A Chartbook of the New Zealand Injury Prevention Strategy Serious Injury Outcome Indicators for Māori; 1996-2005

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A chartbook of the NZIPS serious injury outcome indicators for Māori; 1996-2005

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The project team are very grateful to, and thank, Tony Blakely and Bridget Robson (Wellington School of Medical and Health Sciences) for reviewing our specifications for the "all injury" injury indicators for Māori, and then for providing peer review of a full draft of this report.

Foreword

Presented here is a chartbook of the New Zealand Injury Prevention Strategy serious injury outcome indicators for Māori. The development of the all population 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 specifications of the indicators for Māori were proposed by the authors, following consultation with Craig Wright (PHI, MoH), and review by Tony Blakely and Bridget Robson (Wellington School of Medical and Health Sciences).

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 4 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 for Māori.

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
NZCMS	New Zealand Census Mortality Study
MoH	Ministry of Health
MVTC	Motor Vehicle Traffic Crash(es)
NMDS	NZHIS National Minimum Data Set of hospital discharges
NZHIS	New Zealand Health Information Service
NZIPS	New Zealand Injury Prevention Strategy
PHI	Public Health Intelligence, Ministry of Health
SNZ	Statistics New Zealand
SRR	Survival Risk Ratio
WHO	World Health Organisation

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		
M(T)I01	Frequency of serious non-fatal injuries.	Suggestion of an increase.
M(T)I02	Age-standardised serious non-fatal injury rate, per 100,000 person-years at risk.	Little apparent change.
M(T)I11	Frequency of injury deaths.	Suggestion of an increase.
M(T)I12	Age-standardised injury mortality rate, per 100,000 person-years at risk.	Little apparent change.
M(T)I21	Frequency of serious injuries.	Suggestion of an increase.
M(T)I22	Age-standardised serious injury rate, per 100,000 person-years at risk.	Little apparent change.

Indicator Code	Description	Interpretation of the indicator trends - from 2000 onwards
Assault		
M(T)A01	Frequency of assaultive serious non-fatal injuries.	Some evidence of an increase from 2000 to 2001-5 – could be an artifact of extraneous factors, eg. reporting behaviour.
M(T)A02	Age-standardised assaultive serious non-fatal injury rate, per 100,000 person-years at risk.	Some evidence of an increase from 2000 to 2001-5 – could be an artifact of extraneous factors, eg. reporting behaviour.
M(T)A11	Frequency of assaultive-related serious injuries.	Some evidence of an increase from 2000 to 2001-3 – could be an artifact of extraneous factors, eg. reporting behaviour.
M(T)A12	Age-standardised assaultive serious injury rate, per 100,000 person-years at risk.	Some evidence of an increase from 2000 to 2001-3 – could be an artifact of extraneous factors, eg. reporting behaviour.

Indicator Code	Description	Interpretation of the trends - from 2000 onwards
Work-related injury		
M(T)W01	Frequency of work-related serious non-fatal injuries.	No evidence of a change.
M(T)W02	Age-standardised work-related serious non-fatal injury rate, per 100,000 workers.	No evidence of a change.
Intentional self-harm		
M(T)S11	Frequency of intentional self-harm injury deaths.	To early to say.
M(T)S12	Age-standardised intentional self-harm injury mortality rate, per 100,000 person-years at risk.	Too early to say.
M(T)S21	Frequency of intentional self-harm serious injuries.	No evidence of a change.
M(T)S22	Age-standardised intentional self-harm serious injury rate, per 100,000 person-years at risk.	No evidence of a change.

Indicator Code	Description	Interpretation of the trends - from 2000 onwards
Falls		
M(T)F01a	Frequency of fall-related serious non-fatal injuries – all ages.	Little apparent change.
M(T)F02a	Age-standardised serious non-fatal injury rate, per 100,000 person-years at risk – all ages.	Little apparent change.
M(T)F21a	Frequency of fall-related serious injuries – all ages.	Little apparent change.
M(T)F22a	Age-standardised serious injury rate, per 100,000 person-years at risk – all ages.	Little apparent change.
M(T)F01b	Frequency of fall-related serious non-fatal injuries – age 0-74.	Little apparent change.
M(T)F02b	Age-standardised serious non-fatal injury rate, per 100,000 person-years at risk – age 0-74.	Little apparent change.
M(T)F21b	Frequency of fall-related serious injuries – age 0-74.	Little apparent change.
M(T)F22b	Age-standardised serious injury rate, per 100,000 person-years at risk – age 0-74.	Little apparent change.
M(T)F01c	Frequency of fall-related serious non-fatal injuries – age 75+.	Suggestion of an increase.
M(T)F02c	Age-standardised serious non-fatal injury rate, per 100,000 person-years at risk – age 75+.	Little apparent change.
M(T)F21c	Frequency of fall-related serious injuries – age 75+.	Too early to say.
M(T)F22c	Age-standardised serious injury rate, per 100,000 person-years at risk – age 75+.	Too early to say.

Indicator Code	Description	Interpretation of the trends - from 2000 onwards
Motor vehicle traffic crashes		
M(T)M01	Frequency of MVTC-related serious non-fatal injuries.	Little apparent change until 2004, and then a sharp increase to 2005.
M(T)M02	Age-standardised MVTC-related serious non-fatal injury rate, per 100,000 person-years at risk.	Little apparent change until 2004, and then a sharp increase to 2005.
M(T)M11	Frequency of MVTC-related injury deaths.	No strong evidence of a change.
M(T)M12	Age-standardised MVTC-related injury mortality rate, per 100,000 person-years at risk.	No strong evidence of a change.
M(T)M21	Frequency of MVTC-related serious injuries.	No strong evidence of a change.
M(T)M22	Age-standardised MVTC-related serious injury rate, per 100,000 person-years at risk.	No strong evidence of a change.

Part 1: Background and Methods

Presented here is a chartbook of the New Zealand Injury Prevention Strategy serious injury outcome indicators for Māori. The development of the all population 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)

Within this report, this has been referred to as the Cryer 2004 report.

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 1996 to 2005 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 10th revision (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). For Māori, amongst first discharges from hospital with a primary diagnosis of injury, approximately 10% 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 original NZIPS serious injury indicators

The Māori injury indicators presented in this report are based on the all population NZIPS 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 took place 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 principal authors of the original report[a] independently assessed the validity of existing and the newly proposed injury outcome 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). The majority of injury discharges from hospitals in New Zealand are publicly funded. For 2002 it was estimated that 99% of all hospital injury discharges were publicly funded. [4 5] Frequencies (ie. counts) reflect the societal burden of injury, 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] The provisional serious injury indicators

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

were candidate NZIPS indicators, but which had some identifiable threats to validity. This chartbook presents both the NZIPS serious injury indicators and the provisional serious injury indicators.

There are 28 all population 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.

Injuries were regarded as serious if they resulted in death or were associated with at least a 6% threat-to-life. These 44 indicators are 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 based on those presented in the Cryer 2004 report. [2] A peer reviewed journal article based on the Cryer 2004 report is also available. [6]

1.4 Serious injury indicators for Māori

The Chartbook of NZIPS serious injury outcome indicators for Māori is an assertion of the principles of the Treaty of Waitangi, applied with the intention of contributing to positive health gains in Māori injury prevention.

This work has produced a single Chartbook of both the 'proposed' and the 'provisional' injury outcome indicators for Māori, typically for the period 1996 to 2005. The full set of NZIPS serious injury indicators is listed in the Executive Summary of the 'NZIPS: Developing Valid Injury Outcome Indicators' of the Cryer 2004 report. [2] Only a subset of indicators were viable for Māori - see Table 1 on page 7.

We have supplemented these original NZIPS fatal and serious non-fatal injury indicators with "serious injury indicators", for which the numerators are the sum of the relevant fatal and the serious non-fatal injury indicators – see Appendix C. The reason for including these additional indicators is as follows. Where there is a decline in the rates or numbers of fatal injury, the reason for this could be because of improved emergency medical systems, ie. due to more cases of serious injury surviving than before. If this is the case, then there would be a shift of cases from the fatal category to the serious non-fatal category. In order to present a more complete

picture of what is happening with serious injury, the trends in serious injury (fatal and serious non-fatal injury) have also been presented.

The choice of 1996 as the starting year for the Māori indicators is based on two main factors. For mortality data, there was a major change in the recording of ethnicity on deaths between 1994 and 1996. Reliable counts are not available for 1995. [7] Additionally, there was a major change in the collection of ethnicity data by hospitals from 1995 to 1996. Morbidity data from 1996 onwards are thought to have a low under-count for Māori, in contrast to the years prior to this. The choice of 1996 as a start year is consistent with practice within Public Health Intelligence (Craig Wright, PHI, MoH, personal correspondence, 8 March 2005).

When calculating rates for Māori, there are difficulties with the comparability of numerators and denominators, which can lead to numerator-denominator bias. One of the challenges for this project was to minimise the effects of this bias on the indicators. An additional problem was that ethnic group classification within the potential sources of numerator data (death registrations, hospitalisations, traffic crash reports, ACC claims) and the denominator data (Census and SNZ population estimates) have not been constant over time. For example, the ethnicity question in the Census changed from 1991 to 1996, and then changed back to the 1991 format in 2001 (see Appendix C of Statistics New Zealand Report of the Review of the Measurement of Ethnicity, June 2004). [8] How the problem of numerator-denominator bias has been addressed when using death registrations and hospital data is described below. We were unable to address the problem of numerator-denominator bias when using ACC data alone or traffic crash reports as numerators.

