



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

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## Foreword

Presented here is a chartbook of the New Zealand Injury Prevention Strategy serious injury outcome indicators. This is the third in a series of chartbooks. The development of these outcome indicators 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. (<http://www.nzips.govt.nz/documents/serious-injury-indicators-2004-09.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 methods. This is provided in an 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 <sup>th</sup> revision
ICD-9-CM	ICD-9, Clinical Modification
ICD-10	WHO International Classification of Diseases 10 <sup>th</sup> revision
ICD-10-AM	ICD-10, Australian Modification
ICISS	ICD-based Injury Severity Score
IPRU	Injury Prevention Research Unit, University of Otago, New Zealand
LTNZ	Land Transport 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
TCR	LTNZ Traffic Crash Report
Technical Report	The New Zealand Injury Prevention Strategy Serious Injury Outcome Indicators: Technical Report.
WHO	World Health Organisation
WRFIS	Work-Related Fatal Injury Study
WSNZ	Water Safety New Zealand

## 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 each 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
<a href="#"><u>All injury</u></a>	I01: increase from the baseline of around 8,000 to around 9,750 in 2007.	I11: decrease from the baseline of around 1,450 to around 1,300 fatalities in 2005.
<a href="#"><u>Assault</u></a>	A01 (provisional indicators): increase, although this could be the result of reporting behaviour	A11: no evidence of a change.
<a href="#"><u>Work related</u></a>	W01 (provisional indicators): increase from baseline.	W11 (provisional indicators): No detectable change from baseline.
<a href="#"><u>Intentional self harm</u></a>	S01 (provisional indicators): increase, although this could be the result of reporting behavior	S11: no detectable change from baseline
<a href="#"><u>Falls</u></a>	F01a-c: increase from baseline across all ages, and for the 0-74 and 75+ age groups.	F11a-c: little evidence of change from baseline for all ages and 75+ age groups. Increase for 0-74 age group.
<a href="#"><u>MVTC</u></a>	M01: substantial increase from baseline.	M11 and M15: reduction from baseline for both Mortality Collection and LTNZ traffic crash report (provisional indicator).
<a href="#"><u>Drowning</u></a>	No indicator presented.	D11 and D13: Mortality Collection data suggest no detectable change from baseline up to 2005. However, Drownbase data (provisional indicator) provide evidence of a decrease from baseline after 2005.

## 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
<u>All injury</u>	I02: increase from baseline	I12: decrease from baseline.
<u>Assault</u>	A02 (provisional indicators): increase from baseline, although this could be the result of reporting behaviour	A12: no evidence of a change from baseline.
<u>Work related</u>	W02 (provisional indicators): no detectable change from baseline.	W12 (provisional indicators): no detectable change from baseline.
<u>Intentional self harm</u>	S02 (provisional indicators): increase from baseline, although this could be the result of reporting behaviour	S12: no detectable change from baseline
<u>Falls</u>	F02a-c: little evidence of a change from baseline across all ages, increase for the 0-74 age group, and a suggestion of a decrease from baseline for the 75+ age group.	F12a-c: little evidence of a change from baseline for any age group.
<u>MVTC</u>	M02: increase from baseline.	M12 - M14 and M16 – M18: decrease from baseline in rates based on Mortality Collection data and LTNZ traffic crash reports (provisional indicators).
<u>Drowning</u>	No indicator presented.	D12 and D14: Mortality Collection data suggest little apparent change from baseline. However, Drownbase data (provisional indicator) shows a decrease from baseline in 2006 and 2007.

# 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](#). (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 non-fatal) injury indicators, have been developed for these areas as the main means of measuring performance in reducing injury. The purpose of this chartbook is to present trends over the period 1994 to 2005 for each of the NZIPS fatal and serious (fatal and non-fatal) and 1994 to 2007 for the NZIPS serious non-fatal injury indicators, for each of these priority areas, in order to judge progress in the prevention of serious injury during the lifetime of the NZIPS.

## 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. not including those who are readmitted for the same injury) with a primary diagnosis of injury, approximately 13% have at least a 6% chance of death. The methods by which cases of fatal and serious non-fatal injury are identified are described briefly in the accompanying technical report "The New Zealand Injury Prevention Strategy Serious Injury Outcome Indicators: [Technical Report](#)".

### 1.3 The indicators

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

The [NZ Injury Prevention Strategy's 2008-11 Implementation Plan](#) was approved by the Government in August 2008. This Plan includes the NZIPS fatal, serious non-fatal and serious (fatal and 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 and 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 are the same as 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, serious non-fatal and serious (fatal and non-fatal) injury indicators for 'All injury' and for the six 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, and serious (fatal and non-fatal) injury 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 the aging population.

The methodology for the derivation of the NZIPS fatal, serious non-fatal and serious (fatal and non-fatal) injury indicators for most of the priority areas are based on those for 'all injury'.

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

**A** The original NZIPS fatal and serious non-fatal injury indicators have been supplemented 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** The majority of these indicators are based on the New Zealand Health Information Service (NZHIS) Mortality Collection<sup>2</sup> and the National Minimum Dataset (NMDS)<sup>3</sup> of hospital inpatient data. Provisional indicators for fatal work related injury are based on Accident Compensation Corporation (ACC) data. Provisional indicators for fatal motor vehicle traffic crash injuries are based on Land Transport New Zealand (LTNZ) traffic crash reports. Provisional indicators for drowning are based on Water Safety New Zealand’s (WSNZ) Drownbase<sup>TM</sup>, which records drowning reported in police reports, media releases and Coroners’ reports.

*Q What do the frequencies and rates reflect?*

**A** Frequencies reflect the societal burden of injury<sup>a</sup>, 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)<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).

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<sup>a</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.

*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.

*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)<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 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 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, 3-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, 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.

*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.

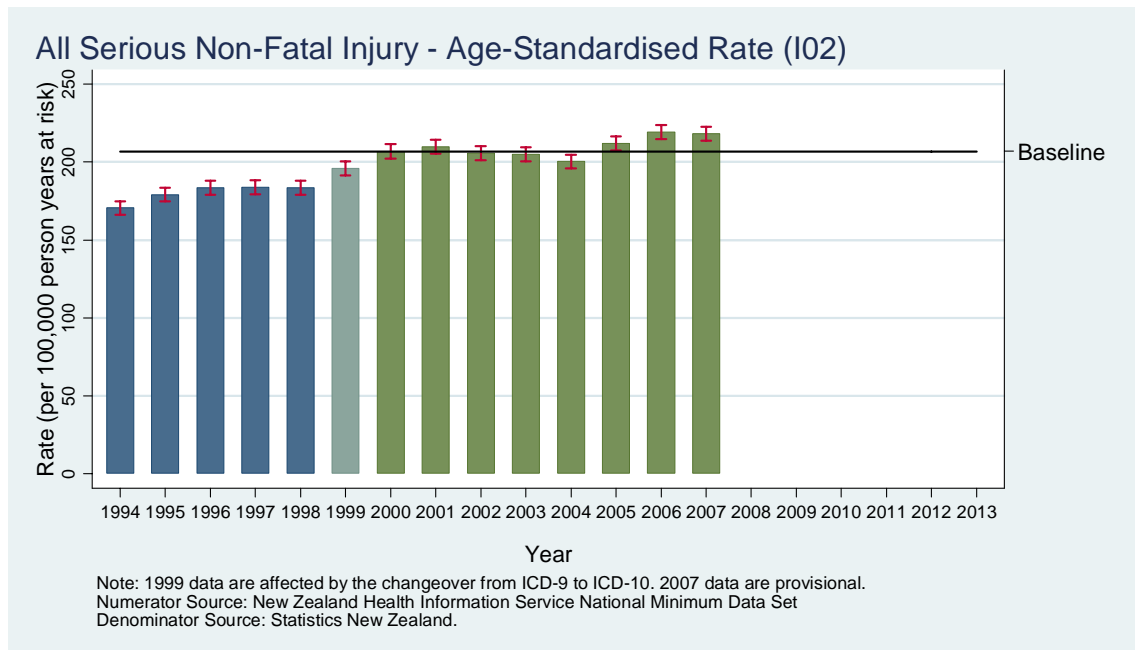
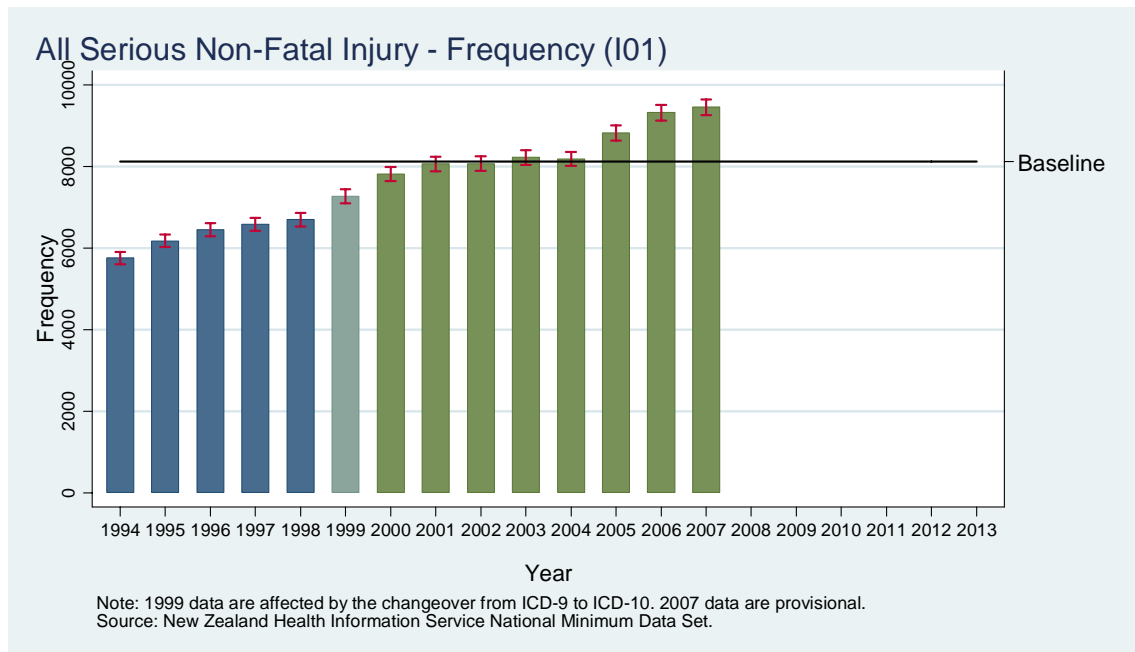
Where there is reader interest in the magnitude of the frequency or rate of serious injury in a given year, there will be particular interest in these confidence intervals for that year. In many other circumstances, it is the trends in the indicators that will be of interest. For example, trends are 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**

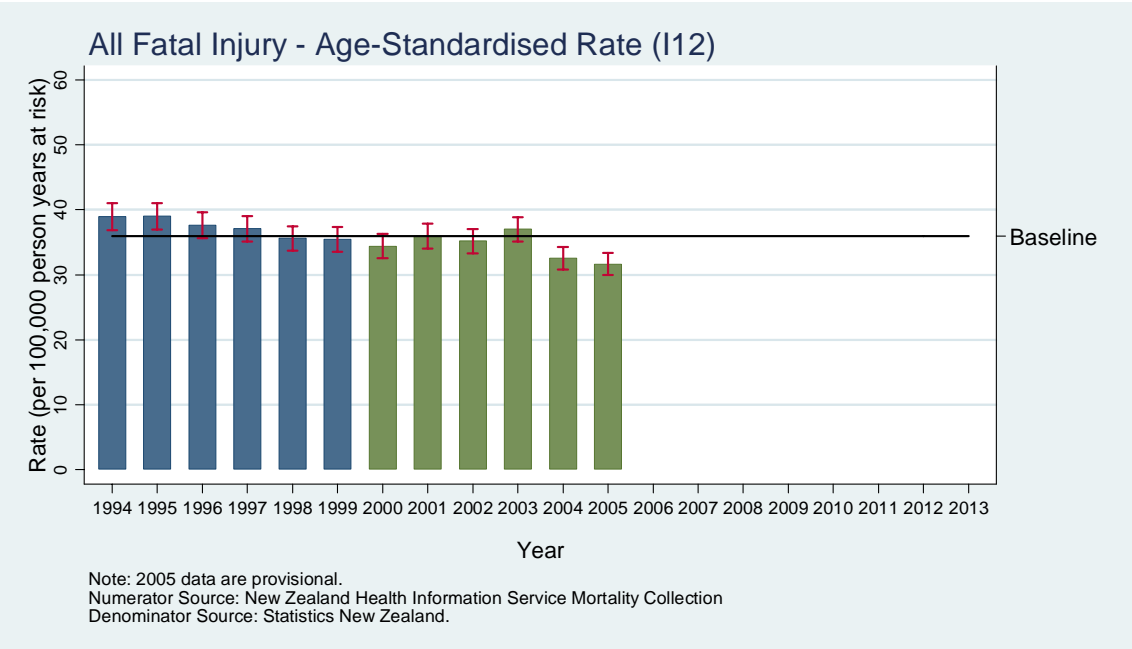
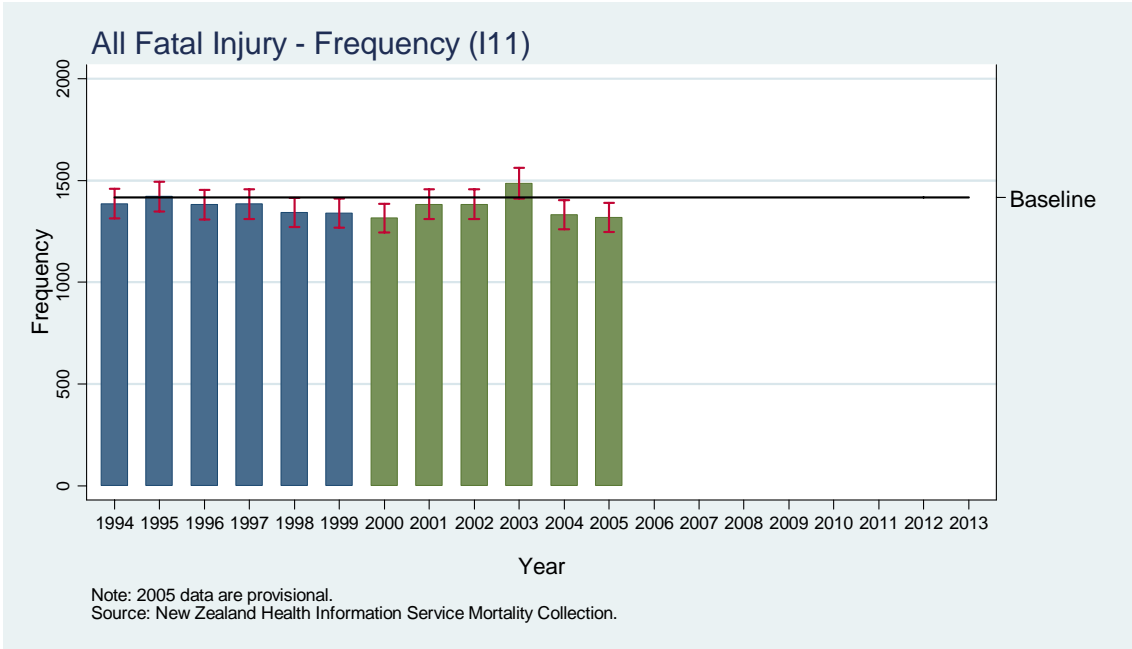
Brief comments on each chart are provided at the foot of each page in Part 2. The interpretations provided are based on a visual inspection (as opposed to formal statistical trend analysis). Within a chart, where the confidence intervals do not overlap the baseline, this is indicative of a change from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

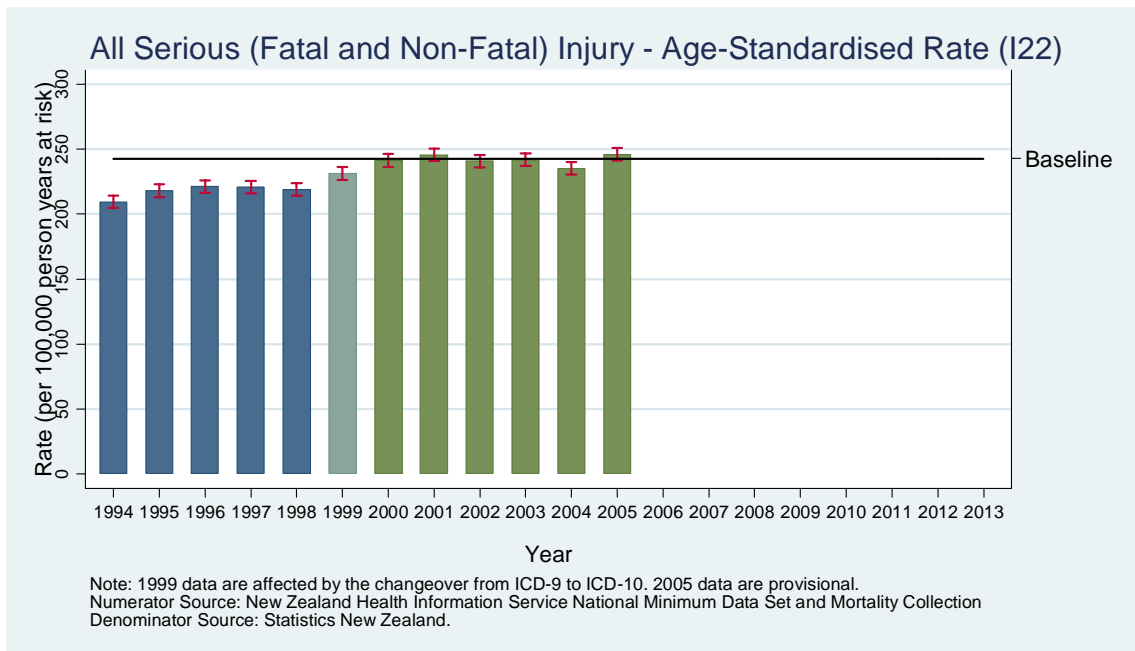
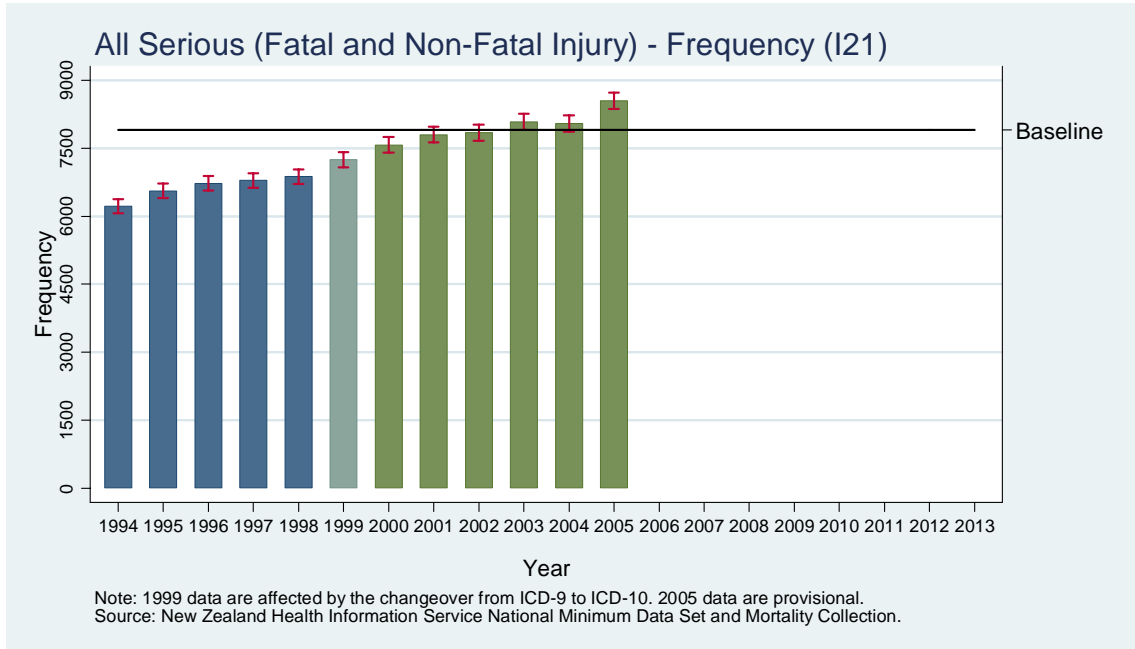
## 2.1 All injury



Since 2004, there has been a steady increase in the frequency of serious non-fatal injury. This trend is also reflected in the rates of injury. In 2006 and 2007 the frequencies and rates of serious non-fatal injury had clearly increased from baseline levels.

