A chartbook of the New Zealand Injury Prevention Strategy serious injury outcome indicators 1994-2004

New Zealand Injury Prevention Strategy
RAUTAKI ĀRAI WHARA O AOTEAROA

January 2006

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ISBN: 0-478-27933-7

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A chartbook of the

New Zealand Injury Prevention Strategy serious injury outcome indicators

1994-2004

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January 2006

ISBN 0-478-27933-7 OR 054

Suggested citation

Cryer C, Davie G, Langley J. A chartbook of the New Zealand Injury Prevention Strategy serious injury outcome indicators 1994 – 2004. Injury Prevention Research Unit (University of Otago) Occasional Report OR054: New Zealand Injury Prevention Strategy Secretariat, ACC, Wellington. January 2006.

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Acknowledgements

The authors would like to thank the New Zealand Injury Prevention Strategy (NZIPS) Secretariat for funding this work, and Geoff Wilson and Bhama Rajiv Kumar (NZIPS) for their help and support during its development. They would also like to thank Keith McLea, Rachel Depree and Tim Boyd Wilson (Accident Compensation Corporation - ACC), Wayne Jones and Lynley Povey (Land Transport New Zealand - LTNZ), Alan Muir, Matt Claridge and Sarah Tomlinson (Water Safety New Zealand - WSNZ), and Paul Brown, Darren Evans and Bridget Murphy (Statistics New Zealand). We acknowledge New Zealand Health Information Service (NZHIS), ACC, LTNZ, and WSNZ as the source of data used for the calculation of indicators presented in this chartbook.

We thank Dan Russell and David Barson, data management, Injury Prevention Research Unit, University of Otago for their work in preparing the data that underlie each of the charts.

A very big thank you goes to Associate Professor James Harrison, National Injury Surveillance Unit, Flinders University, Australia, and to David Chalmers, Deputy Director, Injury Prevention Research Unit, for reviewing and providing extremely helpful comments on the penultimate draft of this report.

Foreword

Presented here is a chartbook of the New Zealand Injury Prevention Strategy serious injury outcome indicators. The development of these 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. Our 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 and commentary. This is provided in the 3 appendices.

It is intended that this chartbook be the first of several planned for monitoring the impact of the New Zealand Injury Prevention Strategy on serious injury.

Abbreviations

ACC	Accident Compensation Corporation
Cryer 2004 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.
ICD	WHO International Classification of Diseases
ICD-9	WHO International Classification of Diseases 9th revision
ICD-9-CM	WHO International Classification of Diseases 9th revision, Clinical Modification
ICD-10	WHO International Classification of Diseases 10th revision
ICD-10-AM	WHO International Classification of Diseases 10th revision, 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	Police Traffic Crash Report
WHO	World Health Organisation
WRFIS	Work-Related Fatal Injury Study
WSNZ	Water Safety New Zealand

Summary of the charts

Below is a summary of the indicator trends contained within this chartbook.

Highlighted in:

- Green - are the NZIPS serious (fatal and non-fatal) injury outcome indicators.
- Brown – are the provisional serious injury outcome indicators

Indicator Code	Description	Interpretation of the indicator trends - from 2000 onwards
All injury		
I01	Frequency of serious non-fatal injuries.	Suggestion of a slight increase.
I02	Age-standardised serious non-fatal injury rate, per 100,000 person-years at risk.	Suggestion of a slight decline.
I11	Frequency of injury deaths.	Little apparent change.
I12	Age-standardised injury mortality rate, per 100,000 person-years at risk.	Little apparent change.
Assault		
A01	Frequency of assaultive serious non-fatal injuries.	Some evidence of an increase – could be an artifact of extraneous factors, eg. reporting behaviour.
A02	Age-standardised assaultive serious non-fatal injury rate, per 100,000 person-years at risk.	Some evidence of an increase – could be an artifact of extraneous factors, eg. reporting behaviour.
A11	Frequency of assaultive-related injury deaths.	Too early to say.
A12	Age-standardised assaultive injury mortality rate, per 100,000 person-years at risk.	Too early to say.

Indicator Code	Description	Interpretation of the trends - from 2000 onwards
Work-related injury		
W01	Frequency of work-related serious non-fatal injuries.	Suggestion of an increase.
W02	Age-standardised work-related serious non-fatal injury rate, per 100,000 workers.	Suggestion of a slight increase.
W11	Frequency of work-related injury deaths – NZHIS data based.	Not available until the release by NZHIS of the 2003 Mortality Collection.
W12	Frequency of work-related injury deaths – ACC data based.	Decline shown from 1995 to 2001 with apparent leveling off thereafter.
W13	Age-standardised work-related injury mortality rate, per 100,000 workers – NZHIS data based.	Not available until the release by NZHIS of the 2003 Mortality Collection.
W14	Age-standardised work-related injury mortality rate, per 100,000 workers – ACC data based.	Decline shown from 1995 to 2001 with apparent leveling off thereafter.
Intentional self-harm		
S01	Frequency of intentional self-harm serious non-fatal injuries.	No strong evidence of a change - could be an artifact of extraneous factors, eg. reporting behaviour.
S02	Age-standardised intentional self-harm serious non-fatal injury rate, per 100,000 person-years at risk.	No strong evidence of a change - could be an artifact of extraneous factors, eg. reporting behaviour.
S11	Frequency of intentional self-harm injury deaths.	No strong evidence of a change.
S12	Age-standardised intentional self-harm injury mortality rate, per 100,000 person-years at risk.	No strong evidence of a change.

Indicator Code	Description	Interpretation of the trends - from 2000 onwards
Falls		
F01a	Frequency of fall-related serious non-fatal injuries – all ages.	Suggestion of a slight increase.
F02a	Age-standardised fall-related serious non-fatal injury rate, per 100,000 person-years at risk – all ages.	Suggestion of a slight decline.
F11a	Frequency of fall-related injury deaths – all ages.	No strong evidence of a change.
F12a	Age-standardised fall-related injury mortality rate per 100,000 person-years at risk – all ages	No strong evidence of a change.
F01b	Frequency of fall-related serious non-fatal injuries – age 0-74.	Little change.
F02b	Age-standardised fall-related serious non-fatal injury rate, per 100,000 person-years at risk – age 0-74.	Little change.
F11b	Frequency of fall-related injury deaths – age 0-74.	Too early to say.
F12b	Age-standardised fall-related injury mortality rate per 100,000 person-years at risk – age 0-74.	Too early to say.
F01c	Frequency of fall-related serious non-fatal injuries – age 75 and over.	Suggestion of a slight increase.
F02c	Age-standardised fall-related serious non-fatal injury rate, per 100,000 person-years at risk – age 75 and over.	Suggestion of a slight decline.
F11c	Frequency of fall-related injury deaths – age 75 and over.	No strong evidence of a change.
F12c	Age-standardised fall-related injury mortality rate per 100,000 person-years at risk – age 75 and over.	No strong evidence of a change.

Indicator Code	Description	Interpretation of the trends - from 2000 onwards
Motor vehicle traffic crashes		
M01	Frequency of MVTC-related serious non-fatal injuries.	Little apparent change.
M02	Age-standardised MVTC-related serious non-fatal injury rate, per 100,000 person-years at risk.	Suggestion of a slight decline.
M11	Frequency of MVTC-related injury deaths.	Little apparent change.
M12	Age-standardised MVTC-related injury mortality rate, per 100,000 person-years at risk.	Little apparent change.
M13	MVTC-related injury mortality rate, per billion vehicle-kilometres.	Little apparent change.
M14	MVTC-related injury mortality rate, per 10,000 registered vehicles.	Little apparent change.
M15	Frequency of MVTC-related injury deaths – TCR data based.	Most recently, there has been little apparent change.
M16	MVTC-related injury mortality rate, per 100,000 person-years at risk – TCR data based.	Most recently, there has been little apparent change.
M17	MVTC-related injury mortality rate, per billion vehicle-kilometres – TCR data based.	Most recently, there has been little apparent change.
M18	MVTC-related injury mortality rate, per 100,000 registered vehicles – TCR data based.	Most recently, there has been little apparent change.
Drowning		
D11	Frequency of drowning.	No strong evidence of a change.
D12	Age-standardised drowning rate, per 100,000 person-years at risk.	No strong evidence of a change.
D13	Frequency of drowning.	Suggestion of a decline.
D14	Age-standardised drowning rate, per 100,000 person-years at risk.	Suggestion of a decline.

Part 1: Background and Methods

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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.)

Six priority areas are referred to in the objectives and actions. Those 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 (fatal and non-fatal) have been developed for these areas as one of the means of measuring performance in reducing injury. The purpose of this chartbook is to present trends over the period 1994 to 2004 for each of the NZIPS serious 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?

Internationally, the most commonly accepted operational definition of injury are those pathologies in the "Injury" chapter of the WHO's International Classification of Disease codes (ICD-codes). ICD codes are used by the New Zealand Health Information Service (NZHIS) to code mortality and hospitalisation data. [1] For hospitalisations, the operational definition of injury, for the serious injury indicators developed for the NZIPS, is given by the following ICD-10 code ranges: for a case to be included it had to have a principal diagnosis code in the range S00-T78, and a first external cause code in the range V01-Y36. For deaths, a case was selected where the underlying cause of death is an external cause code in the range V01-Y36. For the years where ICD-9 was used, close equivalent codes were used to define a case of injury.

There is some dispute in the international community as to which codes within the ICD injury chapter are in fact injuries. This is discussed in Appendix A.

Injuries were regarded as serious if they resulted in death, or resulted in admission to hospital and were associated with at least a 6% threat-to-life (ie. chance of death. Amongst first discharges from hospital with a primary diagnosis of injury, approximately 15% of these exceed this threat-to-life severity threshold. The methods by which such cases of serious injury are identified for the indicators in this chartbook are described briefly in section 1.5, and more fully in Appendix B.

Injuries which result in long term disability and substantial cost should also be regarded as serious. Regrettably, at present the methodologies for deriving valid indicators based on these dimensions have not been developed.

1.3 The indicators

The development of the NZIPS indicators is described in the Cryer 2004 report. [2] For 'all injury' and for each of the six priority areas, the authors used the following approach to identify candidate indicators:

- they identified existing national indicators through a named contact within the lead agency for the NZIPS priority area
- they suggested new fatal and non-fatal injury indicators for 'all injury' ('generic' indicators) and then sought similar indicators for each of the priority areas.
- they subjected all of the candidate indicators to a systematic assessment of validity, using the ICE criteria [3]
- based on the results of that validation, they identified proposed and / or provisional indicators for each priority area.

A fundamental part of the development of these indicators was consultation. Consultation was with the NZIPS project team, NZIPS advisory groups, and with selected representatives from within New Zealand, as well as with the international research community. Furthermore the draft of the Cryer 2004 report was subject to formal international peer review.

They used the ICE criteria to validate the candidate indicators. A set of criteria for validating injury indicators were agreed at a meeting of the International Collaborative Effort on Injury Statistics (ICE) in 2001. The criteria suggest that an ideal indicator should: [3]

- Have a case definition based on diagnosis – on anatomical or physiological damage
- Focus on serious injury
- Have, as far as possible, unbiased case ascertainment
- Be derived from data that are representative of the target population
- Be based on existing data systems (or it should be practical to develop new data systems)
- Be fully specified.

These criteria were developed solely in the context of indicators of injury incidence and, within that, on the characteristics of the incident cases. The less criteria that are satisfied, the more likely it is that the indicator will exhibit some threats to validity.

In this work, each of the above criteria was used to assess the validity of existing and the newly proposed injury outcome indicators. This was achieved by each of the principal authors of the original report[a] independently assessing the candidate indicators against these criteria. Those assessments were reconciled and found to be consistent.

Since the 2001 ICE meeting, other important characteristics of indicators, and the data on which they are based, have been suggested, namely: [2]

- Completeness and accuracy of source data
- Timeliness
- Ability to measure change over time
- Measurement that is practicable
- Readily comprehensible

Although these additional criteria were not considered systematically in the development of the NZIPS indicators, they were taken into account when assessing the existing and new indicators for the Cryer 2004 report.

The validated NZIPS serious 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

These indicators are based on the New Zealand Health Information Service (NZHIS) Mortality data and National Minimum Dataset (NMDS - of hospital inpatient data). Frequencies reflect the societal burden of injury[b], while rates reflect individual risk.

The NZIPS serious injury indicators for most of the priority areas are based on those for 'all injury'. Where valid indicators could not be identified, provisional indicators were developed (see Cryer 2004 report). [2] This chartbook presents both the NZIPS serious injury indicators and the provisional serious injury indicators.

There are 28 NZIPS serious injury indicators, and 16 provisional serious injury indicators, across 'all injury' and the six priority areas. The NZIPS indicators have been accepted by the government as serious injury outcome indicators to monitor the impact of the New Zealand Injury Prevention Strategy. The provisional serious injury indicators were candidate NZIPS indicators, but which had some identifiable threats to validity.

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[a] Colin Cryer, John Langley and Shaun Stephenson, Injury Prevention Research Unit, University of Otago, New Zealand.

[b] Although NZHIS NMDS includes only publicly funded hospital event data, it still gives a very good indication of the societal burden. 4. Langley, J.D., *Experiences Using New Zealand's Hospital Based Surveillance System for Injury Prevention Research.* Methods of Information in Medicine, 1995. **34**(4): p. 340-344.

Injuries were regarded as serious if they resulted in death or were associated with at least a 6% threat-to-life. These 44 indicators will be used to examine trends over time - as they are in this chartbook. The high threshold 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. [2]

The scope and definitions that were used in the development of the NZIPS serious injury indicators for each of these areas are presented in Appendix A. This includes a description of the operational definition of injury and the scope of each of the priority areas. This operational definition excludes medical injuries, pathologies resulting from chronic exposures over time, and the consequences of injury (ie. only the admission to hospital immediately following the injury event is counted, not subsequent episodes of treatment and care).

The detailed methods used to produce the charts in this chartbook are described in Appendix B, and the indicator specifications are presented in Appendix C. These methods and specifications are the same as those presented in the Cryer 2004 report. [2]

It is intended that this chartbook be the first in a series that will present NZIPS serious injury and provisional serious injury outcome indicators during the lifetime of the strategy.

1.4 What the chartbook comprises

The remainder of the chartbook presents the charts for the NZIPS serious injury indicators - and the provisional serious injury indicators - for 'all injury' and for the six priority areas, with baselines. These charts speak largely for themselves, and so only brief commentary is provided for each.

Wherever possible, the period presented in each chart is 1994 to 2004; however, for indicators based on NZHIS Mortality data, the last year available when writing this report was 2002. With some exceptions, the indicators are derived from the NZHIS Mortality and NMDS databases. The coding system used for classifying injury diagnosis and external cause of injury in both of these data sources is the World Health Organisation (WHO) International Classification of Diseases (ICD). During the period considered in these charts, the ICD was substantially revised. (See Appendix B7.1 for a description of those changes.) Readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change. That is, it is apparent that, for some of the charts, the years before 1999 cannot be compared with the years after 1999. Accordingly, the commentary will focus mainly on the trends since the implementation of the Australian Modification of the newest revision, ICD 10th revision (ICD-10-AM) for coding diagnosis and external cause of injury in the NZHIS Mortality Collection and the NMDS, ie. from the year 2000 onwards.

Some readers may ask: why include the years before 2000 in the charts, given that our interpretation of the trends in the NZIPS serious injury outcome indicators will only include the years from 2000 onwards? 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.

The colours used in the charts have been chosen in order to signal the different status of the indicators, as well as the information used to generate the bars in the charts. The colours distinguish the NZIPS serious injury indicators from the provisional serious injury indicators. The change from ICD-9 to ICD-10 took place on 1 January 2000 for NZHIS Mortality data, and predominantly during 1999 for the NZHIS NMDS data[c]. Colours have also been used to designate these changes. So the colour coding is as follows:

Green:	NZIPS serious injury indicator (ICD10-based)
Blue:	NZIPS serious injury indicator back translated to ICD-9.
Brown:	Provisional serious injury indicator
Light brown:	Provisional serious injury indicator, modified to take account of a previous coding change

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

Some of the fatal injury indicators are presented as 3-year moving averages. 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 based on both ICD-9 and ICD-10 coded mortality data. Consequently, in these instances, an intermediate colour is also used for the bars for 1999 and 2000 for fatal injury indicators estimated using 3-year moving averages.

Each bar on each chart includes 95% confidence limits – 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.

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

[c] Hospitals code their own discharge data, which when brought together nationally, form the NZHIS NMDS of hospitalisations. Hospitals transferred from using ICD-9 to ICD-10 during the financial year July 1998 to June 1999. The vast majority made this transfer in 1999, and most of those towards the end of the financial year.

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, then this is highly suggestive of a difference that is not due to random variation.

1.5 Summary of the methods

Scope, definitions, detailed methods for the calculation of indicators, and specifications are presented in Appendices A, B and C. The key points are presented here.

Many of the indicators are calculated using NZHIS Mortality and NMDS (hospitalisation) data. Indicators based on the latter source include only publicly funded cases discharged from hospital. Deaths in hospital are excluded from the serious non-fatal injury indicators. The last year's data for both NZHIS Mortality (2002) and NMDS (2004) are considered by NZHIS to be provisional, with all previous data considered final. The operational definition of injury is described in section 1.2 and Appendix A. For hospitalisations, only first admissions were counted.

Serious injury indicators were chosen to draw attention to 'important' injury as judged by their resulting in death, or because of their threat-to-life. [2] The definition of serious for the non-fatal injury indicators is based on a severity of injury threshold. The method used for measuring severity was the ICD-based Injury Severity Score (ICISS).

The ICISS method involves deriving a Survival Risk Ratio (SRR) - i.e. the probability of survival - for each individual injury diagnosis code, as the ratio of the number of patients with that injury code who have not died to the total number of patients with that diagnosis code. For the ICD-10 based SRRs, they were estimated from hospital discharges for the period 1999-2001 (The 'training set' of data). Thus, a given SRR represents the likelihood that a patient will survive a particular injury whilst in hospital, given that they were admitted to hospital. Each patient's ICISS score (survival probability) is, then, the product of the probabilities of surviving each of their injuries individually. ICISS scores are calculated for all patients discharged from hospital during the period (ie. for this report, 2000 to 2004), based on the SRRs derived from the training data set. These methods were adapted for hospitalisations coded to ICD-9.

The definition of serious non-fatal injury used for these indicators was hospitalised cases with an ICISS score of less than or equal to 0.941 (ICISS$\leq$0.941)[d]. This is equivalent to selecting patients whose injuries give the patient a survival probability

[d] All hospital discharges from public hospital were considered, even ones with 0 days stay; however, only cases that satisfied the severity criterion of ICISS$\leq$0.941 were selected as cases.

of 94.1% or worse – in other words, a probability of death, given admission to hospital, of at least 5.9%.

Hospitalisations with ICISS scores less than or equal to 0.941 represented around 15% of all injury discharges. This included (but wasn't limited to) most cases with the following diagnoses:

S72	Fracture of the femur
S06.1 - .9	Intracranial injury (excluding concussion)
S14	Injuries of nerves and spinal cord at neck level
S22.4	Multiple fractures of ribs
T71	Asphyxiation
T68	Hypothermia

A full list of single injury principal diagnoses captured by this definition of serious injury is included in Table B1, Appendix B, of the Cryer 2004 report. [2] The methods were modified for hospitalisations coded to ICD-9, and the threshold was chosen such that, as far as was possible, the same injury diagnoses were selected as cases of serious injury.

The above method represents a conservative approach to the definition for a case of serious non-fatal injury. A person sustaining an injury assigned any of these serious injury diagnoses would be admitted to hospital in the vast majority of cases. This high threshold for inclusion reduces the likelihood of significant threats to the validity of these serious non-fatal injury outcome indicators (see the Cryer 2004 report for further details). [2]

In most instances, rates are expressed per 100,000 person-years (i.e. per 100,000 population per year of exposure). This approach to analyzing population data has technical advantages, described in Appendix B, but the rates presented in the charts can be interpreted in the same way as rates per 100,000 population in a particular year.

Population data were obtained from Statistics New Zealand population estimates (see www.stats.govt.nz). In most instances, rates were age-adjusted to compensate for societal changes in the age distribution of the population over time.

Ninety five percent confidence intervals are displayed for each bar presented on each chart. The indicators are either counts or rates.

- 95% confidence intervals for counts assume Poisson error – standard errors were derived as the square root of the count.
- 95% confidence intervals for age-standardised rates were produced using the method described in Clayton and Hills. [5]

Baselines were calculated using the data from the three years 2001-2003 – where the data were available. Where moving averages are used, they were calculated using data for the years 2000-2004 – again, where the data were available. When all the required years of data were not available, provisional baselines were calculated and presented using the available data from the baseline period. In future years, when the chartbook is updated, the provisional baselines will be finalised when all the data needed for

their calculation is available. In these circumstances, the baselines will stay constant for all subsequent chartbooks.

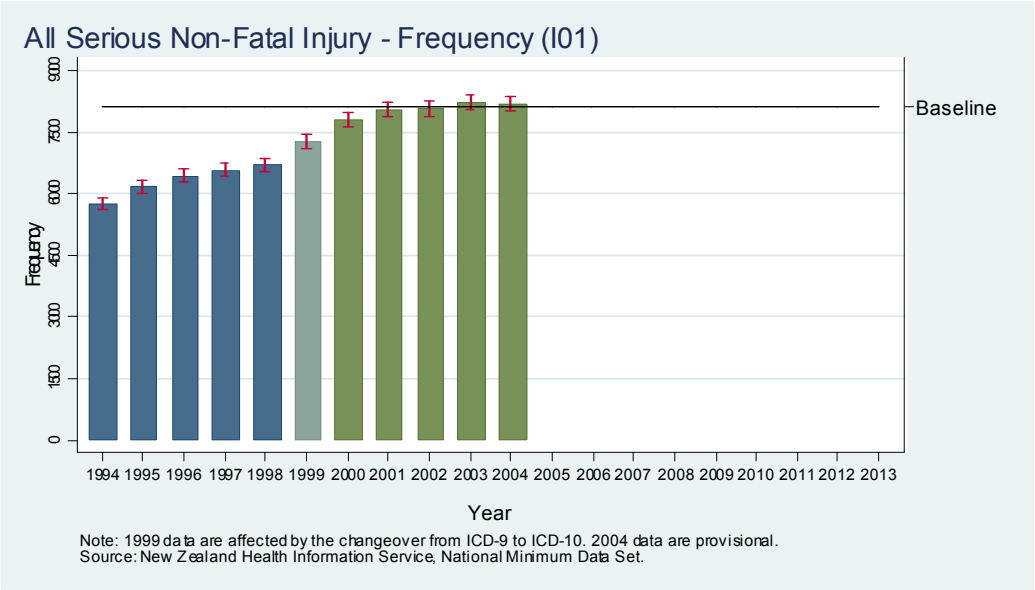
1.6 Interpretation and discussion of the charts

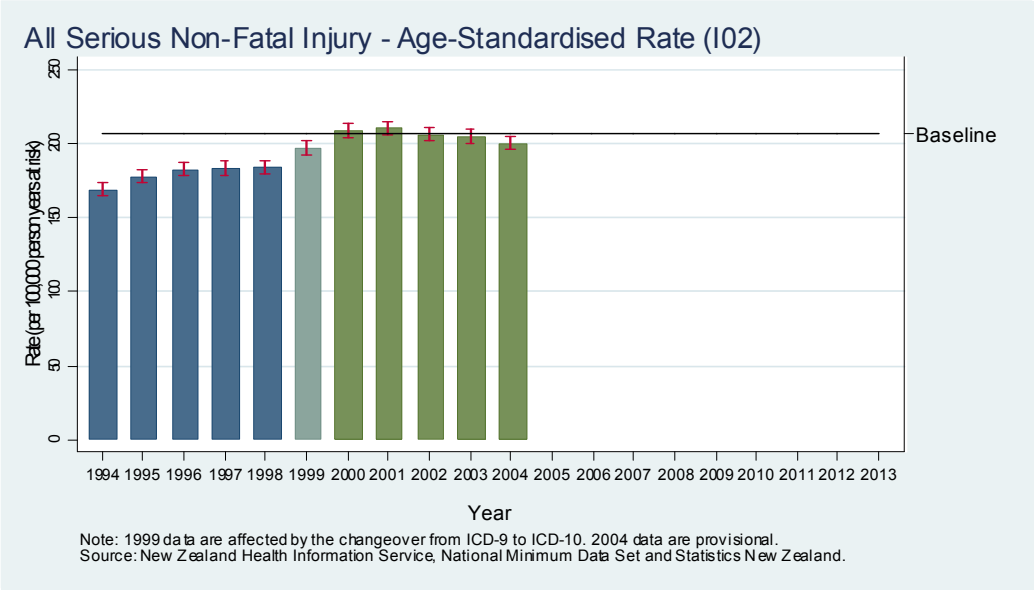
The full interpretation and discussion of the charts is presented in the section "*Notes on the interpretation of indicator trends"* at the end of Appendix B (B7). Brief comments on each chart are provided at the foot of each page in Part 2. The interpretations provided are based on a visual inspection (as opposed to formal statistical analysis) of the changes in the indicator values over the period relative to the width of the confidence intervals. Within a chart, where the confidence intervals from two bars during the period from the year 2000 do not overlap, this has been interpreted as a significant change – unless some threats to validity of the indicator have been identified.