For the calculation of the indicators, there are practical limitations in regard to numbers of Māori cases for some priority groups, and thus for the precision and viability of the indicators. Viable indicators are shown in the Table 1.

For each indicator, where annual average counts during the period 2000-05 were less than 100, 3-year moving averages were presented. If the 3-year cumulative total numbers of cases were less than 100, the indicator was regarded as non-viable. This is with the exception of the serious non-fatal work-related injury indicators for which we only had relevant data for the period 2002-04 and so using moving averages was not an option.

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.

Table 1: The number of viable indicators for Māori for each NZIPS priority area.

Area	Fatals	Serious non-fatals	Serious (Fatal + serious non-fatal)
All injury	✓(2)	✓(2)	✓(2)
Assault	X	✓(2)	✓(2)
Work-related injury	X	✓(2)	[a]
Intentional self-harm	✓(2)	X	✓(2)
Falls	X	✓(6)	✓(6)
Motor vehicle traffic crashes	✓(2)[b]	✓(2)[b]	✓(2)[b]
Drowning and near-drowning	X	X	X

✓ = expected number of cases per year makes the indicators viable
X = small numbers of cases makes the indicators non-viable.
() = The number in brackets indicates the number of viable indicators.
[a] practical difficulties resulted in these indicators not being produced for this report.
[b] For the MVTC indicators, only 2 fatal, 2 non-fatal, and 2 serious injury indicators are indicated as viable. These are NZIPS indicators M(T)M01, M(T)M02, M(T)M11, M(T)M12, M(T)M21 and M(T)M22 (see Appendix C). It was not possible to produce the other indicators M13-M18. These rely on data from Land Transport New Zealand (LTNZ), and the classification of Māori was not accurate enough to enable the production of valid indicators.

Numerator-denominator bias

The protocol requirements used by the Ministry of Health for output of ethnicity information include the following:

1. One of the following three methods of output must be used: sole/combination, total response (overlapping) or prioritised.

2. The same output method must be used for both numerator and denominator datasets.

(http://www.nzhis.govt.nz/documentation/ethnicity/ethnicity-02.html). Due to the nature of the prioritisation, 'total response' and 'prioritised' method of output are equivalent for Māori.

Definitions

The following are taken from the document: "Ethnicity Data Protocols for the Health and Disability Sector". [9]

Sole / combination:

> "*In the sole/combination form of output, there are sole ethnic categories for respondents who report only one ethnic group, and combination categories for respondents who give more than one ethnic group. Examples of combination categories are Samoan/Tongan, NZ European/Māori and Māori/Pacific."*

Total response (overlapping):

> *"In total response output, each respondent is counted in each of the ethnic groups that they reported. Because individuals who indicate more than one*

ethnic group are counted more than once, the sum of the ethnic group populations will exceed the total population of New Zealand."

Prioritised:

"In prioritised output, each respondent is allocated to a single ethnic group using the priority system (Māori, Pacific peoples, Asian, other groups except NZ European). The aim of prioritisation is to ensure that where some need exists to assign people to a single ethnic group, ethnic groups of policy importance, or of small size, are not swamped by the NZ European ethnic group".

Why "total Māori" for hospitalisations and deaths?

"Sole / combination" is the form of output currently recommended by Statistics New Zealand (SNZ). However, it is relatively new and untried, and members of the Māori population could be misidentified. [9] Another alternative is "Total response (overlapping)" output. For Māori people, this is the same as "Prioritised". Prioritised output is most frequently used in MoH statistics. [9] There has been some validation of measures for sole and total Māori (see below).

Why not NZCMS weights for hospitalisations and deaths?

New Zealand Census Mortality Study (NZCMS) weights were constructed for mortality data. They provide a correction for the undercount of Māori in the Mortality Collection compared with the 1996 Census; derived from a linkage study of mortality to census data. For deaths, they are only available for the period 1996-1999. At the time of writing, the weights for the period 2001 to 2004 had not been published and so were unavailable for our work. PHI do not currently use adjusters for the period 2000 onwards (ie. they use weights=1). Once NZCMS is updated and the updates published, however, then this will be reviewed. (Craig Wright, personal correspondence, 8-March-05).

NZCMS weights are not appropriate for hospitalisations – they have not been derived for hospital discharge data, nor have the Mortality Collection weights been validated for these data.

What are appropriate numerators for NZHIS hospitalisations and mortality data?

In the absence of appropriate NZCMS adjusters for hospital discharge data or for the whole of the period of interest (1996-2005 for hospital discharge data and 1996-2003 for mortality data), work has suggested that the "ever-Māori" method is a good alternative for estimating "Total Māori" numerators from both NZHIS Mortality Collection and NMDS hospitalisations data. This has been used in recent publications. [10] [11] [12] For example, Curtis et al. (2005) [10] describes the methods used to estimate breast cancer incidence and mortality in Māori and non-Māori using multiple methods to estimate Māori numerators. Quoting from their paper:

"Unadjusted and NHI-adjusted were least similar to the NZCMS-adjusted estimate used as the 'gold standard' in this study. Ever Māori-adjusted results closely approximated NZCMS-adjusted results in both incidence[b] and mortality data."

Their recommendations are that:

"Future calculations of breast cancer incidence and mortality rates should assign sole and total ethnicity and reduce ethnicity misclassification by using NZCMS or ever Māori-adjusted estimates."

In this work, we have applied these results beyond breast cancer registrations and mortality - in particular to serious non-fatal injury incidence and mortality. Work to validate this approach for injury is described in Appendix D. The results presented in Appendix D suggest that the ever-Māori method does well in correcting for Māori undercount and potential numerator-denominator bias.

1.5 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 1996 to 2005. 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 many 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-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 1996 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.

[b] Although NZCMS adjusted numerators are used as a 'gold standard' for incidence, Curtis et al. (2005) acknowledge that it is uncertain how valid it is to apply the method to morbidity data since the NZCMS weights have been derived from mortality data. They made the assumption that the problems of ethnicity data collection are similar between routinely collected administrative data sets.

The indicators presented in the charts have a reference number. For example, the reference number of the indicator presented in the first chart is "M(T)I01". The "I01" is the indicator reference of the equivalent 'all population' indicator. The prefix "M(T)" designates "total Māori". Whilst this nomenclature is unwieldy, it is consistent with the "Ethnicity data protocols for the health and disability sector" (p20), which requires the method of output to be made completely explicit. [9]

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 Collection 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 1996, 1997 and 1998 are used to estimate an indicator value for 1997. 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.

[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.

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

1.6 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 the NZHIS Mortality Collection (2003) and NMDS (2005) are considered by NZHIS to be provisional, with all previous data considered final. The operational definition of injury was 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 2005), 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

[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.

equivalent to selecting patients whose injuries give the patient a survival probability 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 for the whole population (approximately 10% for Māori). 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 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 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). The denominator data used was as follows:

- Estimated total Māori population
- Estimated total Māori working population

Rates were age-adjusted, using the 2003 Māori population as the standard, 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. [13]

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.

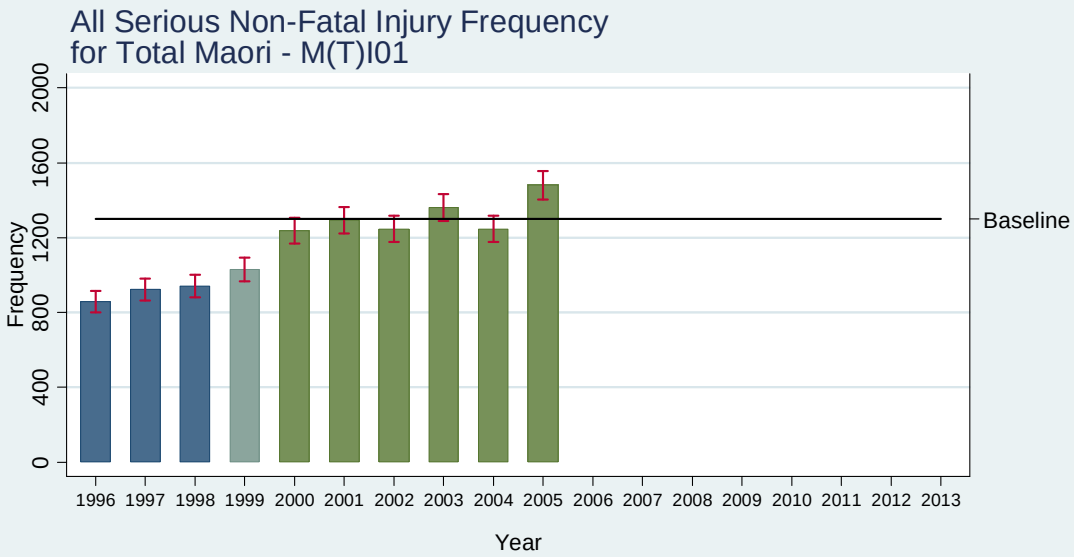
1.7 Interpretation and discussion of the charts

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. 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.

