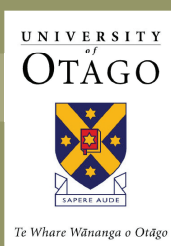


New Zealand Injury Prevention Strategy

Rautaki Ārai Whara o Aotearoa

November 2008

A Chartbook of the New Zealand Injury Prevention Strategy Serious Injury Outcome Indicators for Children: 1994-2007



New Zealand Government

**A Chartbook of the New
Zealand Injury Prevention
Strategy Serious Injury
Outcome Indicators for
Children:
1994-2007**

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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 an update to the 1994-2005 report, published in September 2007. The development of the indicators on which they were based was described in the report:

Cryer C, Langley J, Stephenson S. Developing valid injury outcome indicators. A report for the New Zealand Injury Prevention Strategy. Injury Prevention Research Unit Occasional Report OR 049, Dunedin: University of Otago, September 2004. <http://www.nzips.govt.nz/documents/SI-94-05-chartbook-child.pdf>

The main body of the report is purposely short on words and long on charts. The intention is to let the charts speak for themselves with little detail being provided on the background and methods, and minimal commentary on the results. It is recognised, however, that some readers will wish for more detail, particularly relating to the methods. This is provided in the accompanying Technical Report titled “[The New Zealand Injury Prevention Strategy Serious Injury Outcome Indicators: Technical Report](#)”

Abbreviations

ACC	Accident Compensation Corporation
Cryer 2004 report	Cryer C, Langley J, Stephenson S. Developing valid injury outcome indicators. A report for the New Zealand Injury Prevention Strategy. Injury Prevention Research Unit Occasional Report (OR 049), Dunedin: University of Otago, September 2004.
ICD	WHO International Classification of Diseases
ICD-9	WHO International Classification of Diseases 9 th revision
ICD-9-CM	WHO International Classification of Diseases 9 th revision, Clinical Modification
ICD-10	WHO International Classification of Diseases 10 th revision
ICD-10-AM	WHO International Classification of Diseases 10 th revision, Australian Modification
ICISS	ICD-based Injury Severity Score
IPRU	Injury Prevention Research Unit, University of Otago, New Zealand
MVTC	Motor vehicle traffic crashes
NMDS	NZHIS National Minimum Data Set of hospital discharges
NZHIS	New Zealand Health Information Service
NZIPS	New Zealand Injury Prevention Strategy
SNZ	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.

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	Serious non-fatal trends to 2007	Fatal trends to 2005	Serious (fatal and non-fatal) trends to 2005
<u>All injury</u>	I01: evidence of a decrease from baseline of around 800 to around 750 injuries.	I11: no evidence of change from baseline of around 100.	I21: variable, but weak evidence of a decrease from baseline of around 900 to around 850 injuries.
<u>Assault</u>	No indicators presented	No indicators presented	A21 (provisional indicators): no detectable change from baseline, although could be the result of reporting behaviour
<u>Falls</u>	F01: variable, but no evidence of a change from baseline in 2007.	No indicators presented	F21: decrease from baseline in 2004 and 2005.
<u>MVTC</u>	M01: no detectable change from baseline.	M11: no detectable change from baseline.	M21: no detectable change from baseline.
<u>Pedestrian</u>	No indicators presented	No indicators presented	P21 (provisional indicators): no detectable change from baseline.
<u>Car Occupant</u>	No indicators presented	No indicators presented	C21 (provisional indicators): variable, but no detectable change from baseline in 2005.
<u>Intentional</u>	In01: evidence of an increase from baseline in 2007, although could be the result of reporting behaviour	No indicators presented	In21 (provisional indicators): no change from baseline to 2005, although could be the result of reporting behaviour

Age standardised rates

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

Injury Area	Serious non-fatal trends to 2007	Fatal trends to 2005	Serious (fatal and non-fatal) trends to 2005
<u>All injury</u>	I02: reduction from baseline	I12: no evidence of a change.	I22: variable, but weak evidence of a decrease from baseline.
<u>Assault</u>	No indicators presented	No indicators presented	A22 (provisional indicator): no detectable change, although could be the result of reporting behaviour
<u>Falls</u>	F02: variable, but no evidence of a change from baseline in 2007	No indicators presented.	F22: decrease from baseline in 2004 and 2005.
<u>MVTC</u>	M02: no detectable change from baseline	M12: no detectable change from baseline.	M22: no detectable change from baseline.
<u>Pedestrian</u>	No indicators presented	No indicators presented	P22 (provisional indicator): no detectable change from baseline
<u>Car Occupant</u>	No indicators presented	No indicators presented	C22 (provisional indicator): variable, but no detectable change from baseline in 2005.
<u>Intentional</u>	In02 (provisional indicator): increase from baseline in 2007, although could be the result of reporting behaviour	No indicators presented	In22: (provisional indicators): no detectable change to 2005, although could be the result of reporting behaviour

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 Strategy's broad structure includes a vision, principles, goals, objectives and actions. The Strategy's 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](#).

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 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 (<http://www.nzips.govt.nz/documents/chartbook-serious-indicators.pdf>) for children aged 0-14 years, for four of these priority areas covering the period 1994-2007. 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.

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](#)¹.

The [NZ Injury Prevention Strategy's 2008-11 Implementation Plan](#) was approved by the Government in August 2008. This Plan includes the NZIPS fatal and serious non-fatal injury indicators as one of the key indicators to measure the Strategy's progress and impact.

The high threshold 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 report¹.

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 report¹.

1.4 What the chartbook comprises

Part 2 presents the charts for the NZIPS fatal and serious non-fatal injury indicators for children for 'All injury' and for four priority areas, with baselines. These charts speak largely for themselves, and so only a brief commentary is provided for each.

1.5 Frequently Asked Questions

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

A The validated 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
- 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'.

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 these child indicators are based on the New Zealand Health Information Service (NZHIS) Mortality Collection² and the National Minimum Dataset (NMDS)³ of hospital inpatient data.

Q What do the frequencies and rates reflect?

A Frequencies reflect the societal burden of injury^a, while rates reflect individual risk.

Q Why are there provisional indicators?

A Where valid indicators could not be identified, provisional indicators were developed (see Cryer 2004 report)¹. 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).

Q What is the period presented in the charts?

A Wherever possible, the period presented for serious non-fatal injuries is 1994 to 2007. For fatal injuries, the period presented is 1994 to 2005. 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, 2005 is the most recent year available for the mortality data.

^a 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.

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 NZHIS Mortality Collection and NMDS is the World Health Organisation (WHO) International Classification of Diseases (ICD)⁴. 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 injury⁵. 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 For workplace injuries, drowning and near drowning there were insufficient numbers of cases to permit the calculation of indicators with acceptable levels of precision. 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 information used to generate the bars in the charts (ICD-9 vs ICD-10 coding).

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

An intermediate colour 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 of fatalities attributable to specific causes of death, 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 mortality 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.

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 provided in the Summary (pg vii and viii) and in Part 2.

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 much 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.