Part 2: The Charts

2.1 All injury

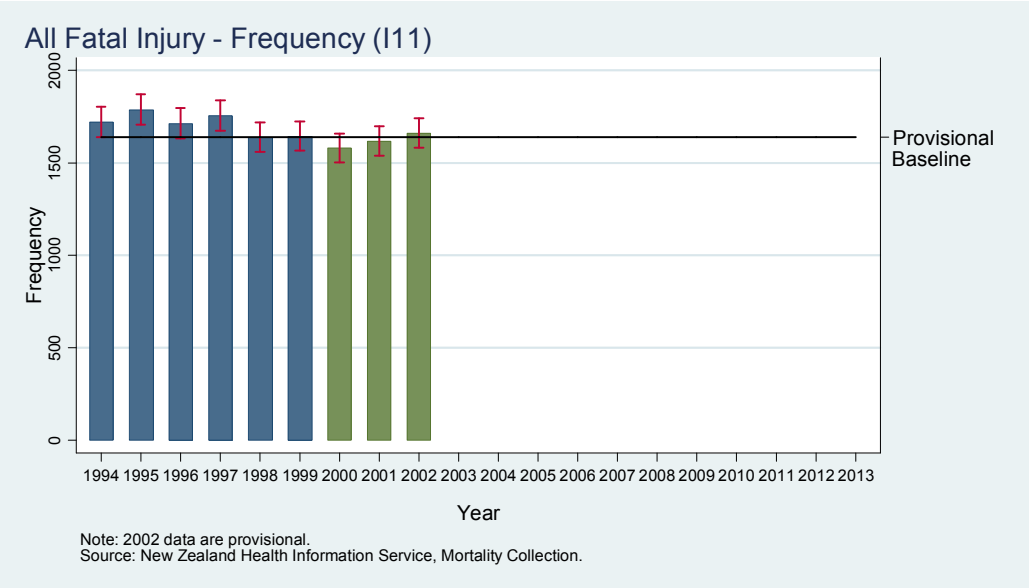
For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change.

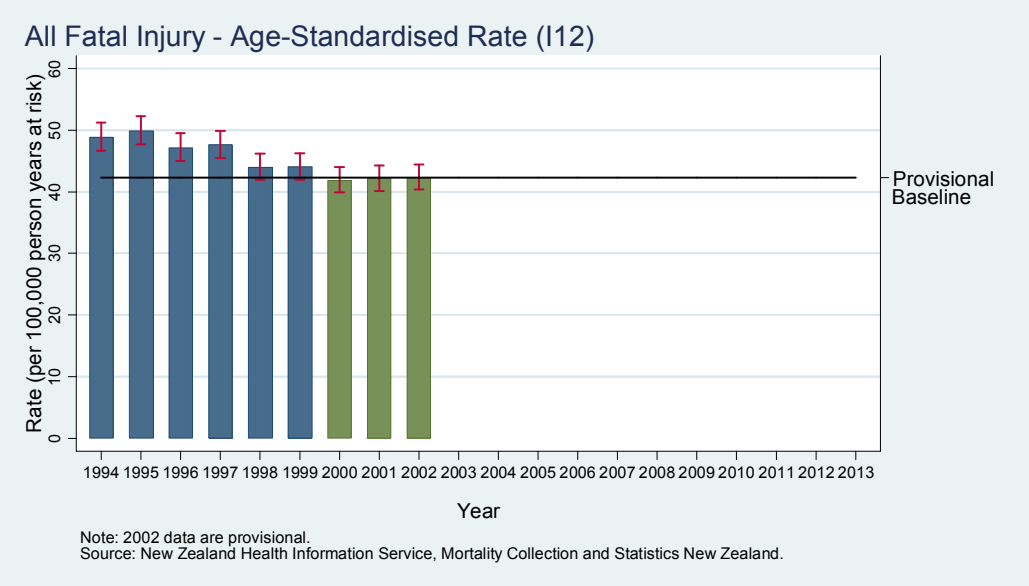




Since 2000, there has been a suggestion of a slight increase in the annual frequencies of non-fatal injuries (I01), and a suggestion of a slight decline in the rates (I02).

For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change.



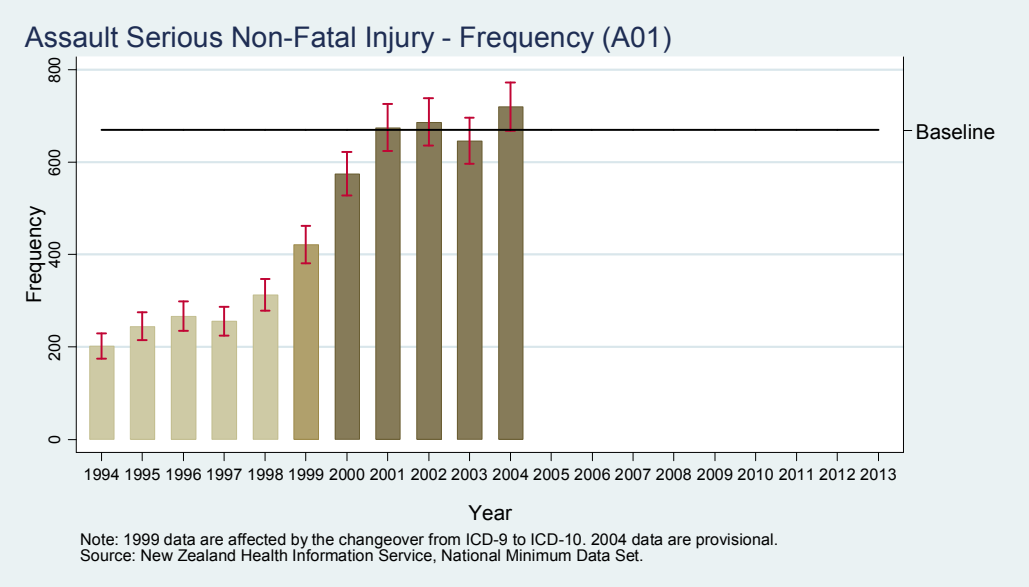


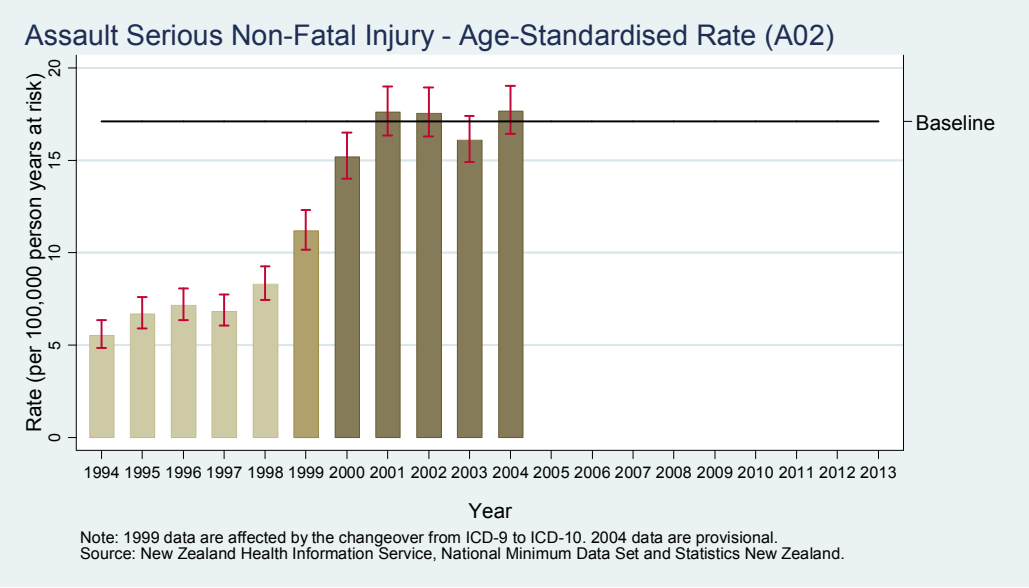
The frequencies (I11) and rates (I12) of fatal injuries, for 'all injury', were similar in 2000, 2001 and 2002. Only after data have been added for further years will we be able to comment more confidently on trends.

The change from ICD-9 to ICD-10 was accompanied by an increase in serious non-fatal injury frequencies / rates (I01, I02), but little change in fatal injury frequencies / rates (I11, I12). The structural changes from ICD-9 to ICD-10 are discussed in Appendix B7.1.

2.2 Assault

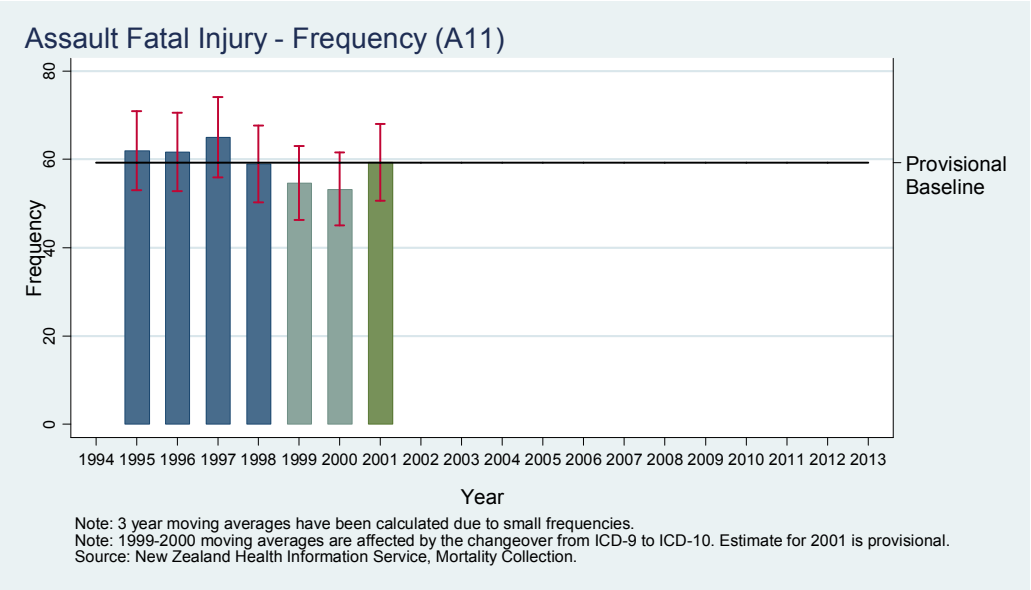
For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change.

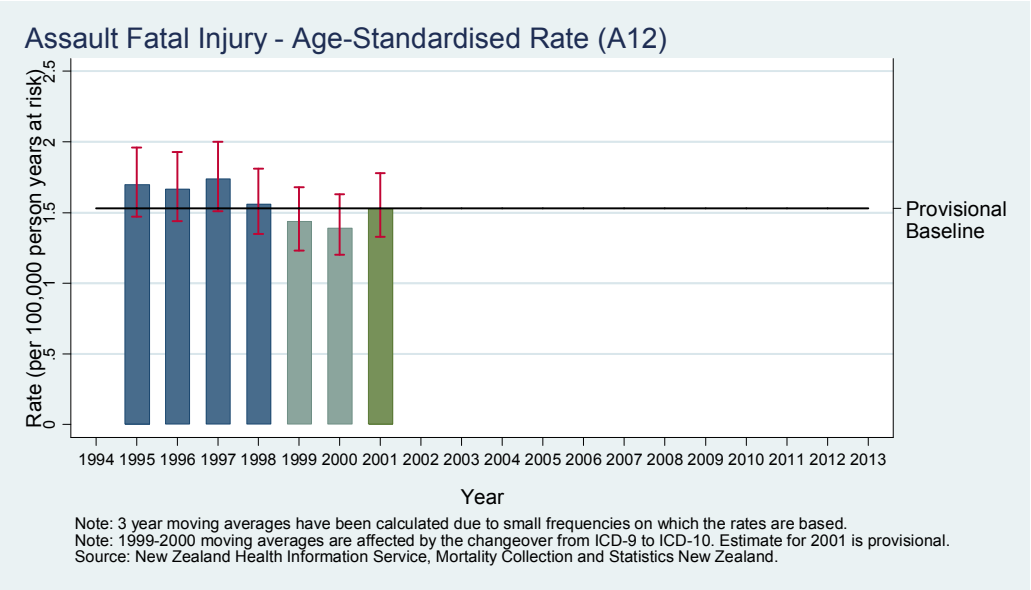




The trends for the frequencies (A01) and rates (A02) of assaultive injuries are similar. There is some evidence of an increase in the frequency from 2000 to 2001-4. These trends could be the results of extraneous factors (see the Cryer 2004 report, pp 38-43 [2] and Appendix B7.3), so care must be taken with interpretation.

For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change. Since 3-year moving averages are used, the most recent year shown below is 2001 (based on data from 2000, 2001 and 2002).

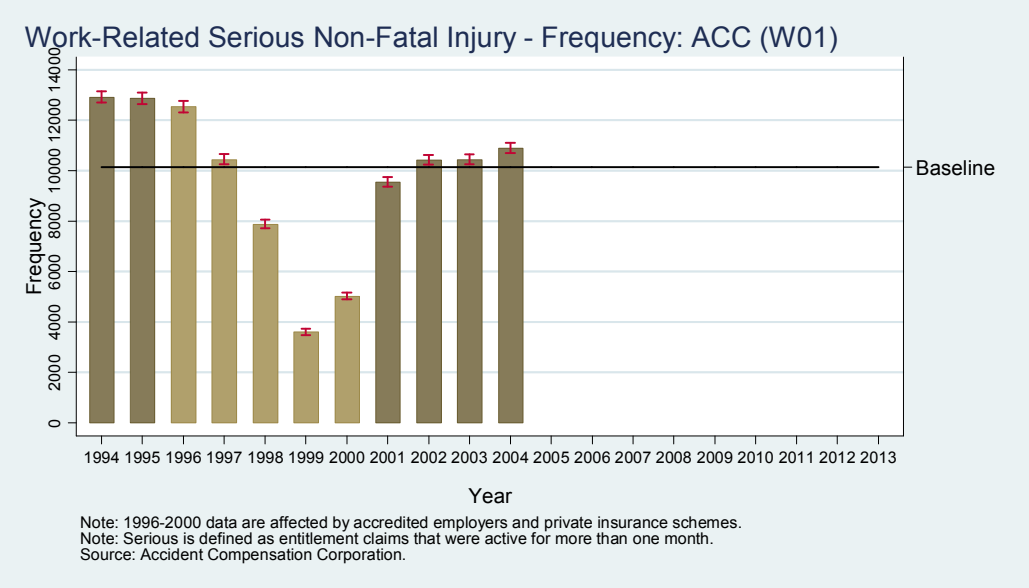


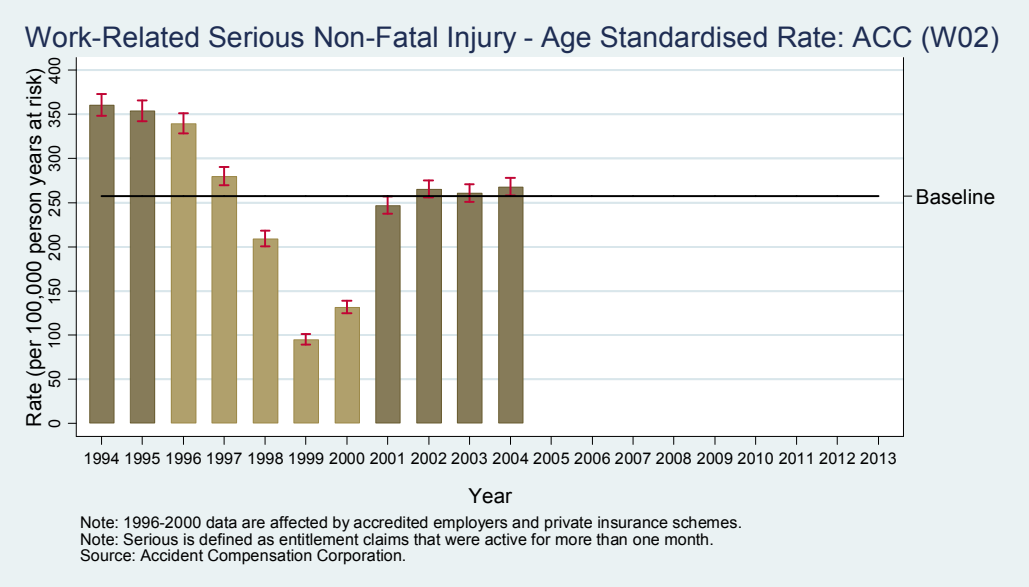


For this report, only the indicator values (A11, A12) for 2001 are purely based on ICD-10 coded data. Consequently, no comment on trends in these values is appropriate.

2.3 Work-related injury

The originally specified – in the Cryer 2004 report [2] - work-related serious non-fatal injury indicators (W01 and W02) cannot be presented since the source data were not available at the time of production. For this chartbook, charts based solely on ACC non-fatal injury data have been presented as a temporary substitute. Threats to the validity of these indicators cannot be discounted.

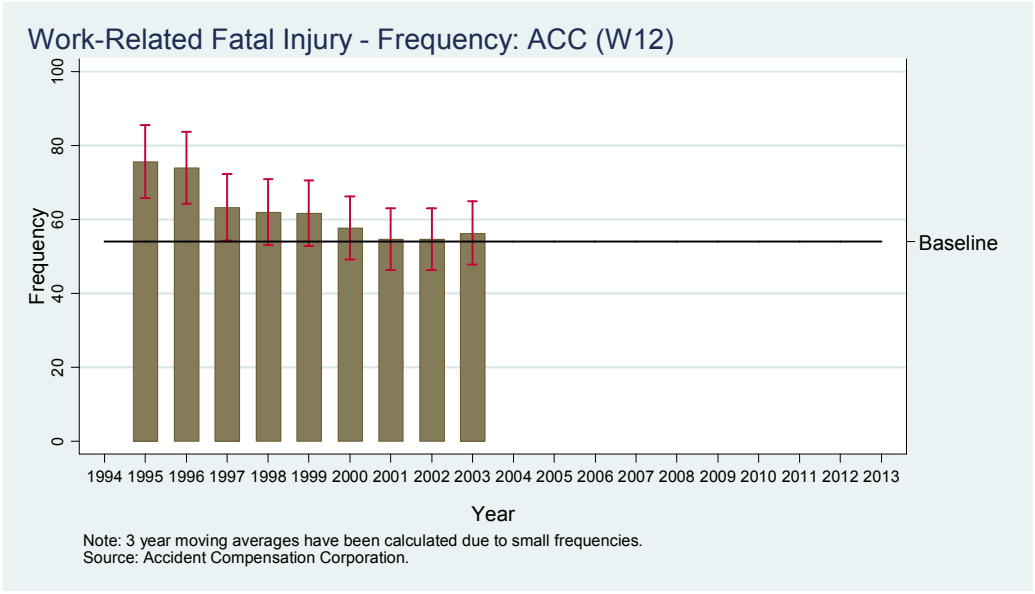


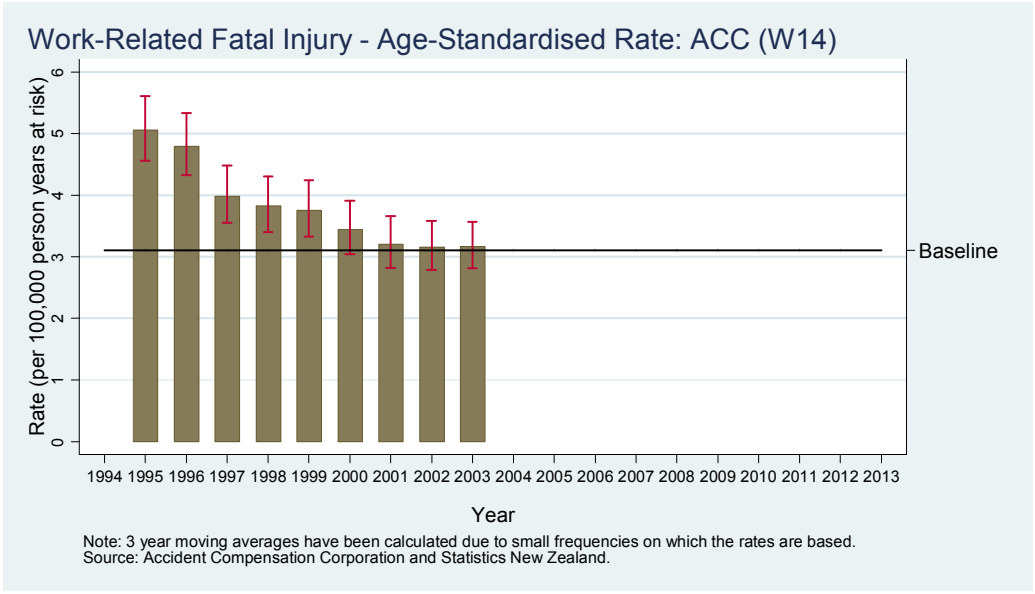


There is a major concern about undercounting cases of work-related serious non-fatal injury during the period 1996 to 2000 inclusive, due to the effect on ACC data of the accredited employer and the private insurance schemes during this period (see Appendix B7.4 for further discussion). Beyond this period, there is a suggestion of an increase in the frequencies (W01) and a slight increase in rates of work-related serious non-fatal injuries.

The NZHIS Mortality data based work-related fatal injury indicators (W11and W13) cannot be calculated for the period 1994-2002. These indicators are based on the identification of work-related cases using the ICD-10 'activity' code. ICD-10 was not used before 2000, and for mortality data relating to registrations from 2000-2002, the field relating to activity was not used. Activity will be coded for 2003 registered deaths, and so these indicators will be available after the NZHIS 2003 Mortality Collection is released, but not in time for this chartbook.

For charts W12 and W14 below, since 3-year moving averages are used, the most recent year shown below is 2003 (based on data from 2002, 2003 and 2004).