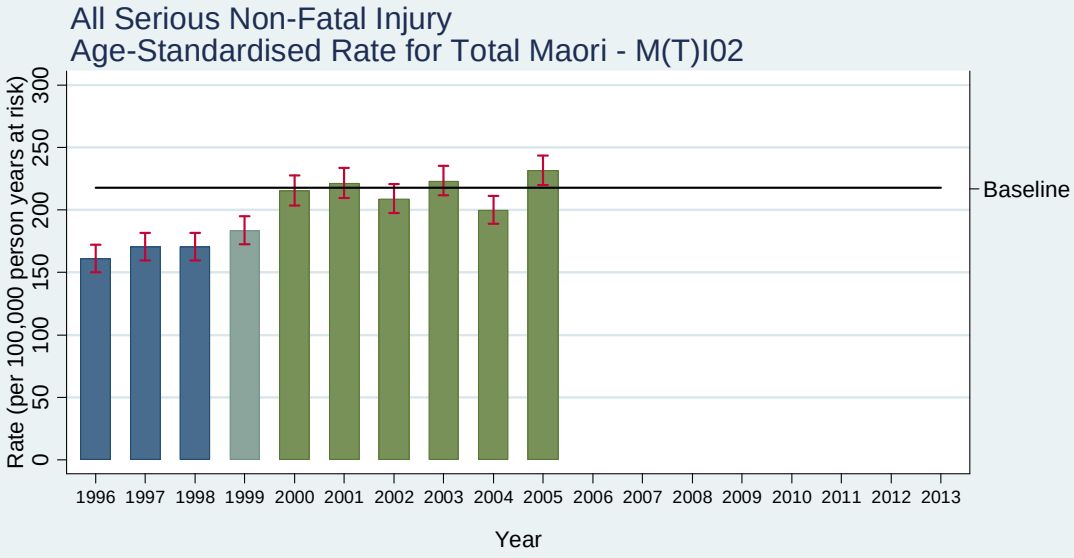
Part 2: The Charts

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.



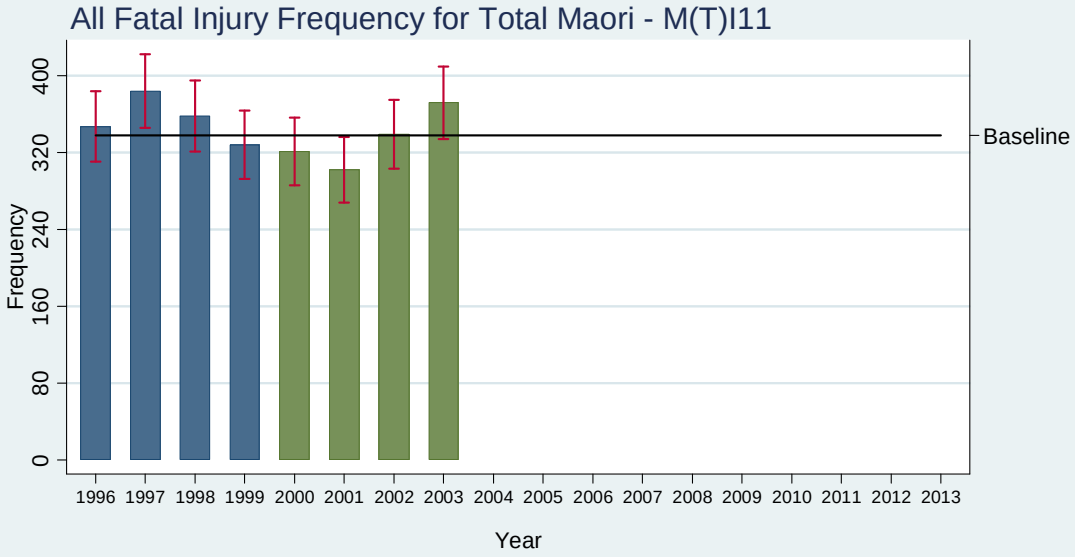
Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2005 data are provisional.
Source: New Zealand Health Information Service, National Minimum Data Set.



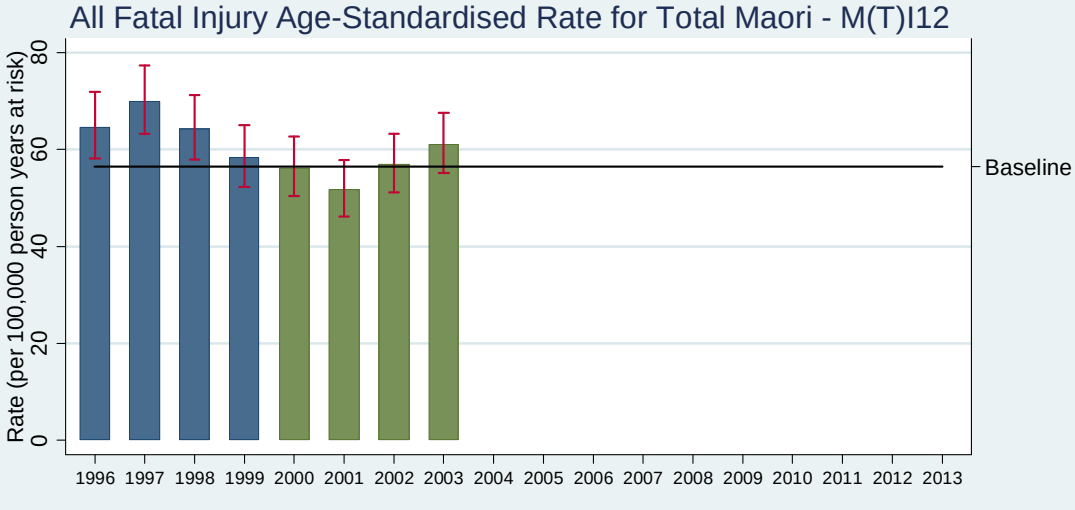
Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2005 data are provisional.
Source: New Zealand Health Information Service, National Minimum Data Set and Statistics New Zealand.

Since 2000, there is a suggestion of an increase in the annual frequencies of non-fatal injuries (M(T)I01), and little evidence of a consistent change in the rates (M(T)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.



Note: 2003 data are provisional.
Source: New Zealand Health Information Service, Mortality Collection.

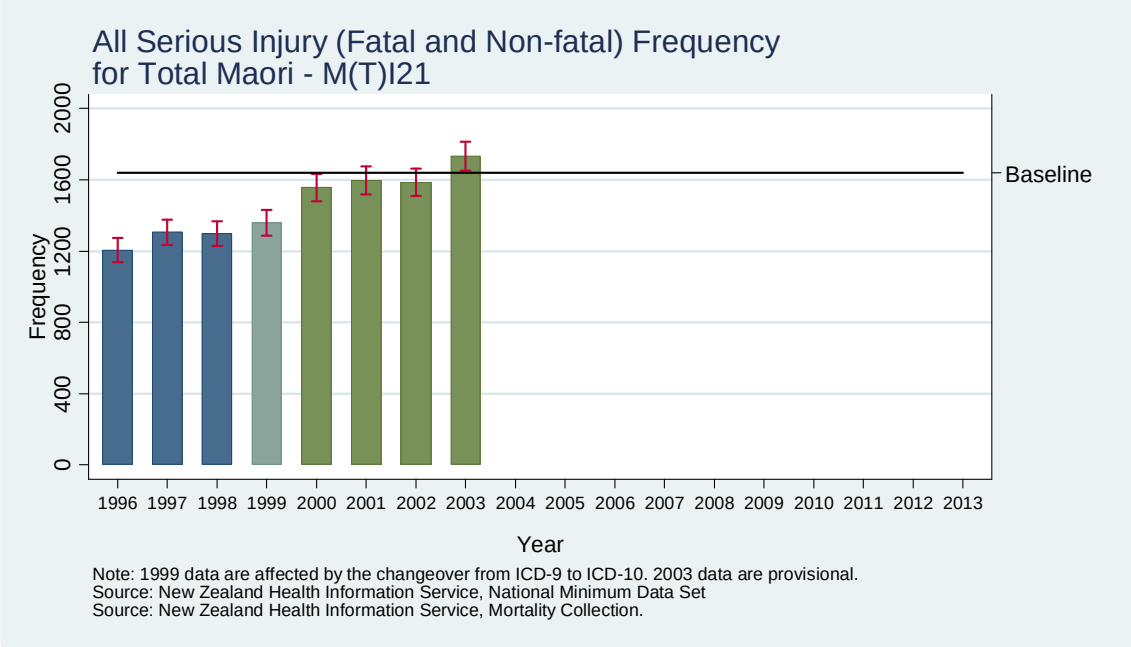


Note: 1999 data are affected by the changeover from ICD-9 to ICD-10.
Note: 2003 data are provisional.
Source: New Zealand Health Information Service, Mortality Collection and Statistics New Zealand.