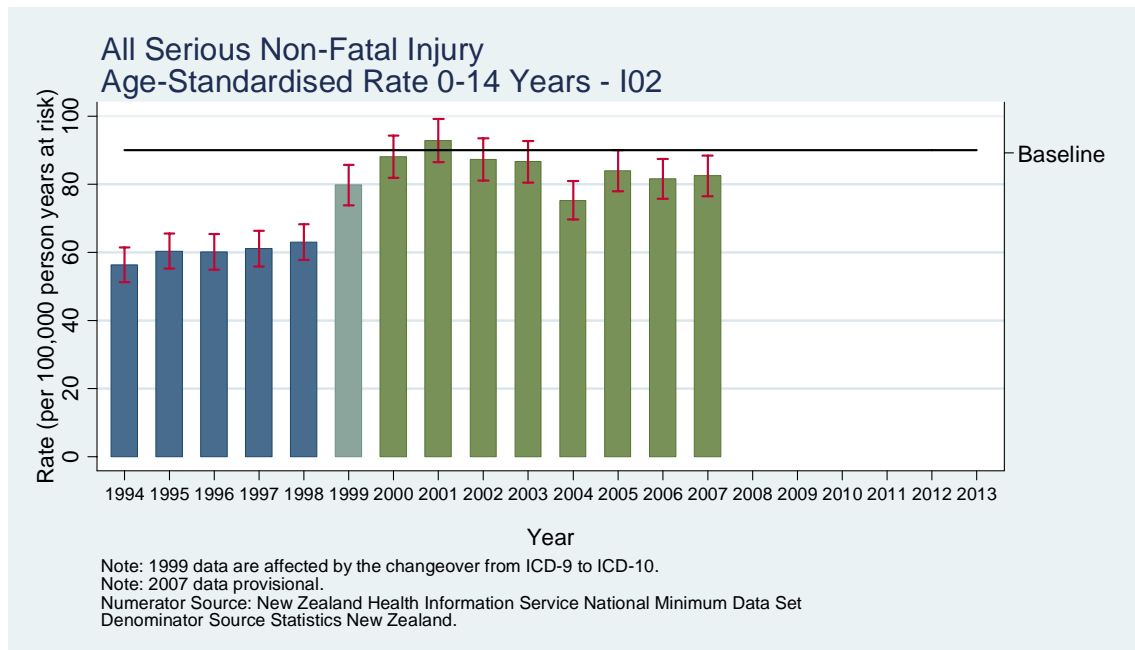
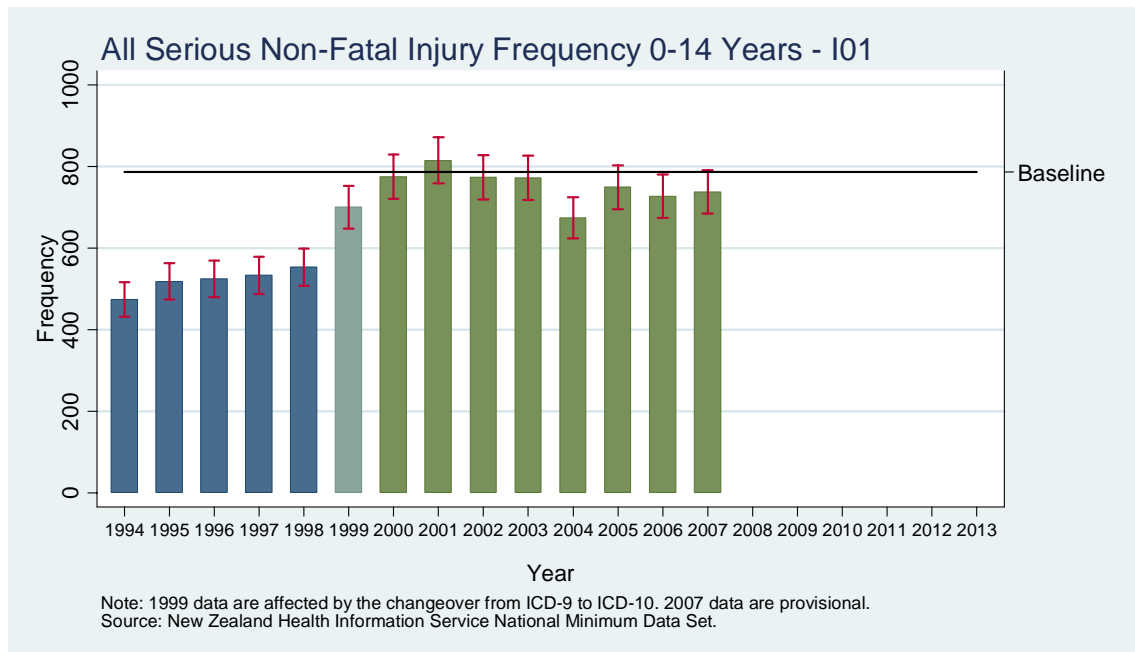
Where there is reader interest in the magnitude of the frequency or rate of serious injury in a given year, there will be particular interest in these confidence intervals for that year. In many other circumstances, it is the trends in the indicators that will be of interest. For example, trends are of interest to gauge how well New Zealand is doing in reducing serious injury following the introduction of the NZIPS. When considering trends, observing the degree of overlap of confidence intervals for individual bars (years) is helpful as an aid to interpretation of trends. If confidence intervals do not overlap the baseline, this is indicative of a change from baseline (the years immediately preceding the introduction of NZIPS) that is unlikely to be due to chance alone.

1.6 Interpretation of the charts

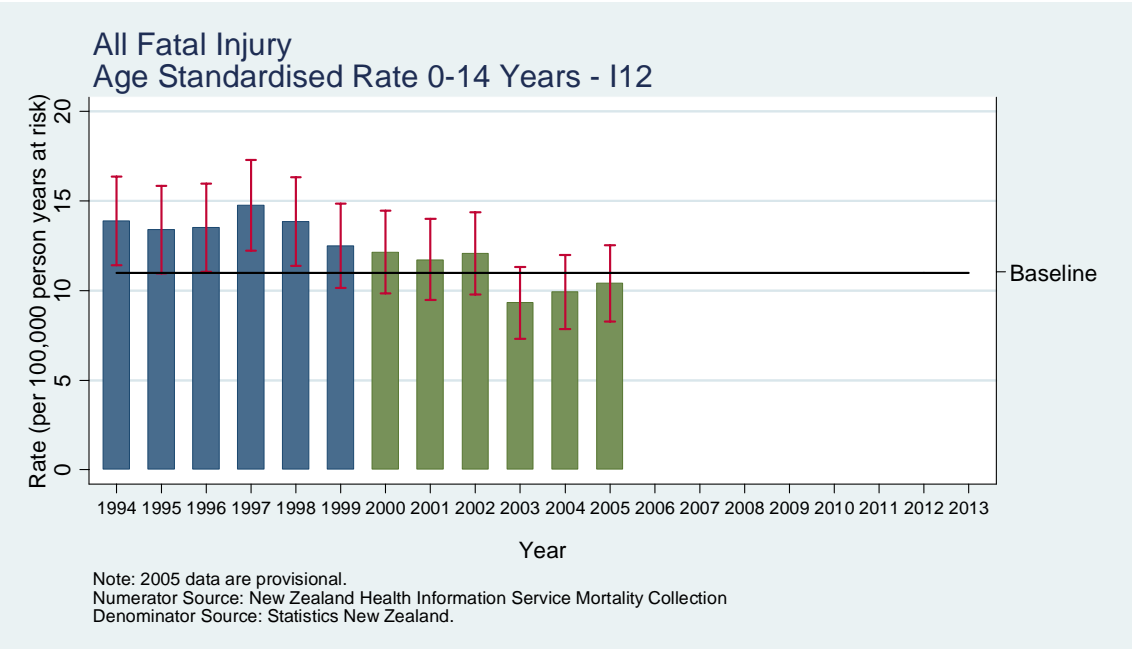
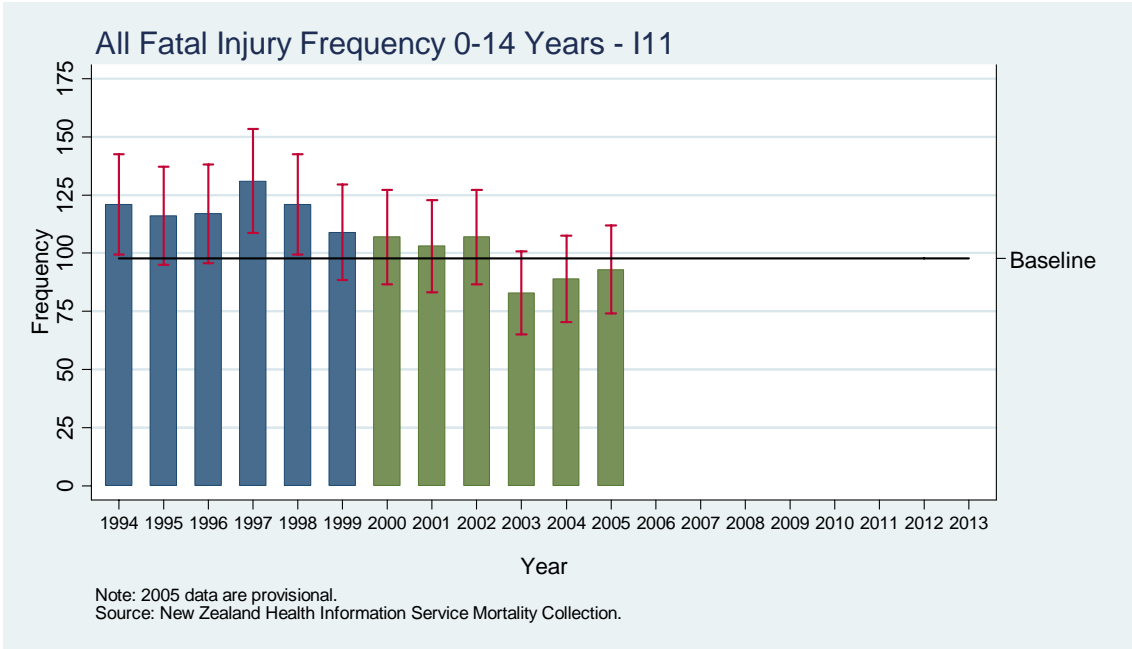
Brief comments on each chart are provided at the foot of each page in [Part 2](#). The interpretations provided are based on a visual inspection (as opposed to formal statistical trend analysis). Within a chart, where the confidence limits do not overlap the baseline, this is indicative of a change from 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