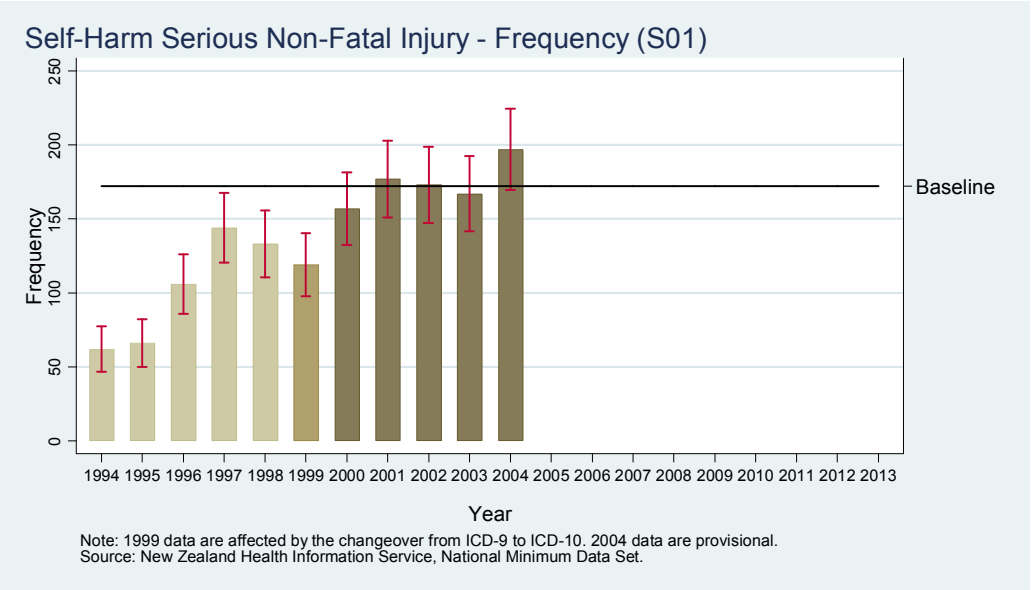


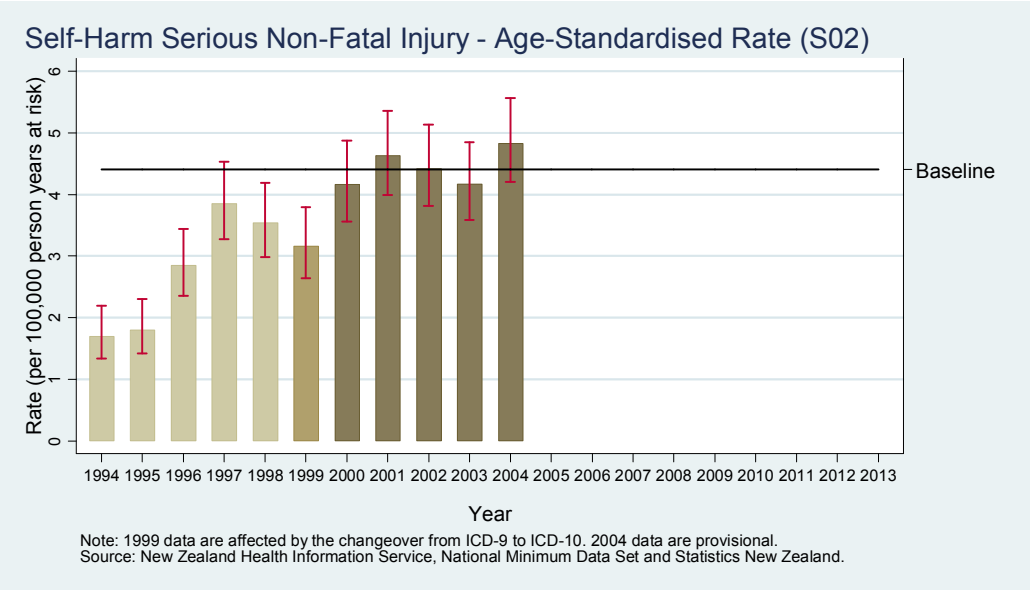


Both the frequencies and the rates of work-related fatal injury (W12 and W14) showed a decline over the period 1995 to 2001, with apparent leveling off thereafter.

2.4 Intentional self-harm

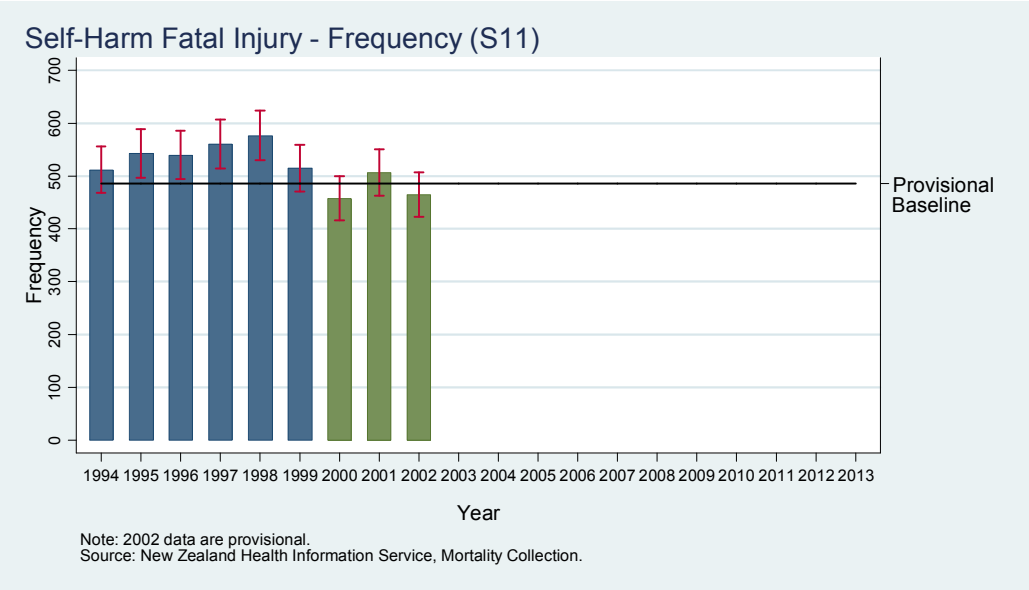
For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change.

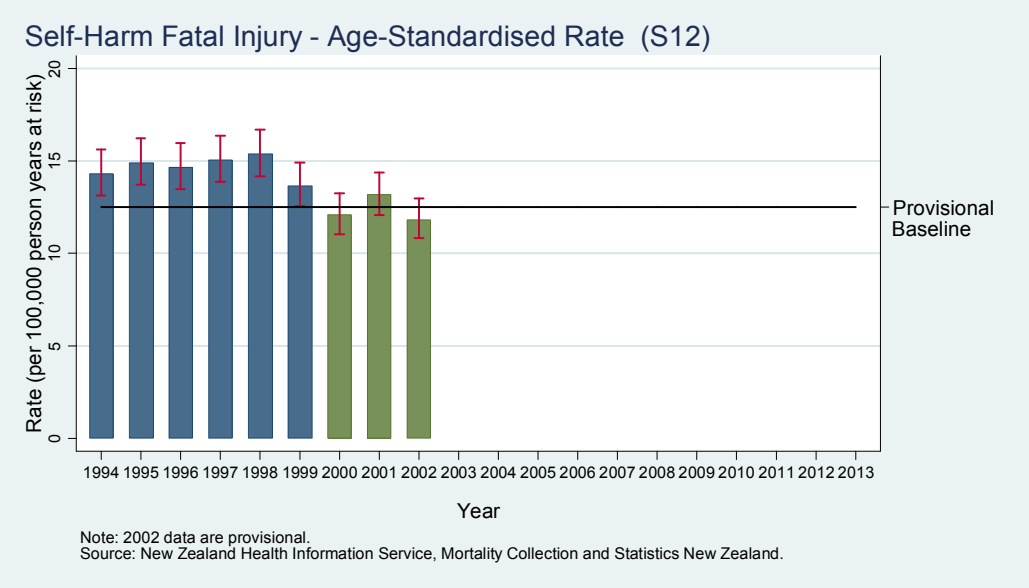




There is little evidence of changes in the frequencies (S01) or rates (S02) of serious injury resulting from intentional self-harm during the period from 2000 onwards. Trends over the whole period could be influenced by extraneous factors (see Cryer 2004 report, pp 38-43 [2] and Appendix B7.5) so additional care must be taken with the interpretation.

For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change.



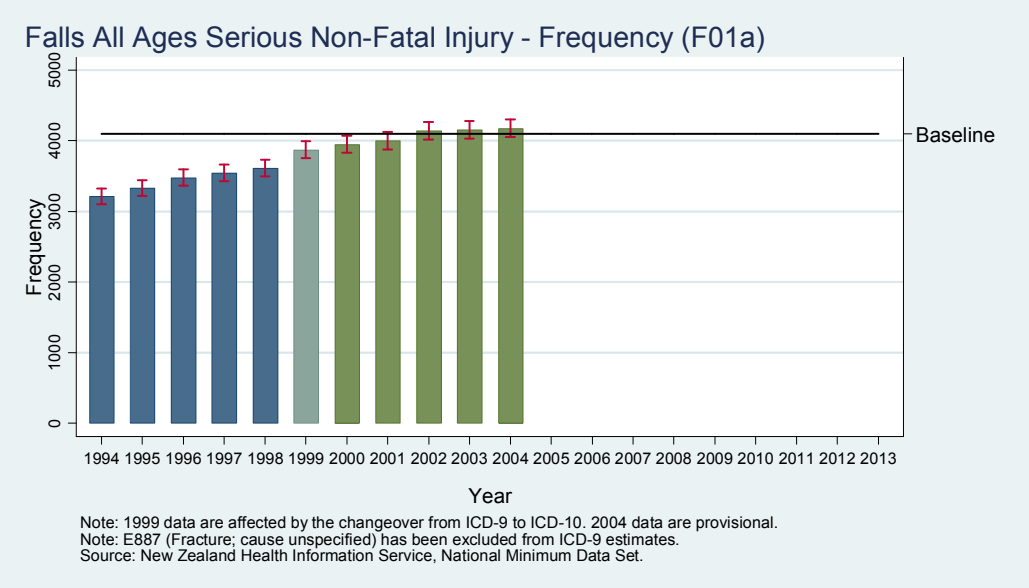


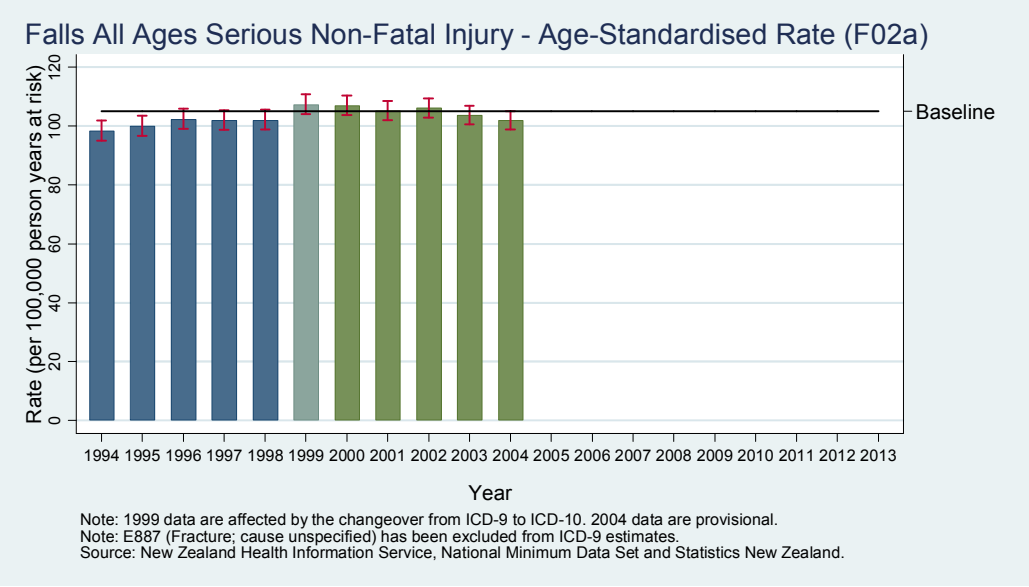
There is no strong evidence of a change in the frequencies (S11) and rates (S12) of fatal injuries resulting from intentional self-harm from 2000. Only after data have been added for further years will we be able to comment more confidently on trends.

2.5 Falls

All ages

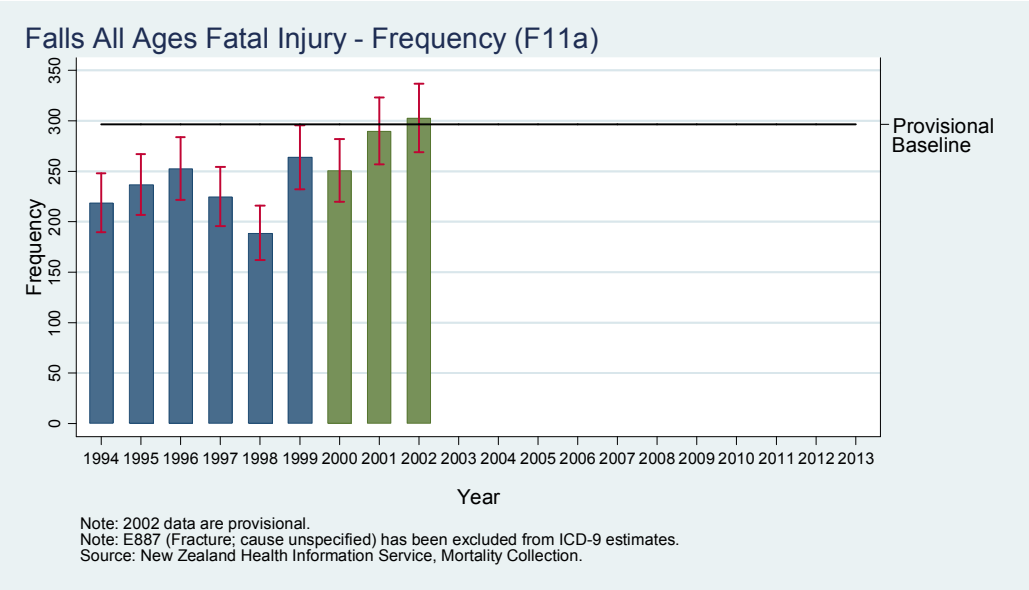
For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change.

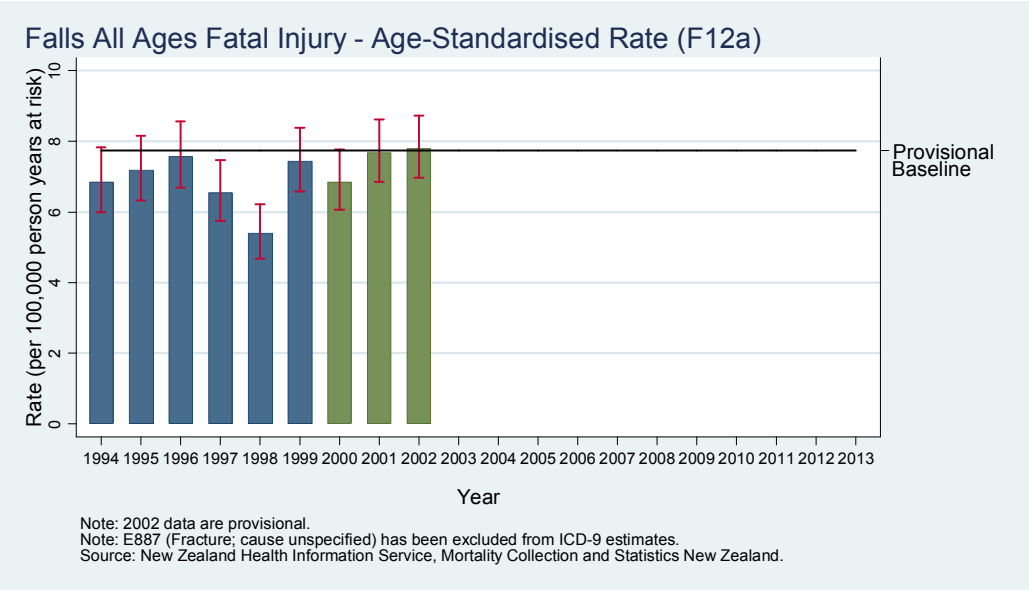




The trends suggest a small increase in the frequency of serious non-fatal injuries resulting from falls (F01a) from 2000, and a small reduction in the rates (F02a). Contrasting trends in frequencies and rates would result from the increasing number of older people in the New Zealand population over this period – see Appendix B7.6.

For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change.

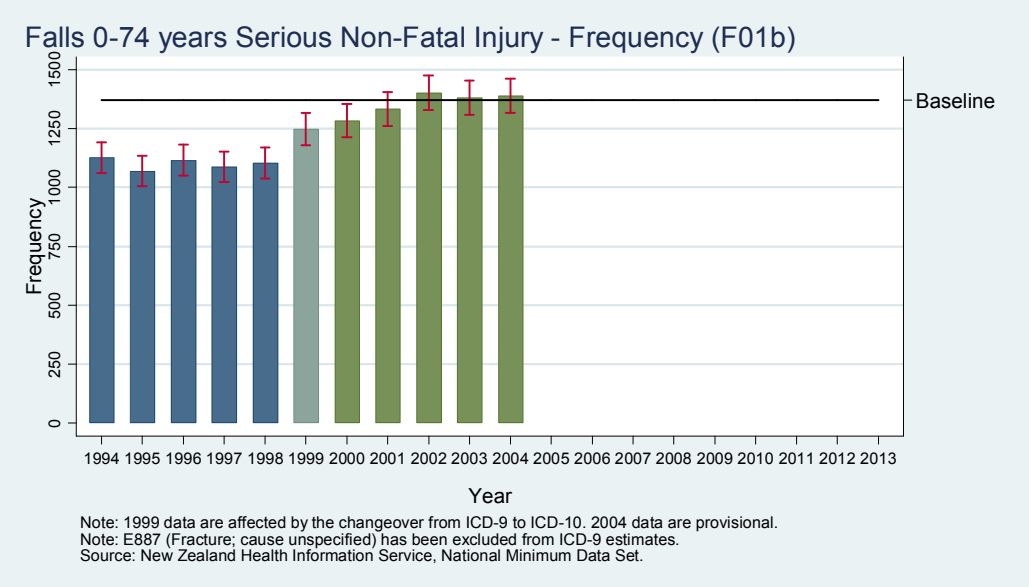


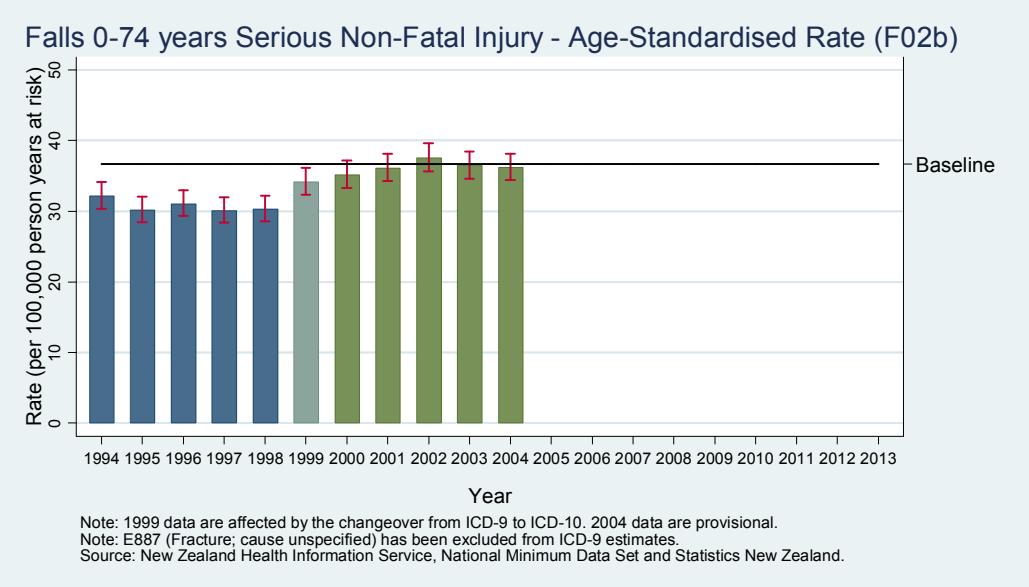


There is no strong evidence of a change in the frequencies (F11a) and rates (F12a) of fatal injuries resulting from falls from 2000, to 2002. Only after data have been added for further years will we be able to comment more confidently on trends.

Aged 0-74 years

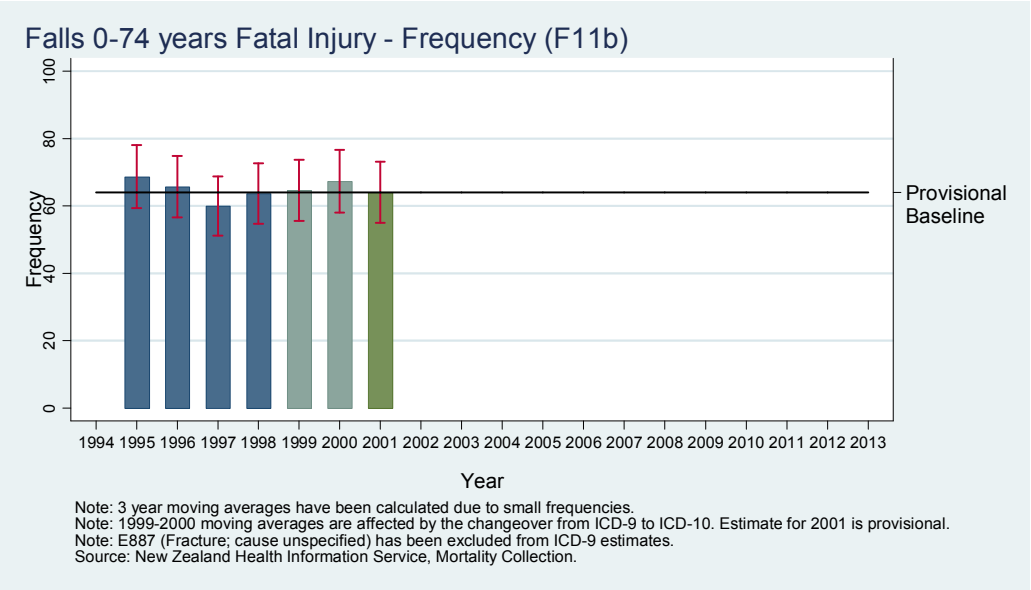
For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change.

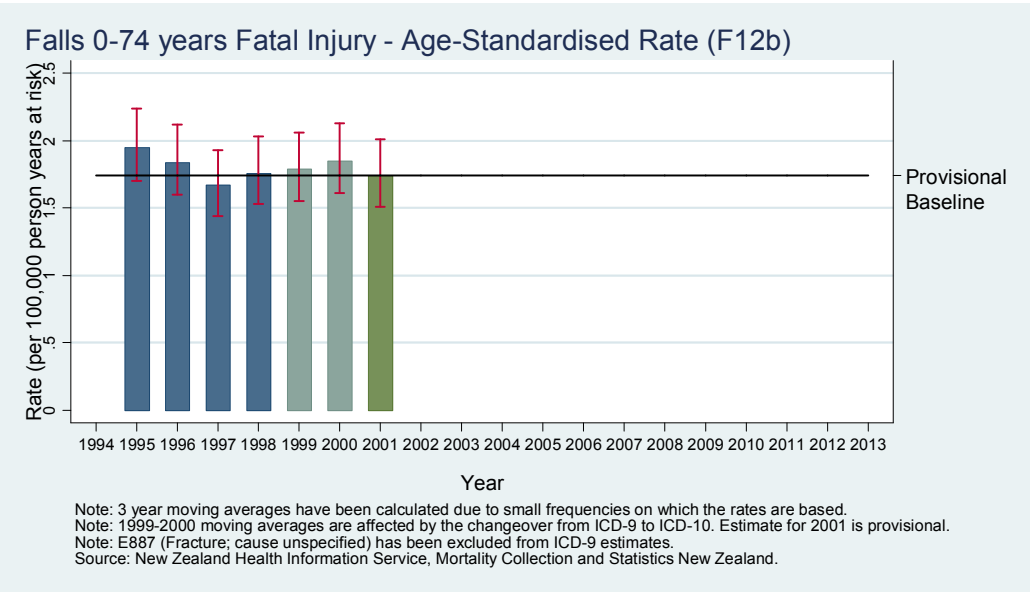




The recent trends suggest little change in the frequencies (F01b) and rates (F02b) of serious non-fatal injuries resulting from falls for those aged 0-74 years.

For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change. Since 3-year moving averages are used, the most recent year shown below is 2001 (based on data from 2000, 2001 and 2002).