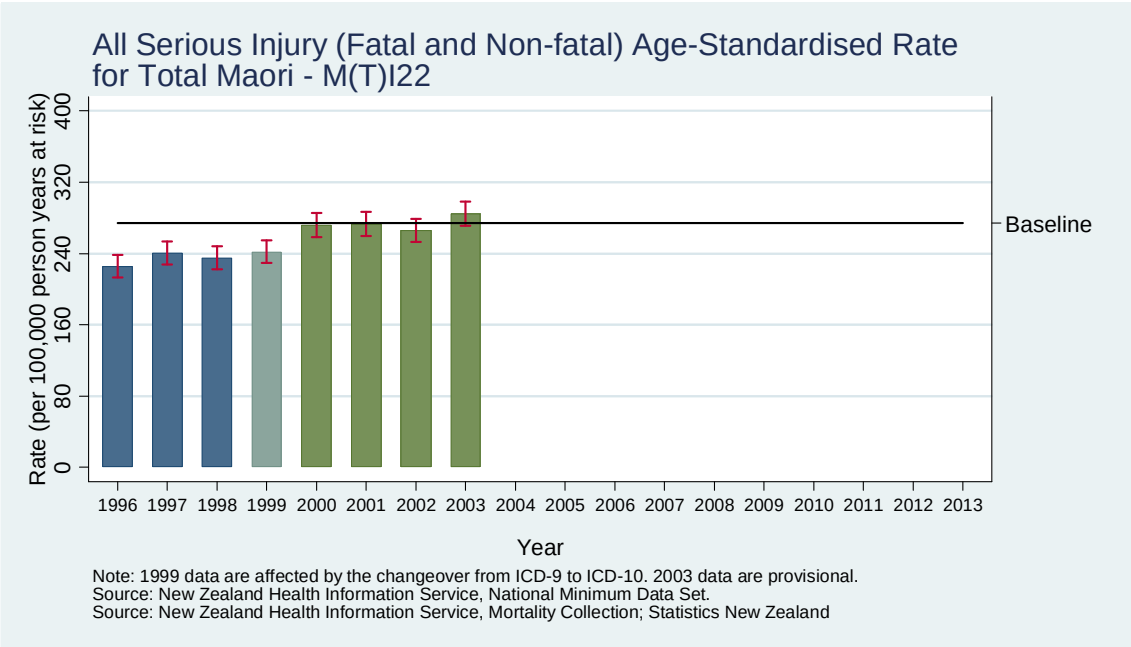
After 2000, there is a suggestion of an increase in the annual frequencies of fatal injuries (M(T)I1), and little evidence of a consistent change in the rates (M(T)I12).

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

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.



Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2003 data are provisional.
Source: New Zealand Health Information Service, National Minimum Data Set
Source: New Zealand Health Information Service, Mortality Collection.

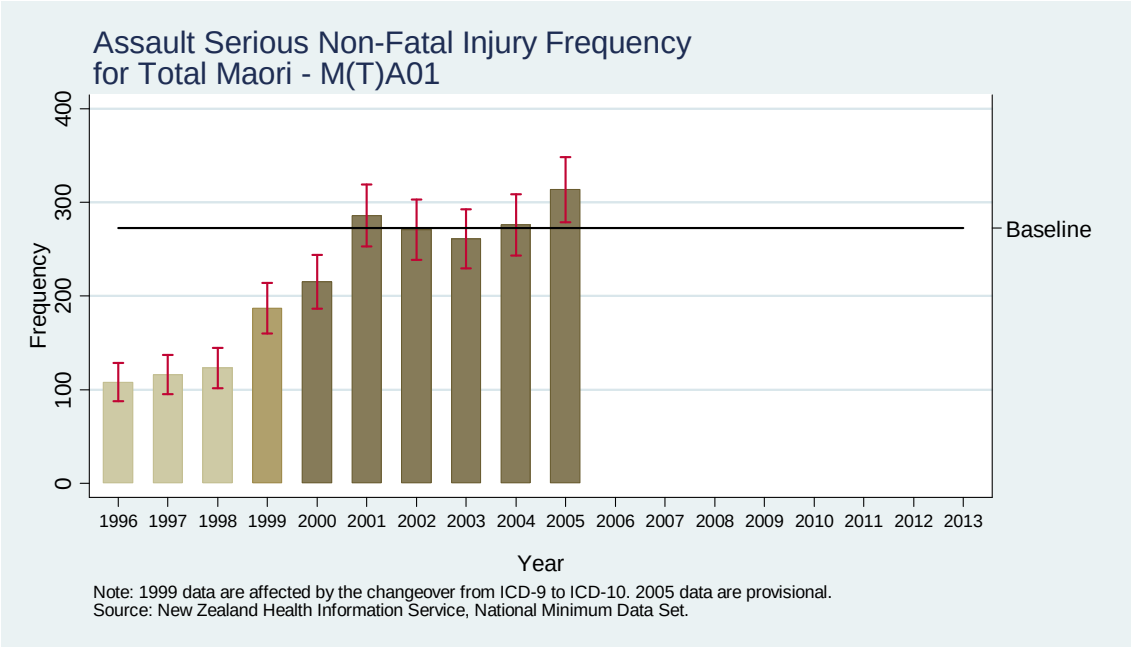


Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2003 data are provisional.
Source: New Zealand Health Information Service, National Minimum Data Set.
Source: New Zealand Health Information Service, Mortality Collection; Statistics New Zealand

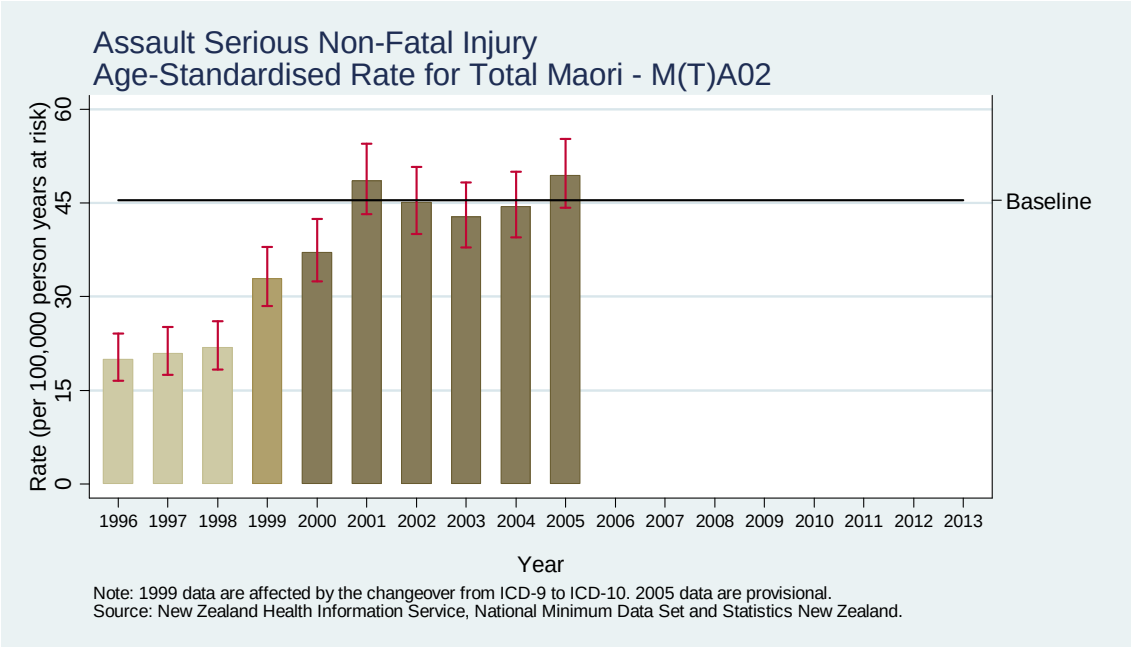
Since 2000, there is a suggestion of an increase in the annual frequencies of serious injuries (M(T)I21), and little evidence of a consistent change in the rates (M(T)I22).

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.



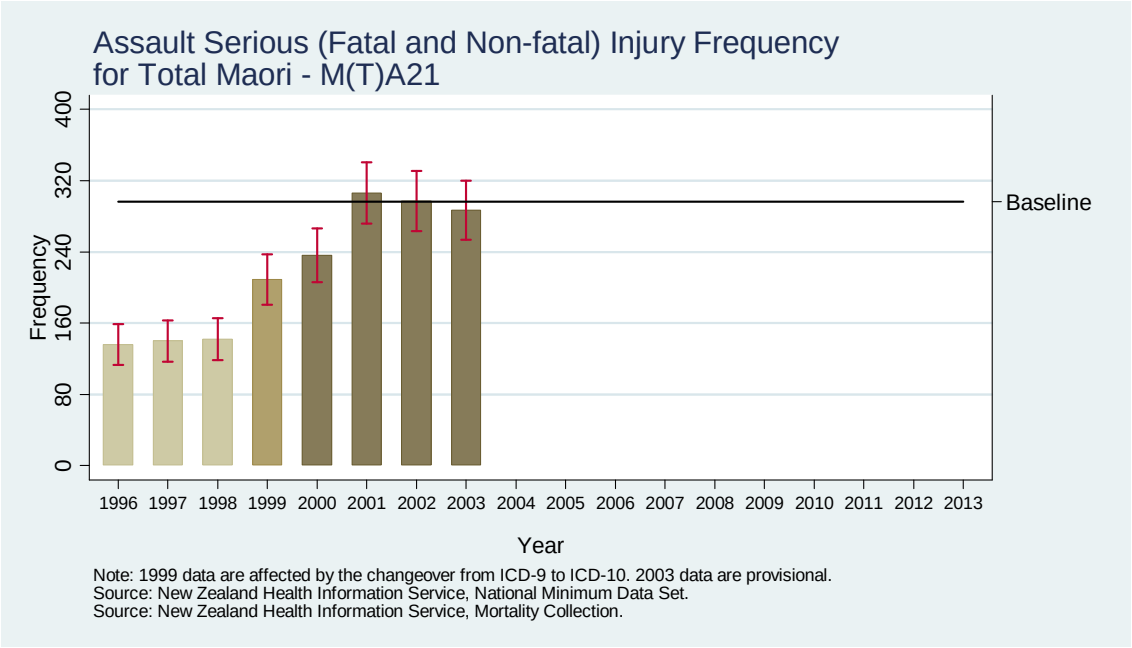
Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2005 data are provisional.
Source: New Zealand Health Information Service, National Minimum Data Set.