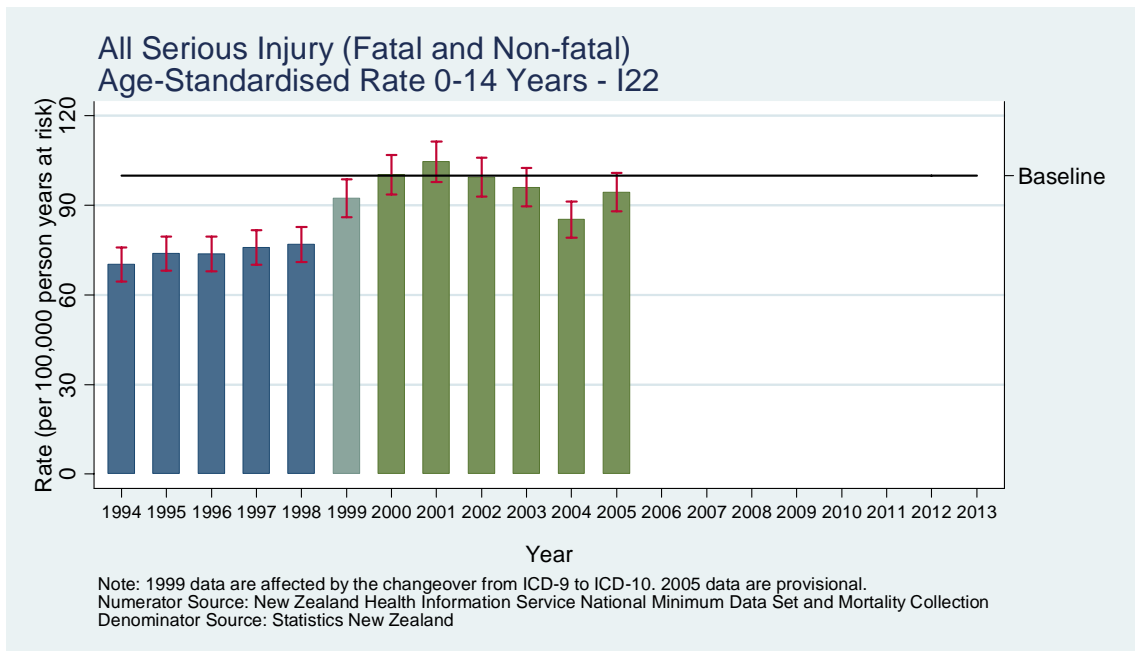
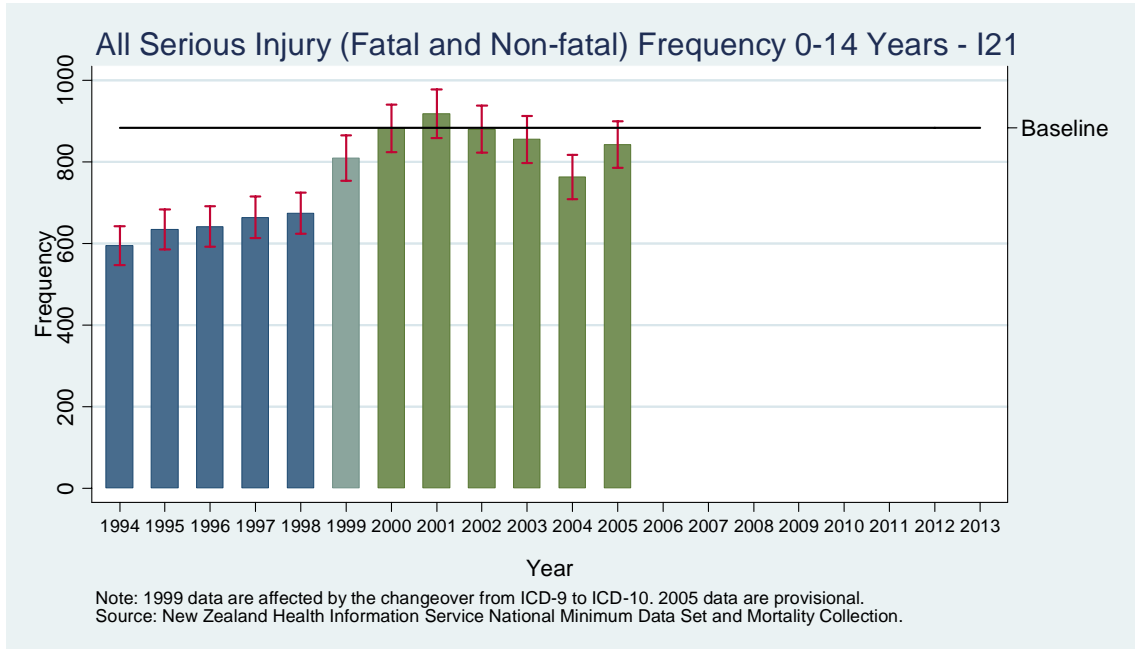
2.1 All injury



There is evidence of a reduction from baseline in the frequency (I01) and rates (I02) of injury for children in 2006 and 2007.

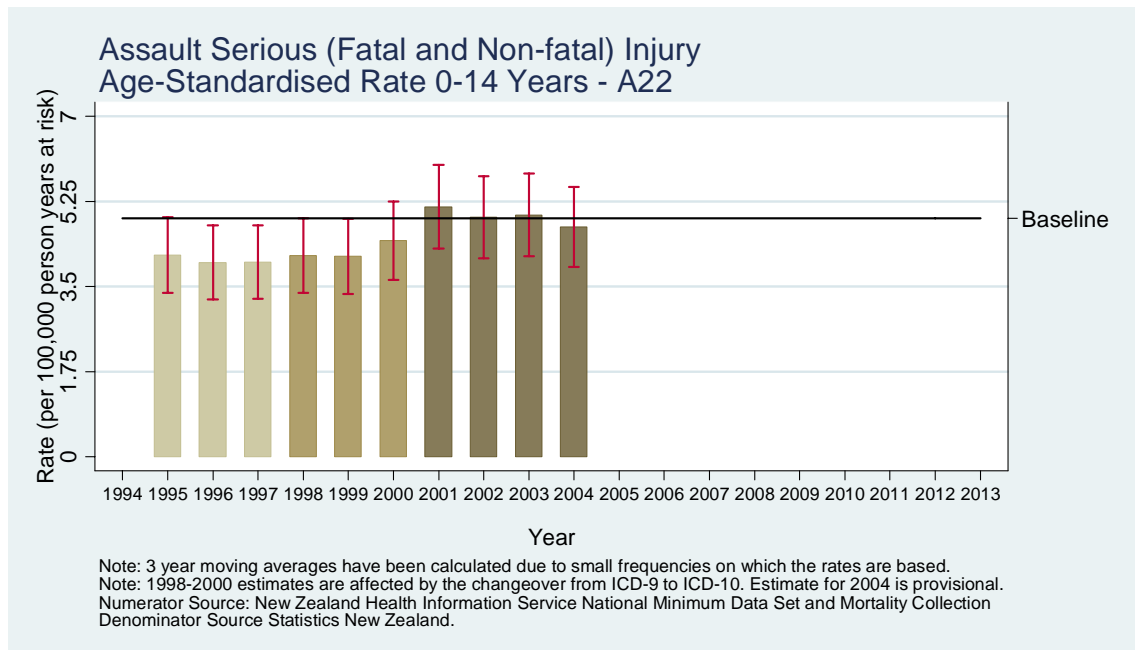
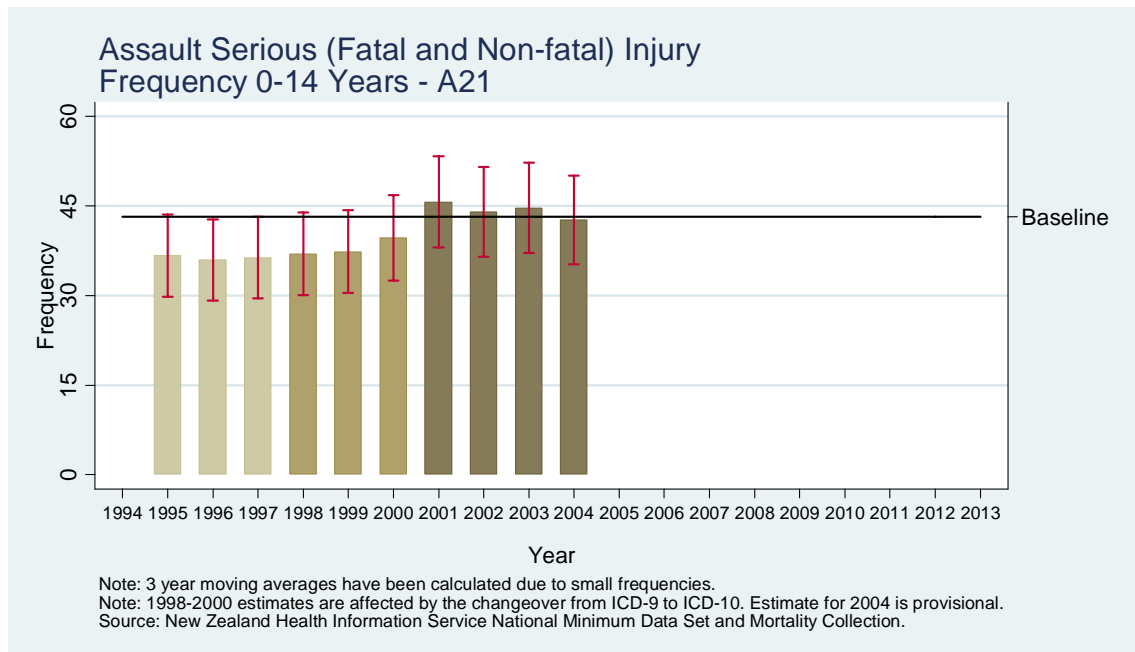


There is no evidence of a change from baseline in either the frequencies (I11) or rates (I12) of fatal injury for children.