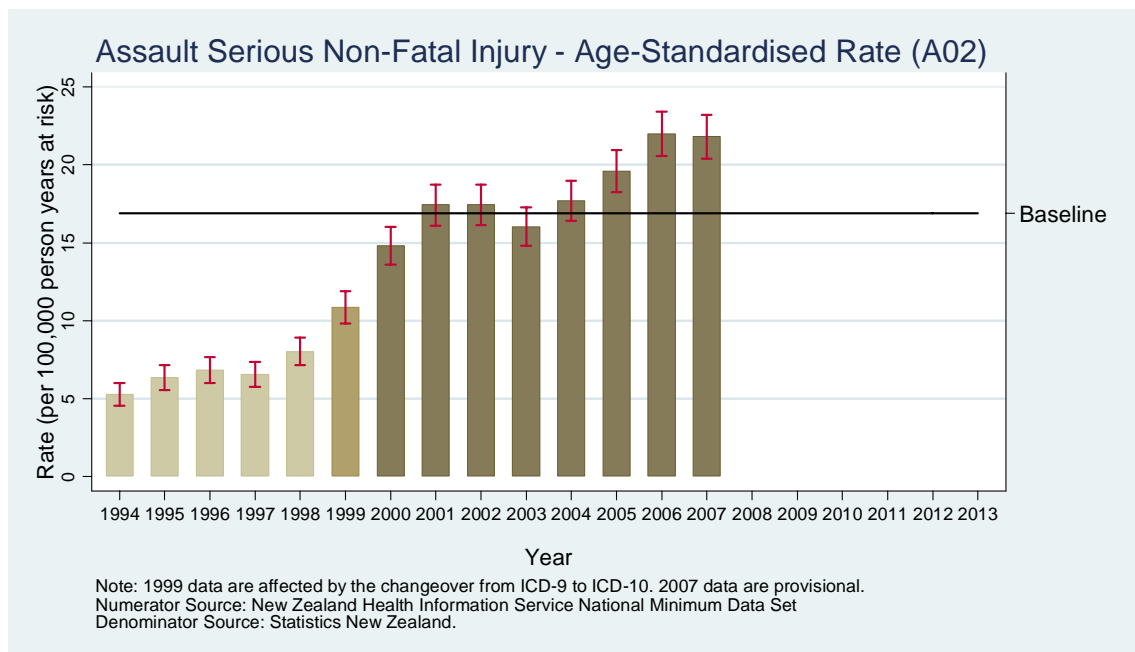
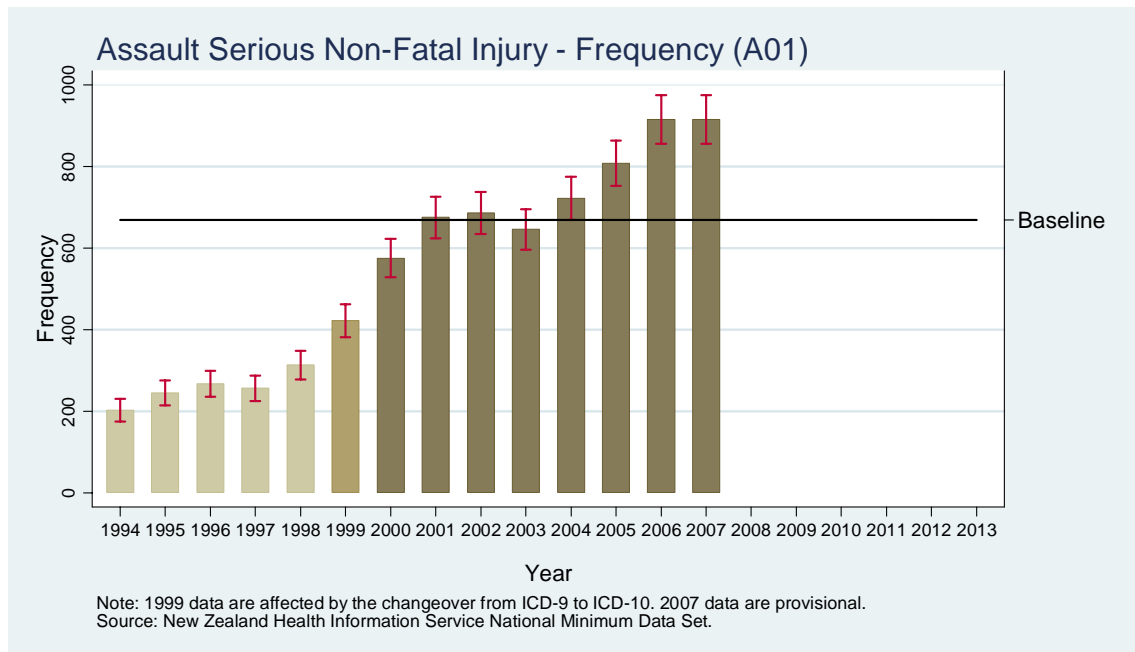


Both the frequencies (I11) and rates (I12) of fatal injury are lower than baseline in 2004 and 2005.

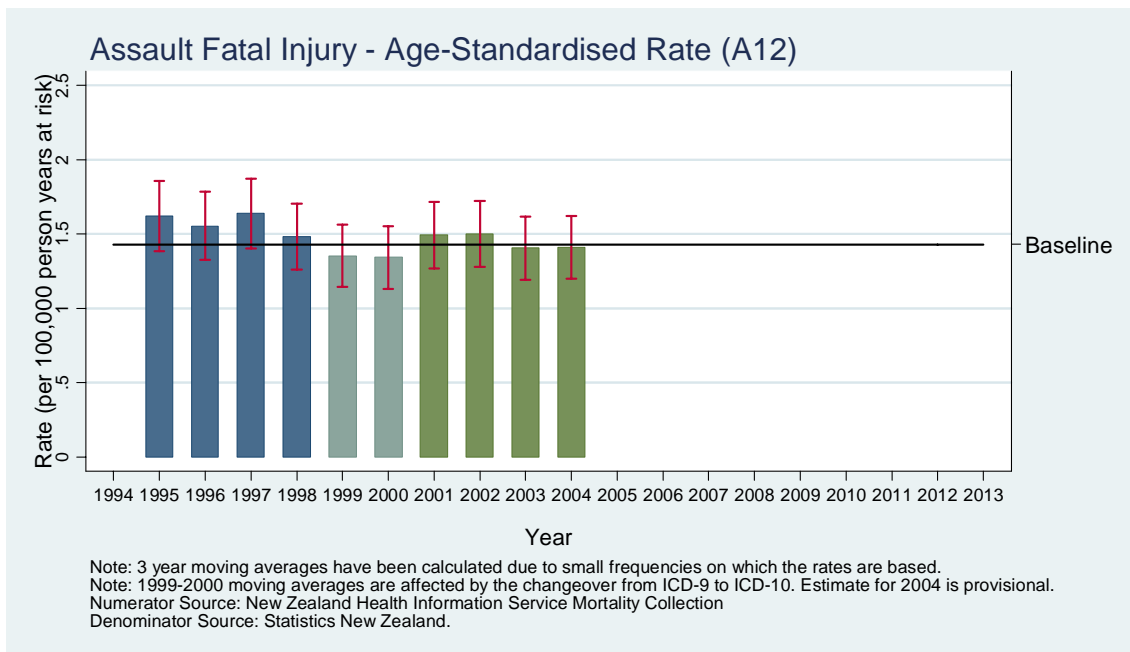
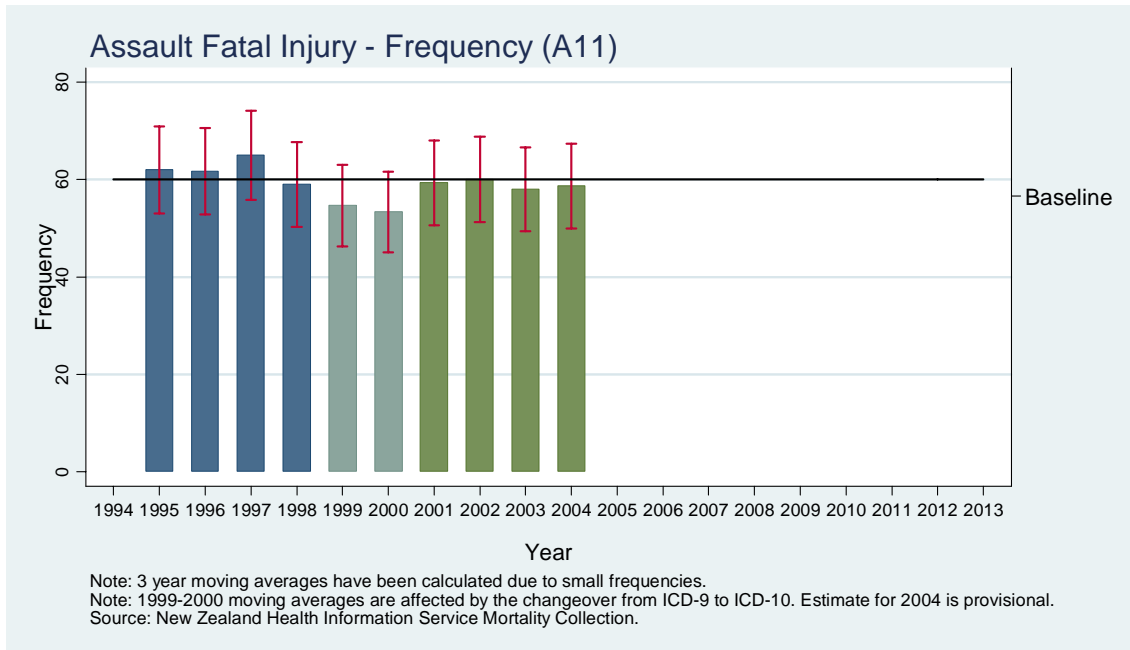


There was an increase from baseline in the 2005 frequency of serious (fatal and non-fatal) injury (I21). There is no evidence of a change in the rate of serious (fatal and non-fatal) injury (I22).

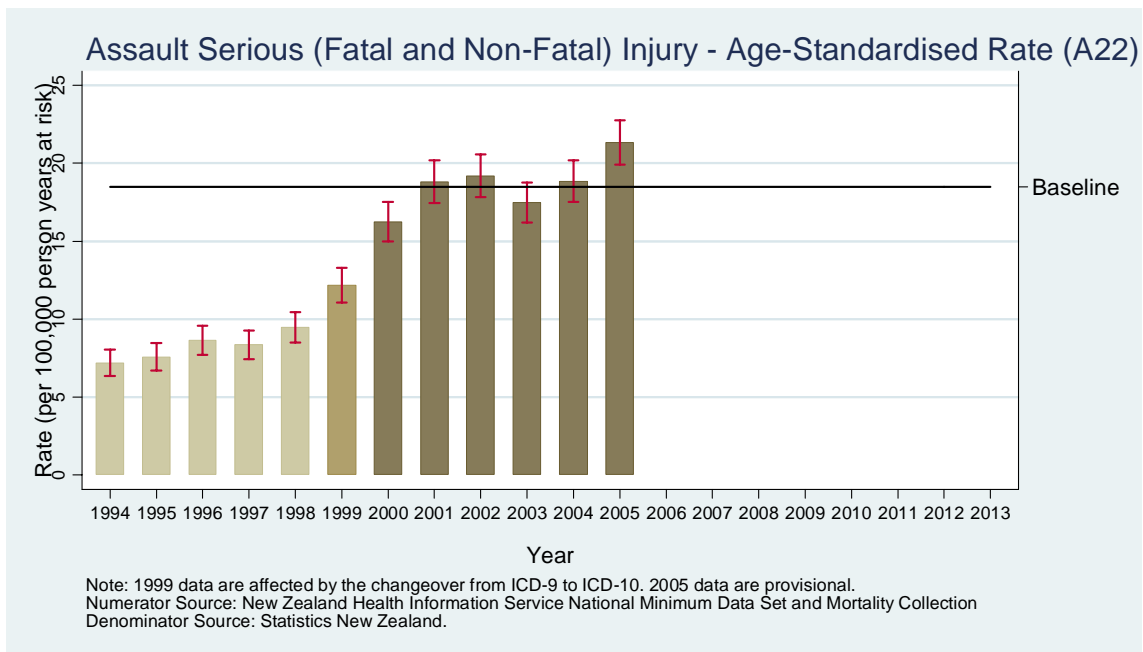
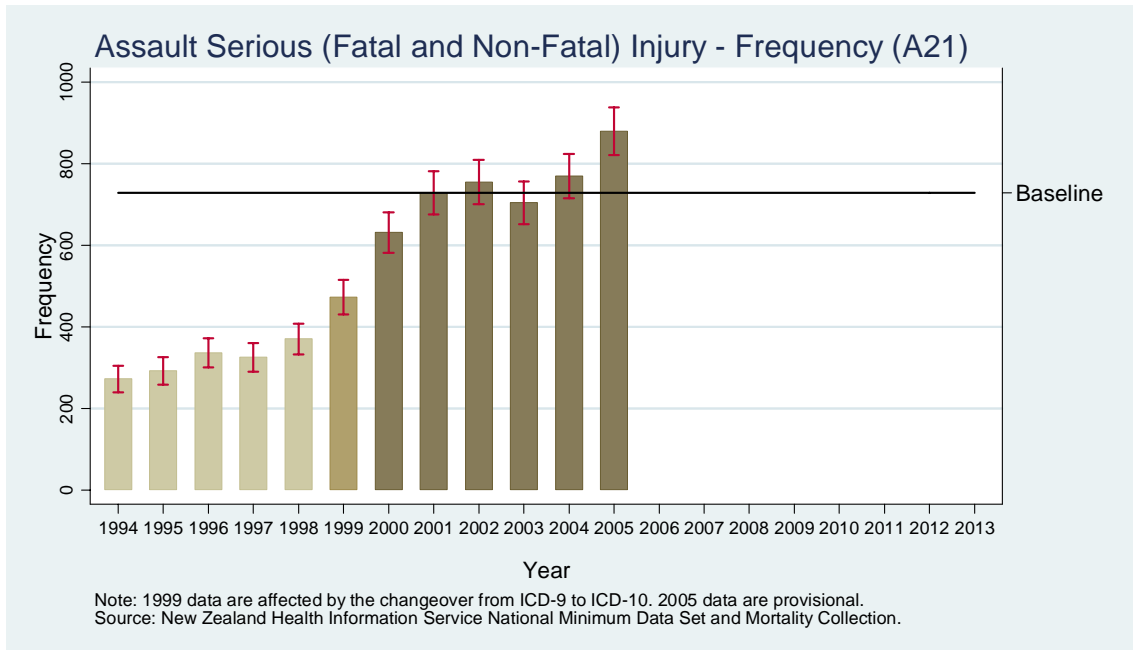
## 2.2 Assault



In a previous chartbook, it was noted that, between 2000 and 2005 the frequencies (A01) and rates (A02) of serious non-fatal assaultive injuries increased. The charts above suggest that this trend has continued. These are, however, provisional indicators and the observed trends could be due to extraneous factors, and care should be taken with interpretation.