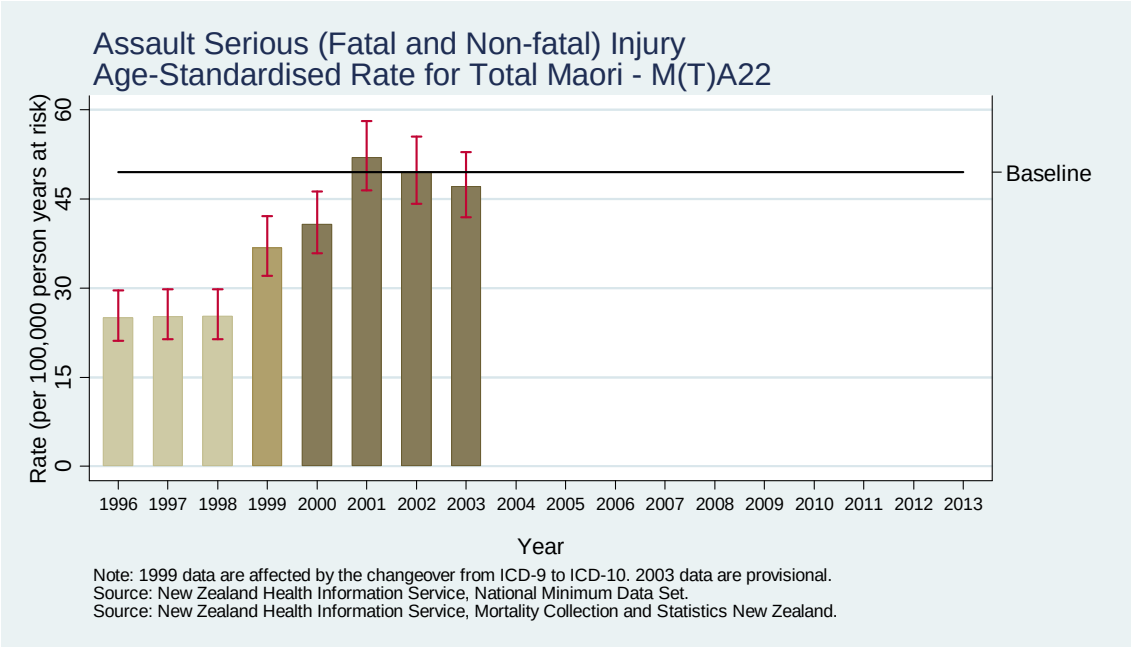


Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2005 data are provisional.
Source: New Zealand Health Information Service, National Minimum Data Set and Statistics New Zealand.

The trends for the frequencies (M(T)A01) and rates (M(T)A02) of assaultive injuries are similar. There is some evidence of an increase in the frequency from 2000 to 2001-5, with little apparent changes since 2001. These increases could be the results of extraneous factors (see Appendix B7.3), so care must be taken with interpretation.

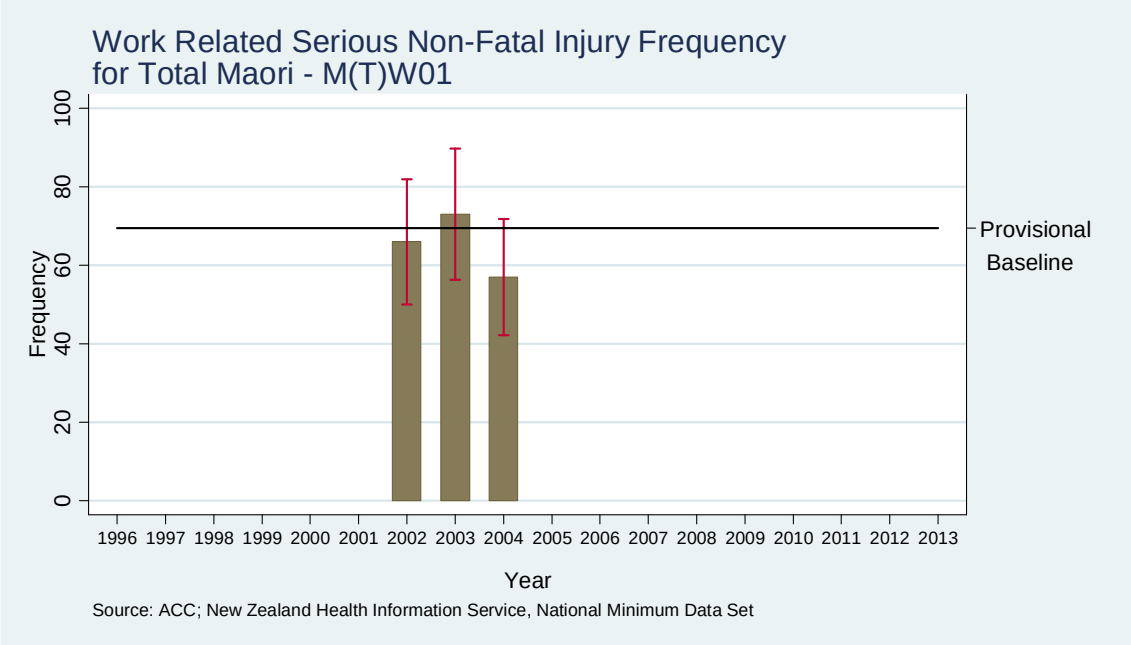
For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change.

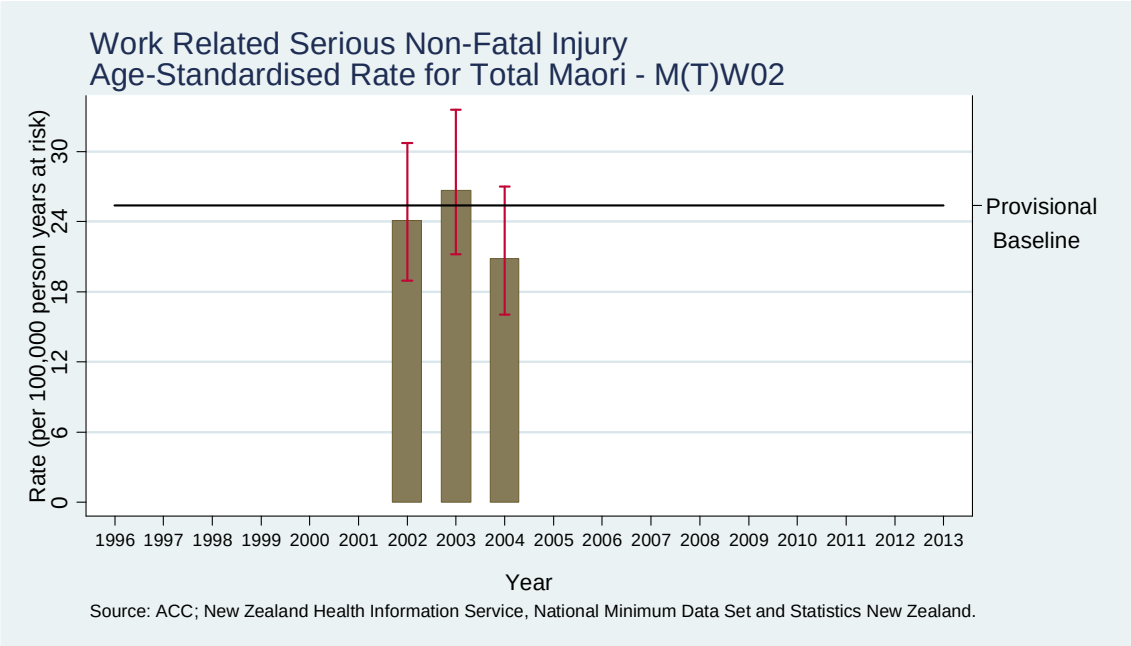




The trends for the frequencies (M(T)A21) and rates (M(T)A22) of serious assaultive injuries are similar. There is some evidence of an increase in the frequency from 2000 to 2001-3, with little apparent changes since 2001. These increases could be the results of extraneous factors (see Appendix B7.3), so care must be taken with interpretation.