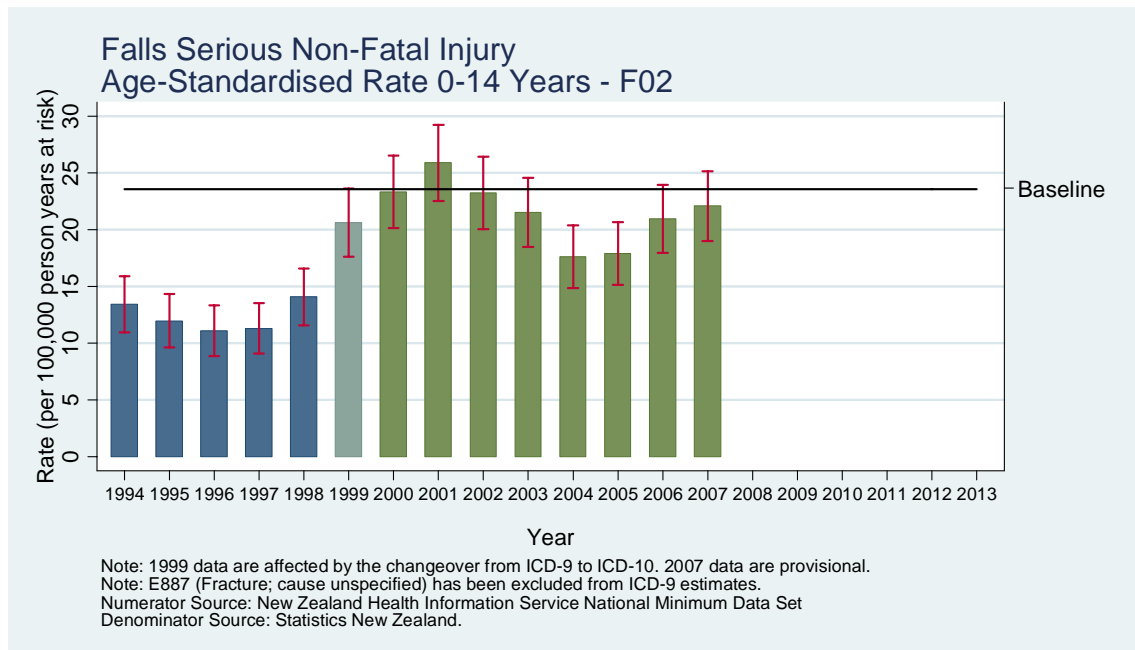
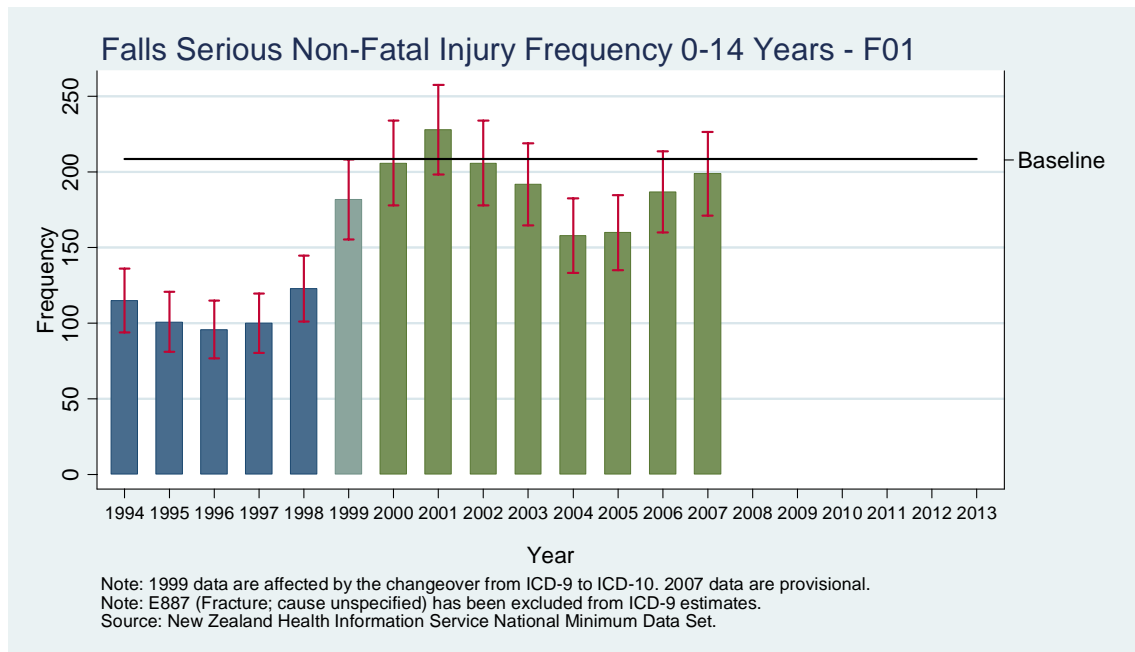
The frequencies (I21) and rates (I22) of serious (fatal and non-fatal) injury for children are variable. There is weak evidence of a decrease from baseline in the period 2004 and 2005.

2.2 Assault

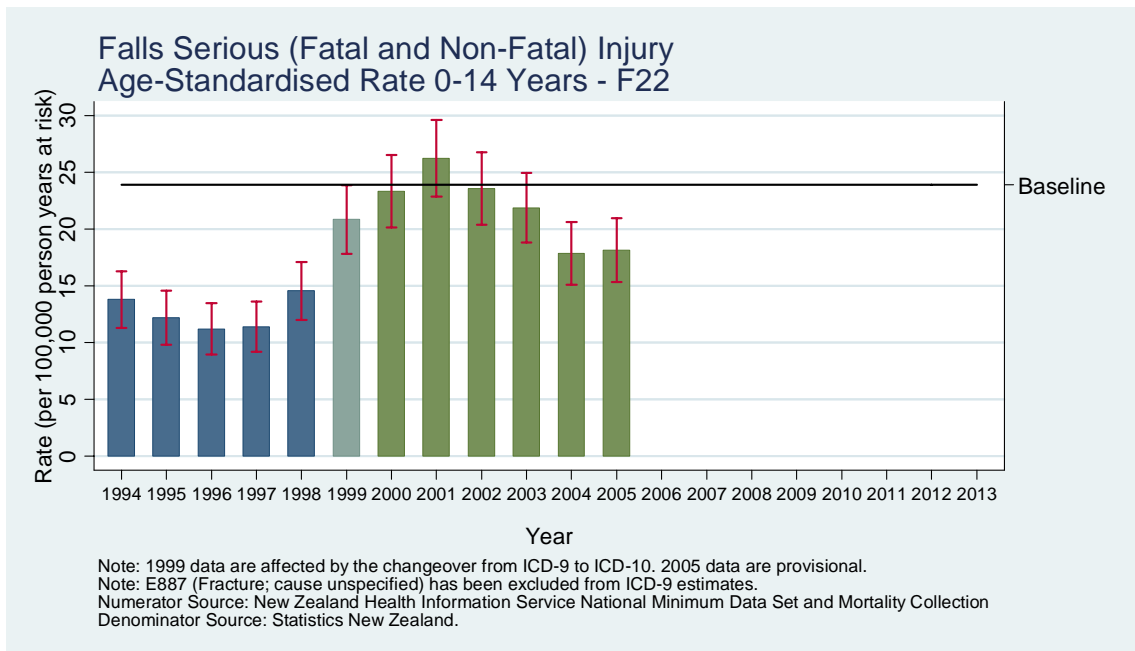
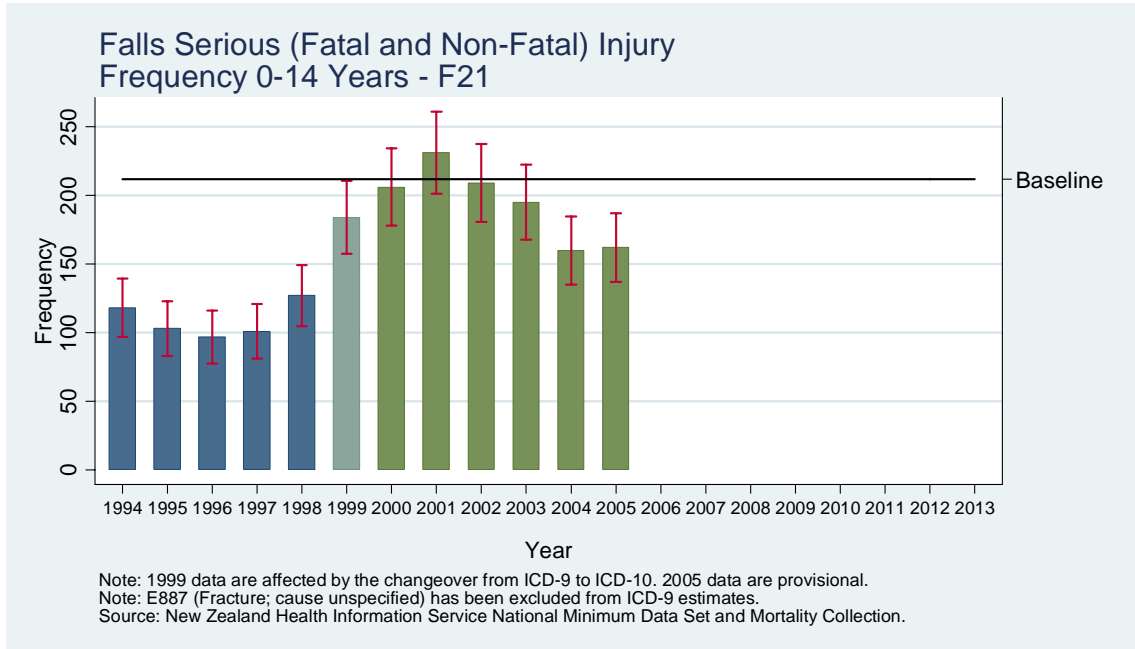


There has been no detectable change in the frequencies (A21) and rates (A22) of serious (fatal and non-fatal) assaultive injuries since 2000. The trends for these provisional indicators could, however, be the results of extraneous factors, and care should be taken with interpretation.