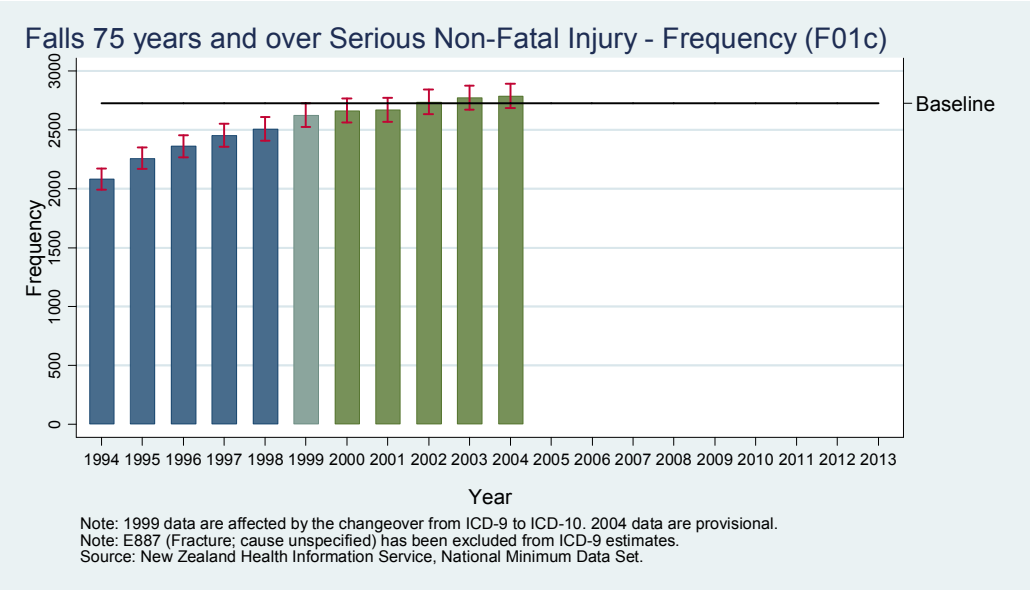


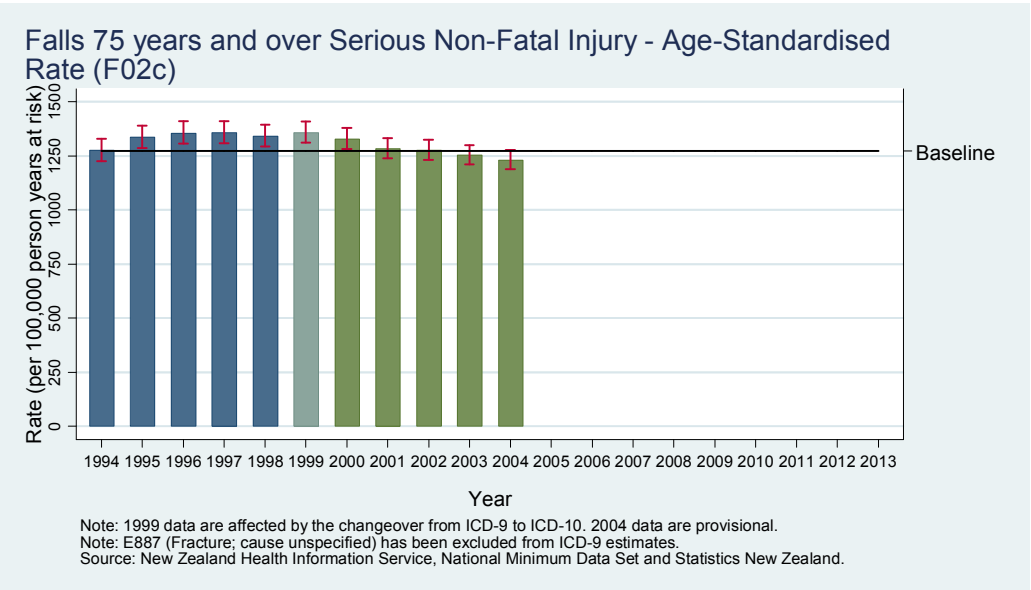


Only the indicator values for 2001 are based purely on ICD-10 coded data. Consequently, no comment on the trends for these indicators is appropriate (F11b, F12b).

Age 75 years and over

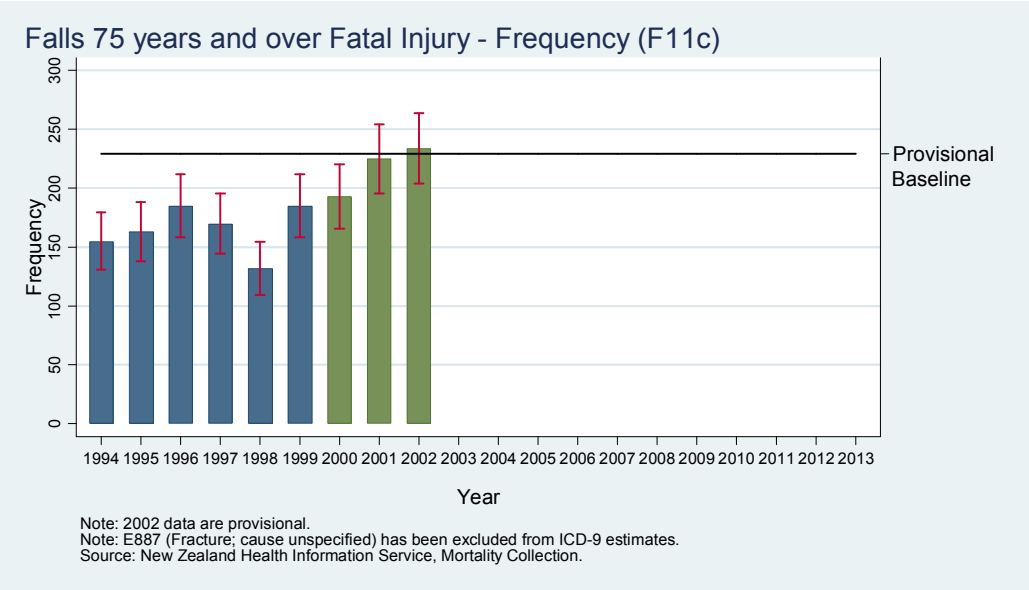
For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change.

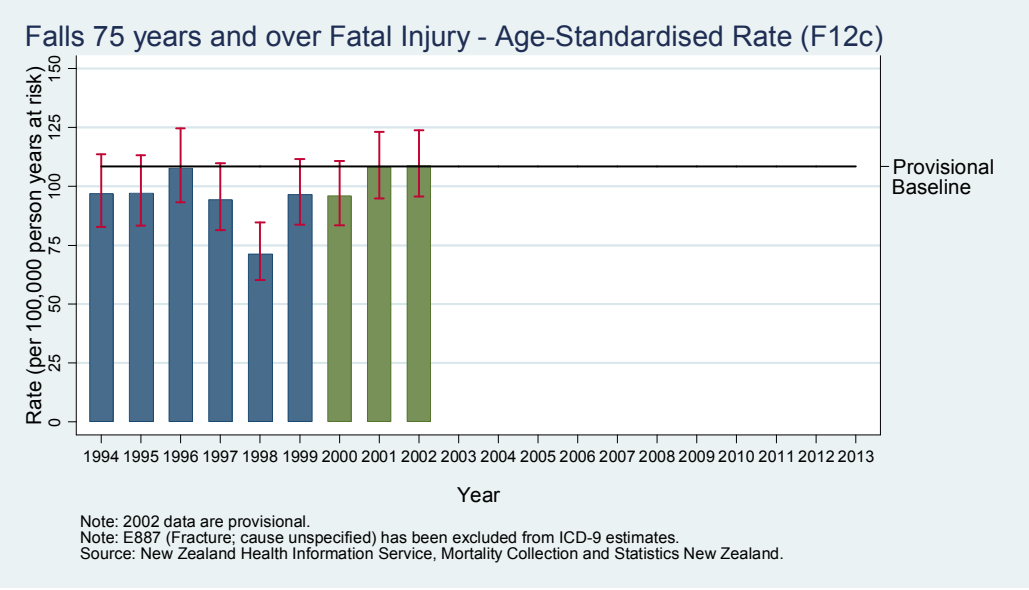




Like the trends for falls for all ages, the trends are suggestive of an increase in the frequency of serious non-fatal injuries resulting from falls (F01c), and a small reduction in the rates (F02c). This phenomenon would result from the increasing number of older people in the New Zealand population over this period– see Appendix B7.6.

For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change.

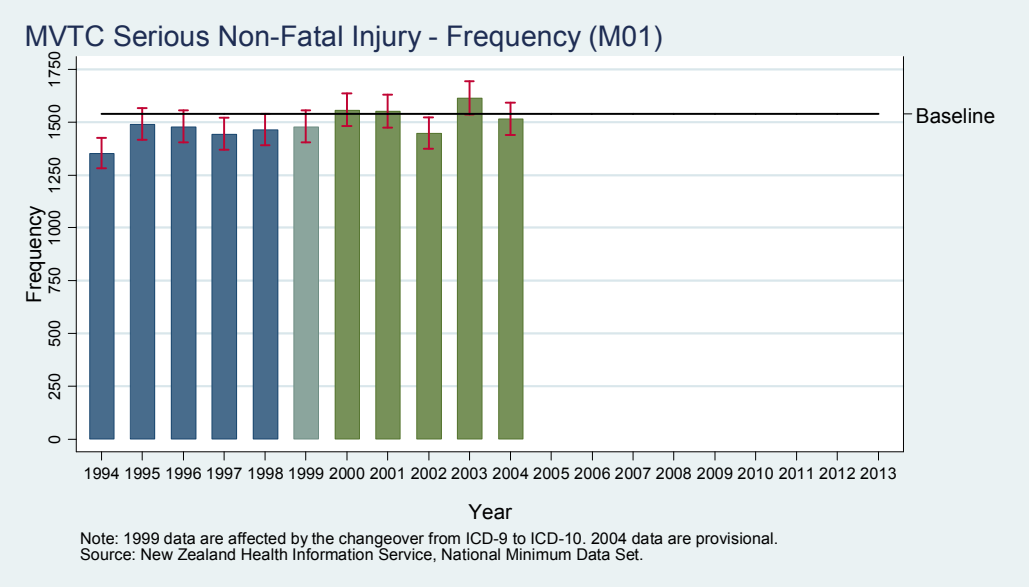


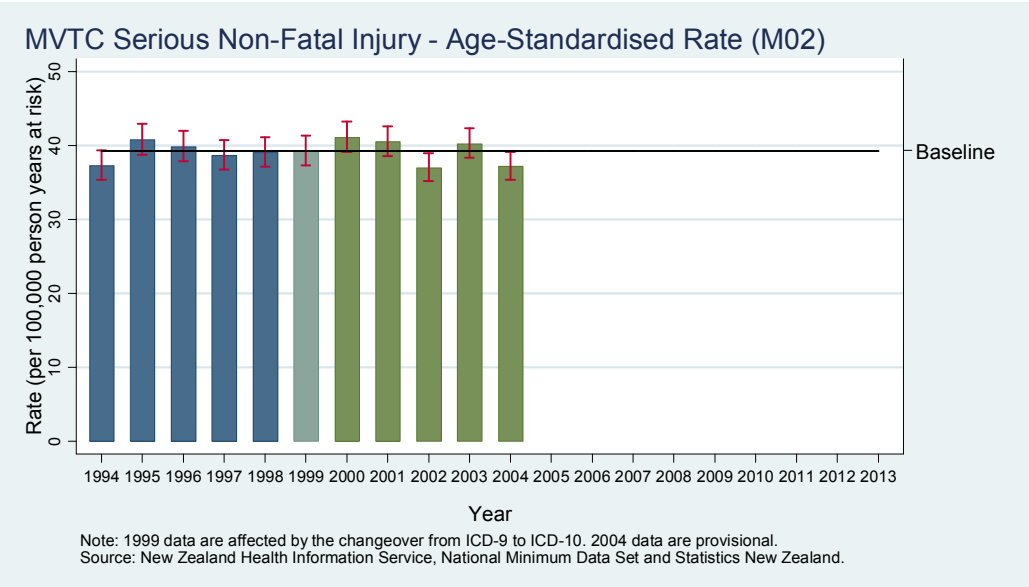


The differences in the frequencies (F11c) and rates (F12c) of fatal injuries resulting from falls for 2000, 2001 and 2002 could have occurred by chance alone. Only after data have been added for further years will we be able to comment more confidently on trends.

2.6 Motor Vehicle Traffic Crashes (MVTC)

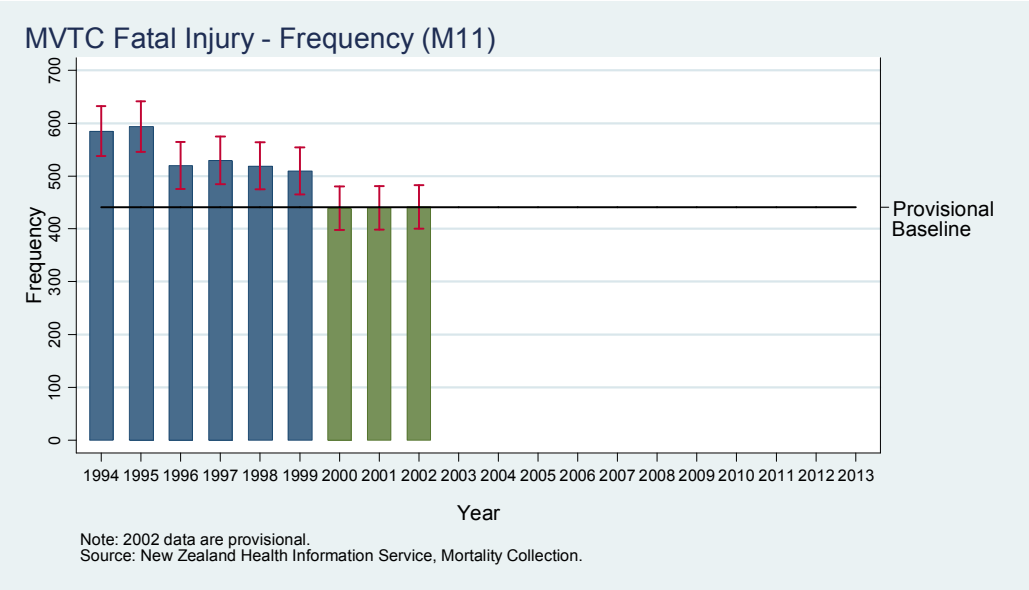
For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change.

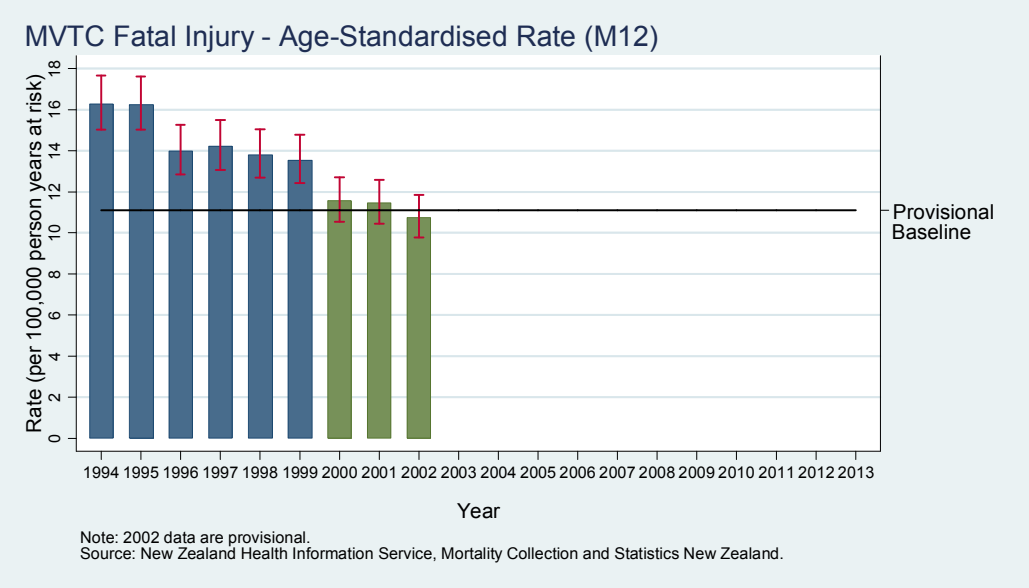




There is no obvious upward or downward trend in the frequencies of MVTC-related serious injuries (M01) since 2000. There appears to be a small reduction in the rates (M02) from 2000 to 2004.

For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change.

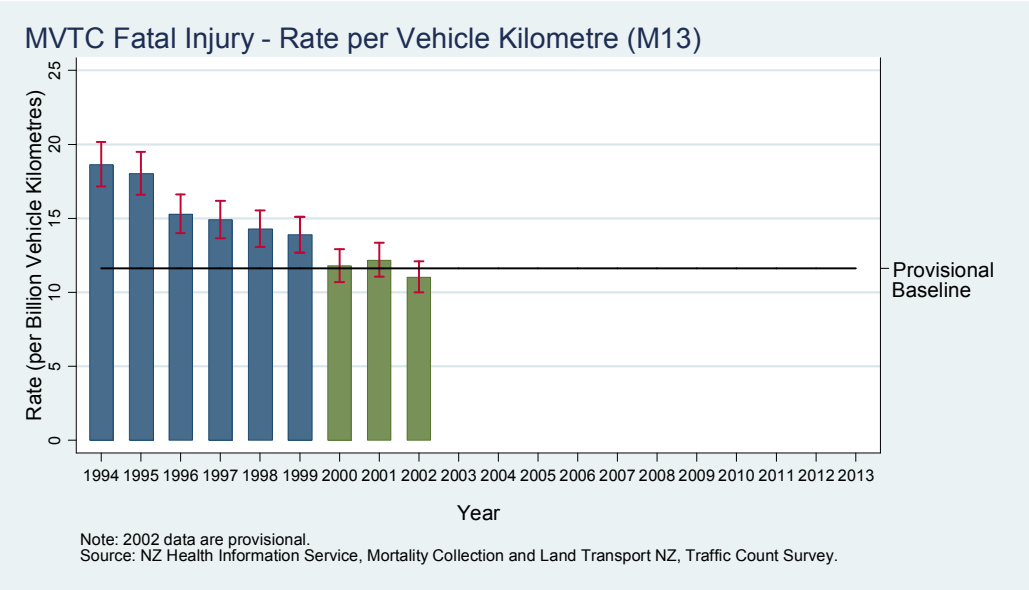


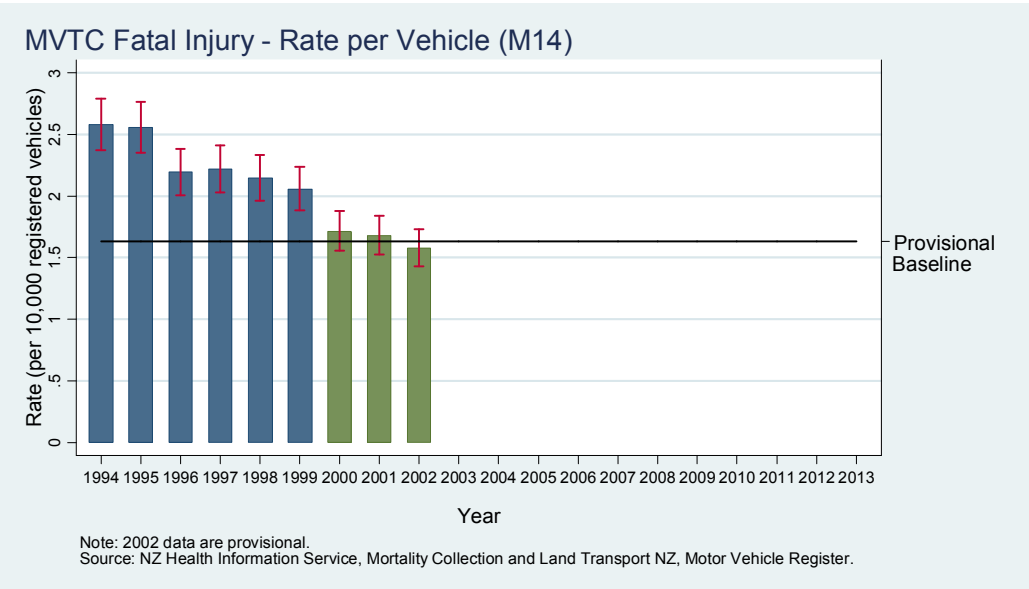


There was no discernable change in the frequencies (M11), and little change in the rates (M12) of MVTC-related fatalities between 2000 and 2002. Only after further years data are available will we be able to comment more confidently.

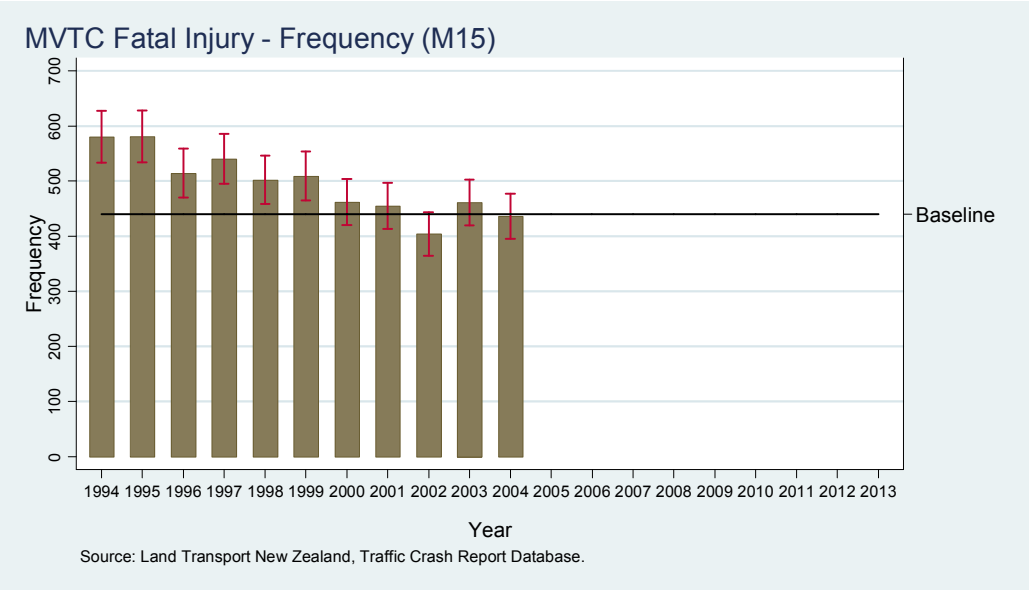
The change from ICD-9 to ICD-10 (from 1998 to 2000) was accompanied by little change in serious non-fatal injury frequencies / rates (M01, M02), but a marked reduction in fatal injury frequencies / rates (M11, M12). This could be an artifact of coding, and is discussed in Appendix B7.7.

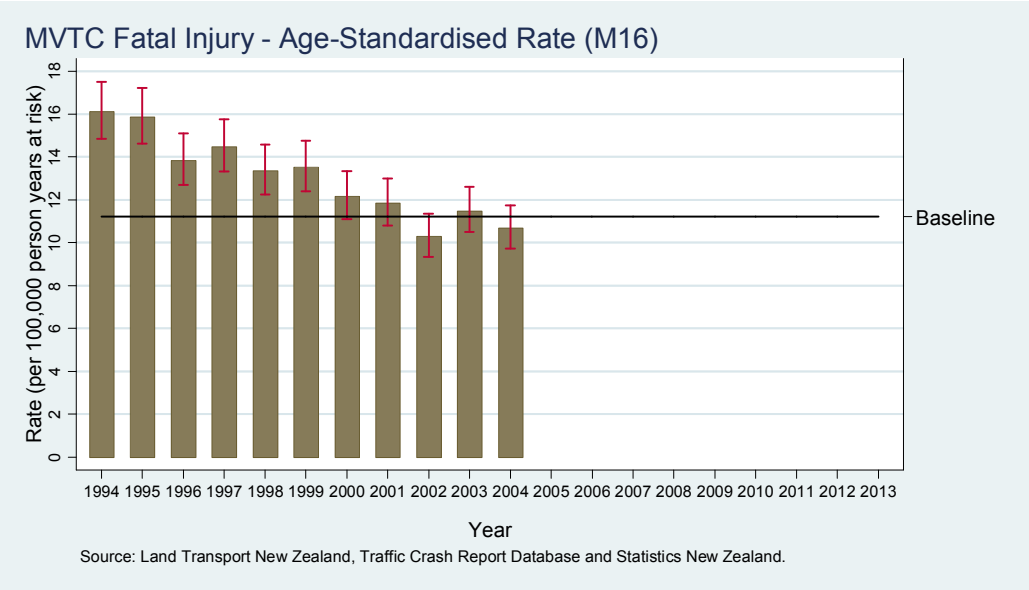
For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change.