2.3 Work-related injury

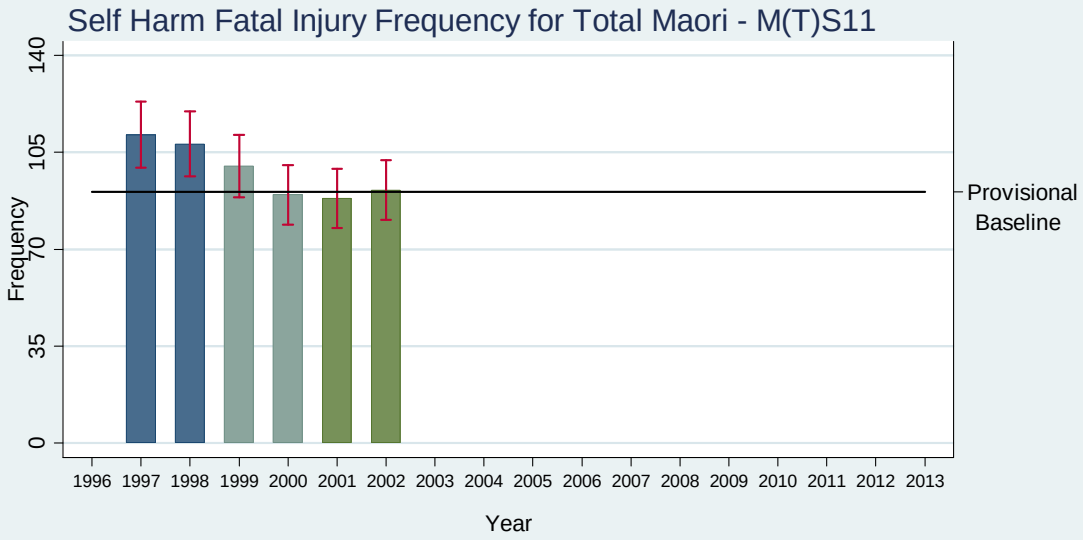




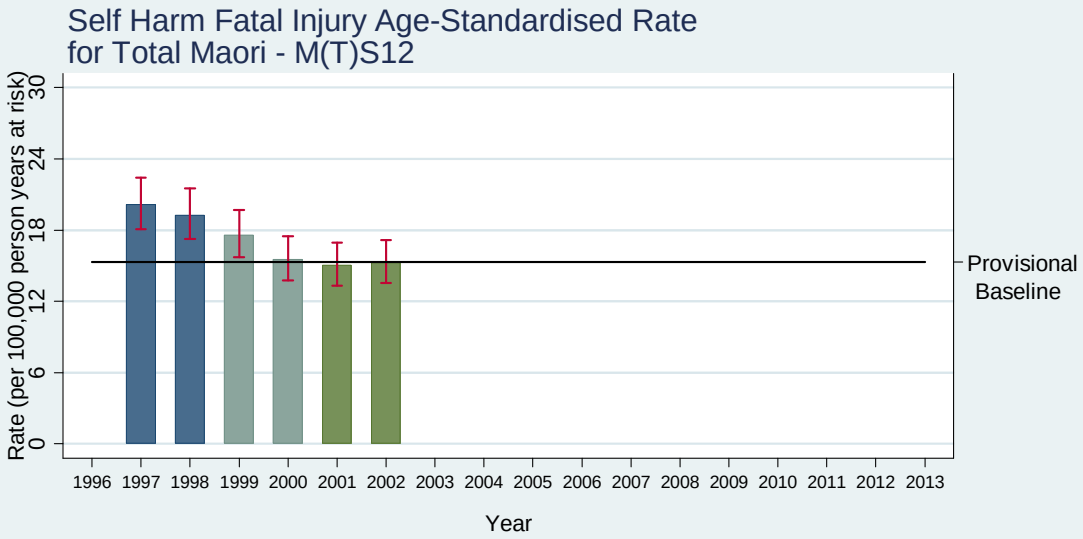
This indicator was only available for the years 2002 to 2004. Although the observed rates show some variability, there is no evidence of a change in the frequencies or rates that could not be due to chance alone.

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.



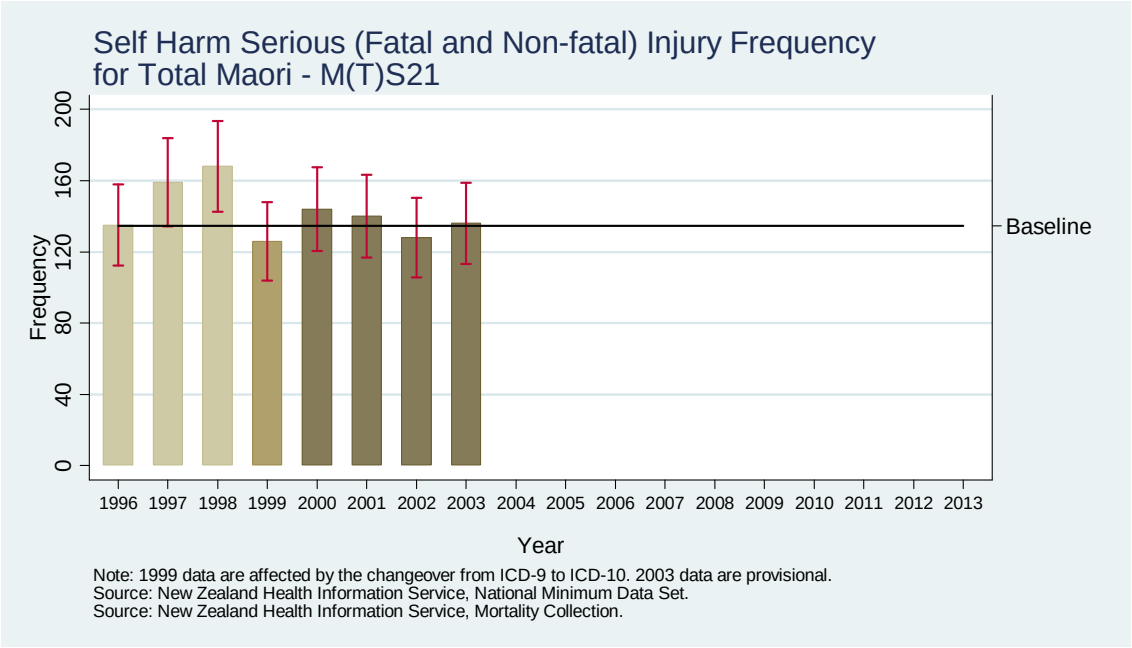
Note: 3 year moving averages have been calculated due to small frequencies.
Note: 1999-2000 moving averages are affected by the changeover from ICD-9 to ICD-10. 2002 data are provisional.
Source: New Zealand Health Information Service, Mortality Collection.

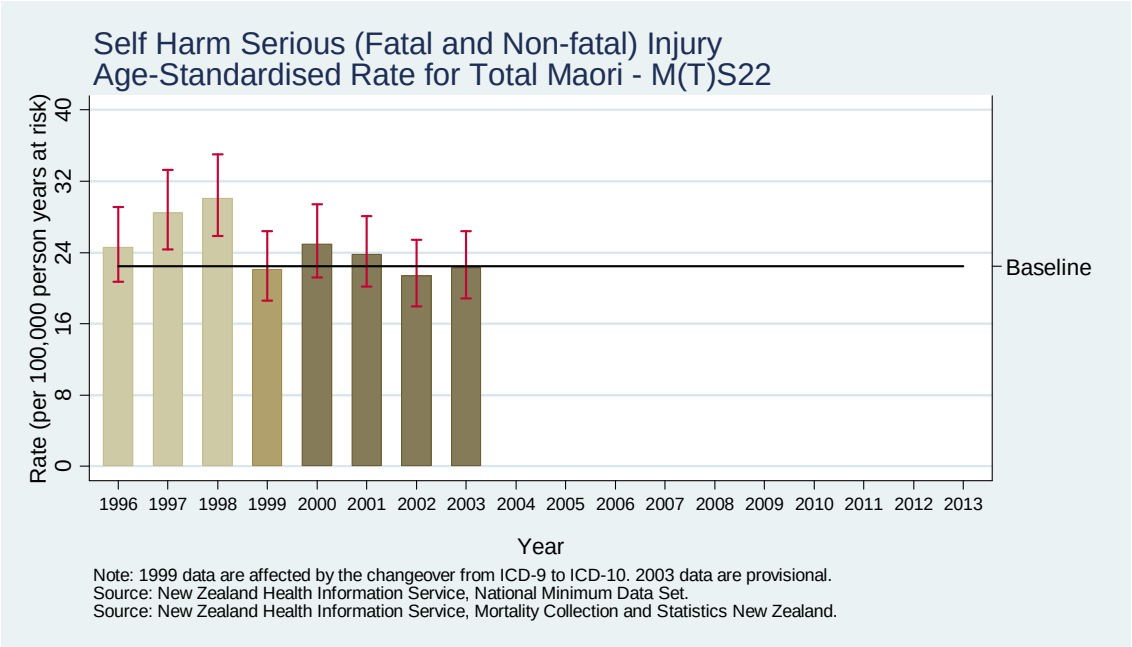


Note: 3 year moving averages have been calculated due to small frequencies on which the rates are based.
Note: 1999-2000 moving averages are affected by the changeover from ICD-9 to ICD-10. 2002 data are provisional.
Source: New Zealand Health Information Service, Mortality Collection and Statistics New Zealand.

Only the indicator values for 2001 and 2002 are based purely on ICD-10 coded data. Consequently, no comment on the trends for these indicators is appropriate (M(T)S11 and M(T)S12).

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.



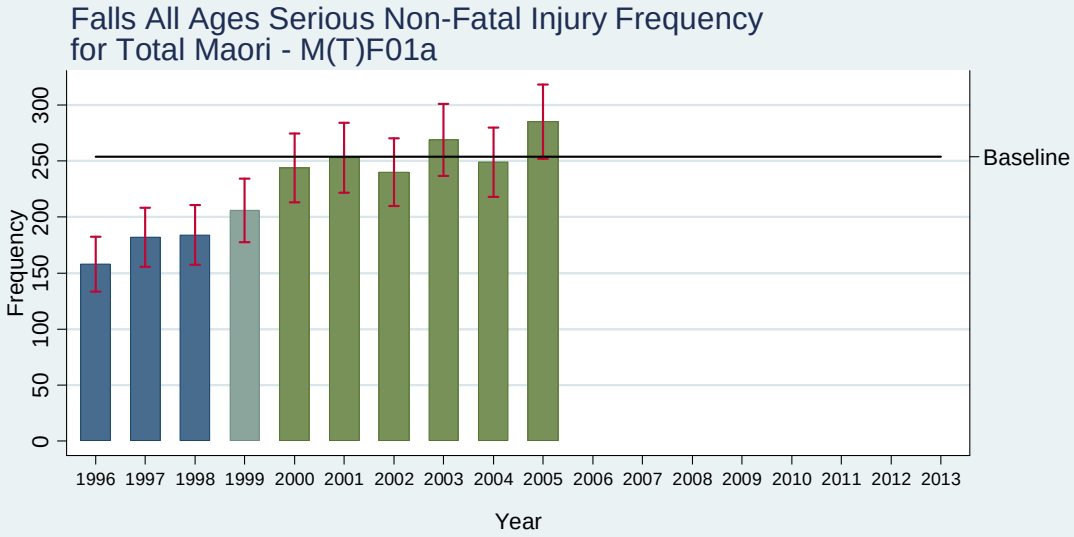


There is no evidence of a change in the frequencies (M(T)S11) and rates (M(T)S12) of serious injuries resulting from intentional self-harm from 2000.