2.3 Falls

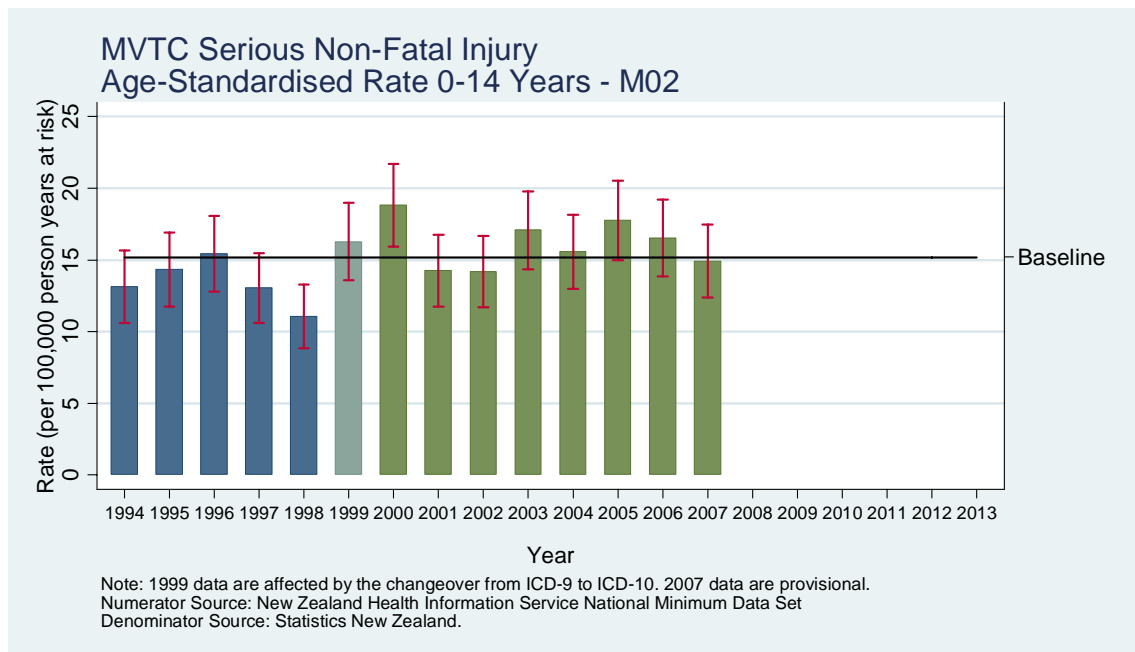
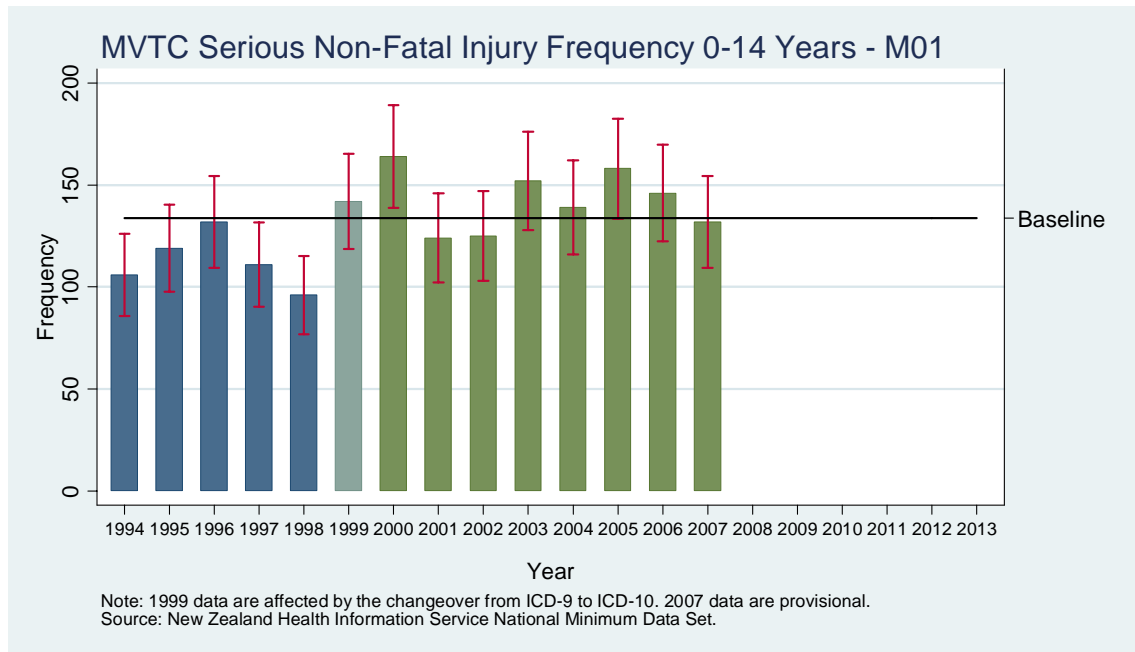


Between 2001 and 2005 there was a reduction in the frequencies (F01) and rates (F02) of serious non-fatal injuries from falls. In 2006 and 2007 the frequencies and of falls increased such that there is no evidence of a change from baseline.

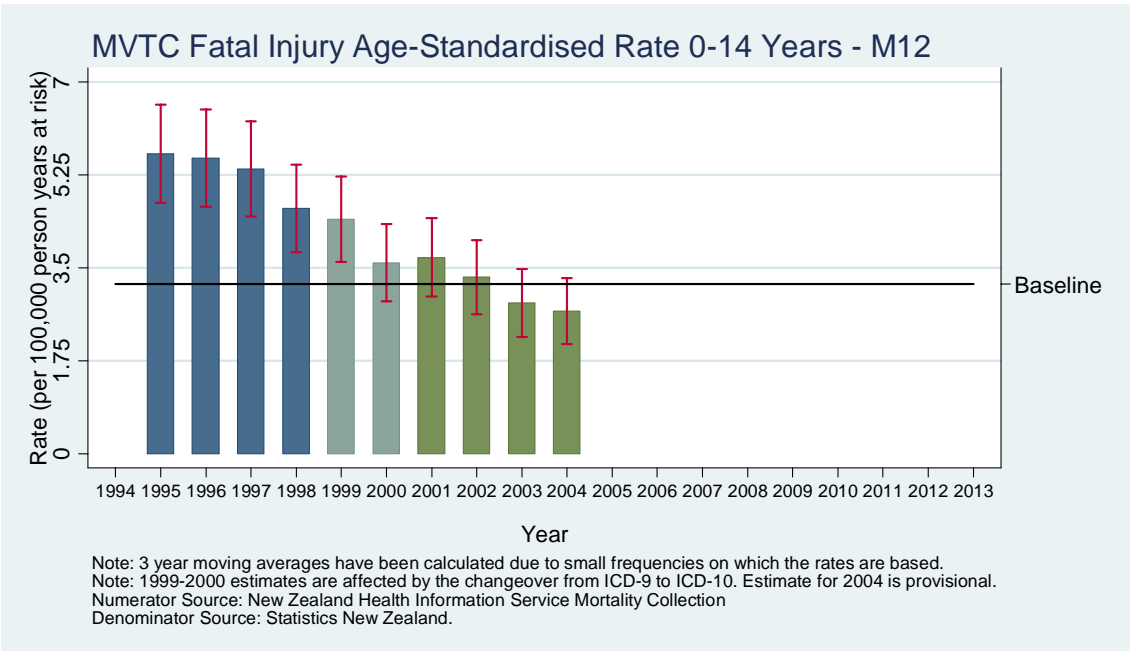
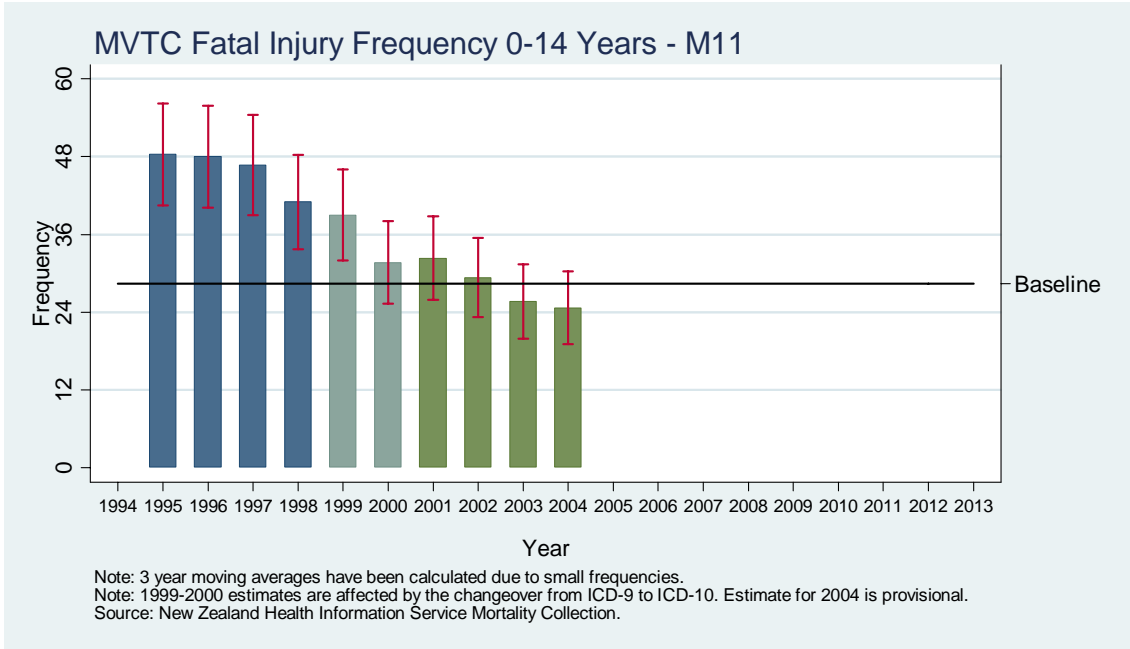