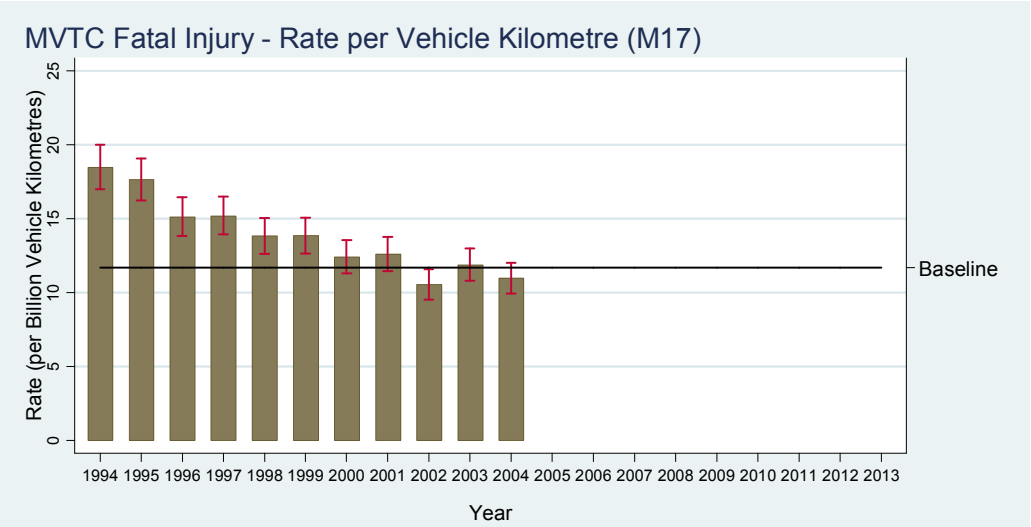


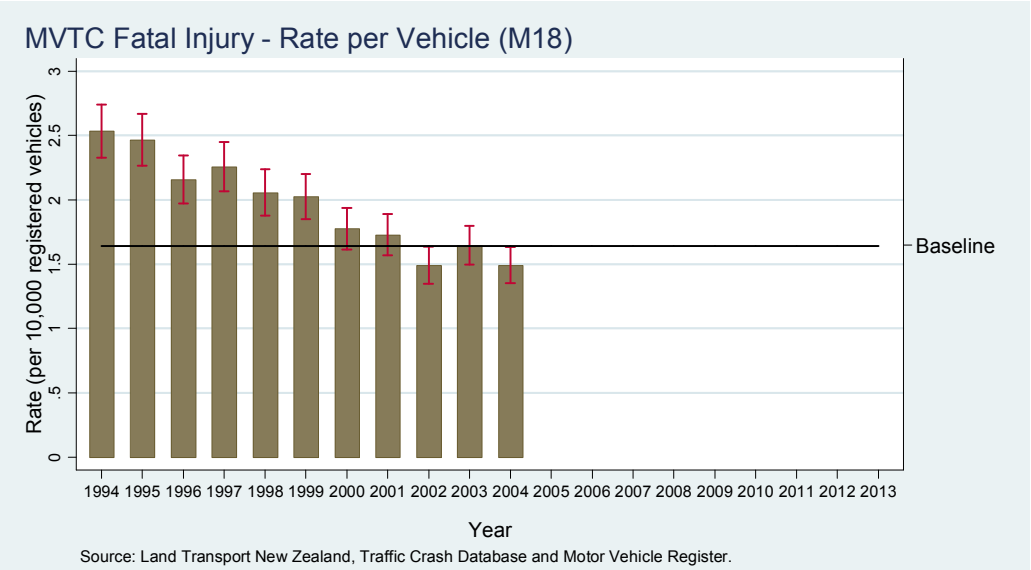
The trends in the rates of fatal MVTCs per person-years (M12), per vehicle kilometer (M13) and per registered vehicle (M14) were very similar. There was little change in the rate per vehicle kilometer between 2000 and 2002 (M13). The same is true for the rates per registered vehicle (M14). Only after data have been added for further years will we be able to comment more confidently on trends.





The trends in the frequencies and rates (per person-year) of MVTC deaths based on NZHIS mortality data (M11, M12) and on Traffic Crash Reports (TCRs) (M15, M16) were similar for the years common to both. TCRs provide a more up-to-date time series. The above charts suggest that, most recently, there has been little decline in the frequencies and rates of MVTC fatalities.

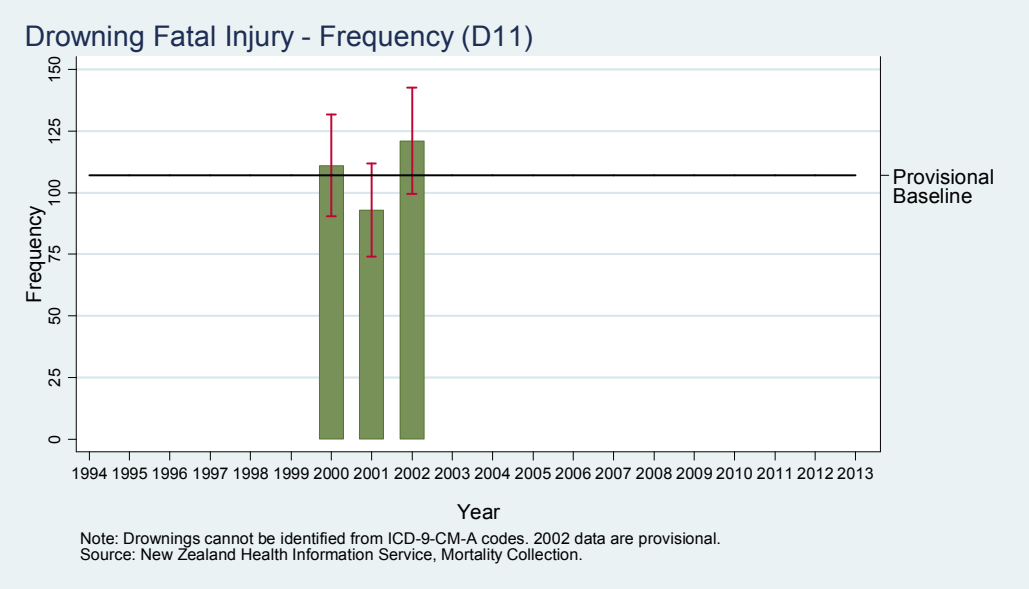


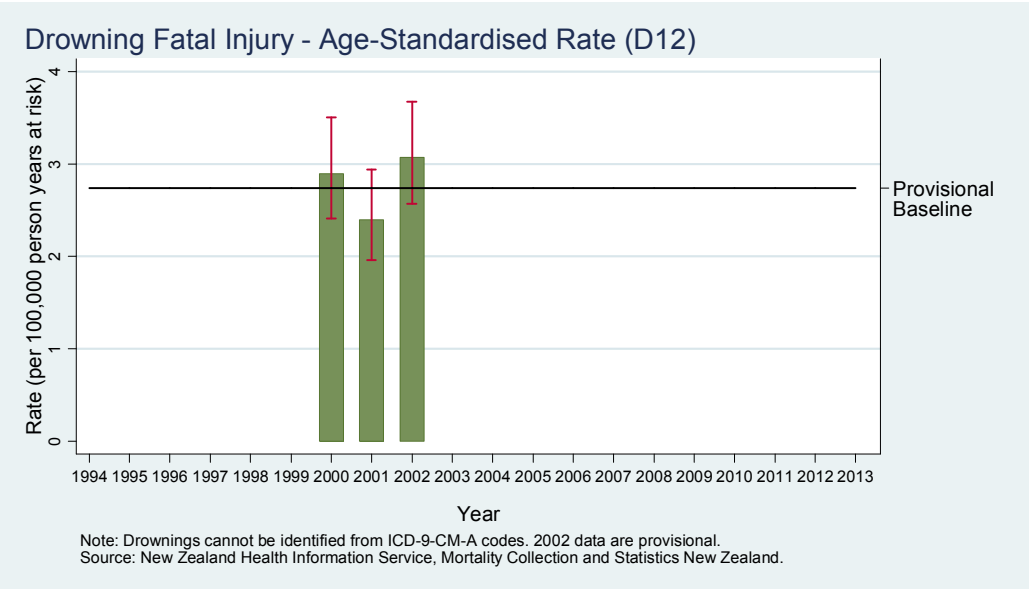


The trends in the rates per vehicle kilometer (M17) and per registered vehicle (M18) of MVTC deaths based on TCRs were similar to each other. They were also similar to the equivalent trends in rates of MVTC deaths based on NZHIS mortality data (M13 and M14) for the years common to M13, M14, M17 and M18. The trends for M17 and M18 suggest that the decline in rates of fatalities may not be as strong for the most recent years.

2.7 Drowning

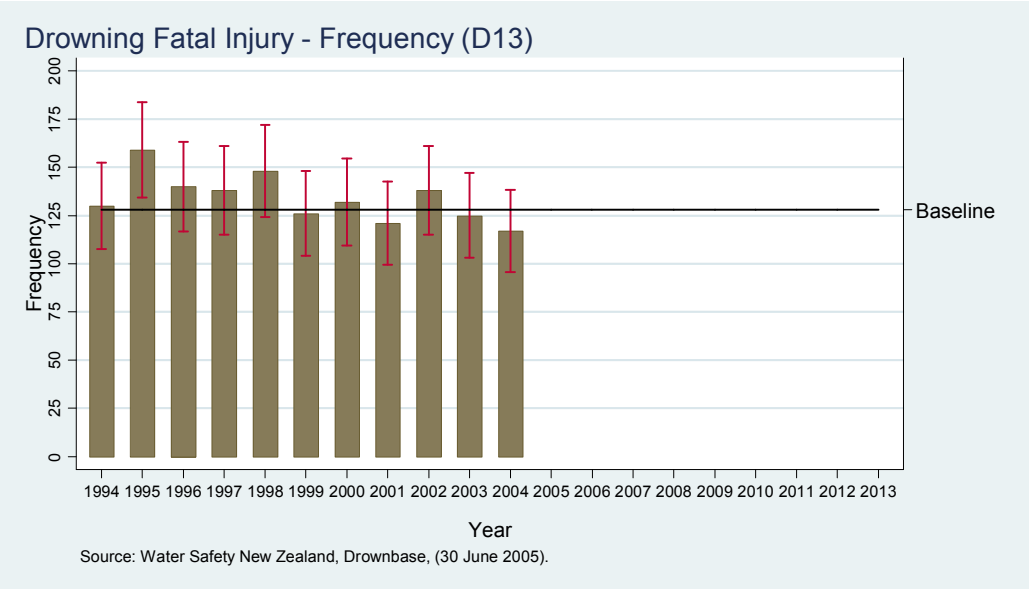
Cases of Drowning could not be identified from the NZHIS NMDS of hospitalisations prior to 2000.





The frequencies (D11) and rates (D12) of drowning are not suggestive of an upward or downward trend during the period 2000 to 2002. Only after data have been added for further years will we be able to comment more confidently on trends.

Indicators D13 and D14 are based on DrownBase data. These data are described by WSNZ as provisional, since DrownBase is updated when new information on drowning deaths is made available. These data can relate to any year.



The trend in the frequencies (D13) and rates (D14) of people drowning year on year, identified by Water Safety New Zealand, suggest a decline. DrownBase data includes all persons drowned irrespective of the intent (i.e. whether it was unintentional, suicide, or homicide). This is one reason why the frequencies and rates of drowning, when using DrownBase as the source, are greater than those identified from the NZHIS Mortality Collection, where the case definition is restricted to unintentional drowning.

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Appendices

Appendix A: Definitions, scope and the indicators

Operational definition of injury

Internationally, the most commonly accepted operational definition of injury is all those pathologies in the "Injury" chapter of the WHO's International Classification of Diseases (ICD-codes). ICD codes are used by the New Zealand Health Information Service (NZHIS) to code mortality and hospitalisation data. [1]

For both of the data sets, diagnosis and external cause of injury were classified using ICD-10 in the most recent years. For hospitalisations, the operational definition of injury for these indicators is given by the following ICD-10 code ranges: for a case to be included it had to have a principal diagnosis code in the range S00-T78, and a first external cause code in the range V01-Y36. For deaths, a case is selected where the underlying cause of death is an external cause code in the range V01-Y36. For the years where ICD-9 was used, close equivalent codes were used to define a case of injury. For hospitalisations, only first admissions were counted.

There is some dispute in the international injury research community as to which pathologies within the ICD injury chapter are in fact injuries. This dispute is discussed below in relation to the chosen operational definition.

Some have argued that "Medical injuries" are outside the domain of traditional injury prevention and control. Using a standard theoretical definition of injury [6], all surgical and some medical procedures can be regarded as injury events, whether or not there are complications. It has been argued that to include complications as injury events, but to remove surgical incisions, is somewhat arbitrary. [6] The International Collaborative Effort on Injury Statistics recommended that these events be tabulated separately, in routine statistics, in recognition that these events occur under a very distinct set of circumstances. The operational definition used for the NZIPS indicators excludes them altogether.

The "Injury" chapter of ICD excludes pathologies resulting from chronic exposure to low energy over time e.g. occupational overuse syndrome. These events lie at the interface between injury and disease. The indicator definitions exclude these pathologies also.

The "Injury" chapter of ICD-10 includes "Maltreatment syndromes" (T74). This category includes "Neglect and abandonment", "Physical abuse", "Sexual abuse", and "Psychological abuse" without any reference to physical injury. In other words, some forms of **intentional** psychological harm / injury are covered by the "Injury" chapter of ICD. Consequently, intentional psychological injury, as encompassed by the ICD "Injury" chapter, is included in the definition of injury used in this chartbook.

Finally, the operational definition of injury includes only first admissions. [7] Sequelae (late affects) of injuries have been excluded as these relate to the late consequences of an injury, rather than the injury itself. The aim of the indicators is to focus on the measurement of injury incidence, and so episodes of inpatient care

resulting from the sequelae of injury have been excluded. For example, a burn victim often has multiple hospital admissions relating to their treatment and rehabilitation. For these cases, their first admission would be included but subsequent admissions would not.

Many of the above issues are discussed by Langley in two papers published in 2004. [6] [8]

A. All Injury

The 'all injury' indicators include all diagnoses, all causes and all intents that satisfy our operational definition of an injury (see above). The NZIPS serious injury outcome indicators for 'all injury' are:

- Number of injury deaths. (NZHIS Mortality data)
- Age-standardised injury mortality rate, per 100,000 person-years at risk. (NZHIS Mortality data)
- Number of serious non-fatal injuries. (NZHIS NMDS)
- Age-standardised serious non-fatal injury rate, per 100,000 person-years at risk. (NZHIS NMDS)

The specifications for all of the indicators can be found in Appendix C

B. Assault

The term 'assault' has been used to describe both fatal and non-fatal interpersonal violence which is used with the intent of causing harm, injury, or death to another. Homicide is death due to injuries inflicted through any means by another person with the intent to injure or kill. [9]

The above definition includes all acts of commission with the exception of injuries due to legal intervention and operations of war. It includes sexual assault and acts of omission (e.g. abandonment) where injury has occurred.

The following were agreed as NZIPS indicators:

- Number of assaultive injury deaths. (NZHIS Mortality data)
- Age-standardised assaultive injury mortality rate, per 100,000 person-years. (NZHIS Mortality data)

The equivalent serious non-fatal injury indicators are not entirely free of threats to validity. Consequently, the following are **provisional** NZIPS indicators:

- Number of assaultive serious non-fatal injuries (NZHIS NMDS)
- Age-standardised assaultive serious non-fatal injury rate, per 100,000 person-years at risk (NZHIS NMDS)

C. Work-related injury

The NZIPS priority area is entitled 'Workplace injuries (including occupational diseases)'. The NZIPS indicators presented here are confined to **injuries** and do not encompass occupational disease.

The phrase 'workplace' places the focus on location. Work-related and non-work-related injuries can occur at a workplace. (For example, for some workers their workplace is the road; however, non-work-related injury also occurs on the road.) The focus of the NZIPS indicators is work-related injury.

The scope for this area includes both unintentional and assaultive injury. Injuries that are purposely self-inflicted or are of undetermined intent are not included.

The scope of 'work-related injury' has been described in a number of different ways. It can include one of more of the following:

- bystanders,
- people traveling whilst at work,
- people commuting to and from work.

People traveling whilst at work are included within a theoretical definition of work-related injury. However, methods for the identification of motor vehicle traffic crashes (MVTCs) that are work-related (either whilst working or when commuting to and from work) and for the identification of bystanders, using routinely collected data, are unreliable, [10] hence they are excluded from the operational definition of the NZIPS work-related injury indicators.

Historically, the measurement of fatal and non-fatal work-related injury experience based on routine data sources has been fraught with difficulties. Two Work-Related Fatal Injury Studies [10] [11] were commissioned in the 1980s and then again in the 1990s because of difficulties in obtaining reliable estimates of work-related fatal injuries from routinely collected national data sources. It follows, therefore, that the development of indicators based on these sources was not easy. It is only since the introduction of ICD-10, and the opportunity it presents to NZHIS to code 'activity' in their mortality data and in their NMDS of hospitalisations, as well as the initiation of the data linkage work of the Injury Information Manager, that the derivation of valid indicators based on routinely collected and processed data has become possible.

The work-related indicators presented in this report pose some potential threats to validity. Nevertheless, they could provide valid indicators for the future. These indicators are, therefore, **provisional**, and are as follows:

- Number of work-related injury deaths (NZHIS Mortality data)
- Age-standardised work-related injury mortality rate, per 100,000 workers (NZHIS Mortality data*)*
- Number of work-related injury deaths (ACC Mortality data)
- Age-standardised work-related injury mortality rate, per 100,000 workers (ACC Mortality data)
- Number of work-related serious non-fatal injuries (ACC-NMDS linked data-based)
- Age-standardised work-related serious non-fatal injury rate, per 100,000 workers (ACC-NMDS linked data-based*)*

The source data for these last two indicators was not available at the time of writing. ACC data-based indicators have been presented in this chartbook as a temporary substitute. Details of these indicators can be found in Appendix B7.4 And Appendix C.

D. Intentional self-harm

The NZIPS identified 'Suicide and deliberate self-harm' as a priority area. Acts of intentional self-harm can result in non-fatal injury or death. The latter are typically referred to as 'suicide'. This could be interpreted to mean that all victims so described intended to die, which is not the case.

Many refer to 'hospitalised self-harming behaviours' as attempted suicide. This is inaccurate since individuals self-harm for a wide range of reasons other than seeking to put their life at risk. Others have used the term 'Parasuicide' to refer to suicide attempts and deliberate self-harm inflicted with no intention to die. [12]

The tenth revision of WHO ICD refers collectively to these fatal and non-fatal events as 'Intentional self-harm' and in so doing does not seek to classify events according to whether or not death was the intended outcome. The same approach is adopted here. In this report, the term intentional self-harm is used to refer to purposely inflicted self-harm which results in non-fatal injury or death.

The NZIPS serious injury outcome indicators are:

- Number of intentional self-harm injury deaths. (NZHIS Mortality data)
- Age-standardised intentional self-harm injury mortality rate, per 100,000 person-years. (NZHIS Mortality data)

The equivalent serious non-fatal injury indicators are not entirely free of threats to validity. Consequently, the following are **provisional** indicators:

- Number of intentional self-harm serious non-fatal injuries (NZHIS NMDS)
- Age-standardised intentional self-harm serious non-fatal injury rate, per 100,000 person-years at risk (NZHIS NMDS)

E. Falls

The falls indicators focus on unintentional injury, and so the scope excludes both intentional self-harm and purposely inflicted injury events. The operational definition also excludes cases where the intent is undetermined.

For the indicators identified below, the operational definition of a fall is based on ICD-10-AM codes. For death and hospitalisation data, the range of falls codes is: W00-W19. These exclude falls from an animal, from a burning building, into fire, into water (with drowning or submersion), onto machinery (whilst in operation), and in/from a transport vehicle. Furthermore, it excludes the collapse of a building or structure. There are a significant number of these events; however, these exclusions are in line with international coding convention. [13]

It should be noted that the injury definition used (see section 1.5), which is based on principal diagnosis and first external cause of injury codes at first discharge from hospital, means that falls that occur in hospital are unlikely to be ascertained by the NZIPS serious non-fatal injury indicator. This is an inevitable limitation of the operational definition of an injury used. To broaden the definition to include all falls in hospital would result in the capture of many more minor injuries, and compromise the validity of the indicators.

When constructing the charts for these indicators, the codes from both the 9th revision and the 10th revision of ICD need to be specified. For these retrospective analyses, falls were defined using ICD-9-CM-A, and the relevant codes were E800-E888. An important coding change that occurred in the transition from the 9th to the 10th revision of ICD was in relation to the ICD-9 code E887: 'Fracture, cause unspecified'. This code was moved from the falls category to elsewhere in ICD-10. Consistent with this, the indicators based on ICD-9 coded data exclude E887. Inclusion or exclusion of this code has little impact on the magnitude of these NZIPS indicators or the trends, however – see the Cryer 2004 report. [2]

Separate falls indicators for older people aged 75 and over have been adopted for the following reasons:

- The mechanism of falling is different for frail older people compared to the rest of the population.
- The multiple pathology experienced by frail older people means that identification of injury cases is less certain than for younger age groups.
- There are very high frequencies and rates of death and hospitalisation as a result of falls in people aged 75 and over.

The NZIPS injury outcome indicators include 6 fatal injury and 6 serious non-fatal injury indicators:

- Number of fall-related injury deaths. (NZHIS Mortality data)
- Age-standardised fall-related injury mortality rate per 100,000 person-years at risk (NZHIS Mortality data)
- Number of fall-related injury deaths amongst people aged 0-74. (NZHIS Mortality data)
- Age-standardised fall-related injury mortality rate per 100,000 person-years for people aged 0-74. (NZHIS Mortality data)
- Number of fall-related injury deaths for people aged 75 and over. (NZHIS Mortality data)
- Age-standardised fall-related injury mortality rate per 100,000 person-years for people aged 75 and older. (NZHIS Mortality data)
- Number of fall-related serious non-fatal injuries (NZHIS NMDS)
- Age-standardised fall-related serious non-fatal injury rate, per 100,000 person-years at risk (NZHIS NMDS)
- Number of fall-related serious non-fatal injuries amongst people aged 0-74. (NZHIS NMDS)
- Age-standardised fall-related serious non-fatal injury rate per 100,000 person-years for people aged 0-74. (NZHIS NMDS)
- Number of fall-related serious non-fatal injury for people aged 75 and over. ((NZHIS NMDS)
- Age-standardised fall-related serious non-fatal injury rate per 100,000 person-years for people aged 75 and older. (NZHIS NMDS)

F. Motor vehicle traffic crashes

A motor vehicle traffic crash is any crash on a public road involving at least one moving motorised vehicle. A crash is assumed to have occurred on a public road unless another place is specified, except in the case of crashes involving only off-road motor vehicles. [13] This definition excludes all cases where there is no motor vehicle involvement, e.g. pedal cycle only crashes; collisions between pedal cyclists and pedestrians.

The scope of this indicator is unintentional injury. Injuries that are purposely self-inflicted, are due to assault, or are of undetermined intent, are not included.

The NZIPS serious injury outcome indicators are:

- Number of MVTC-related injury deaths (NZHIS Mortality data)
- Age-standardised MVTC-related injury mortality rate, per 100,000 person-years at risk (NZHIS Mortality data)
- Number of MVTC-related serious non-fatal injuries (NZHIS NMDS)
- Age-standardised MVTC-related serious non-fatal injury rate, per 100,000 person-years at risk (NZHIS NMDS)
- MVTC-related mortality rate per billion vehicle-kilometres (NZHIS Mortality data)
- MVTC-related mortality rate per 10,000 vehicles (NZHIS Mortality data)

There is a problem with the timeliness for the NZHIS Mortality data based indicators. Consequently, Traffic Crash Report (TCR)-based mortality indicators are also included as **provisional** indicators; that is:

- Number of MVTC-related injury deaths (TCR data)
- Age-standardised MVTC-related injury mortality rate, per 100,000 person-years at risk (TCR data)
- MVTC-related death rate per billion vehicle-kilometres (TCR data)
- MVTC-related death rate per 10,000 vehicles (TCR data)

G. Drowning and near drowning

The final NZIPS priority area is 'Drowning and near drowning'. Drowning has been defined by the World Congress on Drowning as follows: [14]

> "*Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid*."

Since the introduction of ICD-10 by NZHIS to code external cause and nature of injury in both their mortality data (for deaths registered since 1 January 2000) and NMDS of hospital discharges (since mid-1999), it has been possible to identify drowning and near drowning as cases classified to the diagnostic code T75.1. There were, however, insufficient numbers of serious non-fatal near drowning injuries to enable the production of meaningful indicators for these.