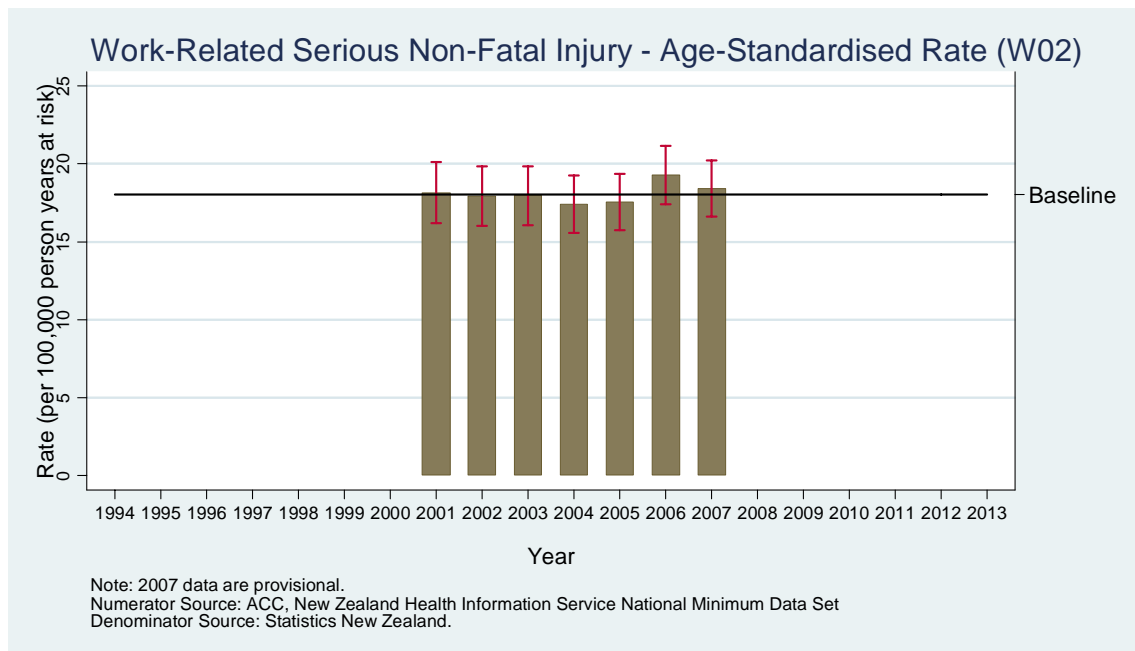
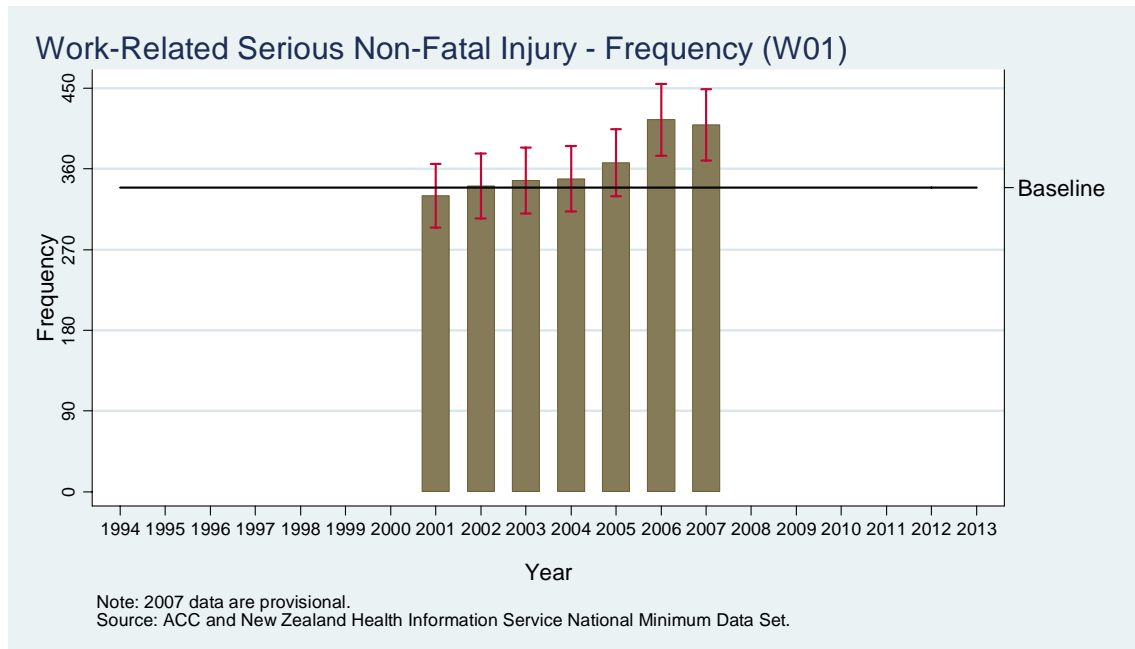


There is no evidence of a change in either the frequencies (A11) or rates (A12) of fatal assaultive injuries.

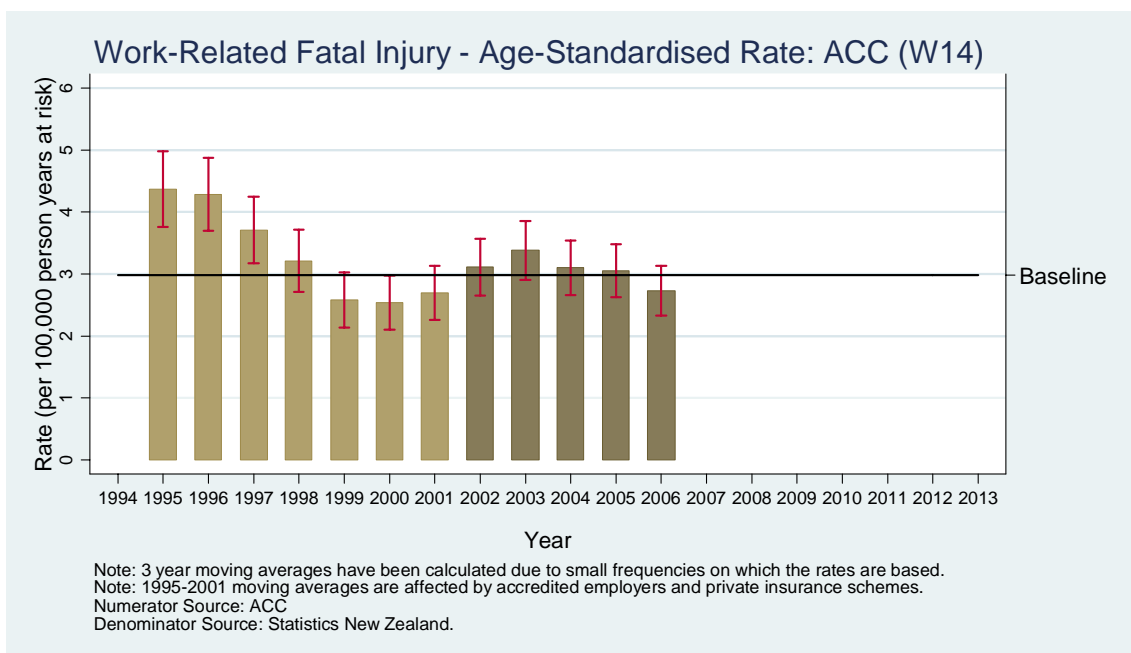
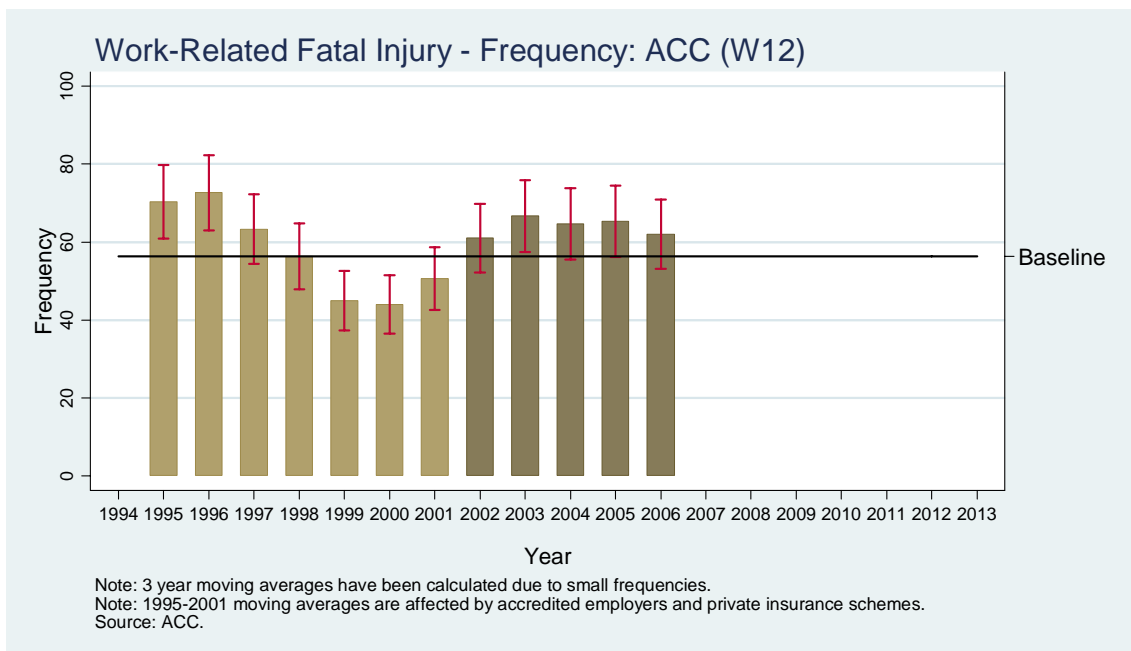


There is evidence of an increase in the frequencies (S21) and rates (S22) of serious (fatal and non-fatal) assault injury from baseline. These trends could, however, be the results of extraneous factors, and care should be taken with interpretation.

## 2.3 Work related injury

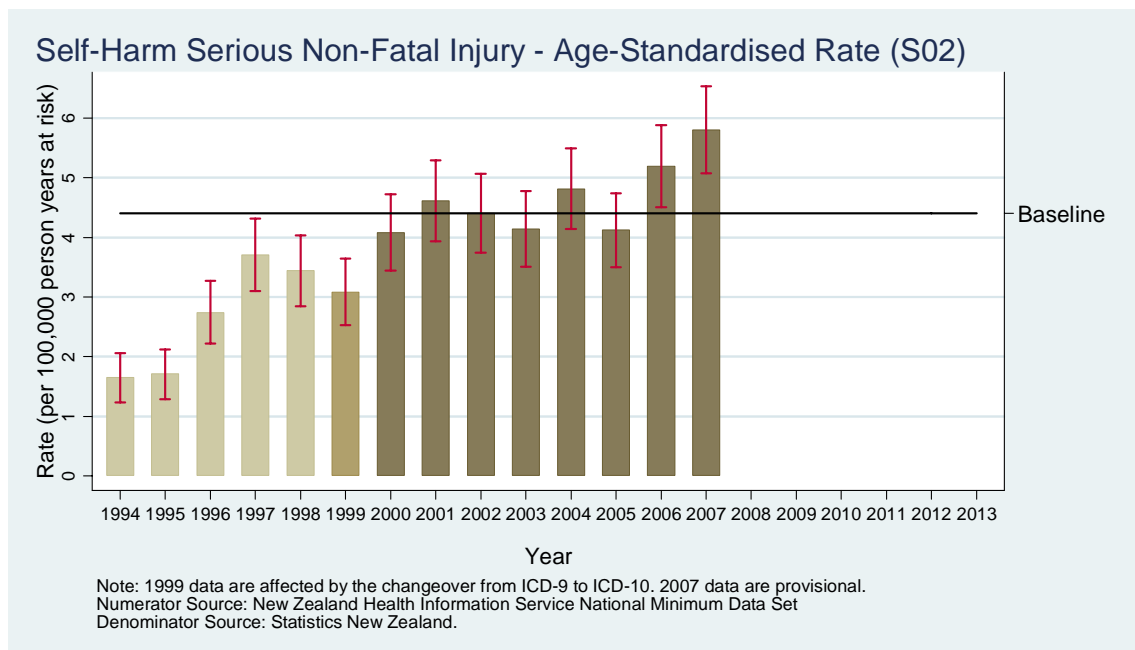
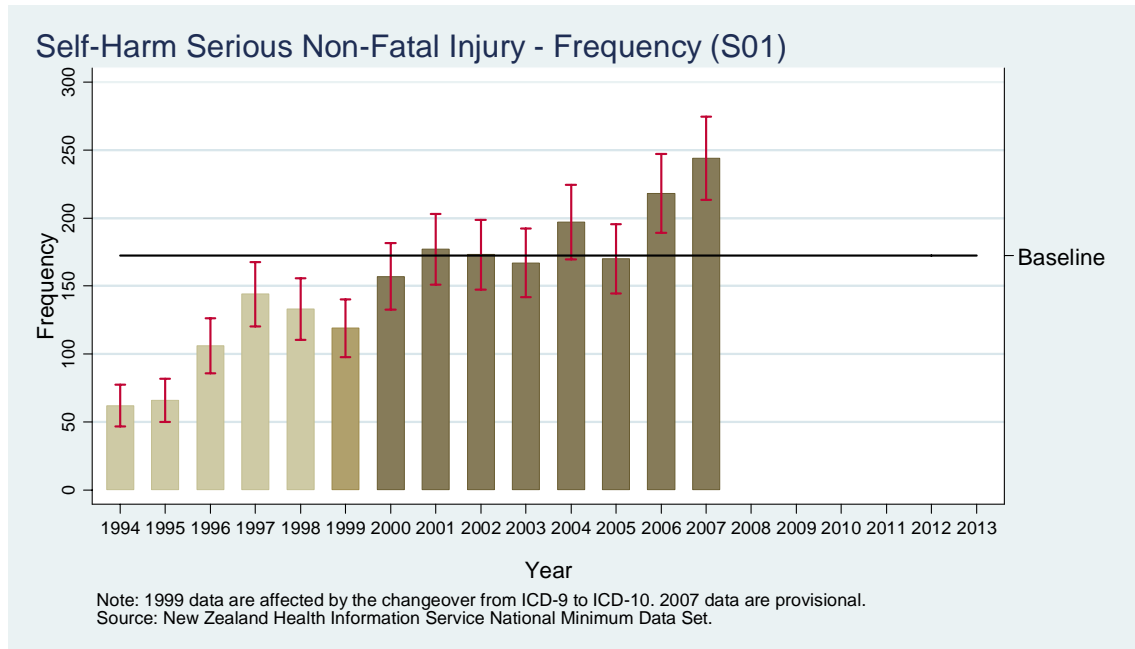


It is apparent that there has been an increase from baseline in the frequency of work related serious non-fatal injuries (W01). There is no detectable change in the rates of work related serious non-fatal injury (W02).

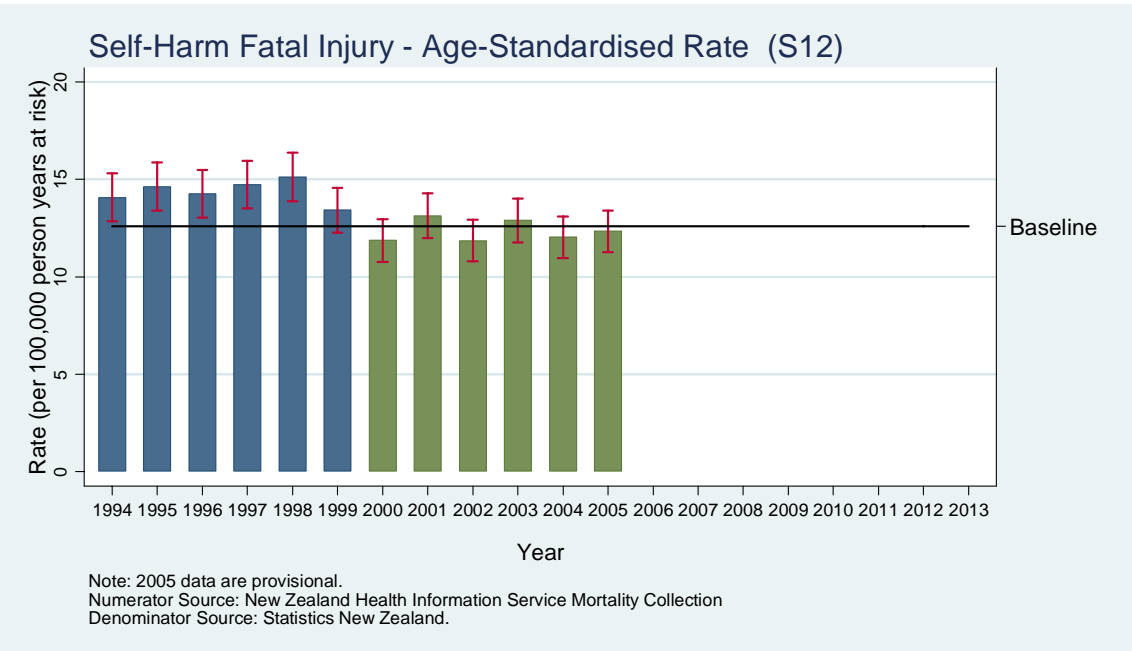
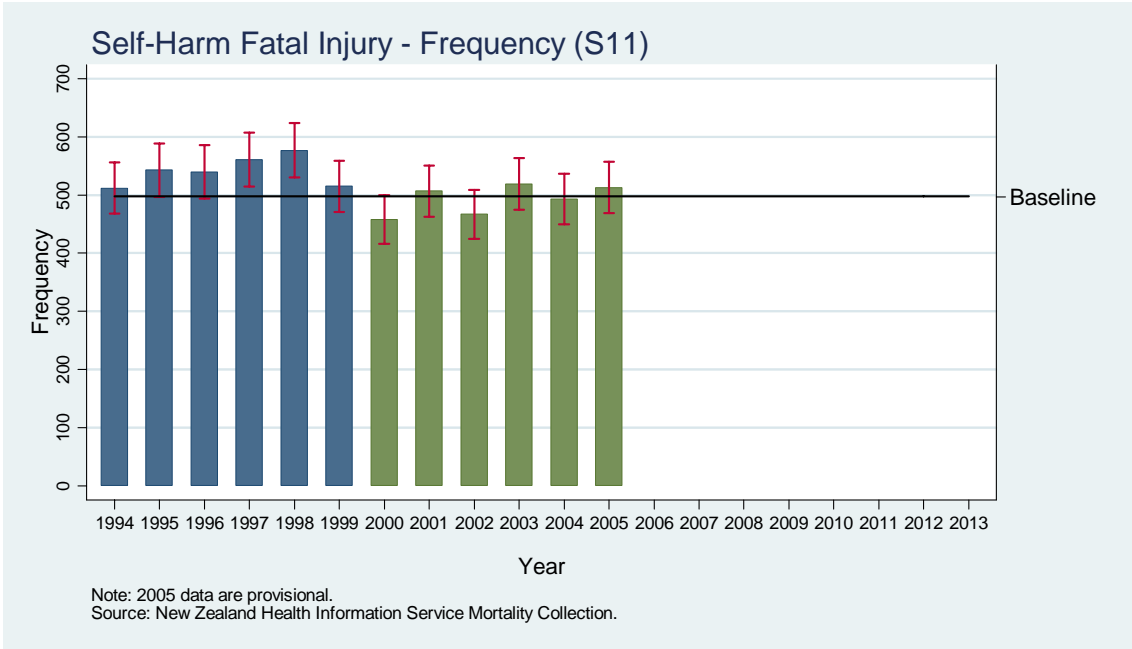


There has been no detectable change from baseline in the frequency (W12) or rates (W14) of ACC fatal work related injuries.

