	19.0	30.3	2.7	2.1	3.3
2005	23.7	18.2	29.2	2.6	2.0	3.2
2006	27.7	21.7	33.6	3.0	2.4	3.7
2007						
		Baseline = 28.4		Baseline = 3.2		
		Serious non-fatal: M01		M02		
1994	106	86	126	13	11	16
1995	119	98	140	14	12	17
1996	132	109	155	15	13	18
1997	111	90	132	13	11	15
1998	96	77	115	11	9	13
1999	142	119	165	16	14	19
2000	164	139	189	19	16	22
2001	124	102	146	14	12	17
2002	125	103	147	14	12	17
2003	152	128	176	17	14	20
2004	139	116	162	16	13	18
2005	158	133	183	18	15	21
2006	146	122	170	17	14	19
2007	133	110	156	15	12	18
2008	106	86	126	12	10	14
2009	129	107	151	15	12	17
		Baseline = 134		Baseline = 15		

Year	Estimate	Frequency		Age standardised rates (per 100,000 person years)		
		Lower CI	Upper CI	Estimate	Lower CI	Upper CI
	<i>MVTC</i>					
	Serious (fatal and non-fatal):M21			M22		
1994	149	125	173	18	15	21
1995	174	148	200	21	18	24
1996	179	153	205	21	18	24
1997	153	129	177	18	15	21
1998	147	123	171	17	14	20
1999	172	146	198	20	17	23
2000	200	172	228	23	20	26
2001	153	129	177	18	15	20
2002	157	132	182	18	15	21
2003	179	153	205	20	17	23
2004	157	132	182	18	15	20
2005	187	160	214	21	18	24
2006	170	144	196	19	16	22
2007	163	138	188	18	16	21
	Baseline = 163			Baseline = 19		

Year	Estimate	Frequency		Age standardised rates (per 100,000 person years)		
		Lower CI	Upper CI	Estimate	Lower CI	Upper CI
	<i>Pedestrian</i>					
	Serious (fatal and non-fatal):P21 (moving averages)			P22 (moving averages)		
1994						
1995	63.7	54.6	72.7	7.5	6.4	8.5
1996	64.3	55.3	73.4	7.4	6.3	8.4
1997	63.3	54.3	72.3	7.2	6.2	8.2
1998	58.0	49.4	66.6	6.5	5.5	7.5
1999	61.7	52.8	70.6	6.9	5.9	7.9
2000	55.3	46.9	63.8	6.2	5.3	7.2
2001	60.0	51.2	68.8	6.7	5.7	7.7
2002	64.7	55.6	73.8	7.3	6.3	8.3
2003	68.0	58.7	77.3	7.6	6.6	8.7
2004	66.3	57.1	75.5	7.4	6.4	8.5
2005	60.7	51.9	69.5	6.8	5.8	7.8
2006	57.0	48.5	65.5	6.4	5.4	7.3
2007						
	Baseline = 63.0			Baseline = 7.1		

Year	Frequency			Age standardised rates (per 100,000 person years)		
	Estimate	Lower CI	Upper CI	Estimate	Lower CI	Upper CI
	<i>Car occupant</i>					
	Serious (fatal and non-fatal):C21 (moving averages)			C22 (moving averages)		
1994						
1995	77.7	67.7	87.6	9.2	8.1	10.4
1996	80.3	70.2	90.5	9.4	8.2	10.5
1997	74.7	64.9	84.4	8.6	7.5	9.7
1998	74.3	64.6	84.1	8.6	7.5	9.7
1999	81.3	71.1	91.5	9.4	8.2	10.6
2000	85.0	74.6	95.4	9.8	8.6	11.0
2001	75.3	65.5	85.2	8.6	7.5	9.7
2002	64.0	54.9	73.1	7.2	6.2	8.2
2003	61.0	52.2	69.8	6.9	5.9	7.8
2004	71.3	61.8	80.9	7.9	6.8	9.0
2005	73.3	63.6	83.0	8.2	7.1	9.3
2006	80.3	70.2	90.5	9.1	7.9	10.2
2007						
	Baseline = 70.6			Baseline = 8.0		

Year	Frequency			Age standardised rates (per 100,000 person years)		
	Estimate	Lower CI	Upper CI	Estimate	Lower CI	Upper CI
	<i>Intentional</i>					
	Serious non-fatal:ln01 (moving averages)			ln02 (moving averages)		
1994						
1995	30.7	24.4	36.9	3.5	2.8	4.2
1996	31.0	24.7	37.3	3.6	2.8	4.3
1997	32.3	25.9	38.8	3.7	2.9	4.4
1998	32.7	26.2	39.1	3.7	2.9	4.4
1999	32.0	25.6	38.4	3.6	2.9	4.3
2000	35.0	28.3	41.7	4.0	3.2	4.8
2001	42.7	35.3	50.1	4.9	4.0	5.7
2002	43.7	36.2	51.1	4.9	4.1	5.7
2003	43.0	35.6	50.4	4.8	4.0	5.6
2004	41.0	33.8	48.2	4.5	3.7	5.3
2005	46.7	38.9	54.4	5.2	4.3	6.1
2006	49.3	41.4	57.3	5.5	4.6	6.4
2007	47.3	39.5	55.1	5.3	4.4	6.2
2008	56.3	47.8	64.8	6.3	5.3	7.2
2009						
	Baseline = 40.4			Baseline = 4.6		
	Serious (fatal and non-fatal):ln21 (moving averages)			ln22 (moving averages)		
1994						
1995	46.7	38.9	54.4	5.5	4.6	6.4
1996	47.0	39.2	54.8	5.4	4.5	6.3
1997	50.3	42.3	58.4	5.8	4.8	6.7
1998	51.7	43.5	59.8	5.9	5.0	6.8
1999	49.0	41.1	56.9	5.6	4.7	6.5
2000	49.0	41.1	56.9	5.6	4.7	6.5
2001	53.7	45.4	62.0	6.0	5.1	7.0
2002	52.3	44.1	60.5	5.9	5.0	6.8
2003	53.0	44.8	61.2	5.9	5.0	6.8
2004	52.0	43.8	60.2	5.8	4.9	6.7
2005	60.3	51.5	69.1	6.7	5.7	7.7
2006	60.7	51.9	69.5	6.8	5.8	7.8
2007						
	Baseline = 51.4			Baseline = 5.8		