The indicators will be restricted to unintentional drowning.

The NZIPS serious injury outcome indicators are:

- Number of drowning cases (NZHIS Mortality data)
- Age-standardised drowning rate, per 100,000 person-years at risk (NZHIS Mortality data)

There is a lag of more than two years between the end of a given year and the release of NZHIS Mortality data for that year. Consequently, there is a problem of timeliness for the NZHIS Mortality data-based indicators. These indicators have been supplemented, therefore, with indicators based on Water Safety New Zealand's database of Drowning cases, namely DrownBase. (A description of DrownBase is provided in the Cryer 204 report.) The indicators based on DrownBase data are produced in this report as **provisional** indicators.

- Number of drowning cases (WSNZ DrownBase data)
- Age-standardised drowning rate, per 100,000 person-years (WSNZ DrownBase data)

Appendix B: Methods used for the production of the charts

B1 Background

The justification for, and a full description of, the methods used in the development and validation of the indicators are presented in the report that underpins this work, namely:

> 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. [2]

This appendix reproduces some of the relevant sections of that report, as well as describing the specific methods used in producing the charts shown in this chartbook. Much of the above report is dedicated to the identification of candidate indicators, and to an assessment and discussion of the validity of the NZIPS serious (fatal and non-fatal) injury and competing national injury indicators. This information is not presented here.

The following summarises the development of the NZIPS serious injury indicators

- The principal driver in their development was that there was a need for indicators that cover the period prior to and during the implementation of the New Zealand Injury Prevention Strategy.
- The approach to indicator development was consistent with the view that before newly proposed indicators are promulgated, they should be subject to formal validation.
- In arriving at the NZIPS indicators, the developers sought to strike a balance between ease of derivation of the indicator, ease of understanding, and validity.
- The NZIPS serious injury indicators are predominantly based on ICD diagnosis and external cause coding, because national death and hospitalisation data are coded using this classification system. (The principal advantage of ICD is that it is a WHO classification system used by many other countries – using it will permit future comparisons with other countries for the indicators that have been developed.)
- The development of national injury indicators involved a degree of rigour which surpasses comparable effort overseas.

Recommendations for the development of complementary indicators (to the NZIPS serious injury indicators) are included in the report cited above. [2] These recommendations are not reproduced or discussed here.

B2 Sources of numerator data

The indicators have been chosen to draw attention to 'important' injuries as judged by their resulting in death, or because of their threat-to-life.

Fatal injury indicators

NZHIS Mortality data (based on death registrations and Coroner's reports) were used for the NZIPS mortality indicators for 'all injury' and the six priority areas. Alternative sources were used for the following provisional indicators:

- Work-related injury indicators W12 & W14: ACC mortality data
- Motor vehicle traffic crash indicators M15 – M18: Police traffic crash reports (TCRs).
- Drowning indicators D13 & D14: Water Safety New Zealand (WSNZ) DrownBase.

Non-fatal injury indicators

NZHIS NMDS, a database which records information on all publicly funded hospital discharges in New Zealand, was used as the source for the NZIPS serious non-fatal injury indicators. The NZHIS NMDS excludes cases that are funded privately. Only a small number of relevant cases would not be identified through the exclusion of these latter cases. [4] This source was also used for the majority of the provisional indicators. Exceptions to this are the work-related injury indicators W01 & W02, which will use ACC data linked to NZHIS NMDS data. These linked data were unavailable for this report; ACC data based indicators have been presented instead as a temporary substitute.

B3 Rates and denominator data

Rates, where applicable, are expressed as per 100,000 person-years at risk (i.e. per 100,000 population per year of exposure). Person-years have been used as denominators for the rates since:

- these are the natural units for a rate; and,
- where the indicator is based on moving averages, then the use of person-years naturally takes account of the effect of using multiple years to construct the rates.

Population data were obtained from Statistics New Zealand population estimates (see www.stats.govt.nz). These are mid-year estimated resident population values. These estimates are for the usually resident population so do not include short-term overseas visitors to New Zealand (e.g. tourists). As such there may be a small mismatch for some rates between the numerator and denominator. However, this is likely to have little impact on the indicators or their trends.

There were a few exceptions to the use of total population estimates for the denominators:

- M13, M14, M17 and M18 are expressed as rates per billion vehicle-kilometres or per 10,000 registered vehicles. The source of these denominator data was LTNZ
- W14 is expressed as rates per 100,000 workers, and W02 and W13 will also be expressed as a rate per 100,000 workers, in subsequent chartbooks. Full-time and part-time workers aged 15 years and over were included in the denominator. The source of these denominator data was Census data (SNZ).

B4 Definition of serious non-fatal injury

It has been IPRU's experience that large administrative sets of non-fatal injury data, such as the NZHIS NMDS of hospital discharges, cannot be used to produce valid indicators without some pre-processing. Typically, biases can be minimised in these data[e] by using a severity threshold for the case definition. A discussion of these issues is provided elsewhere. [15] [16]

A serious non-fatal injury case was defined as one that is hospitalised and has an ICISS score of less than or equal to 0.941[f]. This is equivalent to selecting patients whose injuries give the patient a survival probability of 94.1% or worse – in other words, a probability of death (at admission) of at least 5.9%. Amongst first admissions for injury, this represents around 15% of all injury discharges. This severity threshold includes the majority of the following injuries: fracture of the neck of femur, intracranial injury (excluding concussion only injury), injuries to the nerves and spinal cord at neck level, multiple fractures of the ribs, asphyxia, hypothermia, and many other injury diagnoses of similar or greater severity. The frequency and description of the ICD-10 principal diagnosis codes captured using this severity threshold are tabulated in Appendix 1 of the Cryer 2004 report. [2]

The injury cases selected using this definition of serious injury have high face validity. Since hospital admissions are being used to identify our serious non-fatal injury cases, we must be confident that the injuries satisfying the serious injury definition have a very high likelihood of admission to hospital (and the injuries satisfying this serious injury definition do) and thus are little influenced by extraneous factors such as supply of and access to health services.

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[e] For example, admissions are influenced by socio-demographic, service supply and access factors independent of injury; ACC entitlement claims are influenced by personal and health service factors, employment status, and business cycle, independent of injury.

[f] All hospital discharges that were publicly funded are considered, even ones with 0 days stay; however, only cases that satisfied the severity criterion of ICISS$\leq$0.941 were selected as cases.

B5 ICD-based Injury Severity Score (ICISS)

B5.1 The ICISS Method

For a discussion of the merits of the ICISS severity score relative to other severity scales, please see Appendix 1 of the Cryer 2004 report. [2]

The ICISS method involves calculating a Survival Risk Ratio (SRR), i.e. the probability of survival, for each individual injury diagnosis code as the ratio of the number of patients with that injury code who have not died to the total number of patients assigned that diagnosis code. Thus, a given SRR represents the likelihood that a patient will survive a particular injury. Each patient's ICISS score (survival probability) is derived as the product of the probabilities of surviving each of their injuries individually.

The ICISS scores for each diagnosis are estimated using a 'training set' of data. These scores are then applied to different sets of data to generate the ICISS severity measure.

B5.2 ICISS and the NZIPS serious injury indicators

For the indicators presented in this chartbook, the ICD-10-based SRRs were derived using hospital discharges for the period 1999 to 2001. That is, the SRRs are conditional on a case being admitted to hospital, and discharged during this period. These were then applied to hospital discharges that were coded using ICD-10-AM, ie. for the period from the first use of ICD-10-AM to 2004, where the discharged diagnosis and external cause of injury satisfied the NZIPS indicators injury definition.

This procedure was repeated for cases coded using ICD-9-CM, using a training set based on the years 1989 to 1998. A slightly different severity threshold was set (namely ICISS$\leq$0.96) so that very similar injuries were captured under ICD-9 as ICD-10.

B6 The NZIPS indicators

B6.1 Methods of calculation

The NZIPS indicators presented in this chartbook are listed in Appendix A. There are 28 NZIPS fatal and serious non-fatal injury outcome indicators, and a further 16 provisional indicators. The specifications for the indicators are presented in Appendix C. These specifications give the method of calculation for each of the indicators.

B6.2 95% confidence intervals

Ninety five percent confidence intervals are displayed for each bar presented on each chart. The indicators are either counts or rates.

- 95% confidence intervals for counts assume Poisson error – standard errors were derived as the square root of the count.
- 95% confidence intervals for age-standardised rates were produced using the method described in Clayton and Hills, 1993. [5]

B7 Notes on the interpretation of indicator trends

ICD-10 was used to code diagnosis and external cause of injury for the NZHIS Mortality data registered from 1 January 2000 onwards and the NZHIS NMDS (hospitalisations) data from mid-1999 onwards. The change from the ICD-9 to ICD-10 coding frame, for diagnosis and external cause of injury, is likely to affect any trends in the indicators over the transition period. In the interpretation of the trends in the indicators, the focus is, therefore, on the calendar years from 2000 onwards.

Before discussing the trends in the serious injury outcome indicators, we provide a brief description of the differences between ICD-9 and ICD-10.

B7.1 Differences between ICD-9 and ICD-10

In regard to the use ICD-9 and ICD-10 for coding causes of death, Kreisfeld and Harrison (2005) [17] state:

> *"Changes between ICD-9 and ICD-10 which have a bearing on the coding of injury mortality data are:*
>
> - *Some changes to the rules for deciding which of the several causes of death that might be mentioned on the death certificate should be designated the Underlying Cause.*
> - *The inclusion of a new chapter* External Causes of Mortality and Morbidity *to take the place of the previous supplementary classification.*
> - *The adoption of an alphanumeric coding scheme.*
> - *A change of axis for injuries, giving primacy to body part instead of nature of injury*
> - *A change of axis for land transport accidents, giving more information about type of road vehicles.*
> - *More specific categories for some External Causes, and less specific categories for others.*
> - *Adoption of the term 'sequelae' in preference to 'late effect'.*
> - *A changed fourth-character classification for place of injury occurrence, and a new short classification for activity at the time of injury."*

Above are some structural reasons why the transition from ICD-9 to ICD-10 could result in differences in the types of cases captured under ICD-9 and

ICD-10. Below is a brief synopsis of the results of an empirical investigation of the changes that the use of ICD-10 rather ICD-9 introduces. The work is Australian. It would be difficult to replicate in New Zealand due to the smaller number of injury deaths that occur annually.

In Australia, they found large differences between 1998 and 1999 in the frequency of deaths for:

- Unintentional falls (56% drop);
- Unintentional poisoning by pharmaceuticals (77% rise);
- Other unintentional injuries (133% rise).

[17] Changes that occurred in other external cause groups, between 1998 and 1999, were much more consistent with chance variation. Some of the large difference between the figures for 1998 and 1999 are due to the changed way in which information on cause of death was obtained in Australia from 1999. This particularly affected falls.

In the same report, a comparison of ICD-9 and ICD-10 coded data was reported. This was carried out using 1998 mortality data; data for which underlying cause of death was coded using both ICD-9 and ICD-10. Comparability factors (CF) were produced, which are the ratio of cases coded to the particular category using ICD-10 to the number when using ICD-9:
CF=1 indicates the same number of cases coded when using ICD-9 and ICD-10,
CF>1 indicates a larger case count under ICD-10, and
CF<1 indicates a larger case count under ICD-9

The following CFs were produced using Australian data for the major external cause of injury groups. Also shown below are the results of similar work in the USA:

	Australian Correction Factors	US Correction Factors
All external causes	1.03	
Homicide	1.00	1.00
Suicide	1.00	1.00
Unintentional falls	0.39	0.84
Transport	1.01	1.00
Unintentional drowning	1.02	1.00
Smoke fire and flames	0.99	0.97
Unintentional poisoning by pharmaceuticals	1.07	
Unintentional poisoning by other substances	1.18	
Other unintentional	2.44	
Undetermined intent	1.05	
Adverse events etc.	1.55	

Both the Australian and US CFs were quoted in Kreisfeld and Harrison (2005) [17]; the US CFs were taken from the paper published by Anderson and colleagues. [18] If the Australian and USA results can be applied to the

situation in New Zealand, then few of the NZIPS priority groups would be affected by the change from ICD-9 to ICD-10. The major exception is falls. The problem in Australia is much more acute than New Zealand for falls as will be illustrated below.

The two similarly named ranges of codes in ICD-9 and ICD-10 for falls are not equivalent. The difference is that the cases captured by category E887 ("Fracture cause unspecified") in ICD-9 are classified to falls in ICD-9 but not in ICD-10. This was the principal reason for the large difference in the number of cases classified to falls in Australia when ICD-9 was used, compared to when ICD-10 was introduced. In contrast to this, the use of E887 codes in New Zealand, during the period ICD-9 was used, was much less than in Australia. This is illustrated in the trends shown in the Cryer 2004 report [2] which shows trends in unintentional falls from 1994, with the case definition including E887 for one trend line, but excluding E887 for another. There is only a small shift in the trend line, and far less than that illustrated using Australian data. [17] In this report, we have addressed this problem by the removal of E887 cases from the definition of a case of Falls, when dealing with ICD-9 coded data.

So, in synopsis, for these charts, the change from ICD-9 to ICD-10 will result in some differences in case ascertainment. In New Zealand, the structural problem that was identified for falls has been corrected in these charts, and so one would not necessarily expect any more marked effect of the change from ICD-9 to ICD-10 for falls compared to any of the other priority areas. Over this transition period, all the charts should be interpreted with a similar level of caution. Because of the likely changes in case ascertainment under ICD-9 and ICD-10, we have only attempted to interpret the charts for the period that ICD-10 coding has been applied.

B7.2 All injury

Since 2000, there has been a suggestion of a slight increase in the annual frequencies of non-fatal injuries (I01), and a suggestion of a slight decline in the rates (I02). The frequencies (I11) and rates (I12) of fatal injuries, for 'all injury', were similar in 2000, 2001 and 2002. Only after data have been added for further years will we be able to comment more confidently on trends.

The change from ICD-9 to ICD-10 (from 1998 to 2000) was accompanied by an increase in serious non-fatal injury frequencies / rates (I01, I02), but little change in fatal injury frequencies / rates (I11, I12). The structural changes from ICD-9 to ICD-10 are discussed in Appendix B7.1.

B7.3 Assault

The trends for the frequencies (A01) and rates (A02) of assaultive serious non-fatal injuries are similar. There is some evidence of an increase in the frequencies and rates from 2000 to 2001-4. These provisional indicators of serious non-fatal assaultive injury suffer from misclassification bias, and this bias may change over time. The identification of assaultive events from hospitalisation data is likely to be seriously influenced by changing social norms. Unlike fatalities, there is not a comprehensive and independent verification process by the police and coroners of the intent of all injuries that require admission to hospital. Consequently, any trends that are observed could be an artifact of reporting behaviour – and so, particular care must be taken with interpretation of the trends for these indicators.

There are relatively small numbers of deaths from assault each year. In order to increase the precision of the indicator values, 3-year moving averages have been used for both the frequencies (A11) and rates (A12) of assault. For this report, only the indicator values (A11, A12) for 2001 are based purely on ICD-10 coded data. Consequently, no comment on trends in these values is appropriate.

B7.4 Work-related injury

Charts for four of the six work-related serious injury indicators, as described in the Cryer 2004 report [2], could not be produced for this chartbook.

- The serious non-fatal injury indicators W01 and W02 – as specified in the Cryer 2004 report - could not be presented since the source data was not available at the time of production. (Source data: SNZ integrated ACC and NZHIS NMDS data). For this chartbook, charts based solely on ACC non-fatal injury data have been presented as a temporary substitute. From 2001, there is a suggestion of a slight increase in the frequecies (W01) and rates (W02) of work-related serious non-fatal injuries using these substitute indicators.

  Threats to the validity of these indicators cannot be discounted. Concerns regarding the use of ACC data alone were descibed in the Cryer 2004 report. [2] These substitute indicators are based on Entitlement Claims that were active for more than one month. In the Cryer 2004 report, evidence was presented that the likelihood that a person makes an Entitlement Claim depends not only on the severity of injury, but also on extraneous factors (eg. personal factors, health service factors, employment status). In these circumstances, indicators based on Entitlement Claims to monitor trends over time would be affected by all these factors and so could lead to misleading results. Although, there is no direct evidence that these same extraneous factors would affect Entitlement Claims active for more than one month, the same concerns exist. We await further work to prove otherwise.

There are other factors that will affect the quality and completeness of ACC data, which have varied over time. From 1996 to 1999, 100 large employers were part of an accredited employers' scheme. These employers collected data on behalf of the ACC. The intention was for these data to be submitted and incorporated into the ACC claims database regularly. ACC have informed us that this did not always happen leading to gaps in the database during this period (Tim Boyd Wilson, Chris Taylor [ACC], personal correspondence). Between July 1999 and April 2000, employers could opt out of the ACC and take up the option of private insurance. This also led to major gaps in the data for those who took up this option.

On 1 July 2000, the ACC Accredited Employers (Partnership) Programme started. This allowed accredited employers to manage their own claims, provide entitlements, and capture data, on behalf of the ACC. There was rapid uptake over the first 12 months; and the current level of uptake was achieved in the first 18 months. There are 178 large accredited employer groups in the Partnership Programme, representing 1,180 separate entities, accounting for over 25% of the fulltime workforce. [19] Accredited employers are required to submit claims data to ACC on a monthly basis. Following checks and revisions, the majority of claims appear to be sent in the same or the next quarter. [19] Completeness of data obtained since the introduction of this programme has been described as excellent; ACC employers have indicated that the data has been complete since 1 July 2000 (Tim Boyd Wilson, Chris Taylor [ACC], personal correspondence).

- The NZHIS Mortality data based work-related fatal injury indicators (W11and W13) cannot be calculated for any of the years in the period 1994-2002, since the source data for the numerators for these indicators do not capture "activity" prior to the fatal injury event for these data. It is the ICD-10 'Activity' field that provides the information to identify cases of work-related injury. 'Activity' coding will be available on the 2003 NZHIS Mortality data and beyond – and so it will be possible to present indicator values for W11 and W13 in subsequent chartbooks.

ACC data-based work-related fatal injury indicators

We have produced the indicators W12 and W14, ie. work-related fatal injury indicators (excluding motor vehicle traffic-related) based on ACC data. These are provisonal indicators. In both of the Work-Related Fatal Injury Studies (WRFIS), which cover the periods 1975-1984 (WRFIS-1) [11] and 1985-1994 (WRFIS-2)[g] [10], it was shown that ACC data only captured a proportion of work-related fatal injuries identified from coroners' reports. Additionally,

[g] WRFIS-1 and WRFS-2 cases were identified by hand searching coroners' reports – and so can be regarded as the 'gold standard' for case identification of non-MVTC work-related fatal injuries.

WRFIS-2 found that ACC counted some deaths as having a work-related cause, which could not be confirmed as work-related in the more definitive WRFIS-2 study investigations. Consequently, there was concern about the accuracy of ACC work-related fatal injury data – and hence the W12 and W14 indicators were designated provisonal.

As part of the current work we investigated 3 case definitions for the use of ACC data for presenting trends in work-related fatal injuries. The WRFIS-1 and WRFIS-2 trends in numbers and rates of work-related fatal injuries were contrasted with ACC-based work-related fatal injury trends based on these three case defintions. This is shown in Figures 1 and 2 below. The three case definitions are referred to as ACC-A, ACC-B and ACC-C in these figures.

ACC-A

For ACC-A, a case of work related fatal injury was selected from the ACC fatalities data using the following procedure:

1. Select work-related cases if ‘work' = 'Y' from those claims compensated from the Employer, Self-employed and Residual ACC accounts.

2. For the remaining records, exclude a record if the ICD-10 code (coded directly, derived from an ICD-9 code, or derived from a Read code) lay outside the range (R96-T78, V01-Y36); include the record (at this stage) if the record includes no ICD-10 code.

3. For the remaining records, amongst those with no ICD-10 code, exclude if 'acc_diagnosis' = 19-28, 31, 40, 61, 90-93 (ie. the case is coded to an explicit occupational disease code).

4. For the remaining records, amongst those with no ICD-10 code, reject a record if the 'read_id_label' includes one of the following words: 'neoplasm', 'anomalies', 'anomaly', 'asbestos', 'asbestosis', 'mesothelioma', 'lymphoma', 'tumour', 'asthma', ‘alveolitis’, ‘carcinoma’, ‘stoma appliances’, ‘sudden cardiac death’, ‘leptospirosis’, ‘personal history of unspecified problems’.

ACC-B:

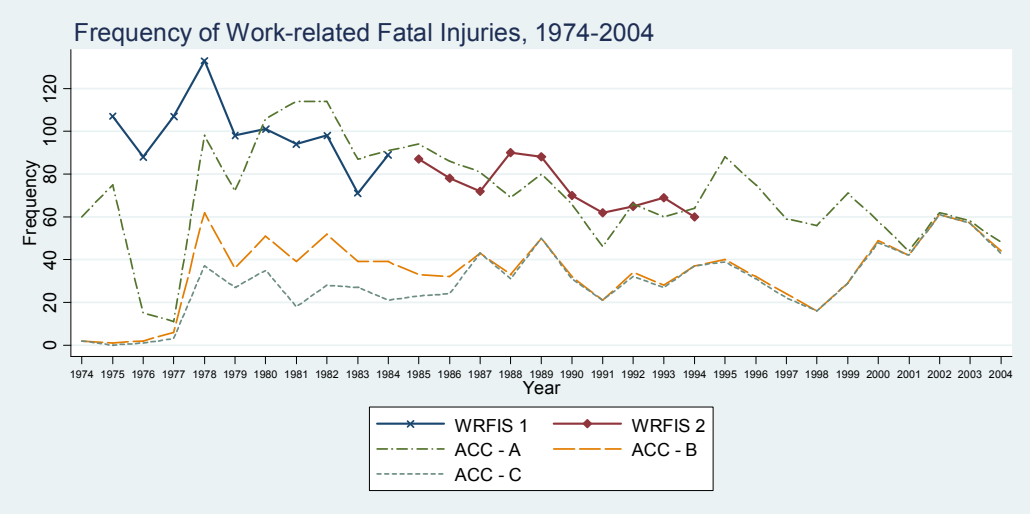
Include the same cases as per ACC-A, but for records with no ICD-10 code, exclude records with either ‘acc_diagnosis’=50 ('missing presumed dead'), 75 ('Fatal') and 99 ('Other').

ACC-C:

Include the same cases as ACC-B, but for records with no ICD-10 code, records with ‘acc_diagnosis’=11 removed. Note: ACC diagnosis code '11' is labeled 'Toxic/adverse effects'. There are very many of these in the ACC file –

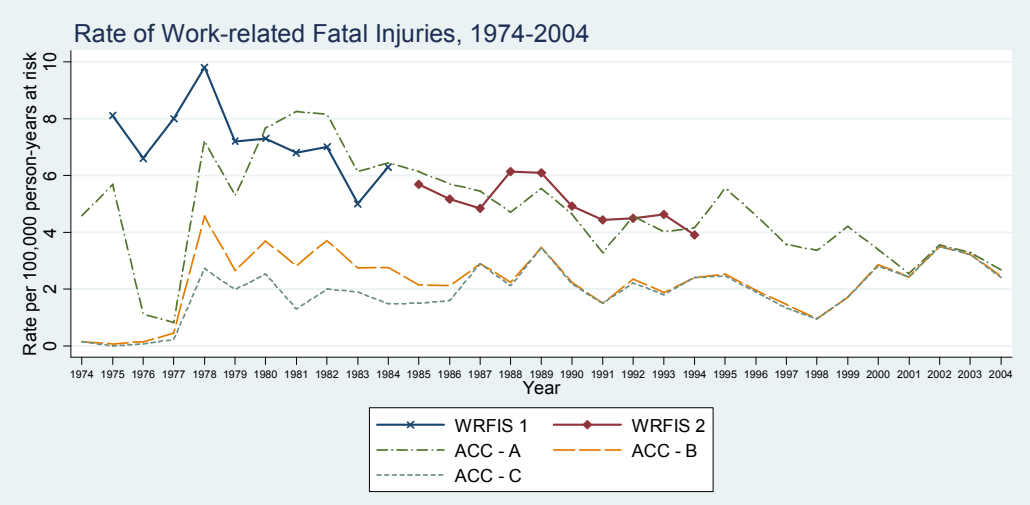
the code was predominantly used, amongst the fatality claims, prior to 1987. There are only 3 with Read codes - and these are cases of asbestosis or mesothelioma. There is a concern, therefore, that many of these diagnosis code '11' records could be disease deaths.