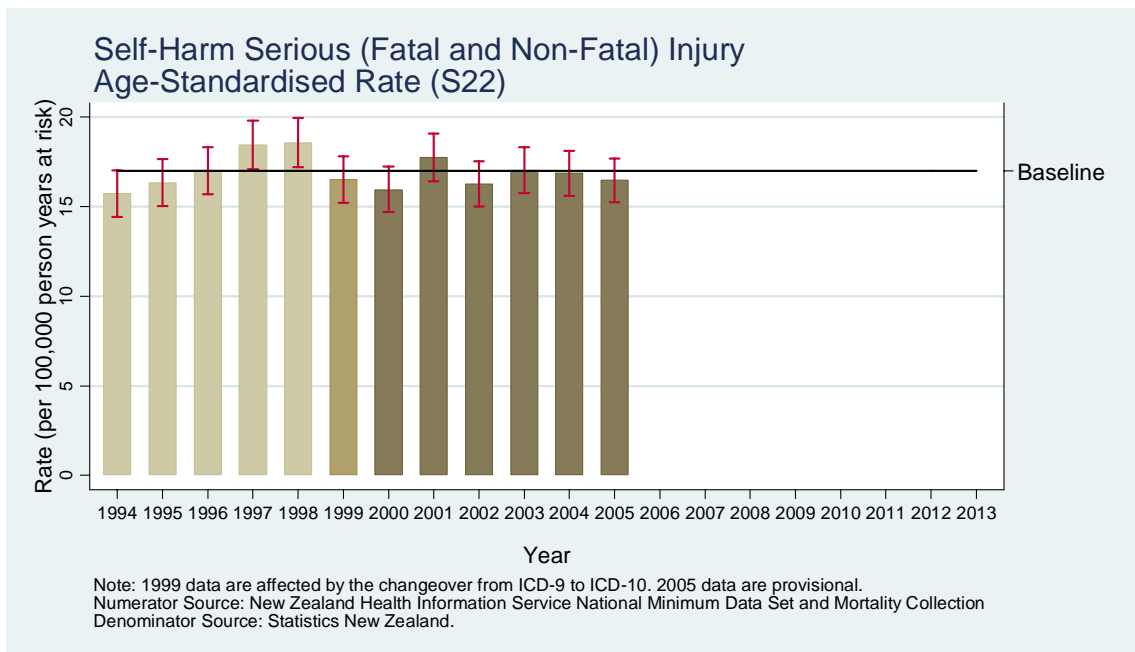
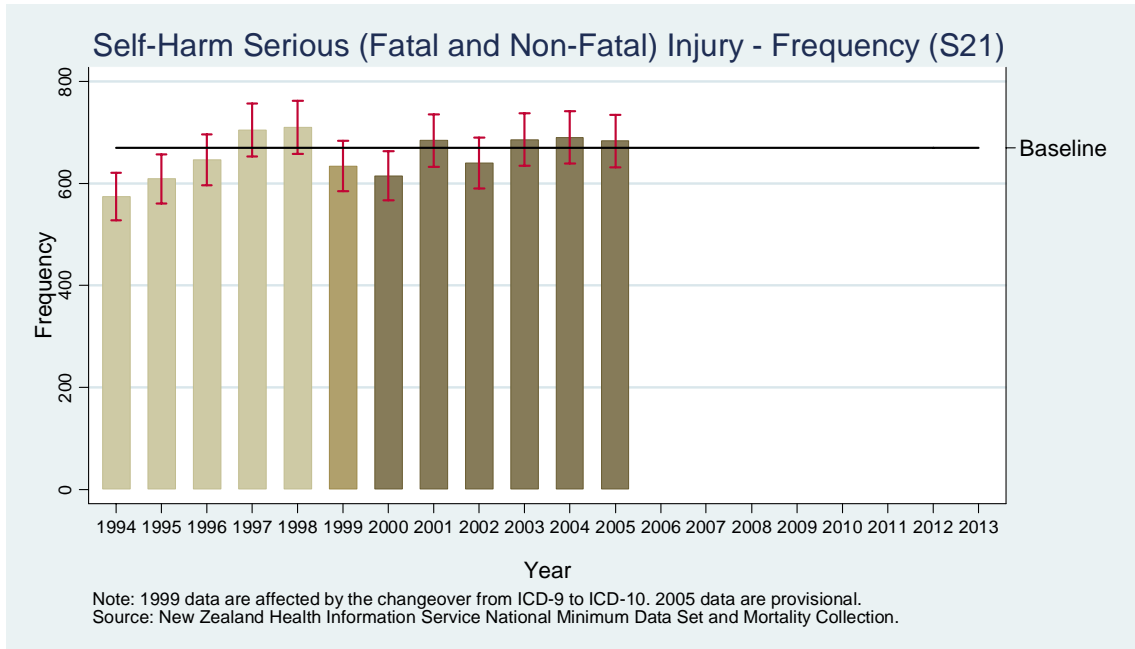
## 2.4 Intentional self-harm



Although the frequencies (S01) and rates (S02) of serious non-fatal self harm injury are highly variable, 2006 and 2007 frequencies and rates have increased from baseline levels. Trends over the whole period for these provisional indicators could be influenced by extraneous factors.



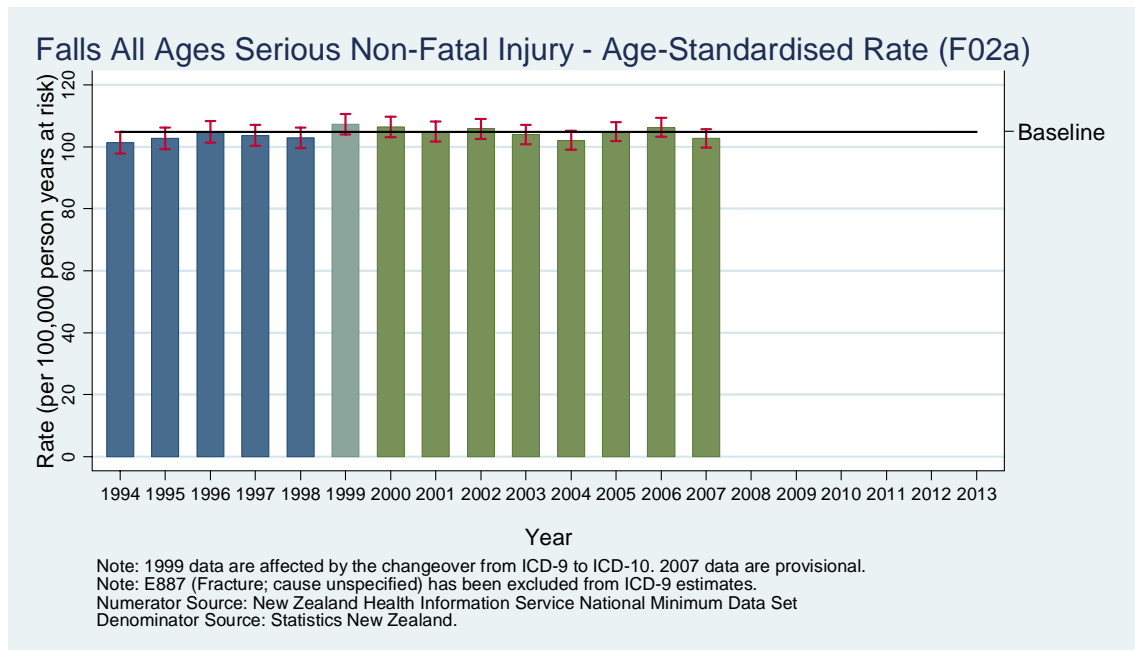
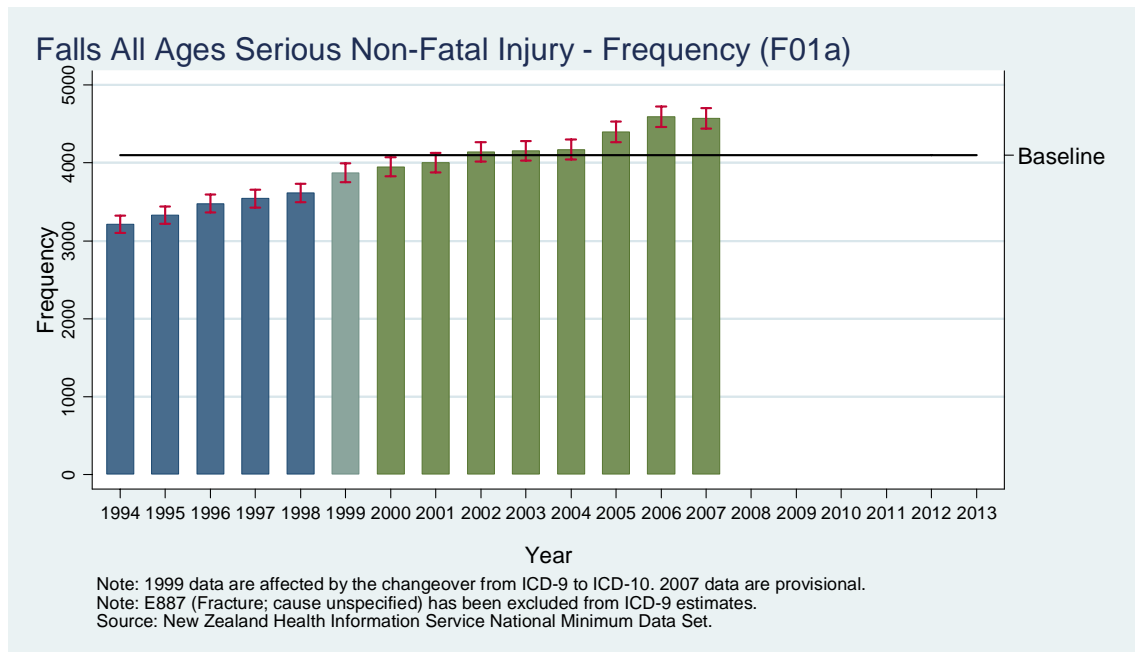
The frequencies (S11) and rates (S12) of fatal self harm injuries are variable. There is no evidence of a trend in either.



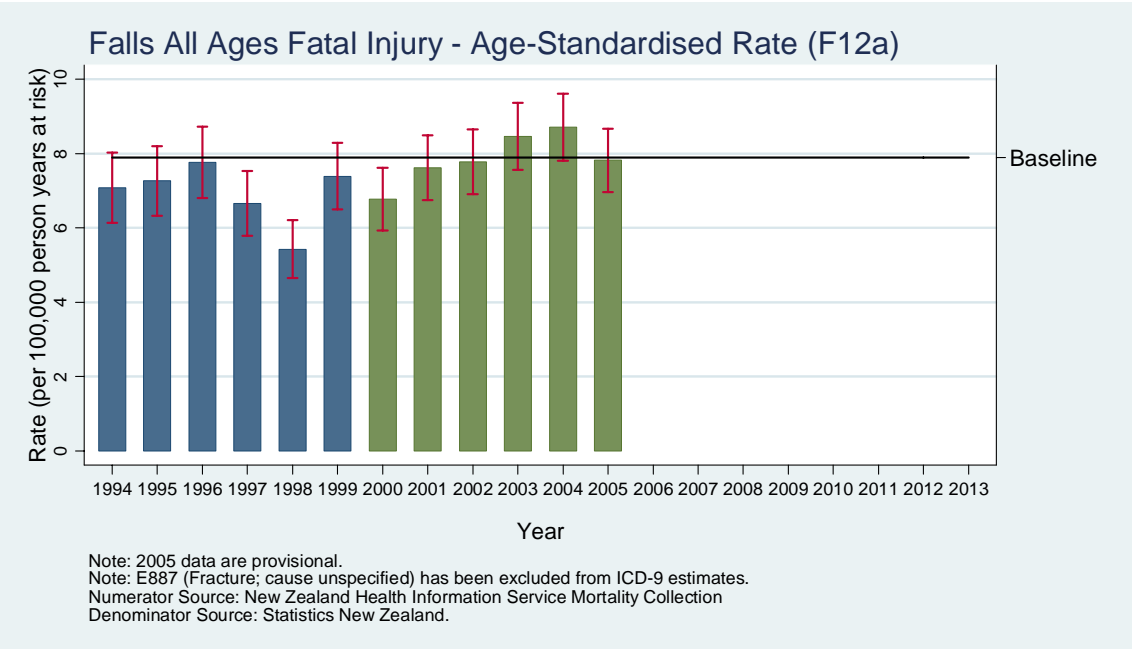
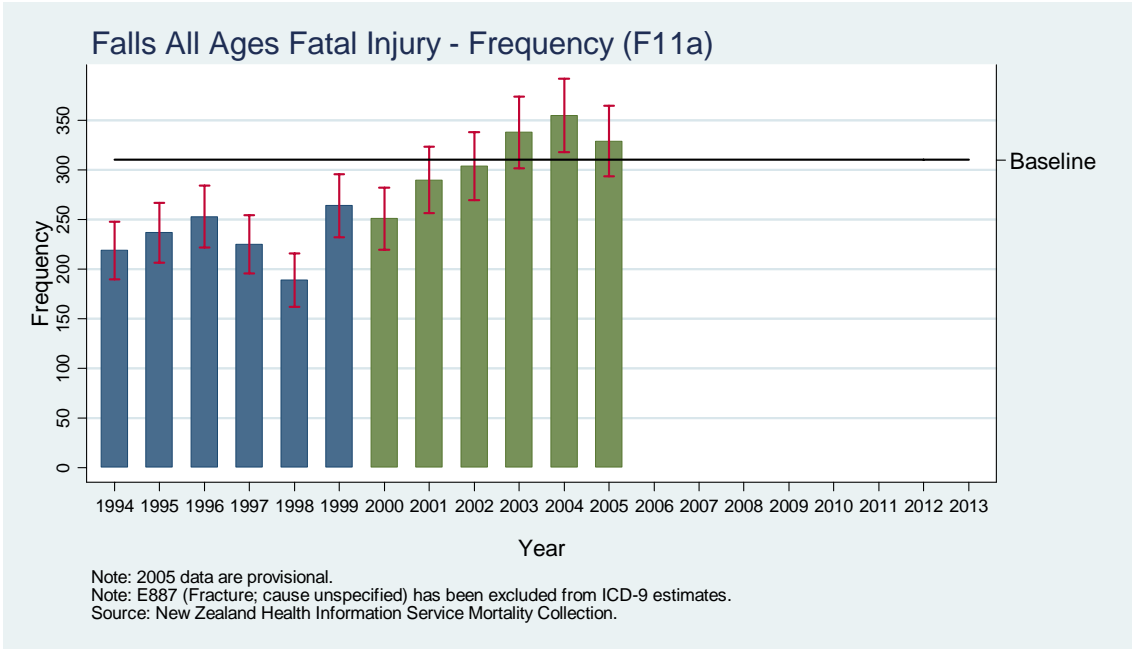
There has been no consistent change in the frequency (S21) or rates (S22) of serious (fatal and non-fatal) self harm injury since 2000. However, trends over the whole period could be influenced by extraneous factors.