Since 2001, there was a steady decline in the frequencies (F21) and rates (F22) of serious (fatal and non-fatal) injuries from falls for children. In 2004 and 2005, the frequencies and rates were below the baseline.

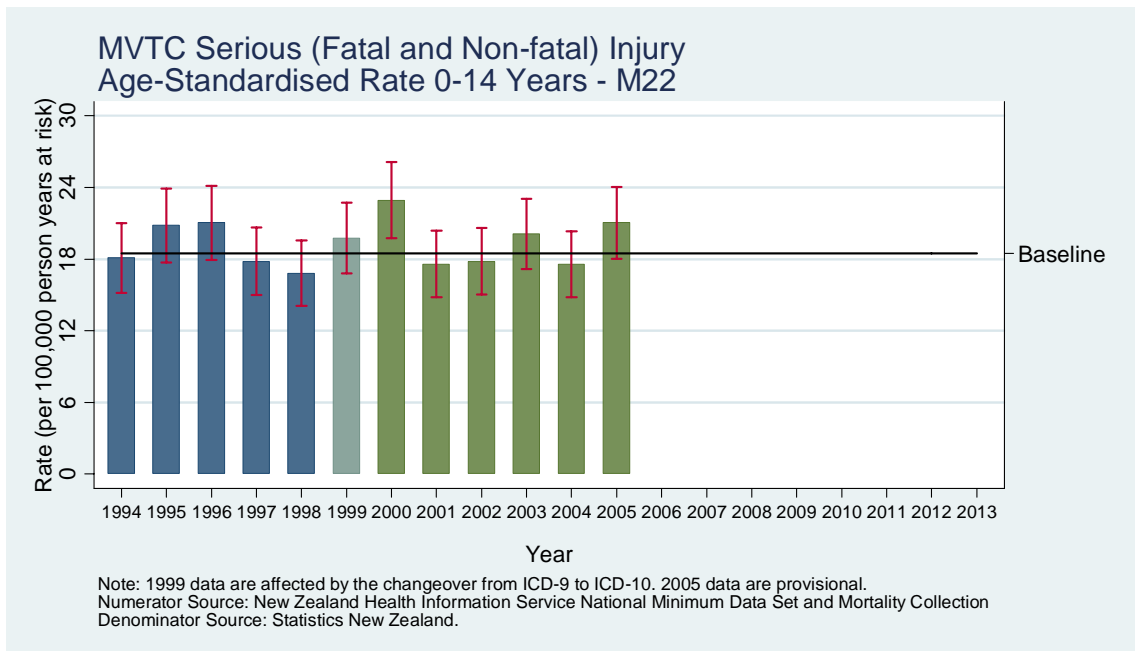
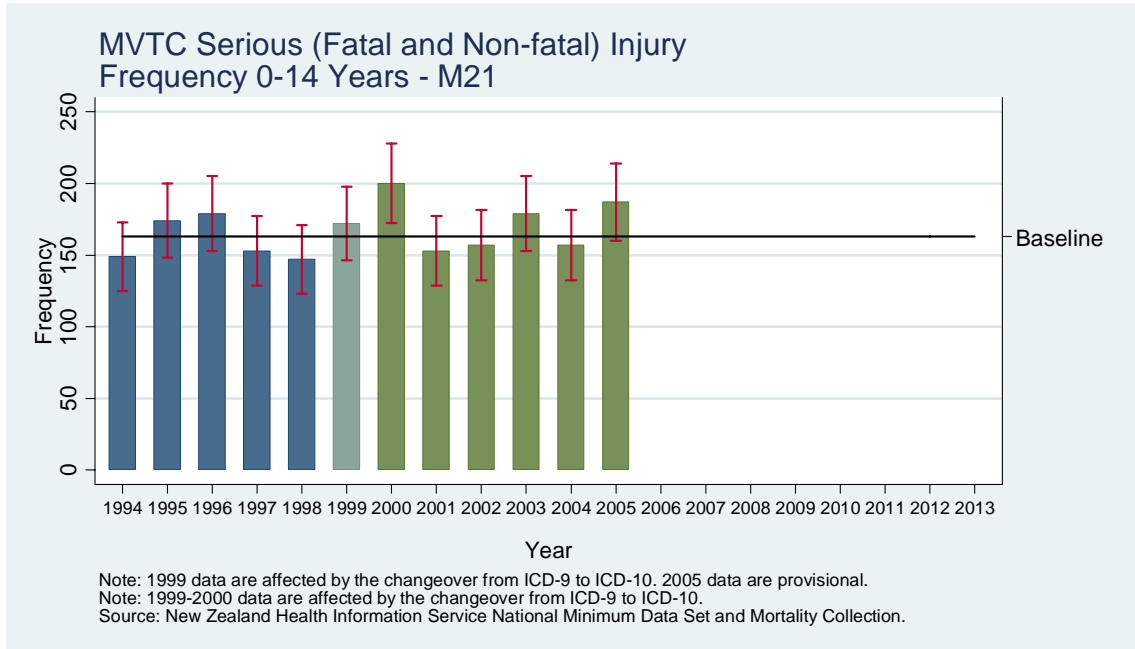
2.4 Motor vehicle traffic crashes (MVTC)



The frequencies (M01) and rates (M02) of serious non-fatal MVTC injury are variable. There is no evidence of a consistent change in either.