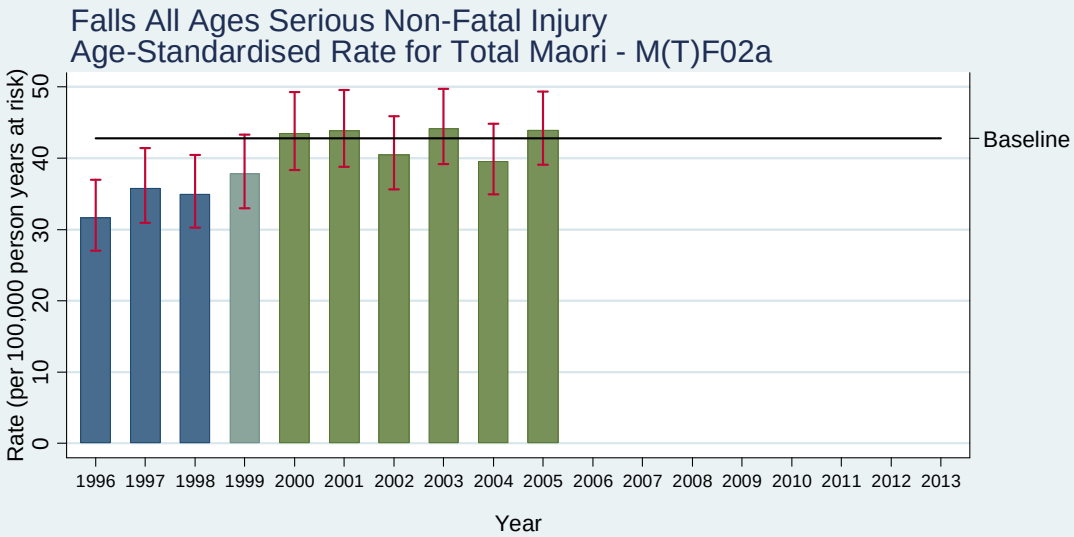
2.5 Falls

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.



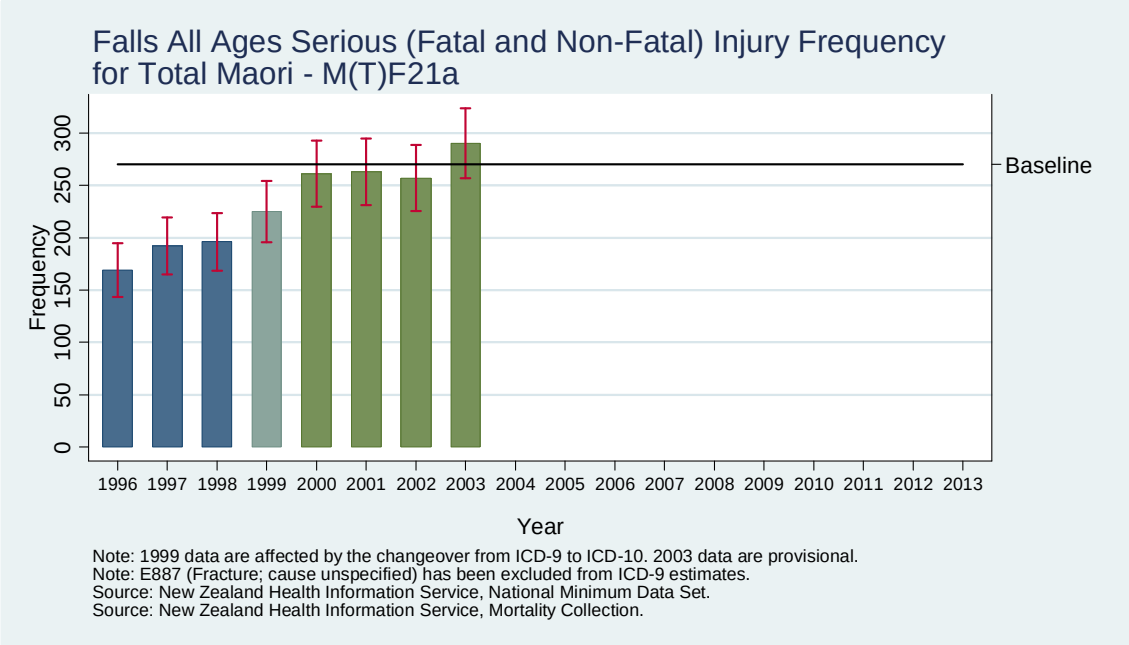
Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2005 data are provisional.
Note: E887 (Fracture; cause unspecified) has been excluded from ICD-9 estimates.
Source: New Zealand Health Information Service, National Minimum Data Set.

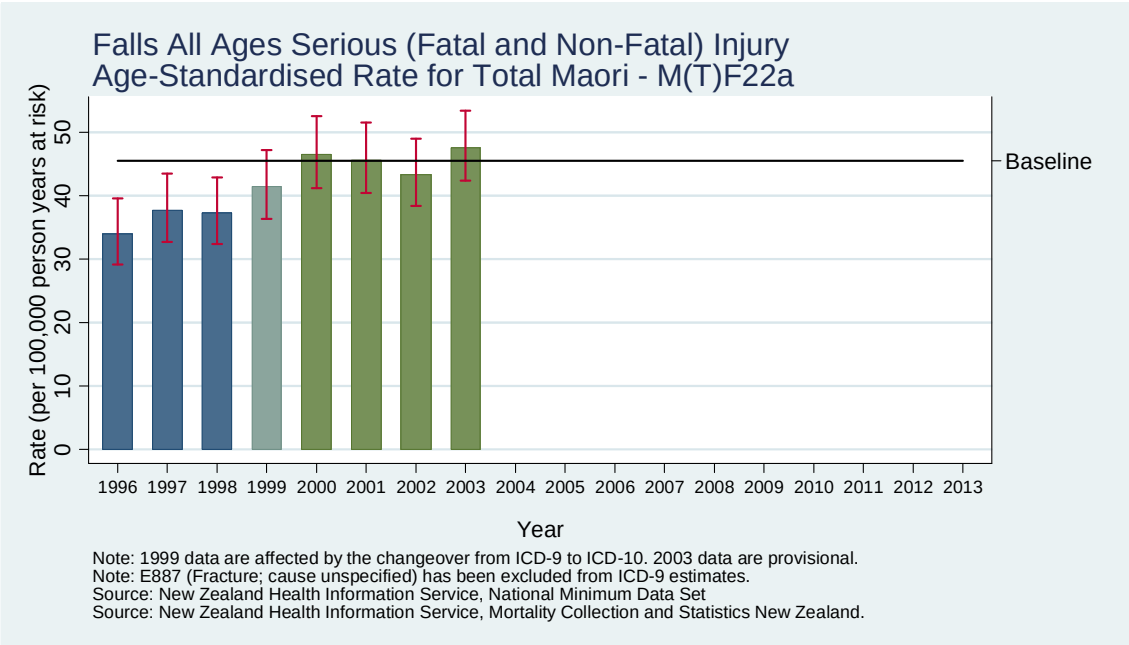


Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2005 data are provisional.
Note: E887 (Fracture; cause unspecified) has been excluded from ICD-9 estimates.
Source: New Zealand Health Information Service, National Minimum Data Set and Statistics New Zealand.

There is no strong evidence of a change in the frequencies (M(T)F01a) or rates (M(T)F02a) of serious non-fatal falls injury during the period 2000 to 2005 that could not be due to chance alone.

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.