Figure 1



Figures 1 and 2 suggest that from 1974 to 1977, that ACC captured or classified only a minority of cases of work-related fatal injury. For the period 1980 to 1994, ACC-A reflects pretty well the definitive trends in work-related fatal injuries (excluding motor vehicle traffic-related) shown by the trends for WRFIS-1 and WRFIS-2. Consequently, it is the ACC-A definition of a case that has been used to produce indicators W12 and W14 within this Chartbook for the period 1994 to 2004.

Figure 2



Using this case definition, both the frequencies and the rates of work-related fatal injury (W12 and W14) showed a decline over the period 1995 to 2001, with apparent leveling off thereafter.

B7.5 Intentional self-harm.

There is little evidence of a change in the frequencies (S01) or rates (S02) of serious injury resulting from intentional self-harm during the period from 2000 onwards. Like the provisional indicators for assault, the provisional indicators for serious non-fatal injury resulting from intentional self-harm suffer from misclassification bias. A self-harmer may mask the intent of their injury, and a service provider may be reluctant to classify the events as self-harm in the absence of compelling evidence to this effect. The changing attitudes to mental health may influence the recording of such events over time, so there is a threat to the validity of trends in the provisional indicators S01 and S02. Unlike fatalities, there is not a comprehensive and independent verification process by the police and coroners of the intent of all injuries that require admission to hospital. Consequently, any trends that are observed could be an artifact of reporting behaviour. Particular care must be taken with the interpretation of the charts relating to these indicators.

There is no strong evidence of a change in the frequencies (S11) and rates (S12) of fatal injuries resulting from intentional self-harm from 2000. Only after data have been added for further years will we be able to comment more confidently on trends.

B7.6 Falls

As described earlier, there was a significant change in the coding of falls from the ICD-9 coding frame to ICD-10, between 1998 and 2000. Within ICD-9, falls are traditionally defined by the code range E800-E888. One of these, E887, captures "Fracture, cause unspecified". This code was omitted from the relevant code range in ICD-10 (ie. W00-W19). As a consequence, in the falls-related charts presented in this chartbook, for the period coded to ICD-9, the code E887 is not included - in order to maximize comparability.

<u>All ages</u>

The trends suggest a small increase in the frequency of serious non-fatal injuries resulting from falls (F01a) from 2000, and a small reduction in the rates (F02a). The increasing numbers of older people in the New Zealand population over this short period would result in this phenomenon. People aged 75 and over have the highest rates of serious non-fatal injury and death from falls compared with other age groups. The increasing number of these high rate members of the New Zealand population inevitably results in increased numbers of serious injuries from falls over time. On the other hand,

the process of standardisation is designed to reduce the impact of demographic changes on the rates presented – so demographic differences (namely increased numbers of older people) from one time to another will not impact on the standardised rates.

There is no strong evidence of a difference in the frequencies (F11a) and rates (F12a) of fatal injuries resulting from falls, for 2000, 2001 to 2002. Only after data have been added for further years will we be able to comment more confidently on trends.

Aged 0-74 years

For people aged 0-74 years, the recent trends suggest little change in the frequencies (F01b) and rates (F02b) of serious non-fatal injuries resulting from falls. This is in contrast to the trends in serious non-fatal injury rates for all ages (F02a), and for people aged 75 years and over (F02c).

There are relatively small numbers of deaths each year from falls for people aged 0-74. In order to increase the precision of the indicator values, 3 year moving averages have been used for both the frequencies (F11b) and rates (F12b) of fatal injuries resulting from falls. Only the fatal injury indicator values for 2001 are based purely on ICD-10 coded data for people aged 0-74 years. Consequently, no comment on trends for these indicators is appropriate.

Aged 75 and over

Note that the indicators that include people aged 75 and over should be viewed with some caution due to known errors (particularly in mortality collections) when coding primary diagnosis / underlying cause of death for older people who have multiple pathologies. Like the trends in serious non-fatal injuries for falls for all ages, the trends for people aged 75 and over are suggestive of an increase in the frequency (F01c), and a small reduction in the rates (F02c). The increasing numbers of people aged 75 and over in the New Zealand population over this period would result in this phenomenon – for the reasons given in an earlier paragraph.

The differences in the frequencies (F11c) and rates (F12c) of fatal injuries resulting from falls for 2000, 2001 and 2002 could have occurred by chance alone. Only after data have been added for further years will we be able to comment more confidently on trends.

B7.7 Motor vehicle traffic crashes

The trends in the frequencies (M01) of MVTC-related serious non-fatal injuries post-1999 show no obvious upward or downward trends. There appears to be a small reduction in the rates (M02) from 2000 to 2004. There was no discernable change in the frequencies (M11) and little change in the rates (M12) of MVTC-related fatalities between 2000 and 2002. Only after further years data are available will we be able to comment more confidently.

The change from ICD-9 to ICD-10 (from 1998 to 2000) was accompanied by little change in serious non-fatal injury frequencies / rates (M01, M02), but a marked reduction in fatal injury frequencies / rates (M11, M12). This could be due to differing practices in coding ICD-10 between the coders of mortality data and those who code hospitalisations. For example, if the involvement of a motor vehicle is not stated explicitly, under ICD-9 the instruction in the coding manual is for coders to assume these are motor vehicle traffic. With the change to ICD-10, this is now open to interpretation. [18] If coders of the mortality collection were, in general, providing a different interpretation of these unspecified cases compared with coders of hospitalisations, then this could account for dramatic changes during transition from ICD-9 to ICD-10 in one case, but not in the other.

The trends in the rates of fatal MVTCs per person-years (M12), per vehicle kilometer (M13) and per registered vehicle (M14) were very similar over the whole period since 1994. There was little change in the rate per vehicle kilometer between 2000 and 2002 (M13). The same is true for the rates per registered vehicle (M14). Only after data have been added for further years will we be able to comment more confidently on trends.

The trends in the frequencies and rates (per person-year) of MVTC deaths based on NZHIS mortality data (M11, M12) and on Traffic Crash Reports (TCRs) (M15, M16) were similar for the years common to both. The provisional indicators based on TCRs provide a more up-to-date time series than the NZIPS indicators based on NZHIS Mortality data. These provisional indicators suggest that there was a decline in frequencies and rates of MVTC fatalities until 2002, but that most recently there has been little decline. We need to wait until we have NZHIS Mortality data-based trends for the same period for confirmation of this.

The trends in the rates per vehicle kilometer (M17) and per registered vehicle (M18) of MVTC deaths based on TCRs were similar to each other. They were also similar to the equivalent trends in rates of MVTC deaths based on NZHIS mortality data (M13 and M14) for the years common to M13, M14, M17 and M18. The trends for M17 and M18 suggest that the decline in rates of fatalities may not be as strong for the most recent years. We need to wait until we have NZHIS Mortality data-based trends for the same period for confirmation of this.

B7.8 Drowning

The frequencies (D11) and rates (D12) of drowning are not suggestive of an upward or downward trend during the period 2000 to 2002. Only after data have been added for further years will we be able to comment more confidently on trends.

The trend in the frequencies (D13) and rates (D14) of people drowning year on year, identified by Water Safety New Zealand, suggest a decline. DrownBase

data includes all persons drowned irrespective of the intent (i.e. whether it was unintentional, suicide, or homicide). This is one reason why the frequencies and rates of drowning, when using DrownBase as the source, are greater than those identified from the NZHIS Mortality Collection, where the case definition is restricted to unintentional drowning. We need to wait until we have NZHIS Mortality data-based trends up to 2004 for confirmation of these trends.

Appendix C: Indicator specifications

ID I01

Name ICISS-based All Serious Non-Fatal Injury Frequency

Concept of Interest Societal burden of serious non-fatal injury.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Injury hospitalisations in a calendar year who did not die in hospital with an ICISS score of 0.941 or less.

Details Hospitalisations have been operationally defined as all publicly funded discharges from hospitals in the relevant year. Injury hospitalisations are those hospitalisations with a principal diagnosis in the range S00-T78 and a first external cause code in the range V01-Y36, where diagnoses and external cause code are coded using the ICD-10-AM classification [1]. Readmissions for subsequent treatment and deaths in hospital have been excluded using the methods described in Langley et al. [7].

ICISS scores have been calculated using the methods described in [20], [21].

In order to compare to earlier years the definition of an injury hospitalisation has been translated into equivalent ICD-9-CM-A codes [22]. These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E800-E869, E880-E928 or E950-E999. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Source NZHIS NMDS [25]

Denominator N/A

Calculation N/A

ID I02

Name ICISS-based All Serious Non-Fatal Injury Rate

Concept of Interest Individuals' average annual risk of serious non-fatal injury.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Injury hospitalisations in a calendar year who didn't die in hospital with an ICISS score of 0.941 or less.

Details Hospitalisations have been operationally defined as all discharges from public hospitals in the relevant year. Injury hospitalisations are those hospitalisations with a principal diagnosis in the range S00-T78 and a first external cause code in the range V01-Y36, where diagnoses and external cause codes are coded using the ICD-10-AM classification. [1] Readmissions for subsequent treatment and deaths in hospital have been excluded using the methods described in Langley et al. [7]

In order to compare to earlier years the definition of an injury hospitalisation has been translated into equivalent ICD-9-CM-A codes [22]. These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E800-E869, E880-E928 or E950-E999. ICISS scores have been calculated using the methods described elsewhere. [20], [21] An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Source NZHIS NMDS [25]

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey adjusted for the estimated number of New Zealand residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-14, 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical Research, 2nd ed., pp 399-403.

ID I11

Name All Fatal Injury Frequency

Concept of Interest Societal burden of fatal injury.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Injury fatalities registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification [1].

In order to compare with earlier years the definition of an injury fatality has been translated into equivalent ICD-9-CM-A codes. [22] These are an underlying cause of death e-code in the range E800-E869, E880-E928 or E950-E999.

Source NZHIS Mortality Collection [23]

Denominator N/A

Calculation N/A

ID I12

Name All Fatal Injury Rate

Concept of Interest Individuals' average annual risk of fatal injury.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Injury fatalities registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification [1].

In order to compare to earlier years the definition of an injury fatality has been translated into equivalent ICD-9-CM-A codes. [22] These are an underlying cause of death e-code in the range E800-E869, E880-E928 or E950-E999.

Source NZHIS Mortality Collection [23]

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey adjusted for the estimated number of New Zealand residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-14, 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403.

ID A01

Name Provisional ICISS-based Assault Serious Non-Fatal Injury Frequency

Concept of Interest Societal burden of serious non-fatal injury from assault.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Assault hospitalisations in a calendar year who didn't die in hospital with an ICISS score of 0.941 or less.

Details Hospitalisations have been operationally defined as all discharges from public hospitals in the relevant year. Injury hospitalisations are those hospitalisations with a principal diagnosis in the range S00-T78 and a first external cause code in the range V01-Y36, where diagnoses and e-codes are coded using the ICD-10-AM classification.[1] Assault hospitalisations are injury hospitalisations with a first external cause code in the range X85-Y09. Readmissions for subsequent treatment and deaths in hospital have been excluded using the methods described in Langley et al. [7]

In order to compare to earlier years the definition of an assault hospitalisation has been translated into equivalent ICD-9-CM-A codes.[22] These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E960-E969. ICISS scores have been calculated using the methods described elsewhere. [20], [21] An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Source NZHIS NMDS [25]

Denominator N/A

Calculation N/A

ID A02

Name Provisional ICISS-based Assault Serious Non-Fatal Injury Rate

Concept of Interest Individuals' average annual risk of serious non-fatal injury from assault.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Assault hospitalisations in a calendar year who didn't die in hospital with an ICISS score of 0.941 or less.

Details Hospitalisations have been operationally defined as all discharges from public hospitals in the relevant year. Injury hospitalisations are those hospitalisations with a principal diagnosis in the range S00-T78 and a first e-code in the range V01-Y36, where diagnoses and external cause codes are coded using the ICD-10-AM classification.[1] Assault hospitalisations are injury hospitalisations with a first external cause code in the range X85-Y09. Readmissions for subsequent treatment and deaths in hospital have been excluded using the methods described in Langley et al.[7]

In order to compare to earlier years the definition of an assault hospitalisation has been translated into equivalent ICD-9-CM-A codes.[1] These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E960-E969. ICISS scores have been calculated using the methods described elsewhere. [20], [21]. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Source NZHIS NMDS [25]

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics NZ. They are based on the most recent NZ Census and post-enumeration survey adjusted for the estimated number of NZ residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-14, 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated NZ population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403.

ID A11

Name Assault Fatal Injury Frequency

Concept of Interest Societal burden of fatal injury from assault.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Assault fatalities registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification.[1] Assault fatalities are injury fatalities with a underlying cause of death e-code in the range X85-Y09.

In order to compare to earlier years the definition of an assault fatality has been translated into equivalent ICD-9-CM-A codes. [22] These are an underlying cause of death e-code in the range E960-E969.

Source NZHIS Mortality Collection [23]

Denominator N/A

Calculation Because the annual number of assault fatalities was less than 100, three-year moving averages are presented.

ID A12

Name Assault Fatal Injury Rate

Concept of Interest Individuals' average annual risk of fatal injury from assault.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Assault fatalities registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification. [1] Assault fatalities are injury fatalities with a underlying cause of death e-code in the range X85-Y09.

In order to compare to earlier years the definition of an assault fatality has been translated into equivalent ICD-9-CM-A codes. [22] These are an underlying cause of death e-code in the range E960-E969.

Source NZHIS Mortality Collection [23]

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey adjusted for the estimated number of New Zealand residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-14, 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403. Three-year moving averages are presented, in order to increase the precision of the indicator values.

ID W01

Name Work-Related Serious Non-Fatal Injury Frequency (Temporary substitute – ACC based)

Concept of Interest Societal burden of serious non-fatal work-related injury.

Scope

Area	All Injury
Gender	Both genders
Age	15 years and older

Source Organisation ACC.

Numerator

Description Work-related ACC Entitlement Claims for injury occurring in a calendar year; claims that are ongoing for more than a month.

Details ACC Entitlement Claims data which was active for more than one month was selected. These were matched with the ACC file of claims for "gradual process", and cases of "gradual process" excluded. From the remaining file of data, a case of work related injury was selected from the ACC Entitlement Claims data using the following procedure:

- Select work-related cases if 'work' = 'Y' from those claims compensated from the Employer, Self-employed and Residual ACC accounts.
- For the remaining records, exclude a record if the ICD-10 code (coded directly, derived from an ICD-9 code, or derived from a Read code) lay outside the range (R96-T78, V01-Y36); include the record (at this stage) if the record includes no ICD-10 code.
- For the remaining records, amongst those with no ICD-10 code, exclude if 'acc_diagnosis' = 19-28, 31, 40, 61, 90-93 (ie. the case is coded to an explicit occupational disease code).
- For the remaining records, amongst those with no ICD-10 code, reject a record if the 'read_id_label' includes one of the following words: 'neoplasm', 'anomalies', 'anomaly', 'asbestos', 'asbestosis', 'mesothelioma', 'lymphoma', 'tumour', 'asthma', 'alveolitis', 'carcinoma', 'stoma appliances', 'sudden cardiac death', 'leptospirosis', 'personal history of unspecified problems'..

Source ACC http//acc.co.nz/injury-prevention/acc-injury-statistics

Denominator N/A

Calculation N/A

ID W02

Name Work-Related Serious Non-Fatal Injury Rate (Temporary substitute – ACC based)

Concept of Interest Individuals' average annual risk of serious non-fatal work-related injury.

Scope

Area	All Injury
Gender	Both genders
Age	15 years and older

Source Organisation ACC.

Numerator

Description Work-related ACC Entitlement Claims for injury occurring in a calendar year; claims that are ongoing for more than a month.

Details ACC Entitlement Claims data which was active for more than one month was selected. These were matched with the ACC file of claims for "gradual process", and cases of "gradual process" excluded. From the remaining file of data, a case of work related injury was selected from the ACC Entitlement Claims data using the following procedure:

- Select work-related cases if 'work' = 'Y' from those claims compensated from the Employer, Self-employed and Residual ACC accounts.
- For the remaining records, exclude a record if the ICD-10 code (coded directly, derived from an ICD-9 code, or derived from a Read code) lay outside the range (R96-T78, V01-Y36); include the record (at this stage) if the record includes no ICD-10 code.
- For the remaining records, amongst those with no ICD-10 code, exclude if 'acc_diagnosis' = 19-28, 31, 40, 61, 90-93 (ie. the case is coded to an explicit occupational disease code).
- For the remaining records, amongst those with no ICD-10 code, reject a record if the 'read_id_label' includes one of the following words: 'neoplasm', 'anomalies', 'anomaly', 'asbestos', 'asbestosis', 'mesothelioma', 'lymphoma', 'tumour', 'asthma', 'alveolitis', 'carcinoma', 'stoma appliances', 'sudden cardiac death', 'leptospirosis', 'personal history of unspecified problems'.

Source NZHIS NMDS [25]

Denominator

Description Estimated total NZ working population as at 30 June of the relevant year.

Details The estimates have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey. (ref http://xtabs.stats.govt.nz/eng/TableViewer/Wdsview/dispviewp.asp?ReportId=206

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical Research, 2nd ed., pp 399-403.

ID W11

Name Provisional Work-Related Fatal Injury Frequency

Concept of Interest Societal burden of work-related fatal injury.

Scope

Area	All Injury
Gender	Both genders
Age	15 years and older

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Work-related injury fatalities registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification. Work-related fatalities are those with an ICD-10-AM activity code of 2. [1]

Source NZHIS Mortality Collection [23]

Denominator N/A

Calculation N/A

ID W12

Name Provisional Work-Related Fatal Injury Frequency - ACC

Concept of Interest Societal burden of work-related fatal injury.

Scope

Area	All Injury
Gender	Both genders
Age	15 years and older

Source Organisation ACC

Numerator

Description New work-related injury fatalities ACC claims registered in a calendar year.

Details A case of work related injury was selected from the ACC fatalities data using the following procedure:

- Select work-related cases if ‘work' = 'Y' from those claims compensated from the Employer, Self-employed and Residual ACC accounts.
- For the remaining records, exclude a record if the ICD-10 code (coded directly, derived from an ICD-9 code, or derived from a Read code) lay outside the range (R96-T78, V01-Y36); include the record (at this stage) if the record includes no ICD-10 code.
- For the remaining records, amongst those with no ICD-10 code, exclude if 'acc_diagnosis' = 19-28, 31, 40, 61, 90-93 (ie. the case is coded to an explicit occupational disease code).
- For the remaining records, amongst those with no ICD-10 code, reject a record if the 'read_id_label' includes one of the following words: 'neoplasm', 'anomalies', 'anomaly', 'asbestos', 'asbestosis', 'mesothelioma', 'lymphoma', 'tumour', 'asthma', ‘alveolitis’, ‘carcinoma’, ‘stoma appliances’, ‘sudden cardiac death’, ‘leptospirosis’, ‘personal history of unspecified problems’.

Source ACC (http://acc.co.nz/injury-prevention/acc-injury -statistics accessed August 2005)

Denominator N/A

Calculation N/A

ID W13

Name Provisional Work-Related Fatal Injury Rate

Concept of Interest Individuals' average annual risk of work-related fatal injury.

Scope

Area	All Injury
Gender	Both genders
Age	15 years and older

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Work-related injury fatalities registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification. Work-related fatalities are those with an ICD-10-AM activity code of 2. [1]

Source NZHIS Mortality Collection [23]

Denominator

Description Estimated total New Zealand working population as at 30 June of the relevant year**.**

Details The estimates have been published by Statistics New Zealand. They are based on the most recent NZ Census and post-enumeration survey. (ref http://xtabs.stats.govt.nz/eng/TableViewer/Wdsview/dispviewp.asp?ReportId=206

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical Research, 2nd ed., pp 399-403.

ID W14

Name Provisional Work-Related Fatal Injury Rate - ACC

Concept of Interest Individuals' average annual risk of work-related fatal injury.

Scope

Area	All Injury
Gender	Both genders
Age	15 years and older

Source Organisation ACC

Numerator

Description New work-related injury fatalities ACC claims registered in a calendar year.

Details A case of work related injury was selected from the ACC fatalities data using the following procedure:

- Select work-related cases if 'work' = 'Y' from those claims compensated from the Employer, Self-employed and Residual ACC accounts.
- For the remaining records, exclude a record if the ICD-10 code (coded directly, derived from an ICD-9 code, or derived from a Read code) lay outside the range (R96-T78, V01-Y36); include the record (at this stage) if the record includes no ICD-10 code.
- For the remaining records, amongst those with no ICD-10 code, exclude if 'acc_diagnosis' = 19-28, 31, 40, 61, 90-93 (ie. the case is coded to an explicit occupational disease code).
- For the remaining records, amongst those with no ICD-10 code, reject a record if the 'read_id_label' includes one of the following words: 'neoplasm', 'anomalies', 'anomaly', 'asbestos', 'asbestosis', 'mesothelioma', 'lymphoma', 'tumour', 'asthma', 'alveolitis', 'carcinoma', 'stoma appliances', 'sudden cardiac death', 'leptospirosis', 'personal history of unspecified problems'.

Source ACC (http://acc.co.nz/injury-prevention/acc-injury -statistics accessed August 2005)

Denominator

Description Estimated total New Zealand working population as at 30 June of the relevant year.

Details The estimates have been published by Statistics New Zealand. They are based on the most recent NZ Census and post-enumeration survey. (ref http://xtabs.stats.govt.nz/eng/TableViewer/Wdsview/dispviewp.asp?ReportId=206 (Accessed August 2004)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical Research, 2nd ed., pp 399-403.

ID S01

Name Provisional ICISS-based Self-Harm Serious Non-Fatal Injury Frequency

Concept of Interest Societal burden of serious non-fatal injury from self-harm.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Self-harm hospitalisations in a calendar year who didn't die in hospital with an ICISS score of 0.941 or less.

Details Hospitalisations have been operationally defined as all discharges from public hospitals in the relevant year. Injury hospitalisations are those hospitalisations with a principal diagnosis in the range S00-T78 and a first external cause code in the range V01-Y36, where diagnoses and e-codes are coded using the ICD-10-AM classification. [1] Self-harm hospitalisations are injury hospitalisations with a first external cause code in the range X60-X84. Readmissions for subsequent treatment and deaths in hospital have been excluded using the methods described in Langley et al. [7]

In order to compare to earlier years the definition of an self-harm hospitalisation has been translated into equivalent ICD-9-CM-A codes [22]. These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E950-E959. ICISS scores have been calculated using the methods described elsewhere. [20], [21] An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Source NZHIS NMDS [25]

Denominator N/A

Calculation N/A

ID S02

Name Provisional ICISS-based Self-Harm Serious Non Fatal Injury Rate

Concept of Interest Individuals' average annual risk of serious non-fatal injury from self-harm.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Self-harm hospitalisations in a calendar year who didn't die in hospital with an ICISS score of 0.941 or less.

Details Hospitalisations have been operationally defined as all discharges from public hospitals in the relevant year. Injury hospitalisations are those hospitalisations with a principal diagnosis in the range S00-T78 and a first external cause code in the range V01-Y36, where diagnoses and external cause codes are coded using the ICD-10-AM classification. [1] Self-harm hospitalisations are injury hospitalisations with a first e-code in the range X60-X84. Readmissions for subsequent treatment and deaths in hospital have been excluded using the methods described in Langley et al. [7]

In order to compare to earlier years the definition of an self-harm hospitalisation has been translated into equivalent ICD-9-CM-A codes.[22] These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E950-E959. ICISS scores have been calculated using the methods described elsewhere. [20], [21] An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Source NZHIS NMDS [25]

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent NZ Census and post-enumeration survey adjusted for the estimated number of NZ residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-14, 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403.

ID S11

Name Self-Harm Fatal Injury Frequency

Concept of Interest Societal burden of fatal injury from self-harm.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Self-harm fatalities registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification. [1] Self-harm fatalities are injury fatalities with an underlying cause of death e-code in the range X60-X84.