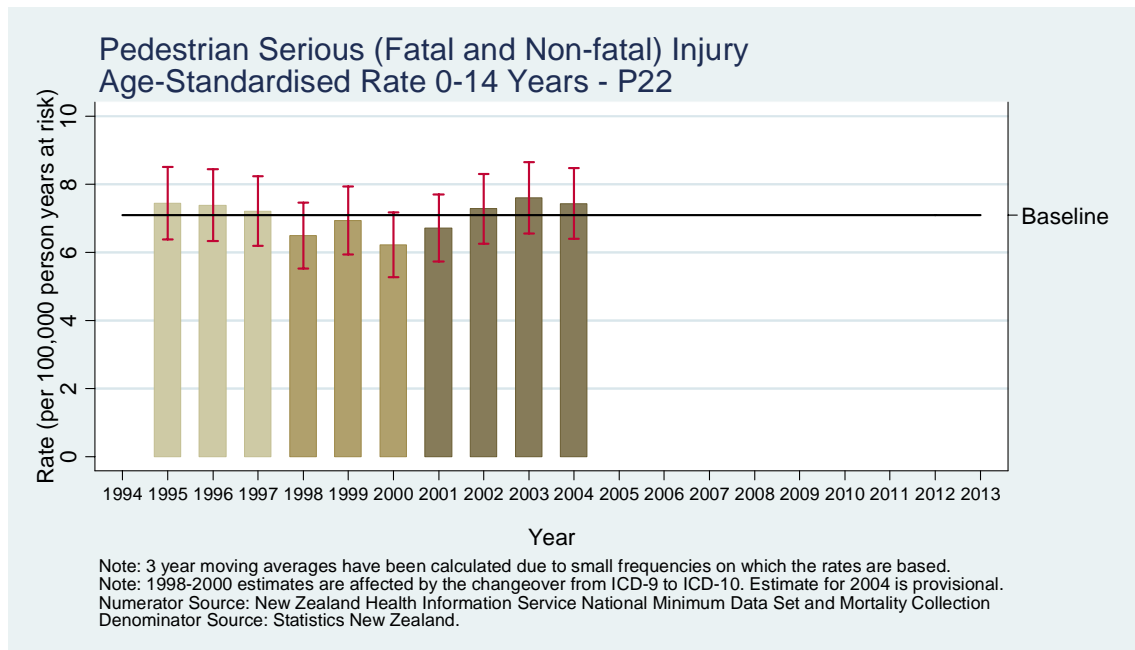
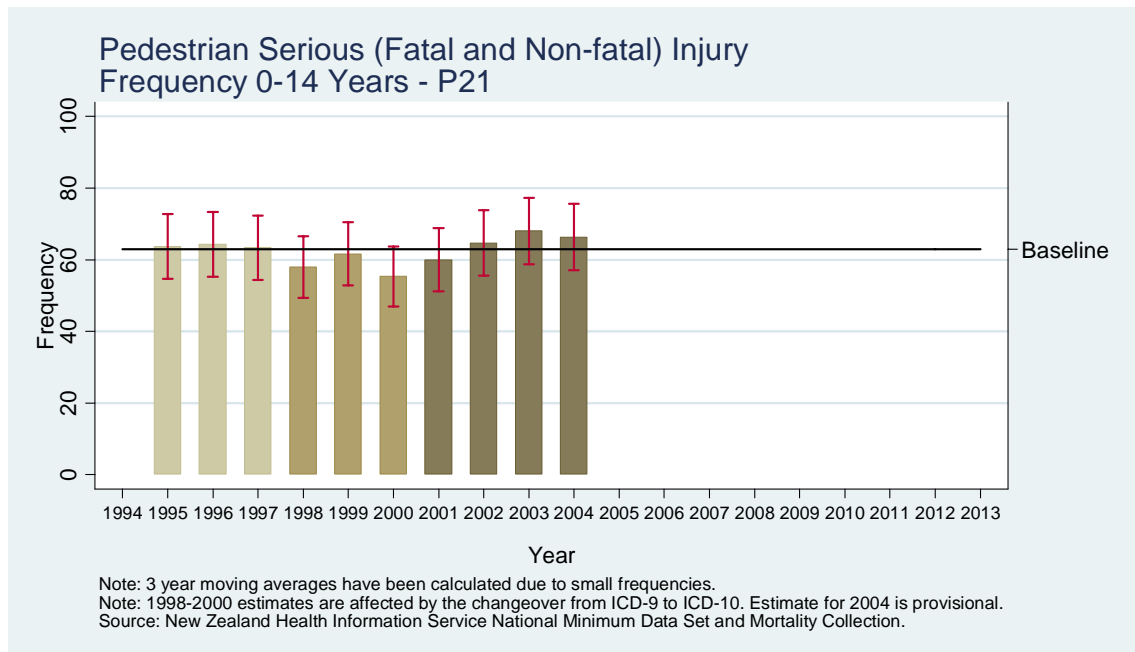


There is no detectable change from baseline in the frequencies (M11) and rates (M12) of fatal MVTC injuries for children aged 0-14 years.



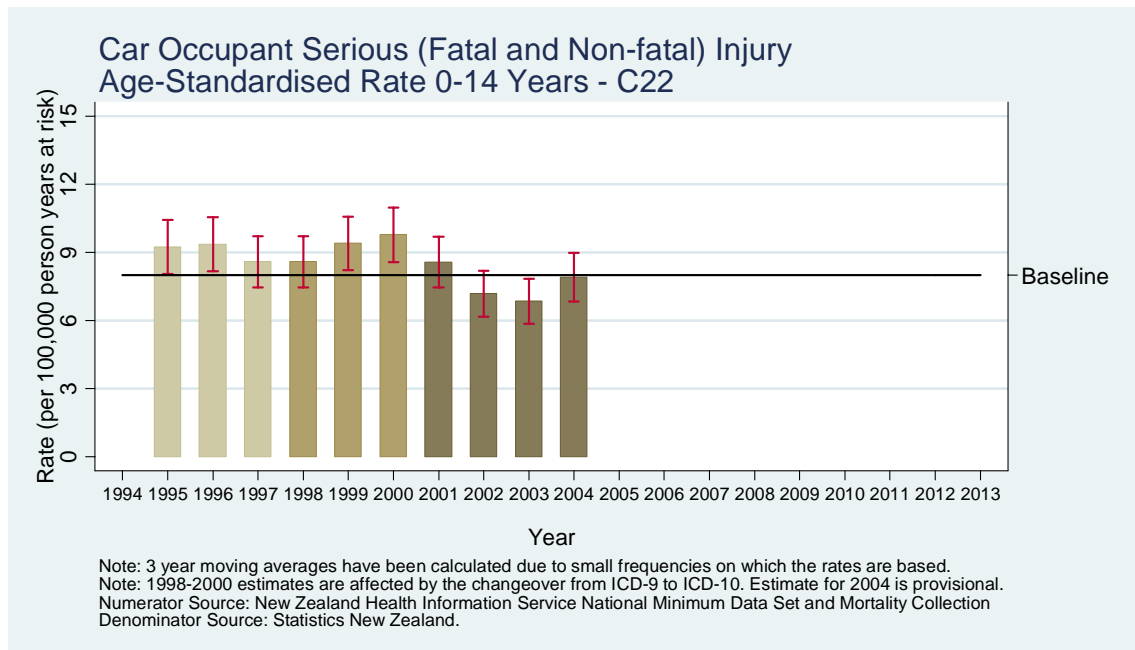
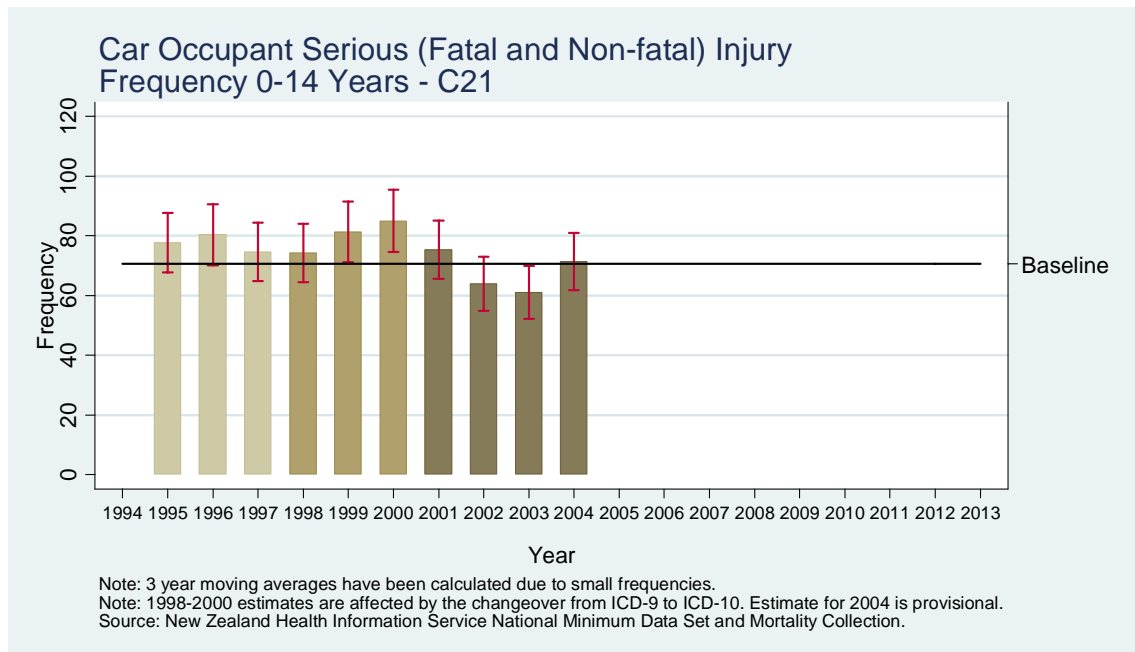
Both the frequencies (M21) and rates (M22) of serious (fatal and non-fatal) MVTC injuries are variable. There is no strong evidence of a change from baseline.