## 2.5 Falls

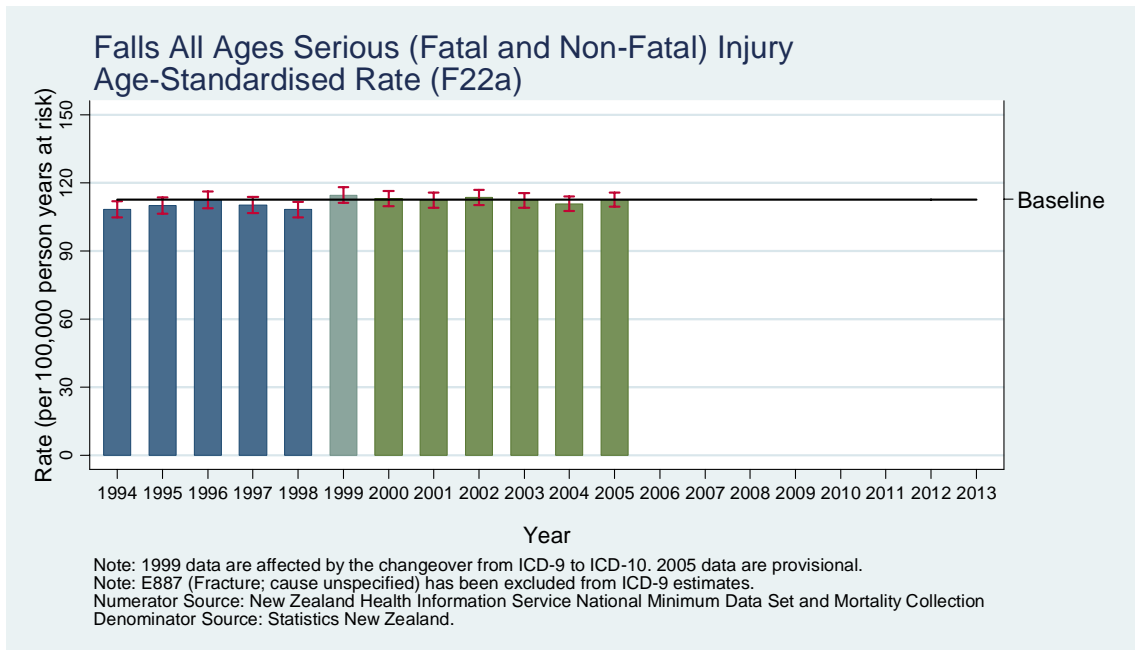
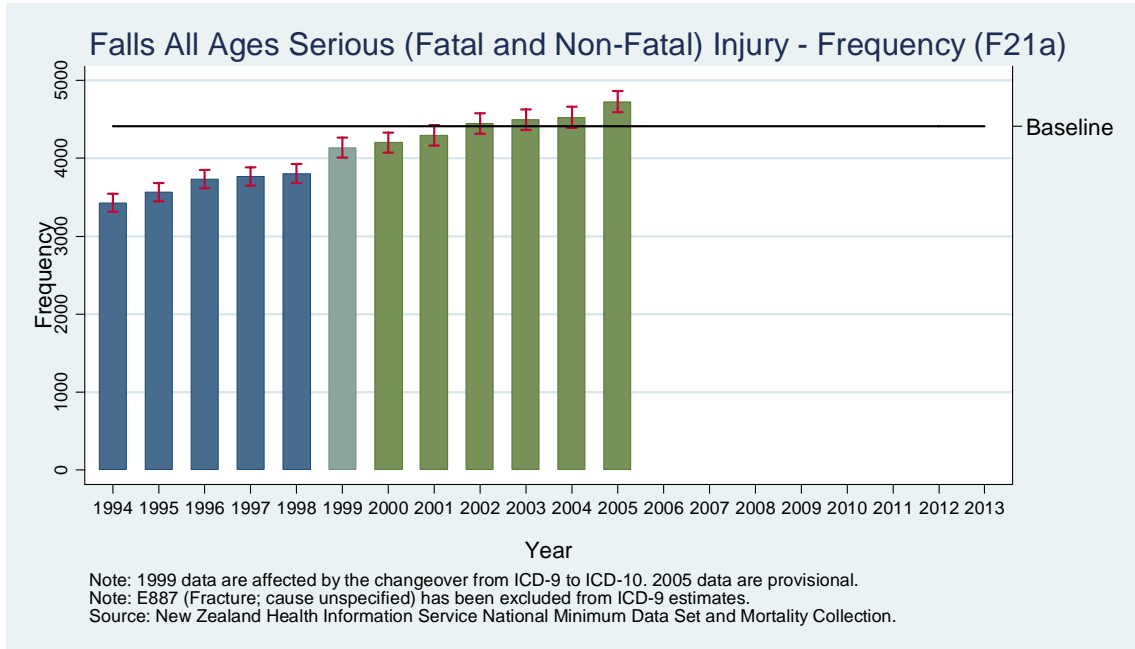
### All ages



There has been an increase from baseline in the frequency (F01a) of falls for all ages since 2000. There has been no evidence of an increasing or decreasing trend in the rates of falls (F02a) for all ages.

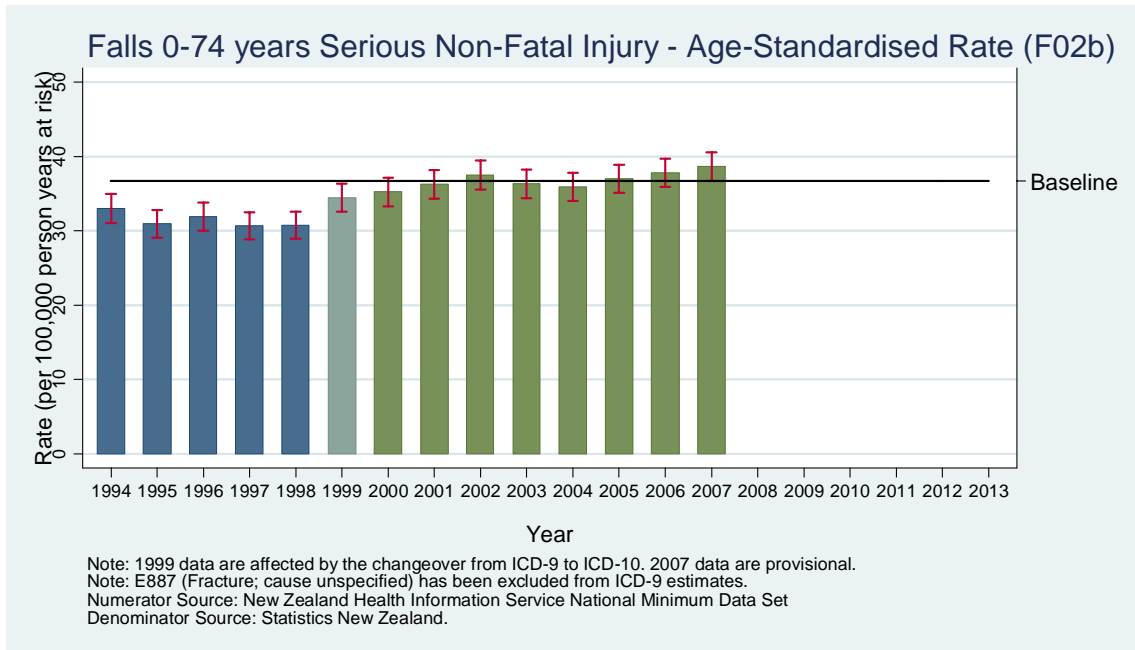
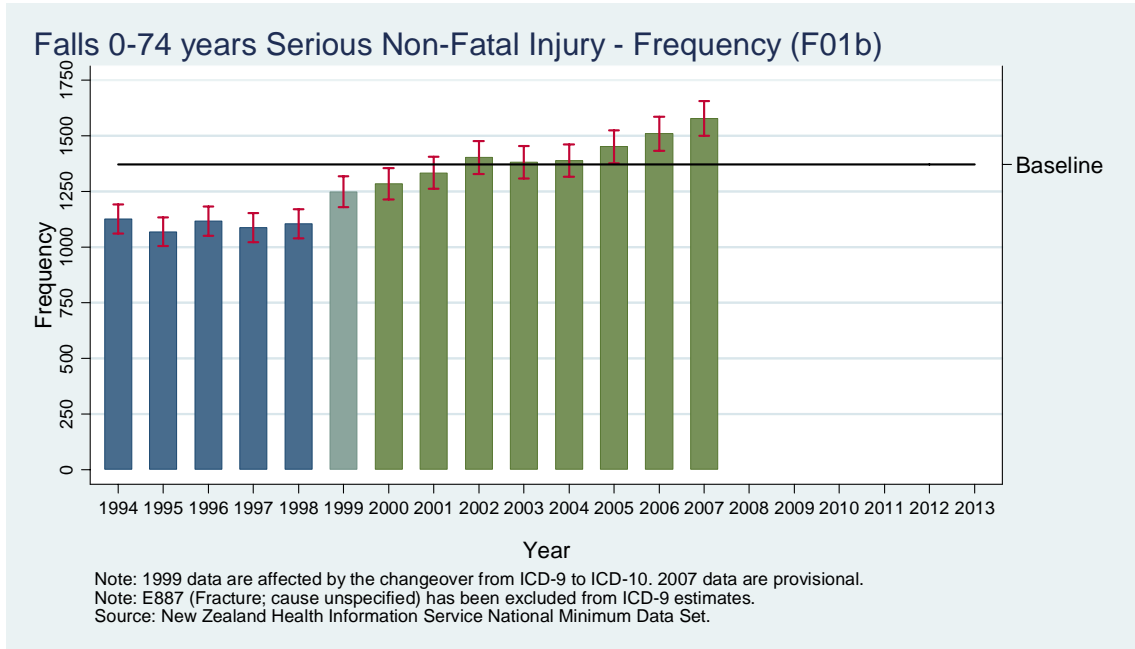


In the latest year (2005) there was no detectable change from baseline in the frequency (F11a) or rate (F12a) of fatal falls for all ages.

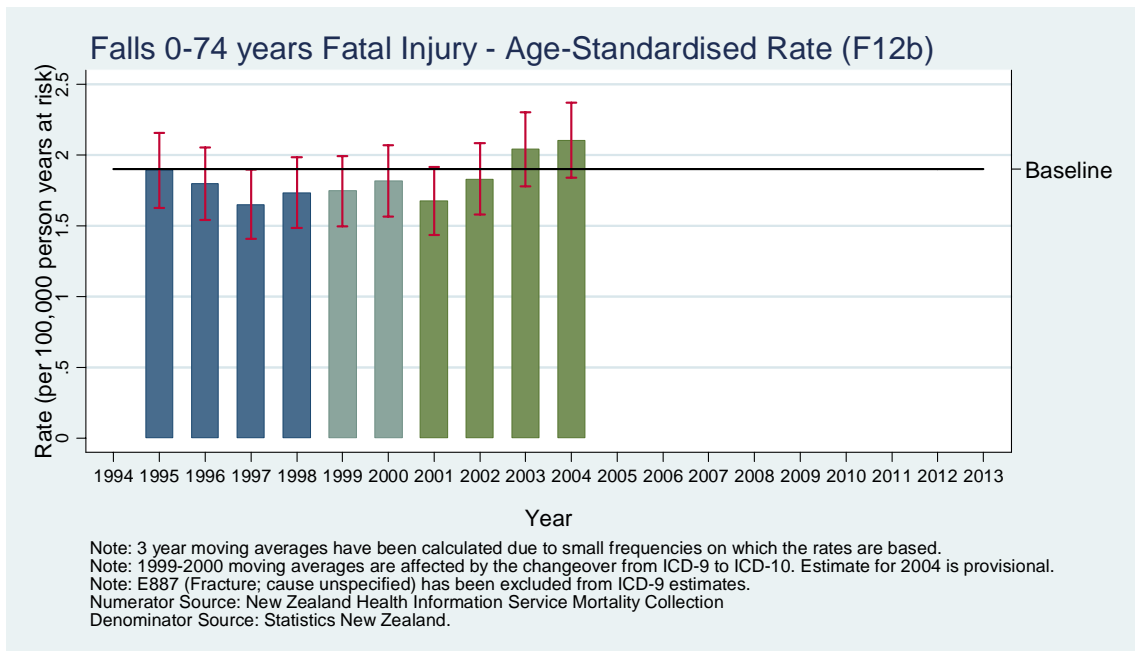
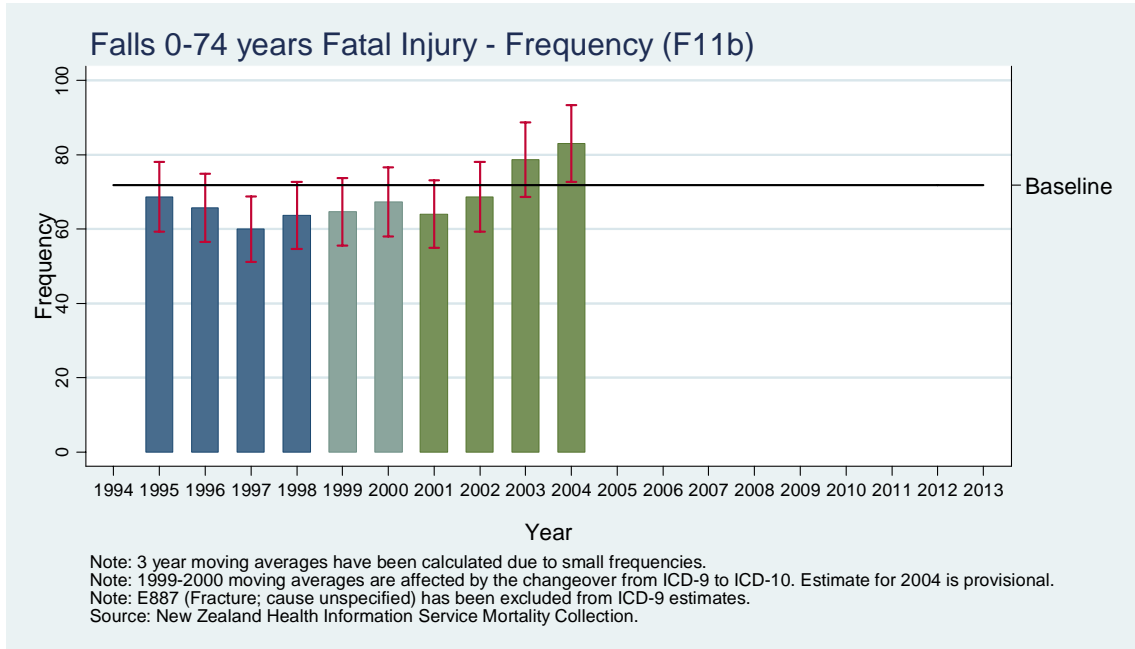


Between 2000 and 2005, there was an increase in the frequency of serious (fatal and non-fatal) falls (F21a) for all ages. There was no change in the rates of serious (fatal and non-fatal) falls (F22a) for all ages over the same time period.

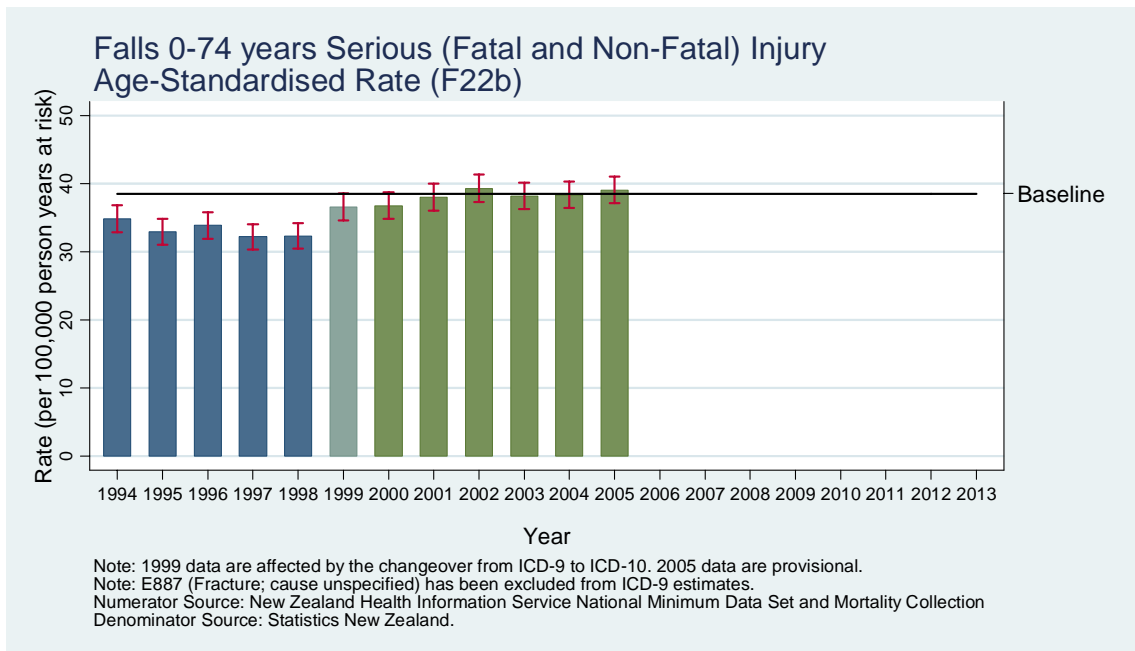
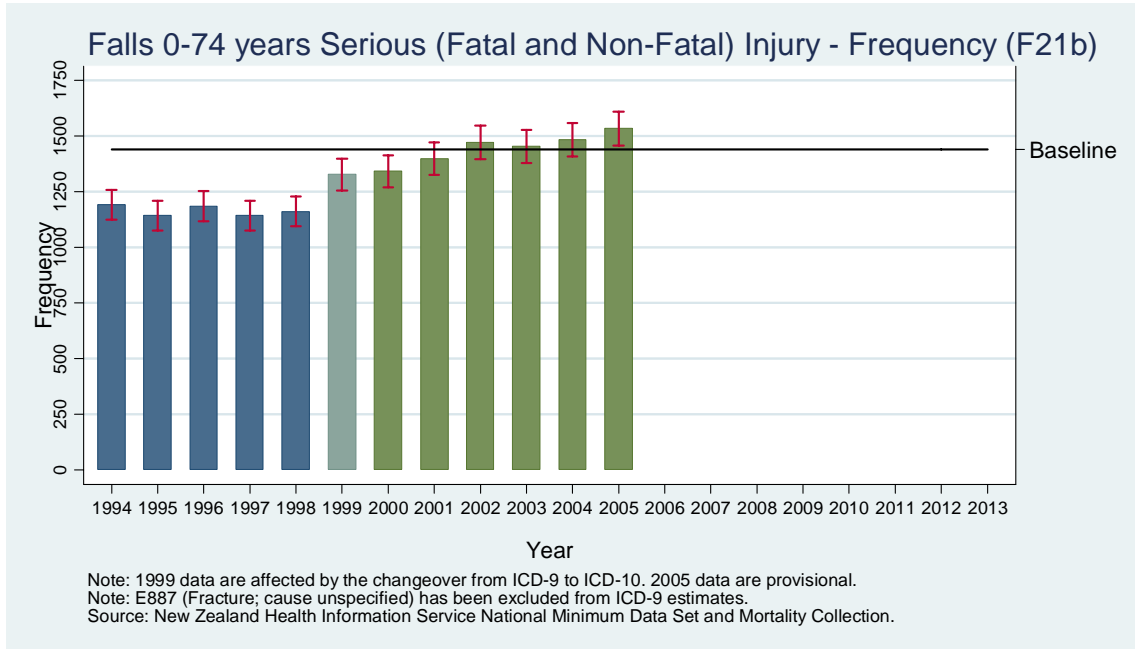
Aged 0-74 years



The frequency (F01b) has increased from baseline for 2000 onwards for those aged 0-74 years. More recently, the rates (F02a) of falls for those aged 0-74 years has also increased from baseline.