In order to compare to earlier years the definition of a self-harm fatality has been translated into equivalent ICD-9-CM-A codes. [22] These are an underlying cause of death e-code in the range E950-E959.

Source NZHIS Mortality Collection [23]

Denominator N/A

Calculation N/A

ID S12

Name Self-Harm Fatal Injury Rate

Concept of Interest Individuals' average annual risk of fatal injury from self-harm.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Self-harm fatalities registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification [1] Self-harm fatalities are injury fatalities with an underlying cause of death external cause code in the range X60-X84.

In order to compare to earlier years the definition of a self-harm fatality has been translated into equivalent ICD-9-CM-A codes [22]. These are an underlying cause of death e-code in the range E950-E959.

Source NZHIS Mortality Collection [23]

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey adjusted for the estimated number of New Zealand residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-14, 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403.

ID F01a

Name ICISS-based Falls All ages Serious Non-Fatal Injury Frequency

Concept of Interest Societal burden of serious non-fatal injury from falls.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Falls hospitalisations in a calendar year who didn't die in hospital with an ICISS score of 0.941 or less.

Details Hospitalisations have been operationally defined as all discharges from public hospitals in the relevant year. Injury hospitalisations are those hospitalisations with a principal diagnosis in the range S00-T78 and a first external cause code in the range V01-Y36, where diagnoses and external cause codes are coded using the ICD-10-AM classification.[1] Falls hospitalisations are injury hospitalisations with a first external cause code in the range W00-W19. Readmissions for subsequent treatment and deaths in hospital have been excluded using the methods described in Langley et al. [7]

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes. [22] These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E880-E886 or E888. ICISS scores have been calculated using the methods described elsewhere. [20], [21] An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Source NZHIS NMDS [25]

Denominator N/A

Calculation N/A

ID F02a

Name ICISS-based Falls All ages Serious Non Fatal Injury Rate

Concept of Interest Individuals' average annual risk of serious non-fatal injury from falls.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Falls hospitalisations in a calendar year who didn't die in hospital with an ICISS score of 0.941 or less.

Details Hospitalisations have been operationally defined as all discharges from public hospitals in the relevant year. Injury hospitalisations are those hospitalisations with a principal diagnosis in the range S00-T78 and a first external cause code in the range V01-Y36, where diagnoses and external cause codes are coded using the ICD-10-AM classification. [1] Falls hospitalisations are injury hospitalisations with a first e-code in the range W00-W19. Readmissions for subsequent treatment and deaths in hospital have been excluded using the methods described in Langley et al. [7]

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes [22] These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E880-E886 or E888. ICISS scores have been calculated using the methods described elsewhere.[20][21] An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Source NZHIS NMDS [25]

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey adjusted for the estimated number of New Zealand residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-14, 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403.

ID F11a

Name Falls All ages Fatal Injury Frequency

Concept of Interest Societal burden of fatal injury from falls.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Fatalities falls registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification.[1] Falls fatalities are injury fatalities with an underlying cause of death external cause code in the range W00-W19.

In order to compare to earlier years the definition of a fatal fall has been translated into equivalent ICD-9-CM-A codes. [22] These are an underlying cause of death e-code in the range E880-E886 or E888.

Source NZHIS Mortality Collection [23]

Denominator N/A

Calculation N/A

ID F12a

Name Falls All ages Fatal Injury Rate

Concept of Interest Individuals' average annual risk of fatal injury from falls.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Fatal falls registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification.[1] Falls fatalities are injury fatalities with an underlying cause of death external cause code in the range W00-W19.

In order to compare to earlier years the definition of a fatal fall has been translated into equivalent ICD-9-CM-A codes. [22] These are an underlying cause of death e-code in the range E880-E886 or E888.

Source NZHIS Mortality Collection [23]

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey adjusted for the estimated number of New Zealand residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation

Age standardised rate. Age standardisation was via the direct method with age groups of 0-14, 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403.

ID F01b

Name ICISS-based Falls 0-74 years Serious Non-Fatal Injury Frequency

Concept of Interest Societal burden of serious non-fatal injury from falls.

Scope

Area	All Injury
Gender	Both genders
Age	0-74 years

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Falls hospitalisations in a calendar year who didn't die in hospital with an ICISS score of 0.941 or less.

Details Hospitalisations have been operationally defined as all discharges from public hospitals in the relevant year. Injury hospitalisations are those hospitalisations with a principal diagnosis in the range S00-T78 and a first external cause code in the range V01-Y36, where diagnoses and external cause codes are coded using the ICD-10-AM classification.[1] Falls hospitalisations are injury hospitalisations with a first external cause code in the range W00-W19. Readmissions for subsequent treatment and deaths in hospital have been excluded using the methods described in Langley et al. [24]

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes. [22] These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E880-E886 or E888. ICISS scores have been calculated using the methods described elsewhere. [20], [21] An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Source NZHIS NMDS [25]

Denominator N/A

Calculation N/A

ID F02b

Name ICISS-based Falls 0-74 years Serious Non Fatal Injury Rate

Concept of Interest Individuals' average annual risk of serious non-fatal injury from falls.

Scope

Area	All Injury
Gender	Both genders
Age	0-74 years

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Falls hospitalisations in a calendar year who didn't die in hospital with an ICISS score of 0.941 or less.

Details Hospitalisations have been operationally defined as all discharges from public hospitals in the relevant year. Injury hospitalisations are those hospitalisations with a principal diagnosis in the range S00-T78 and a first external cause code in the range V01-Y36, where diagnoses and external cause codes are coded using the ICD-10-AM classification. [1] Falls hospitalisations are injury hospitalisations with a first e-code in the range W00-W19. Readmissions for subsequent treatment and deaths in hospital have been excluded using the methods described in Langley et al.[7]

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes. [22] These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E880-E886 or E888. ICISS scores have been calculated using the methods described elsewhere.[20], [21] An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Source NZHIS NMDS [25]

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey adjusted for the estimated number of New Zealand residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation

Age standardised rate. Age standardisation was via the direct method with age groups of 0-14, 15-24, 25-64, 65-74. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403.

ID F11b

Name Falls 0-74 years Fatal Injury Frequency

Concept of Interest Societal burden of fatal injury from falls.

Scope

Area	All Injury
Gender	Both genders
Age	0-74 years

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Fatalities falls registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification [1]. Falls fatalities are injury fatalities with an underlying cause of death external cause code in the range W00-W19.

In order to compare to earlier years the definition of a fatal fall has been translated into equivalent ICD-9-CM-A codes. [22] These are an underlying cause of death e-code in the range E880-E886 or E888.

Source NZHIS Mortality Collection [23]

Denominator N/A

Calculation N/A

ID F12b

Name Falls 0-74 years Fatal Injury Rate

Concept of Interest Individuals' average annual risk of fatal injury from falls.

Scope

Area	All Injury
Gender	Both genders
Age	0-74 years

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Fatal falls registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification. [1] Falls fatalities are injury fatalities with an underlying cause of death external cause code in the range W00-W19.

In order to compare to earlier years the definition of a fatal fall has been translated into equivalent ICD-9-CM-A codes. [22] These are an underlying cause of death e-code in the range E880-E886 or E888.

Source NZHIS Mortality Collection [23]

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey adjusted for the estimated number of New Zealand residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-14, 15-24, 25-64, 65-74. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403.

ID F01c

Name ICISS-based Falls 75 years and older Serious Non-Fatal Injury Frequency

Concept of Interest Societal burden of serious non-fatal injury from falls.

Scope

Area	All Injury
Gender	Both genders
Age	75 and older

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Falls hospitalisations in a calendar year who didn't die in hospital with an ICISS score of 0.941 or less.

Details Hospitalisations have been operationally defined as all discharges from public hospitals in the relevant year. Injury hospitalisations are those hospitalisations with a principal diagnosis in the range S00-T78 and a first external cause code in the range V01-Y36, where diagnoses and external cause codes are coded using the ICD-10-AM classification [1]. Falls hospitalisations are injury hospitalisations with a first external cause code in the range W00-W19. Readmissions for subsequent treatment and deaths in hospital have been excluded using the methods described in Langley et al [7].

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes. [22] These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E880-E886 or E 888. ICISS scores have been calculated using the methods described elsewhere. [20], [21] An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Source NZHIS NMDS [25]

Denominator N/A

Calculation N/A

ID F02c

Name ICISS-based Falls 75 years and older Serious Non Fatal Injury Rate

Concept of Interest Individuals' average annual risk of serious non-fatal injury from falls.

Scope

Area	All Injury
Gender	Both genders
Age	75 years and older

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Falls hospitalisations in a calendar year who didn't die in hospital with an ICISS score of 0.941 or less.

Details Hospitalisations have been operationally defined as all discharges from public hospitals in the relevant year. Injury hospitalisations are those hospitalisations with a principal diagnosis in the range S00-T78 and a first external cause code in the range V01-Y36, where diagnoses and external cause codes are coded using the ICD-10-AM classification [1]. Falls hospitalisations are injury hospitalisations with a first e-code in the range W00-W19. Readmissions for subsequent treatment and deaths in hospital have been excluded using the methods described in Langley et al. [24]

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes [22] These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E880-E886 or E888. ICISS scores have been calculated using the methods described elsewhere. [20], [21] An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Source NZHIS NMDS [25]

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey adjusted for the estimated number of New Zealand residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 75-79, 80-84, 85 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403.

ID F11c

Name Falls 75 years and over Fatal Injury Frequency

Concept of Interest Societal burden of fatal injury from falls.

Scope

Area	All Injury
Gender	Both genders
Age	75 years and over

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Fatalities falls registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification [1]. Falls fatalities are injury fatalities with an underlying cause of death external cause code in the range W00-W19.

In order to compare to earlier years the definition of a fatal fall has been translated into equivalent ICD-9-CM-A codes. [22] These are an underlying cause of death e-code in the range E880-E886 or E888.

Source NZHIS Mortality Collection [23]

Denominator N/A

Calculation N/A

ID F12c

Name Falls 75 years and over Fatal Injury Rate

Concept of Interest Individuals' average annual risk of fatal injury from falls.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Fatal falls registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification [1]. Falls fatalities are injury fatalities with an underlying cause of death external cause code in the range W00-W19.

In order to compare to earlier years the definition of a fatal fall has been translated into equivalent ICD-9-CM-A codes. [22] These are an underlying cause of death e-code in the range E880-E886 or E888.

Source NZHIS Mortality Collection [23]

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey adjusted for the estimated number of New Zealand residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 75-79, 80-84 and 85 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403.

ID M01

Name ICISS-based MVTC Serious Non-Fatal Injury Frequency

Concept of Interest Societal burden of serious non-fatal injury from MVTCs.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description MVTC hospitalisations in a calendar year who didn't die in hospital with an ICISS score of 0.941 or less.

Details Hospitalisations have been operationally defined as all discharges from public hospitals in the relevant year. Injury hospitalisations are those hospitalisations with a principal diagnosis in the range S00-T78 and a first external cause code in the range V01-Y36, where diagnoses and external cause codes are coded using the ICD-10-AM classification [1]. MVTC hospitalisations are injury hospitalisations with a first e-code in the range V02-V04 (with a 4th digit in the range .1-.9), V09 (.2), V12-V14 (.3-.9), V19 (.4-.6), V20-V28 (.3-.9), V29-V79 (.4-.9), V80 (.3-.5), V81-V82 (.1), V83-V86 (.0-.3), V87 (.0-.8) or V89 (.2). Readmissions for subsequent treatment and deaths in hospital have been excluded using the methods described in Langley et al.[7].

In order to compare to earlier years the definition of an MVTC hospitalisation has been translated into equivalent ICD-9-CM-A codes. [22] These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E810-E819. ICISS scores have been calculated using the methods described elsewhere. [20], [21] An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Source NZHIS NMDS [25]

Denominator N/A

Calculation N/A

ID M02

Name ICISS-based MVTC Serious Non-Fatal Injury Rate

Concept of Interest Individuals' average annual risk of serious non-fatal injury from MVTCs.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description MVTC hospitalisations in a calendar year who didn't die in hospital with an ICISS score of 0.941 or less.

Details Hospitalisations have been operationally defined as all discharges from public hospitals in the relevant year. Injury hospitalisations are those hospitalisations with a principal diagnosis in the range S00-T78 and a first external cause code in the range V01-Y36, where diagnoses and external cause codes are coded using the ICD-10-AM classification [1]. MVTC hospitalisations are injury hospitalisations with a first external cause code in the range V02-V04 (with a 4th digit in the range .1-.9), V09 (.2), V12-V14 (.3-.9), V19 (.4-.6), V20-V28 (.3-.9), V29-V79 (.4-.9), V80 (.3-.5), V81-V82 (.1), V83-V86 (.0-.3), V87 (.0-.8) or V89 (.2). Readmissions for subsequent treatment and deaths in hospital have been excluded using the methods described in Langley et al. [24]

In order to compare to earlier years the definition of an MVTC hospitalisation has been translated into equivalent ICD-9-CM-A codes. [22] These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E810-E819. ICISS scores have been calculated using the methods described elsewhere. [20], [21] An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Source NZHIS NMDS [25]

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey adjusted for the estimated number of New Zealand residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-14, 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403.

ID M11

Name MVTC Fatal Injury Frequency

Concept of Interest Societal burden of fatal injury from MVTCs.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description MVTC fatalities registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification [1]. MVTC fatalities are injury fatalities with an underlying cause of death external cause code in the range V02-V04 (with a 4th digit in the range .1-.9), V09 (.2), V12-V14 (.3-.9), V19 (.4-.6), V20-V28 (.3-.9), V29-V79 (.4-.9), V80 (.3-.5), V81-V82 (.1), V83-V86 (.0-.3), V87 (.0-.8) or V89 (.2).

In order to compare to earlier years the definition of a MVTC fatality has been translated into equivalent ICD-9-CM-A codes. [22] These are an underlying cause of death e-code in the range E810-E819.

Source NZHIS Mortality Collection [23]

Denominator N/A

Calculation N/A

ID M12

Name MVTC Fatal Injury Rate

Concept of Interest Individuals' average annual risk of fatal injury from MVTCs.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description MVTC fatalities registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification [1]. MVTC fatalities are injury fatalities with an underlying cause of death external cause code in the range V02-V04 (with a 4th digit in the range .1-.9), V09 (.2), V12-V14 (.3-.9), V19 (.4-.6), V20-V28 (.3-.9), V29-V79 (.4-.9), V80 (.3-.5), V81-V82 (.1), V83-V86 (.0-.3), V87 (.0-.8) or V89 (.2)

In order to compare to earlier years the definition of a MVTC fatality has been translated into equivalent ICD-9-CM-A codes [22]. These are an underlying cause of death e-code in the range E810-E819.

Source NZHIS Mortality Collection [23]

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey adjusted for the estimated number of New Zealand residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-14, 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403.

ID M13

Name MVTC Fatal Injury Rate Per Vehicle Kilometre

Concept of Interest Individuals' average annual risk of fatal injury from MVTCs adjusting for exposure.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description MVTC fatalities registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification [1]. MVTC fatalities are injury fatalities with an underlying cause of death external cause code in the range V02-V04 (with a 4th digit in the range .1-.9), V09 (.2), V12-V14 (.3-.9), V19 (.4-.6), V20-V28 (.3-.9), V29-V79 (.4-.9), V80 (.3-.5), V81-V82 (.1), V83-V86 (.0-.3), V87 (.0-.8) or V89 (.2).

In order to compare to earlier years the definition of a MVTC fatality has been translated into equivalent ICD-9-CM-A codes [22]. These are an underlying cause of death e-code in the range E810-E819.

Source NZHIS Mortality Collection [23]

Denominator

Description Estimated total kilometres travelled by motor vehicles in New Zealand in the relevant year.

Details From 2000, estimates of Vehicle Kilometres Travelled (VKT) are based on traffic count surveys conducted on both state highways and local roads. Prior to 2000 the estimates of the number of VKT are based on Transit's state highway traffic count index. No surveys were conducted in 2002 and 2004.

Source LTNZ

Calculation As no Traffic Count surveys were conducted in 2002 or 2004, estimates of Vehicle Kilometres Travelled (VKT) for these years were obtained by regression.

ID M14

Name MVTC Fatal Injury Rate Per Vehicle

Concept of Interest Drivers' average annual risk of fatal injury from MVTCs.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description MVTC fatalities registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification [1]. MVTC fatalities are injury fatalities with an underlying cause of death external cause code in the range V02-V04 (with a 4th digit in the range .1-.9), V09 (.2), V12-V14 (.3-.9), V19 (.4-.6), V20-V28 (.3-.9), V29-V79 (.4-.9), V80 (.3-.5), V81-V82 (.1), V83-V86 (.0-.3), V87 (.0-.8) or V89 (.2)

In order to compare to earlier years the definition of a MVTC fatality has been translated into equivalent ICD-9-CM-A codes. [22] These are an underlying cause of death e-code in the range E810-E819.

Source NZHIS Mortality Collection [23]

Denominator

Description Estimated total motor vehicles registered in New Zealand as at 30 June of the relevant year.

Details Vehicle numbers include registered Cars, Vans, Trucks, Buses, Motor Caravans, Motor Cycles and Mopeds, but excludes those with an exempt or restoration licence.

Source Motor vehicle register, LTNZ

Calculation LTNZ provide the total number of vehicles registered as at 31 December. Annual estimates of the total motor vehicles registered as at 30 June were obtained by the average of the total motor vehicles registered in the relevant year and the previous year.

ID M15

Name Provisional MVTC Fatal Injury Frequency

Concept of Interest Societal burden of fatal injury from MVTCs.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation LTNZ

Numerator

Description MVTC fatalities recorded in the Traffic Crash Report (TCR) database in a calendar year.

Details All motor vehicle crashes resulting in injury or death that occur on a public road are required to be reported within 24 hours. Reported crashes are attended by a police officer who completes a TCR. People injured in a crash are coded as fatalities if they die within 30 days of the crash. Deaths that did not result from injuries sustained in the crash or result from suicide or murder are excluded.

Source LTNZ TCR database

Denominator N/A

Calculation N/A

ID M16

Name Provisional MVTC Fatal Injury Rate

Concept of Interest Individuals' average annual risk of fatal injury from MVTCs.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation LTNZ

Numerator

Description MVTC fatalities recorded in the Traffic Crash Report (TCR) database in a calendar year.

Details All motor vehicle crashes resulting in injury or death that occur on a public road are required to be reported within 24 hours. Reported crashes are attended by a police officer who completes a TCR. People injured in a crash are coded as fatalities if they die within 30 days of the crash. Deaths that did not result from injuries sustained in the crash or result from suicide or murder are excluded.

Source LTNZ TCR database

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey adjusted for the estimated number of New Zealand residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-14, 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403.

Each year between 0.2% & 4.1% of TCR fatalities had missing age data. Because the percentage of missing data was decreasing with time, it was considered important to include the fatalities with missing age data in the calculation of the age-standardised rate. To do this the assumption was made that the missing ages followed the same distribution as those with age information.

ID M17

Name Provisional MVTC Fatal Injury Rate Per Vehicle Kilometre

Concept of Interest Individuals' average annual risk of fatal injury from MVTCs adjusting for exposure.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation LTNZ.

Numerator

Description MVTC fatalities recorded in the Traffic Crash Report (TCR) database in a calendar year.

Details All motor vehicle crashes resulting in injury or death that occur on a public road are required to be reported within 24 hours. Reported crashes are attended by a police officer who completes a TCR. People injured in a crash are coded as fatalities if they die within 30 days of the crash. Deaths that did not result from injuries sustained in the crash or result from suicide or murder are excluded.

Source LTNZ TCR database

Denominator

Description Estimated total kilometres travelled by motor vehicles in New Zealand in the relevant year.

Details From 2000 estimates of Vehicle Kilometres Travelled (VKT) are based on traffic count surveys conducted on both state highways and local roads. Prior to 2000 the estimates of the number of VKT are based on Transit's state highway traffic count index. No surveys were conducted in 2002 and 2004.

Source LTNZ, Traffic Count Surveys

Calculation As no Traffic Count Surveys were conducted in 2002 or 2004, estimates of Vehicle Kilometres Travelled (VKT) for these years were obtained by regression.

ID M18

Name Provisional MVTC Fatal Injury Rate Per Vehicle

Concept of Interest Drivers' average annual risk of fatal injury from MVTCs.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation LTNZ.

Numerator

Description MVTC fatalities recorded in the Traffic Crash Report (TCR) database in a calendar year.

Details All motor vehicle crashes resulting in injury or death that occur on a public road are required to be reported within 24 hours. Reported crashes are attended by a police officer who completes a TCR. People injured in a crash are coded as fatalities if they die within 30 days of the crash. Deaths that did not result from injuries sustained in the crash or result from suicide or murder are excluded.

Source LTNZ TCR database

Denominator

Description Total motor vehicles registered in New Zealand as at 30 June of the relevant year.

Details Vehicle numbers include registered Cars, Vans, Trucks, Buses, Motor Caravans, Motor Cycles and Mopeds, but excludes those with an exempt or restoration licence.

The total number of vehicles registered in New Zealand as at 31 December each year was from the LTSA Motor Vehicle Crashes in NZ 2003 report. Annual estimates of the total number of vehicles registered in New Zealand as at 30 June was obtained from the average of the preceding and current year.

Source LTNZ Motor vehicle register

ID D11

Name Drowning Fatal Injury Frequency

Concept of Interest Societal burden of fatal injury from drowning.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Drowning fatalities registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification [1]. Drowning fatalities are injury fatalities with any diagnosis of T75.1 and an underlying cause of death external cause code that is not in the range X60- Y36.

There are no available equivalent ICD-9-CM-A codes [22] to identify drowning fatalities.

Source NZHIS Mortality Collection [23]

Denominator N/A

Calculation N/A

ID D12

Name Drowning Fatal Injury Rate

Concept of Interest Individuals' average annual risk of fatal injury from drowning.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Developed by IPRU for NZIPS.

Numerator

Description Drowning fatalities registered in a calendar year.

Details All fatalities are required to be registered. Injury fatalities are those fatalities where the underlying cause of death is an external cause code in the range V01-Y36, where external cause codes are coded using the ICD-10-AM classification [1]. Drowning fatalities are injury fatalities with any diagnosis of T75.1 and an underlying cause of death external cause code that is not in the range X60-Y36.

There are no available equivalent ICD-9-CM-A codes [22] to identify drowning fatalities.

Source NZHIS Mortality Collection [23]

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey adjusted for the estimated number of New Zealand residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-14, 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403.

ID D13

Name Provisional Drowning Fatal Injury Frequency

Concept of Interest Societal burden of fatal injury from drowning.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Water Safety New Zealand

Numerator

Description Drowning fatalities recorded in the DrownBase database in a calendar year.

Details Fatalities are recorded in DrownBase if:

1. Drowning is the primary cause of death; or
2. Drowning is a contributing cause of death and the primary cause was potentially survivable in the absence of the drowning.

Multiple sources are used to identify potential drowning-related fatalities including police reports, media and coroner's files. [26]

Source DrownBase

Denominator N/A

Calculation N/A

ID D14

Name Provisional Drowning Fatal Injury Rate

Concept of Interest Individuals' average annual risk of fatal injury from drowning.

Scope

Area	All Injury
Gender	Both genders
Age	All ages

Source Organisation Water Safety New Zealand

Numerator

Description Drowning fatalities recorded in the DrownBase database in a calendar year.

Details

Fatalities are recorded in DrownBase if:

1. Drowning is the primary cause of death; or
2. Drowning is a contributing cause of death and the primary cause was potentially survivable in the absence of the drowning.

Multiple sources are used to identify potential drowning-related fatalities including police reports, media and coroner's files [24].

Source DrownBase

Denominator

Description Estimated total New Zealand population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on the most recent New Zealand Census and post-enumeration survey adjusted for the estimated number of New Zealand residents overseas on census night, estimated natural increase in population and estimated net long term and permanent migration. (ref http://www.stats.govt.nz/tables/nat-pop-est-tables.htm accessed August 2005)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-14, 15-24, 25-64, 65-79 and 80 and above. The standard population was the estimated New Zealand population as at 30 June 2003. For details of the process of direct standardisation see, for example, Armitage and Berry (1987), Statistical Methods in Medical research, 2nd ed., pp 399-403.