2.4.1 Pedestrian



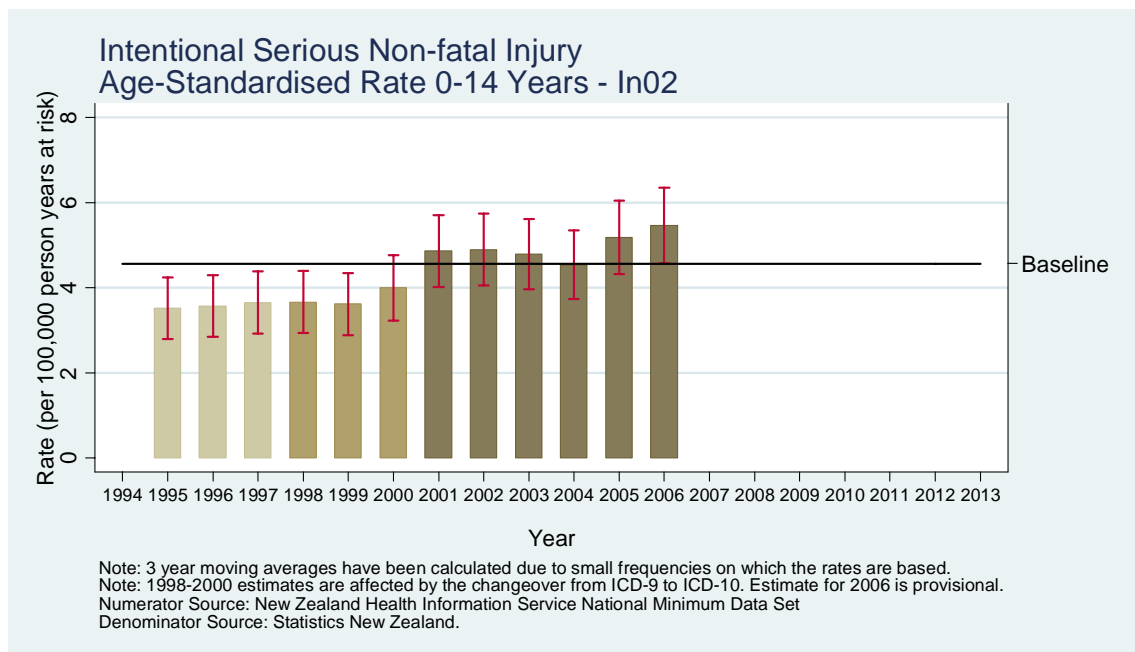
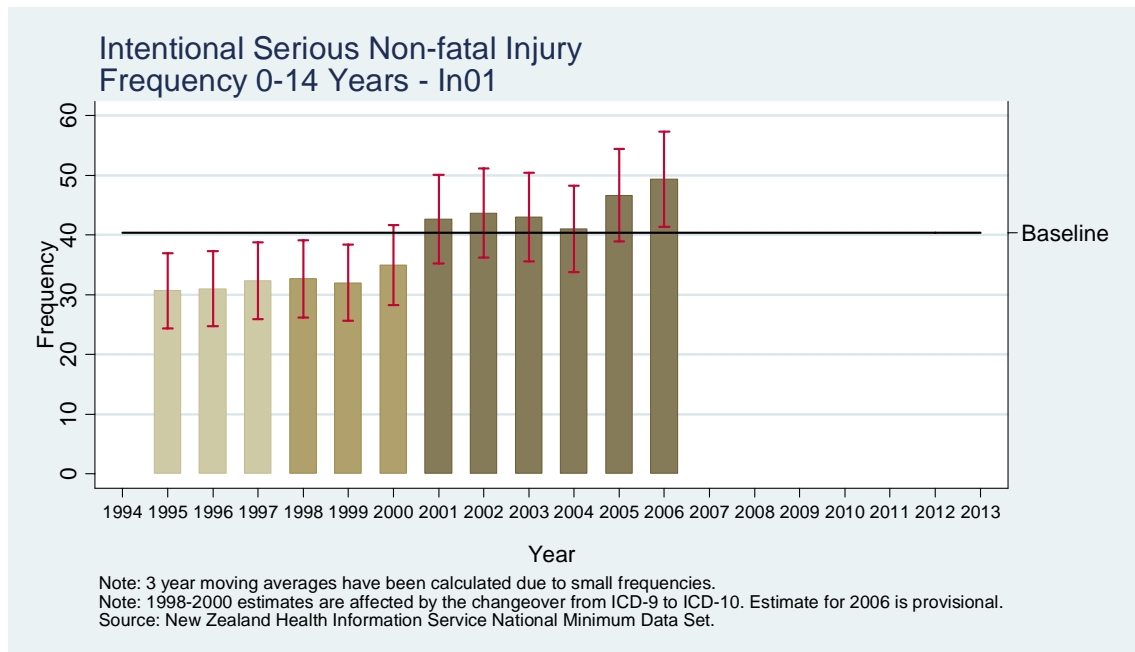
There has been no detectable change in the frequencies (P21) and rates (P22) of serious (fatal and non-fatal) pedestrian injuries for children since 2000.

2.4.2 Car Occupant

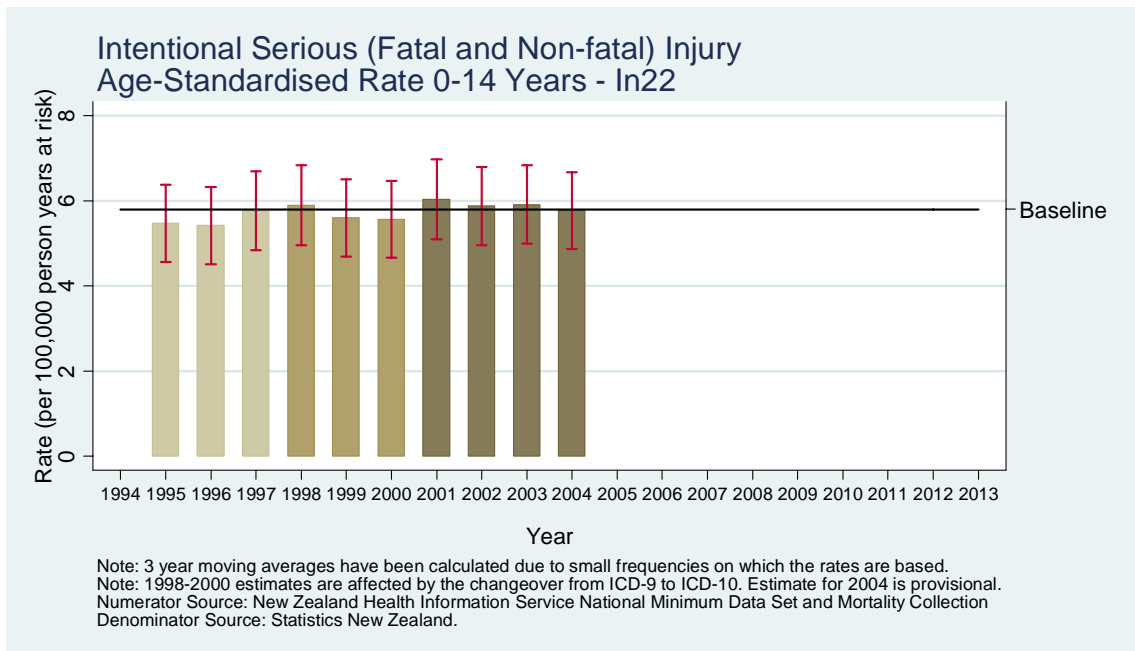
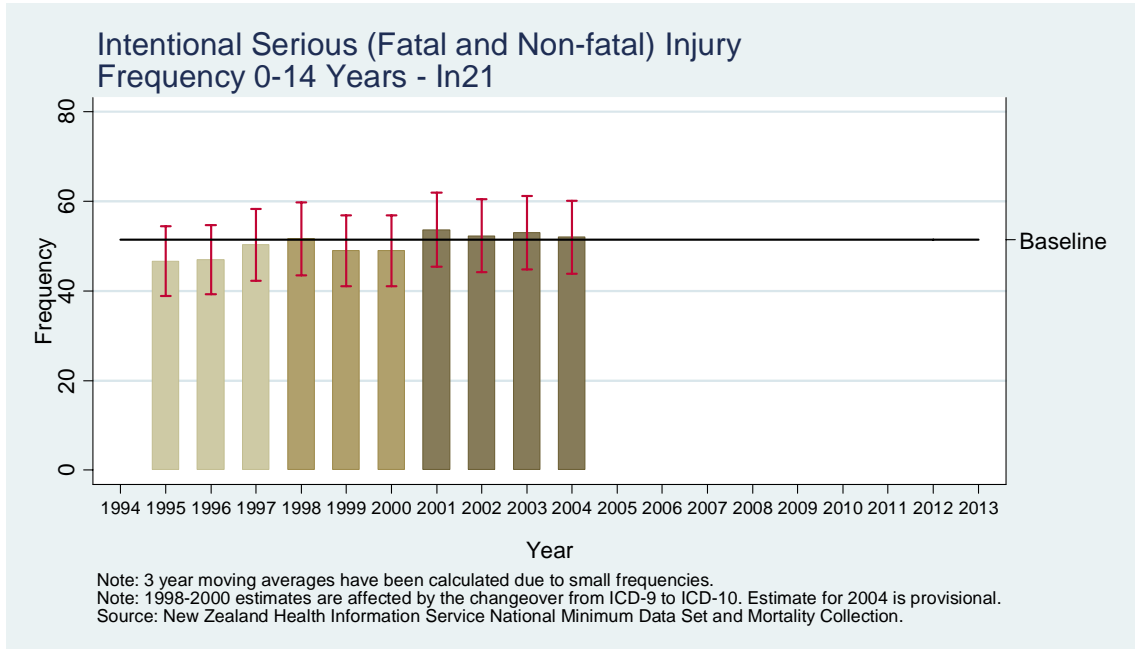


The frequencies (C21) and rates (C22) of serious (fatal and non-fatal) car occupant injuries for children aged 0-14 years are variable. There is no evidence of a change from baseline in the moving average frequency and rate in 2004.

2.5 Intentional (Assault and Self-Harm)



There was an increase from baseline in the moving average frequency (In01) and rates (In02) of serious non-fatal intentional injury for 2006. The trends for these provisional indicators could, however, be the results of extraneous factors, and care should be taken with interpretation.



There is no evidence of a change in the frequencies (In21) or rates (In22) of serious (fatal and non-fatal) intentional injuries between 2001 and 2004. The trends for these provisional indicators could, however, be the results of extraneous factors, and care should be taken with interpretation.

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