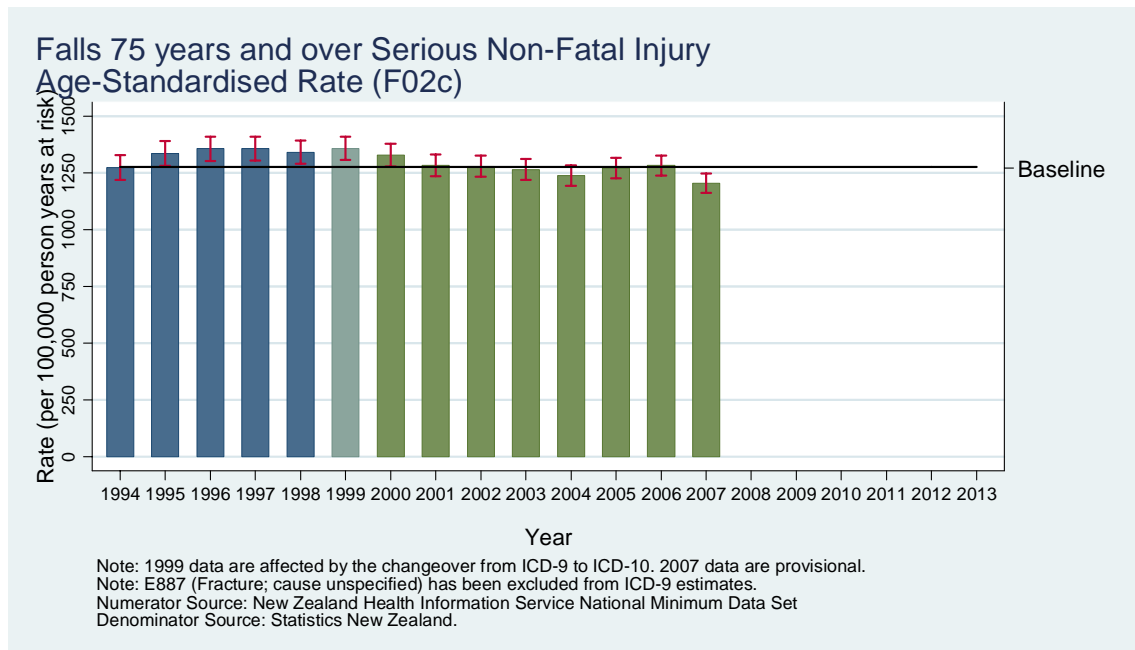
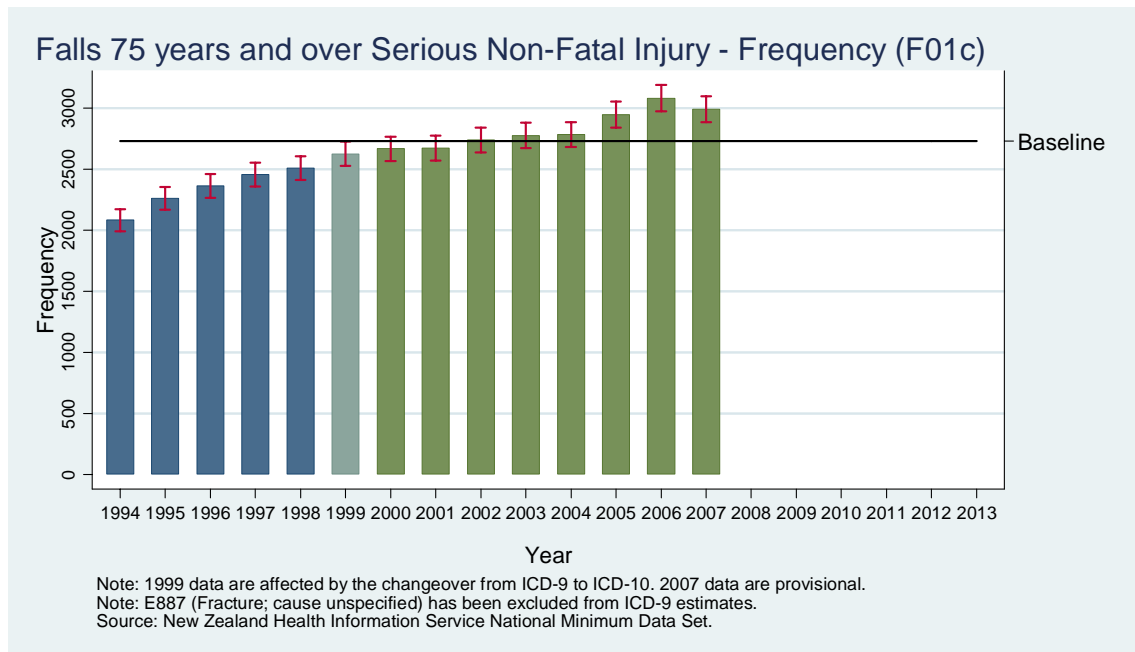


When compared to baseline, there is evidence of an increase in the frequency of fatal falls injury for those aged 0-74 years. In contrast, there is insufficient evidence of a change in the rates of fatal falls injury.

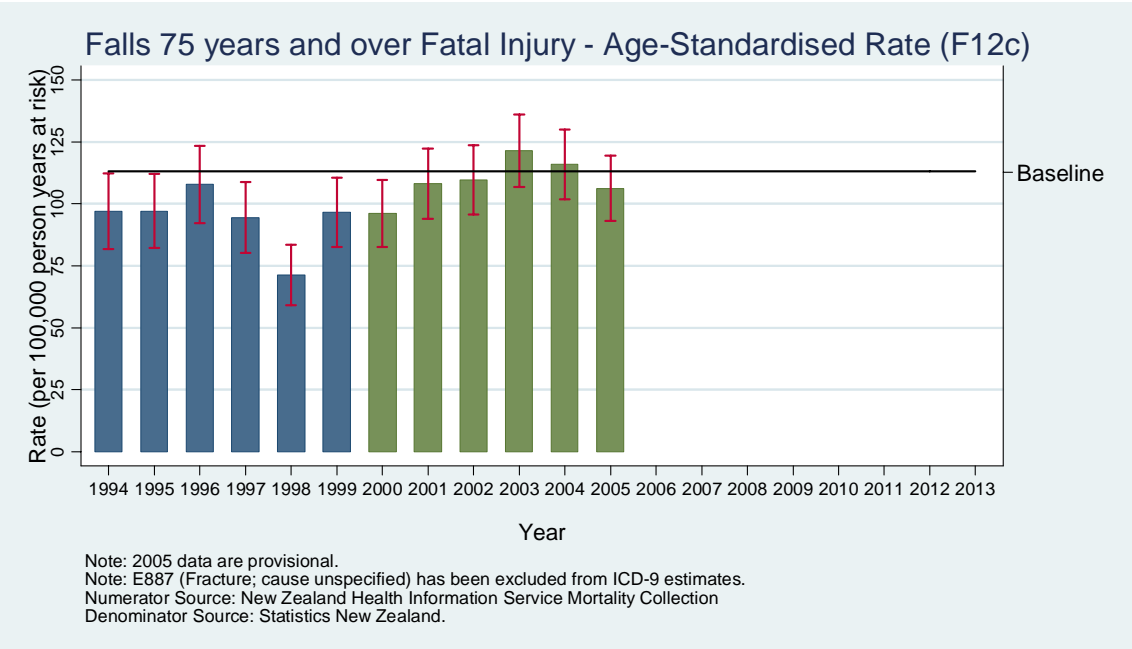
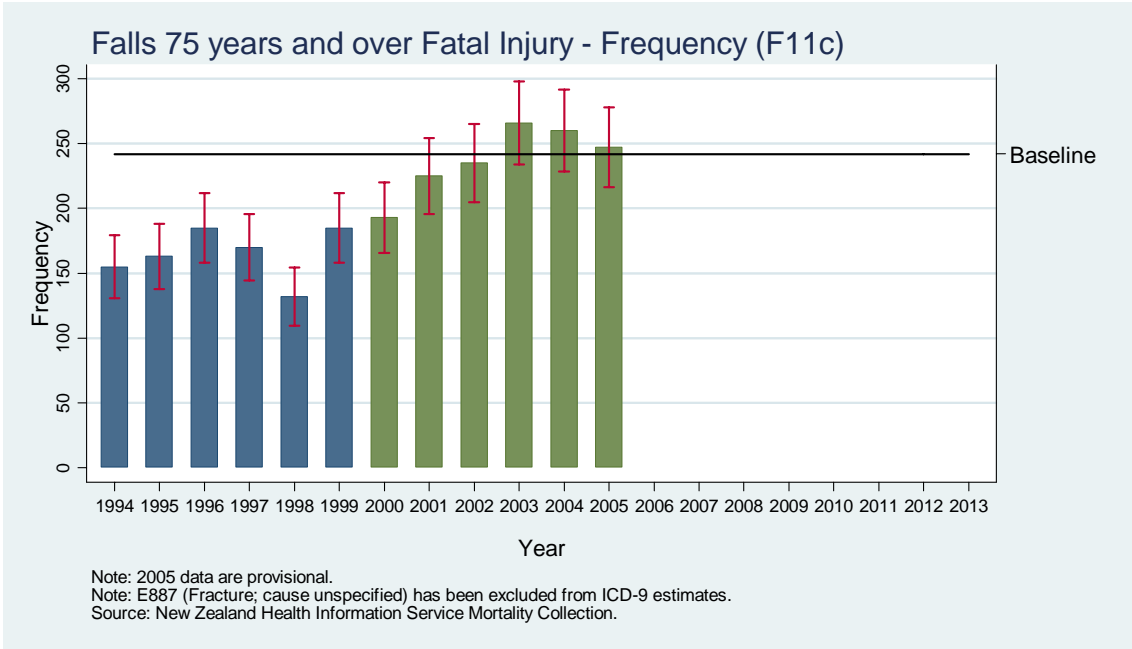


Between 2000 and 2005, the frequency of serious (fatal and non-fatal) falls (F21b) for the 0-74 age group has increased. There has been no change in the rates of serious (fatal and non-fatal) falls (F22b) for the 0-74 age group over the same time period.

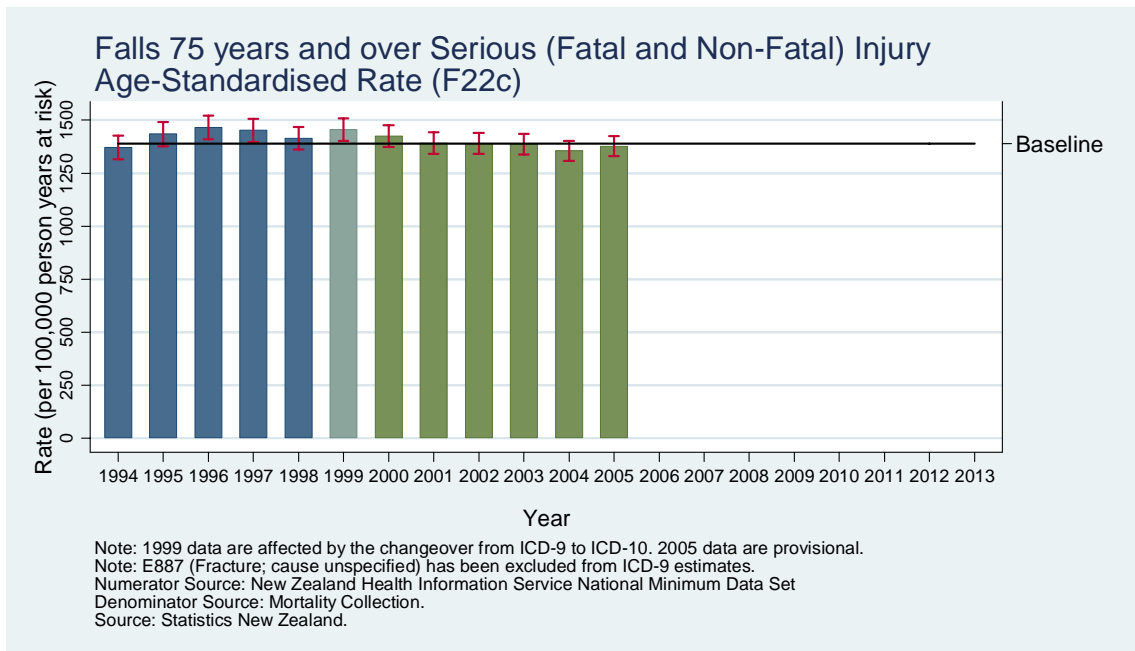
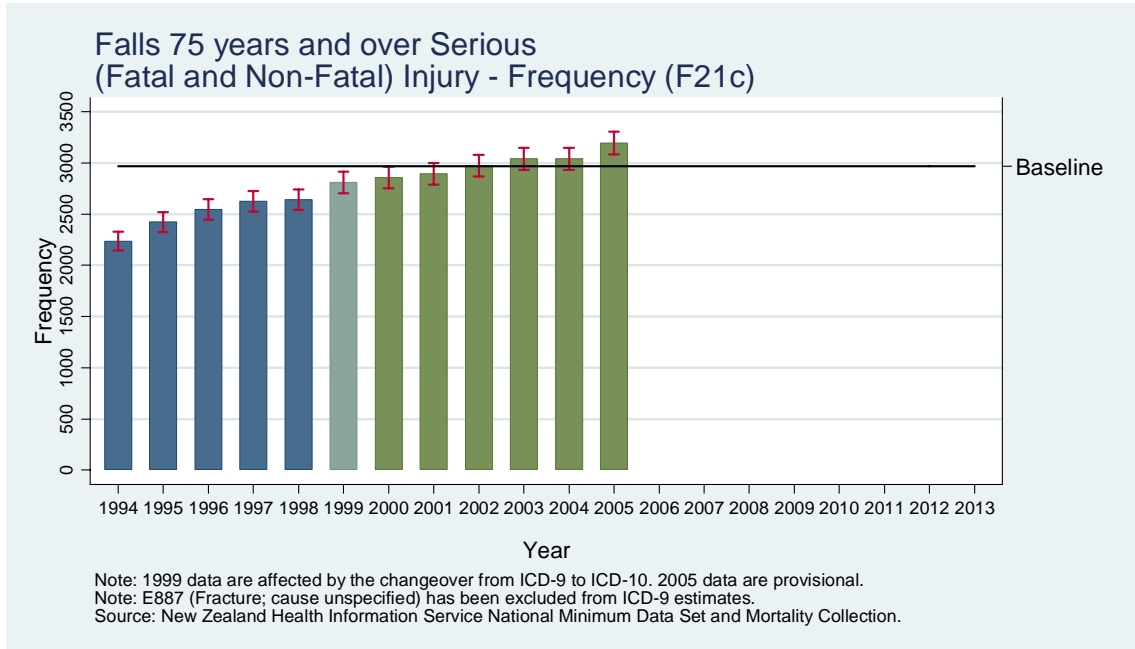
## 75 years and over



Since 2005, the frequency of falls (F01c) for those aged over 75 years has clearly been above the baseline. For 2007 there is evidence of a reduction from baseline in the rates of falls (F02c) injury for those aged over 75 years.

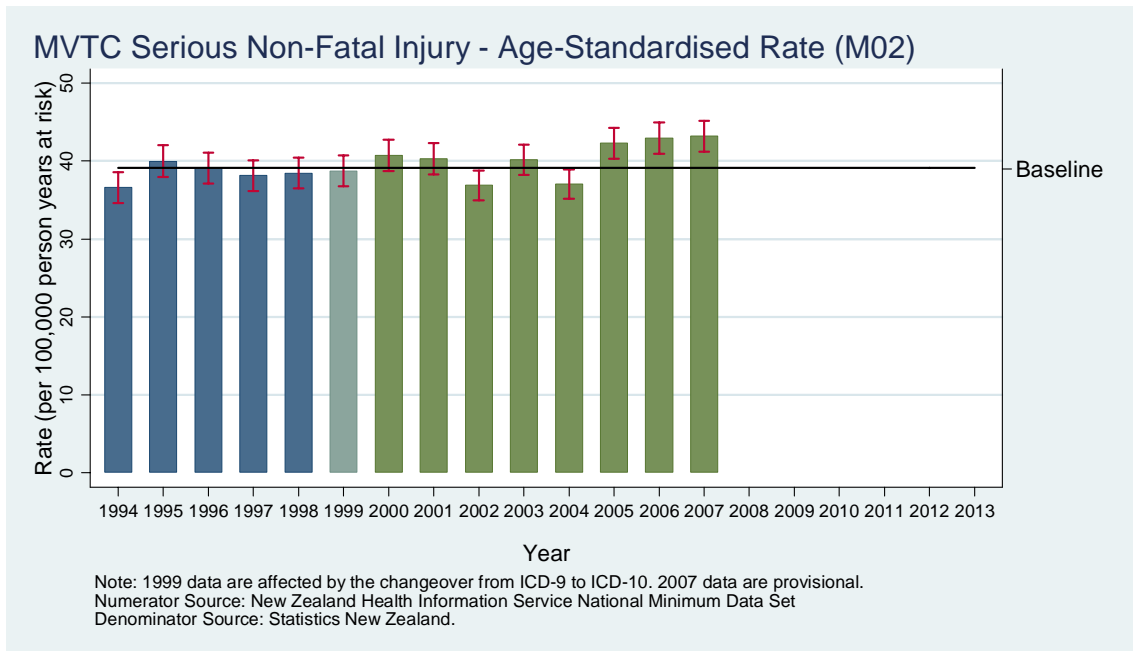
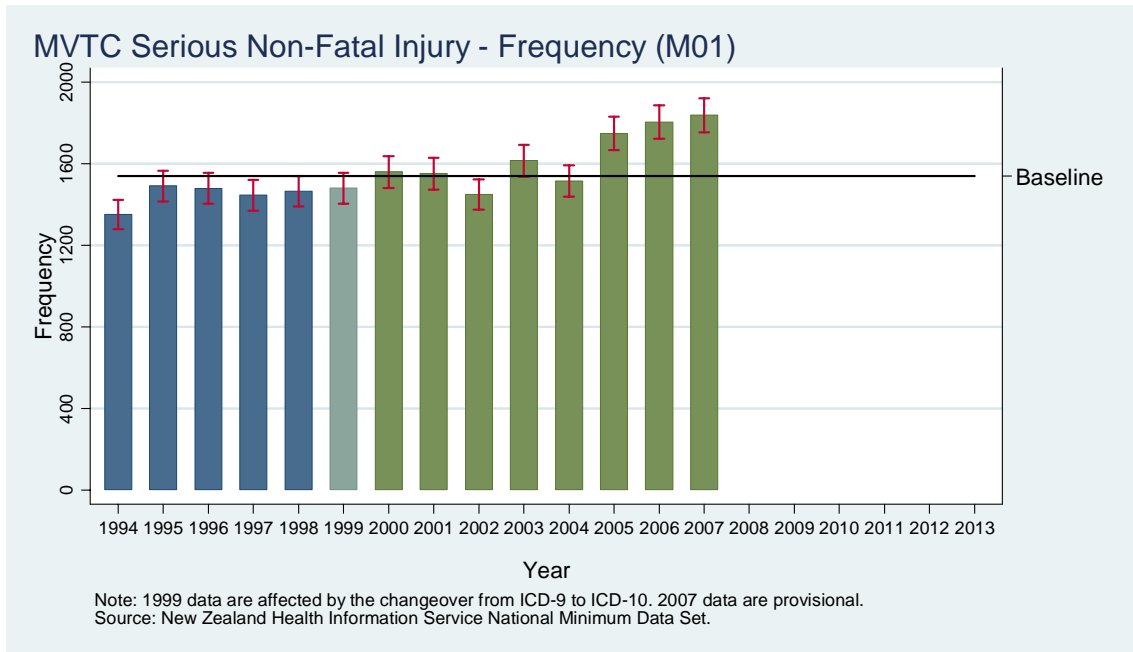


There is no evidence of a change from baseline in the frequencies (F11c) or rates (F12c) of fatal falls injury for the 75+ age group.

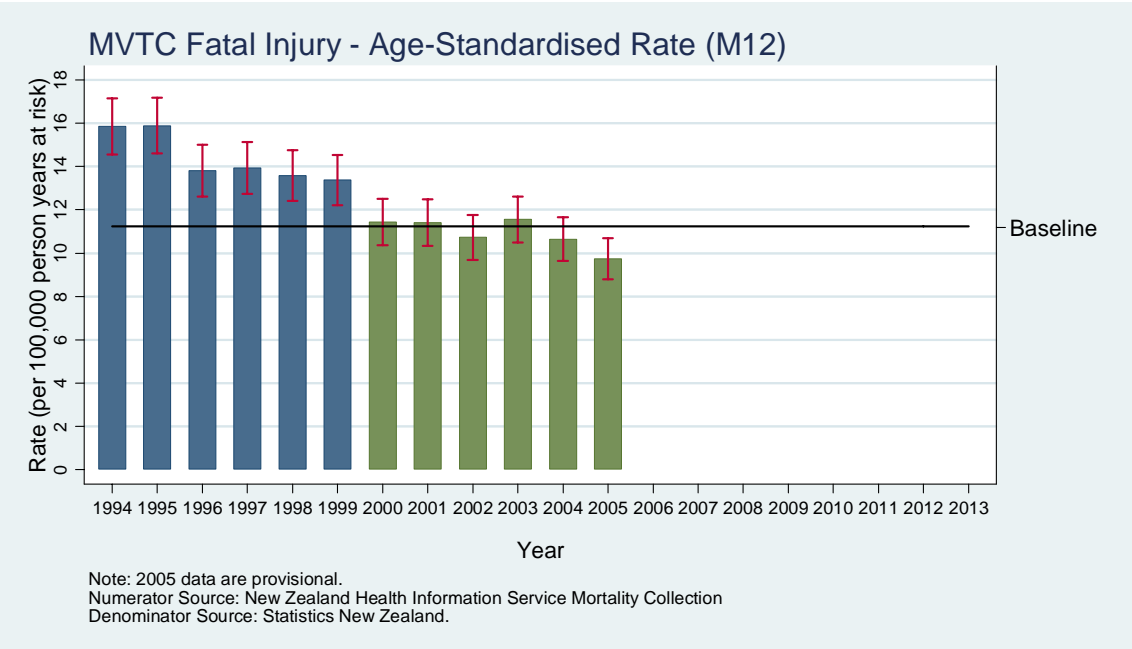
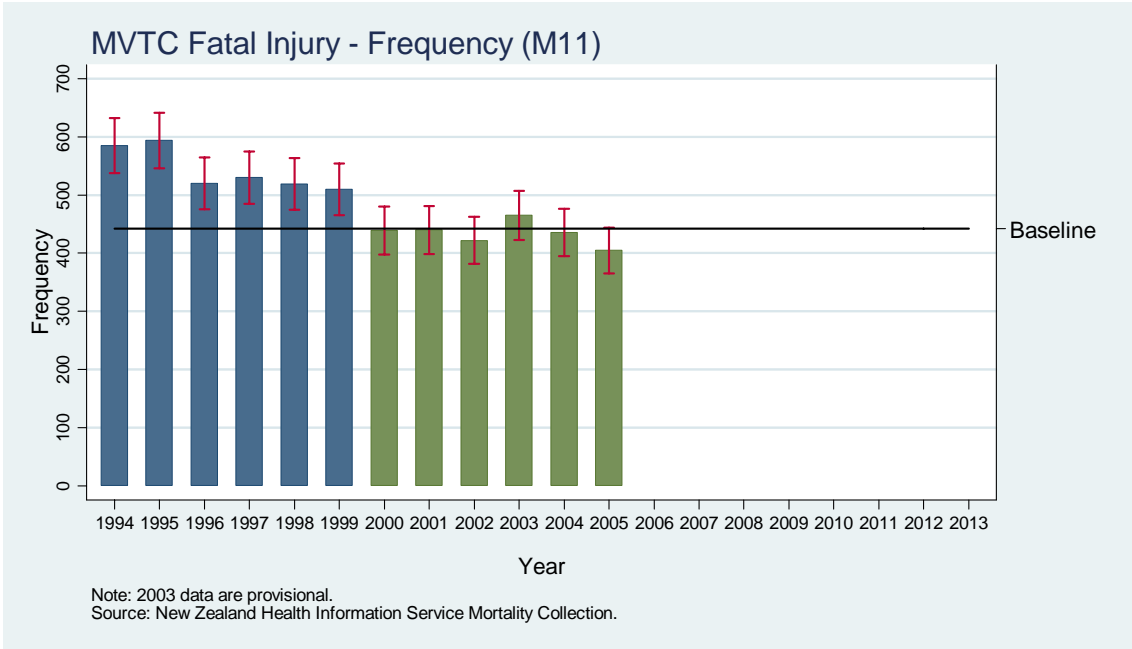


Between 2000 and 2005, there was a trend of increasing frequency of serious (fatal and non-fatal) falls (F21c) for the 75+ age group. There was no detectable change in the rates of serious (fatal and non-fatal) falls injury (F22c) for the 75+ age group over the same time period.

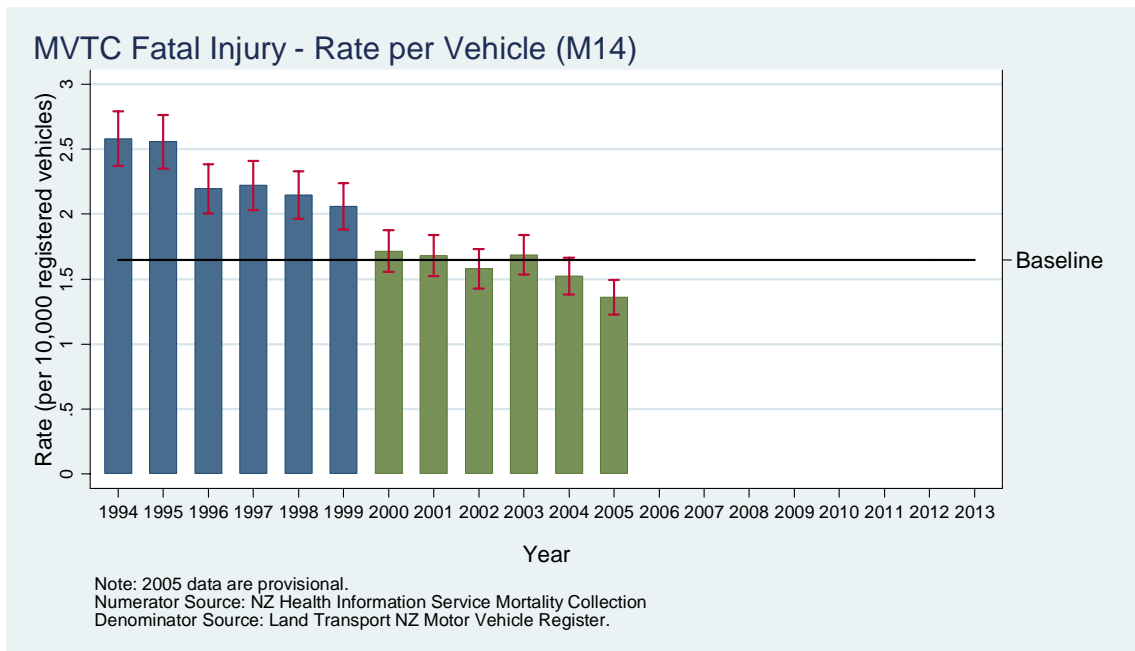
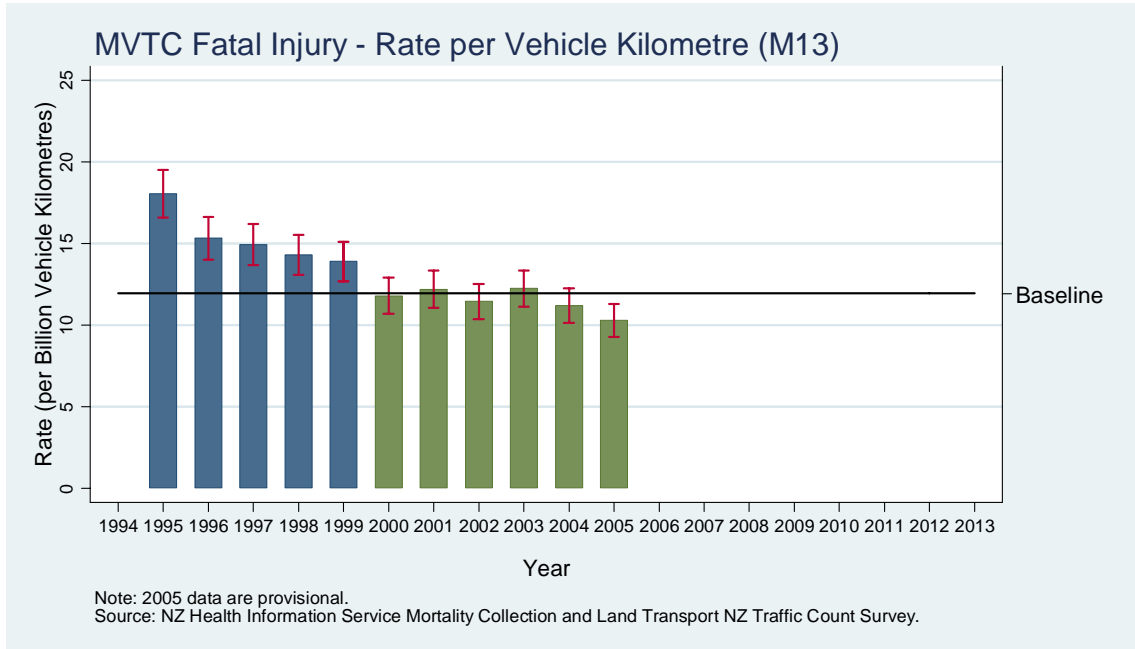
## 2.6 Motor vehicle traffic crashes (MVTC)



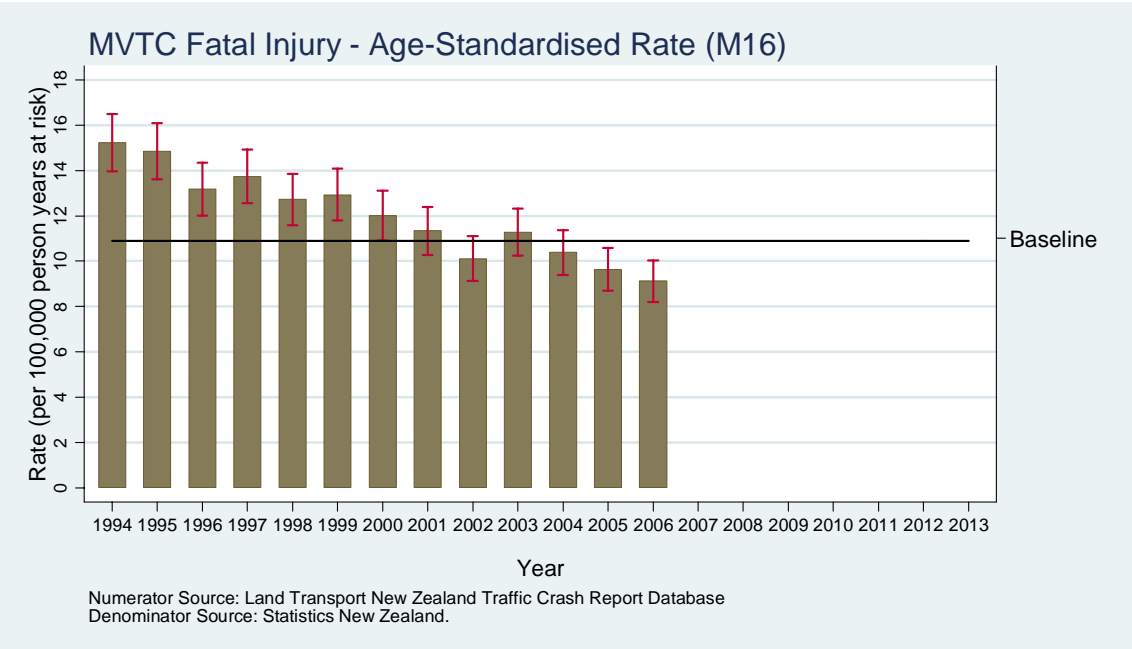
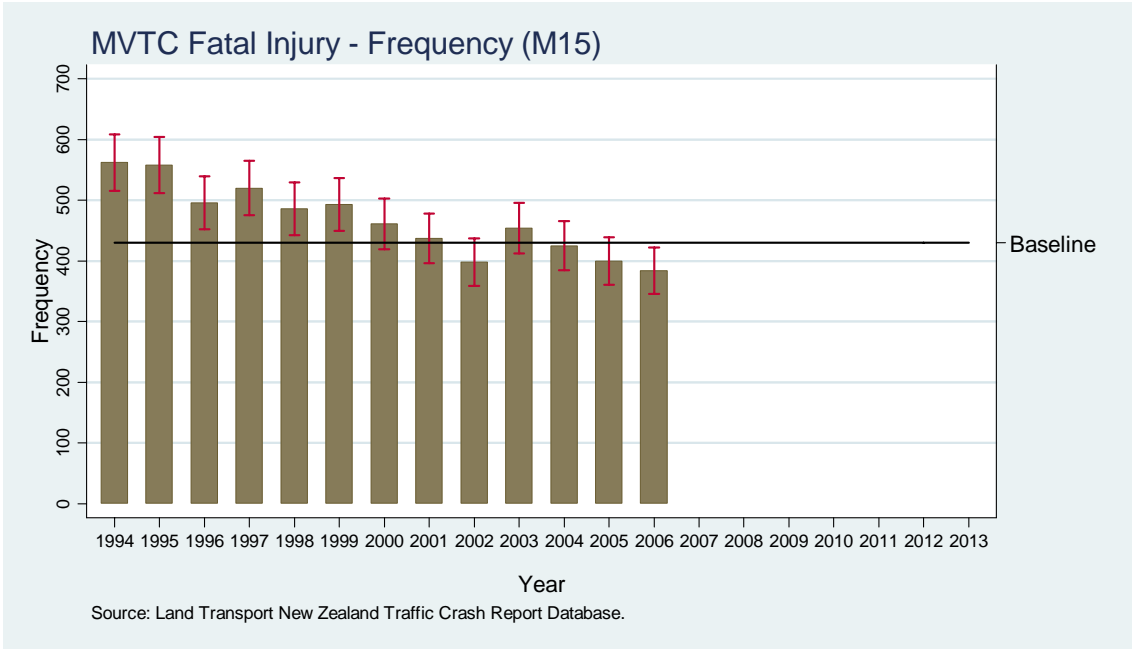
Compared to baseline, there has been a substantial increase in both the frequencies (M01) and the rates (M02) of MTVC for 2005-2007.



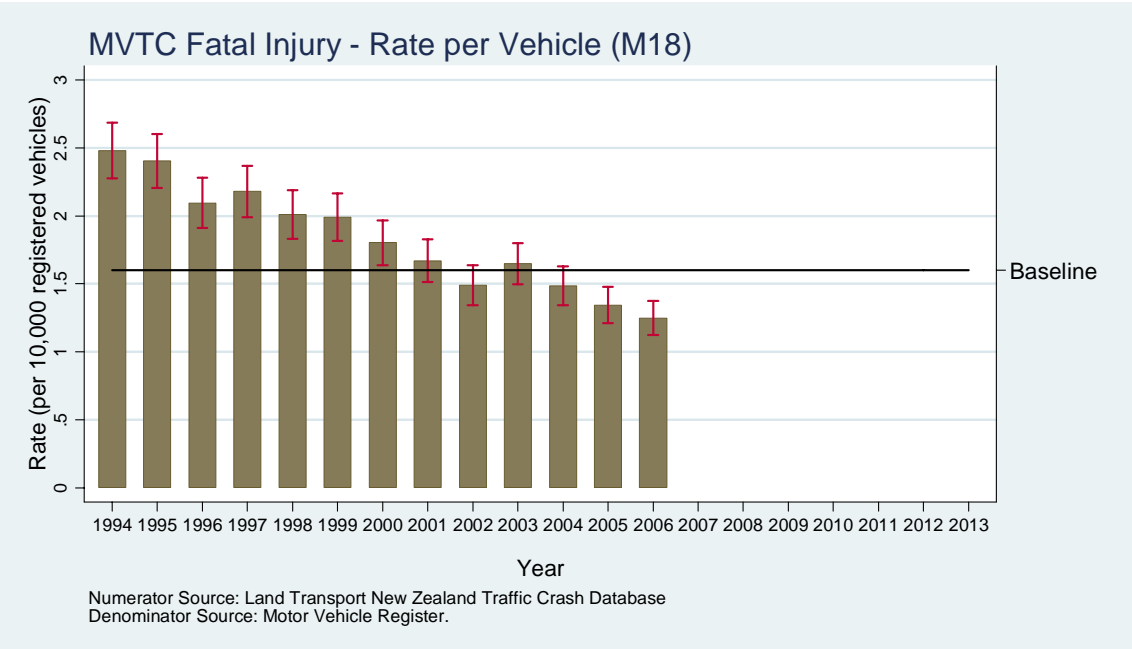
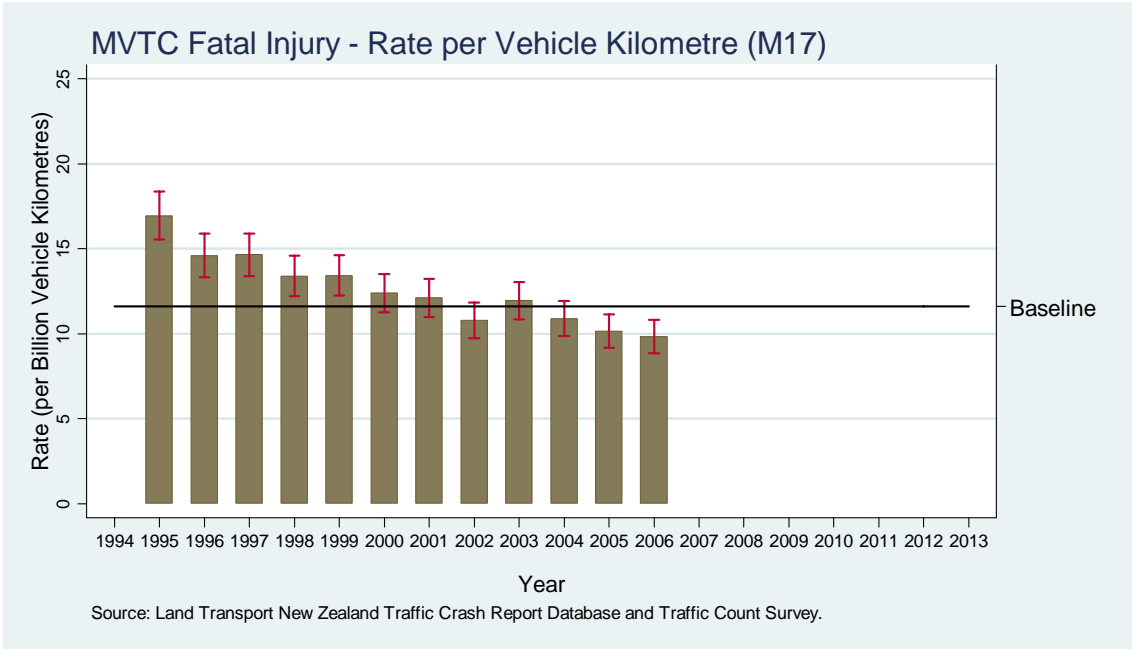
NZHS based fatal MVTC injury indicators for 2005 show a reduction in the frequency (M11) and rate (M12) of fatal MVTC from baseline.



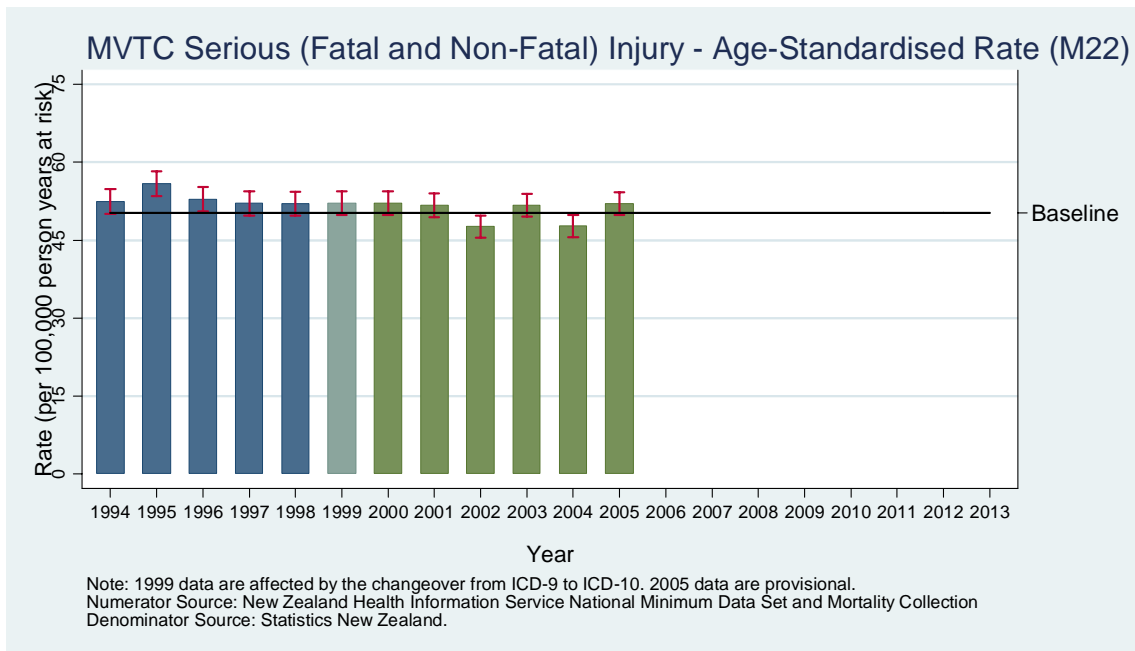
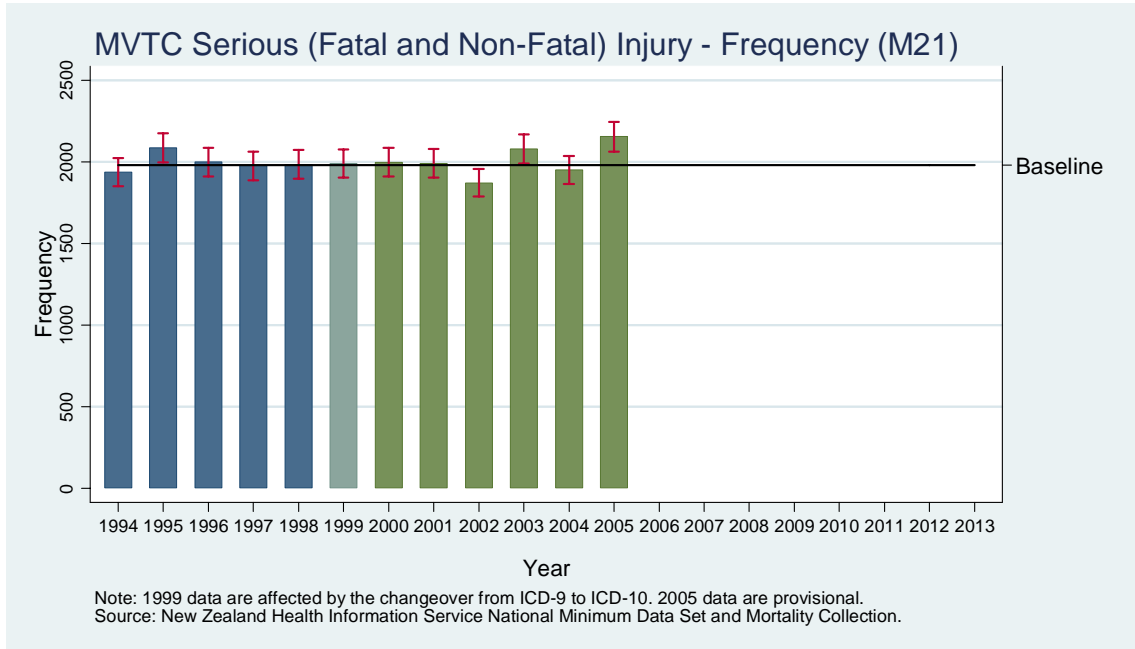
NZHIS based fatal MVTC injury indicators for 2005 show a reduction from baseline in the rate of fatal injury per vehicle kilometre travelled (M13) and per vehicle (M14) for 2005.



Since 2003, there has been a steady decrease in frequencies (M15) and rates (M16) of LTNZ based fatal MVTC injury. For 2006, the frequency and rate were both clearly below baseline.

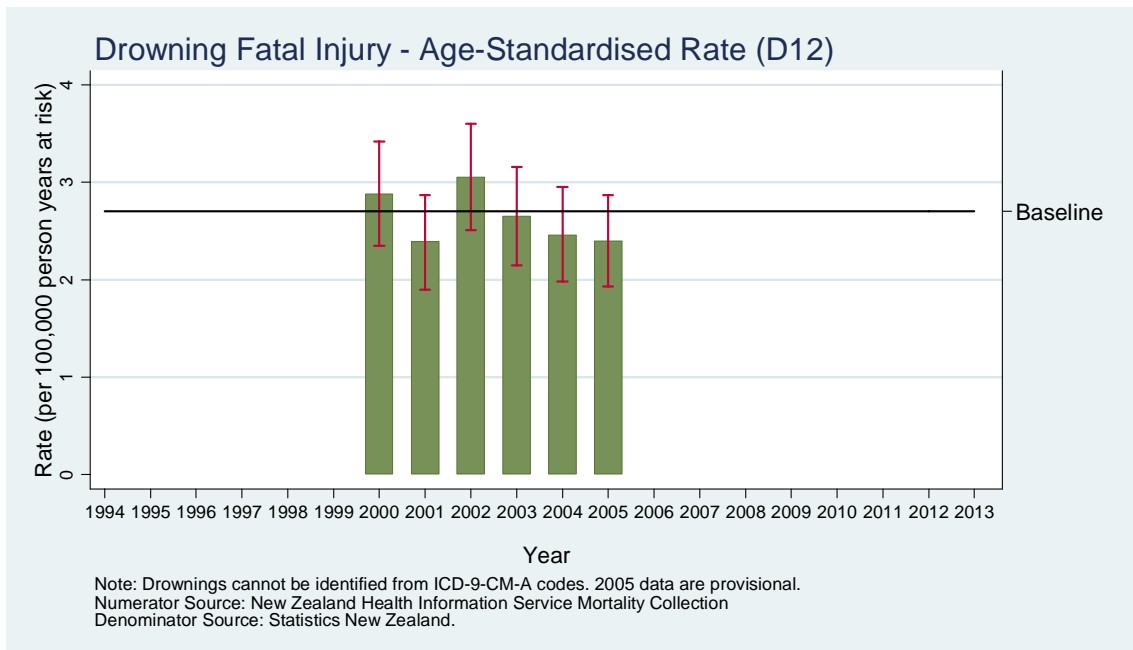
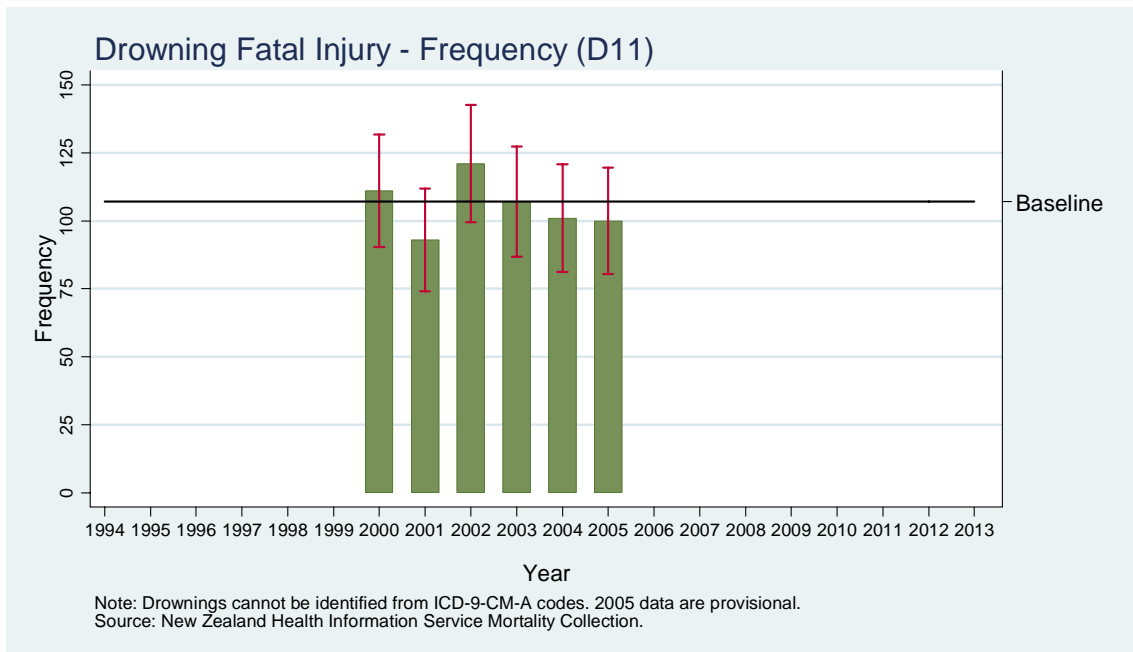


Since 2003, there has been a steady decrease from baseline in the rates of LTNZ based fatal MVTC injury per vehicle kilometre (M17) and per vehicle (M18).

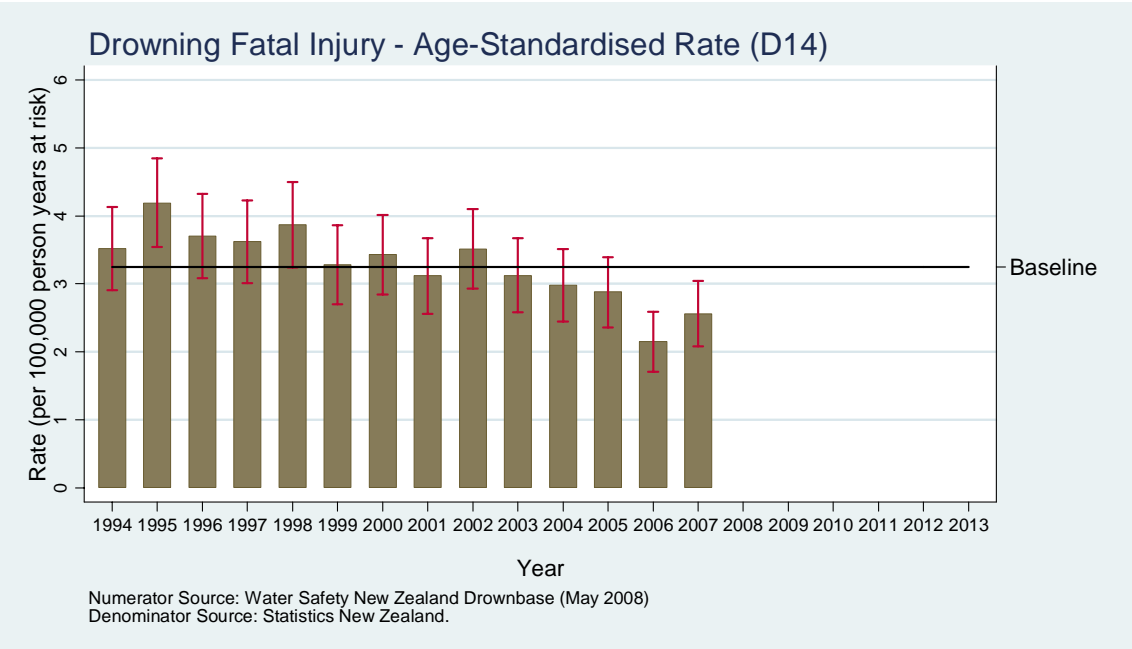
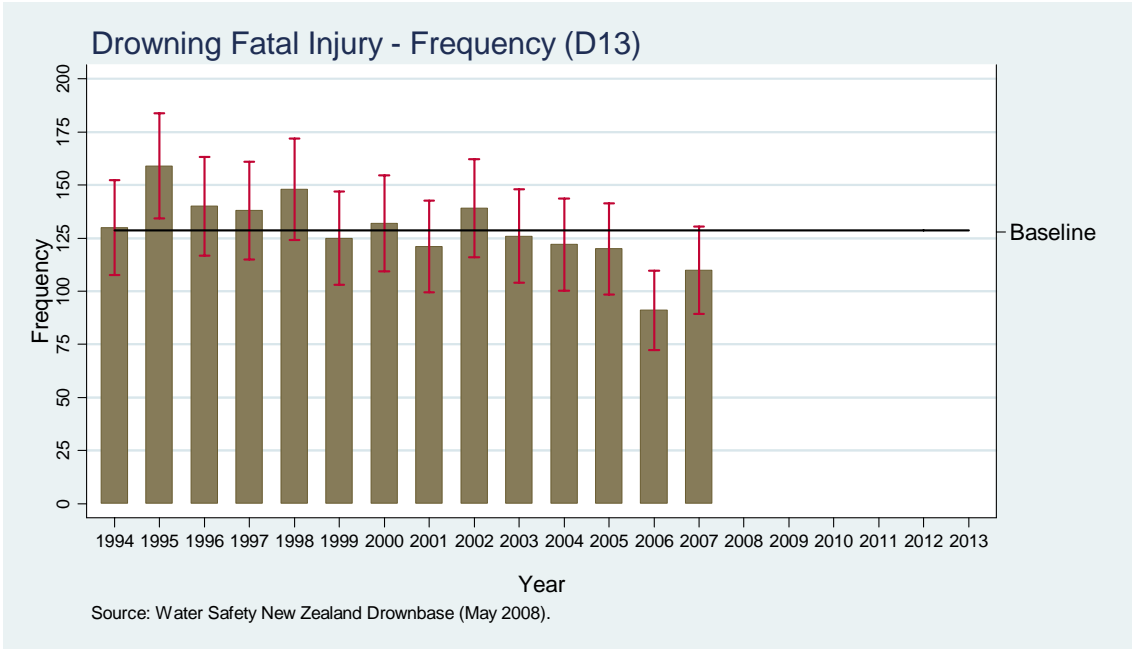


The frequencies (M21) and rates (M22) of serious (fatal and non-fatal) MVTC injury are variable. In 2005, there was an increase from baseline in the frequency of serious (fatal and non-fatal) MVTC injury. There is no evidence of a change from baseline in the rates of serious (fatal and non-fatal) MVTC injury.

## 2.7 Drowning



The frequencies (D11) and rates (D12) of NZHIS based fatal drowning injury are variable. There is no evidence of a change from baseline.



In 2006 and 2007, the frequencies (D13) and rates (D14) of drownings derived from Drownbase were below the baseline.

## References

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## New Zealand Government

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