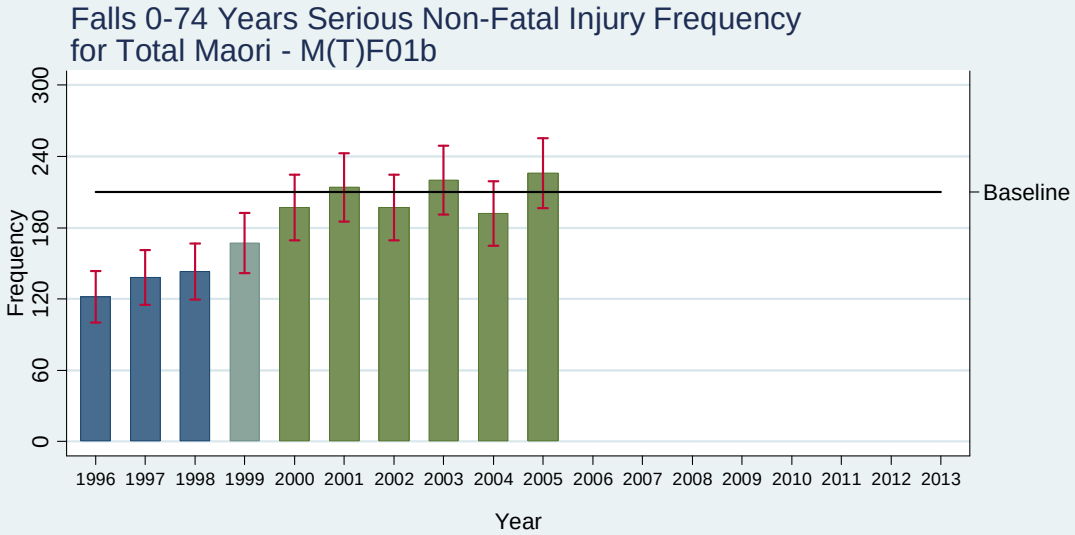




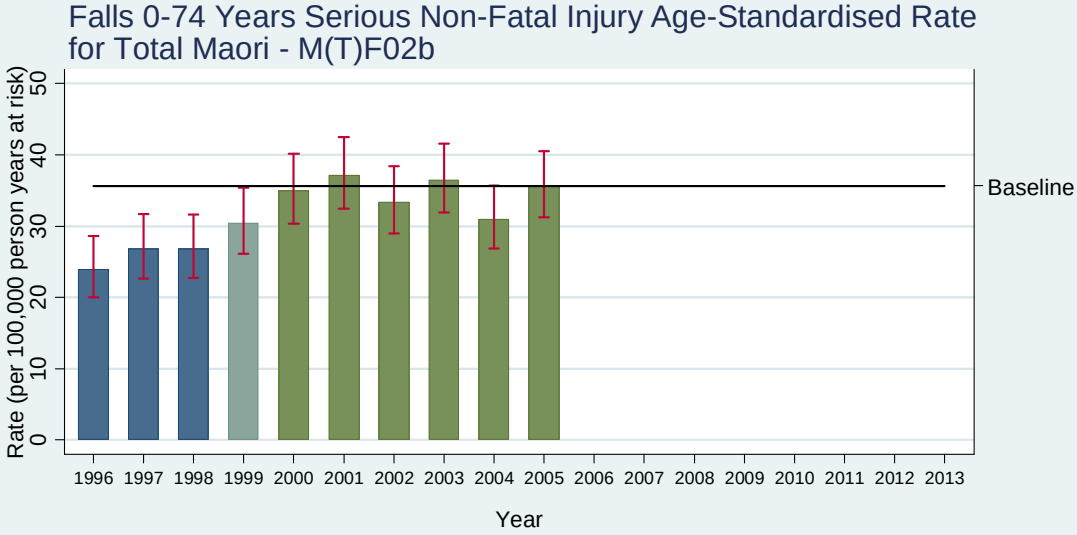
There is no strong evidence of a change in the frequencies (M(T)F21a) and rates (M(T)F22a) of fatal injuries resulting from falls from 2000 to 2003.

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.



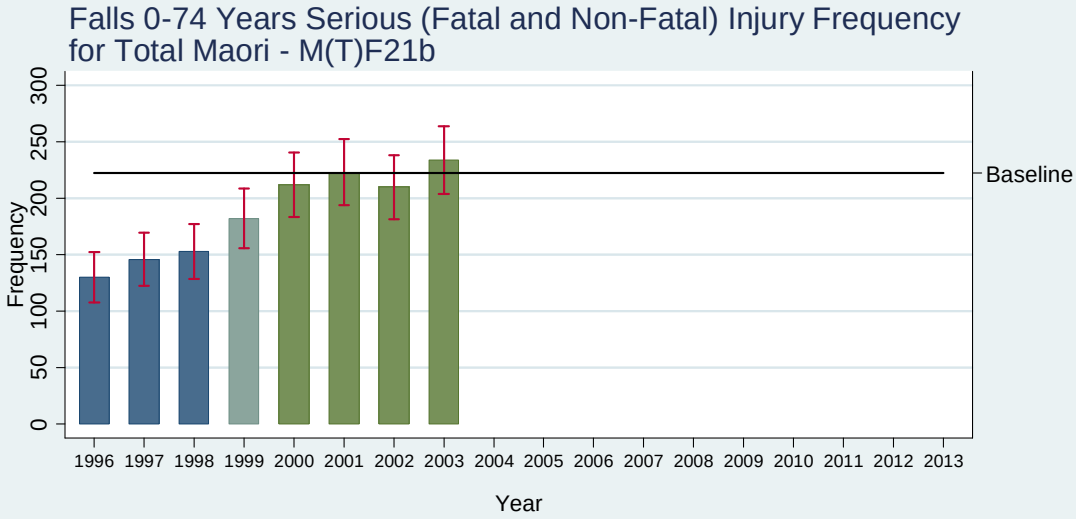
Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2005 data are provisional.
Note: E887 (Fracture; cause unspecified) has been excluded from ICD-9 estimates.
Source: New Zealand Health Information Service, National Minimum Data Set.



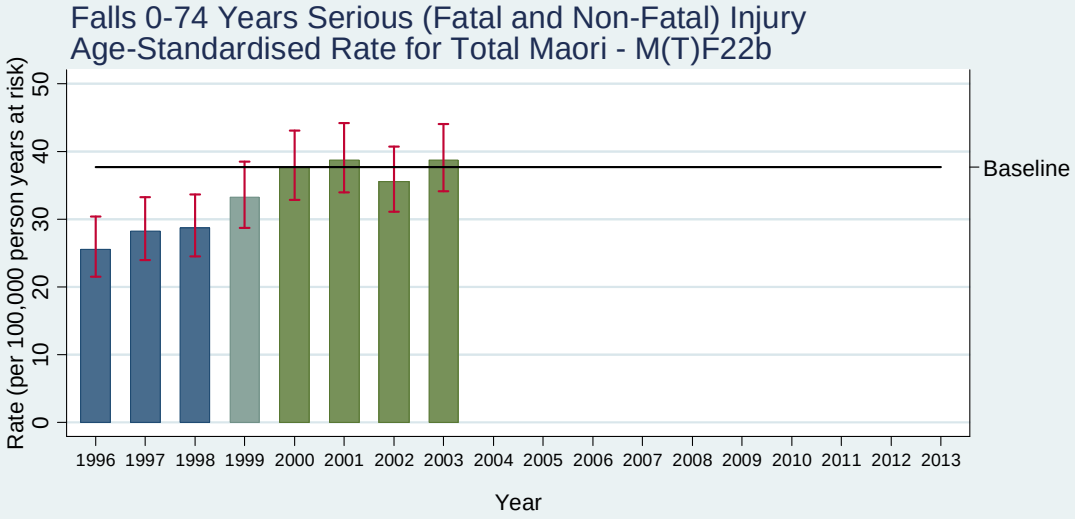
Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2005 data are provisional.
Note: E887 (Fracture; cause unspecified) has been excluded from ICD-9 estimates.
Source: New Zealand Health Information Service, National Minimum Data Set and Statistics New Zealand.

The trends since 2000 suggest little apparent change in the frequencies (M(T)F01b) and rates (M(T)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.



Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2003 data are provisional.
Note: E887 (Fracture; cause unspecified) has been excluded from ICD-9 estimates.
Source: New Zealand Health Information Service, National Minimum Data Set.
Source: New Zealand Health Information Service, Mortality Collection.

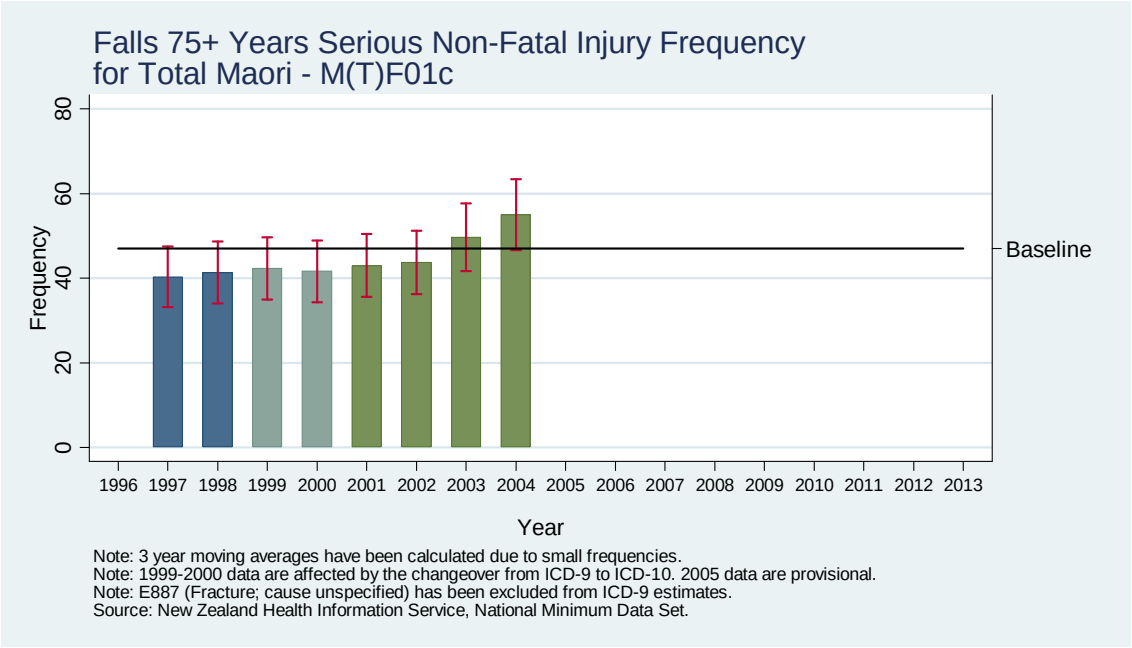


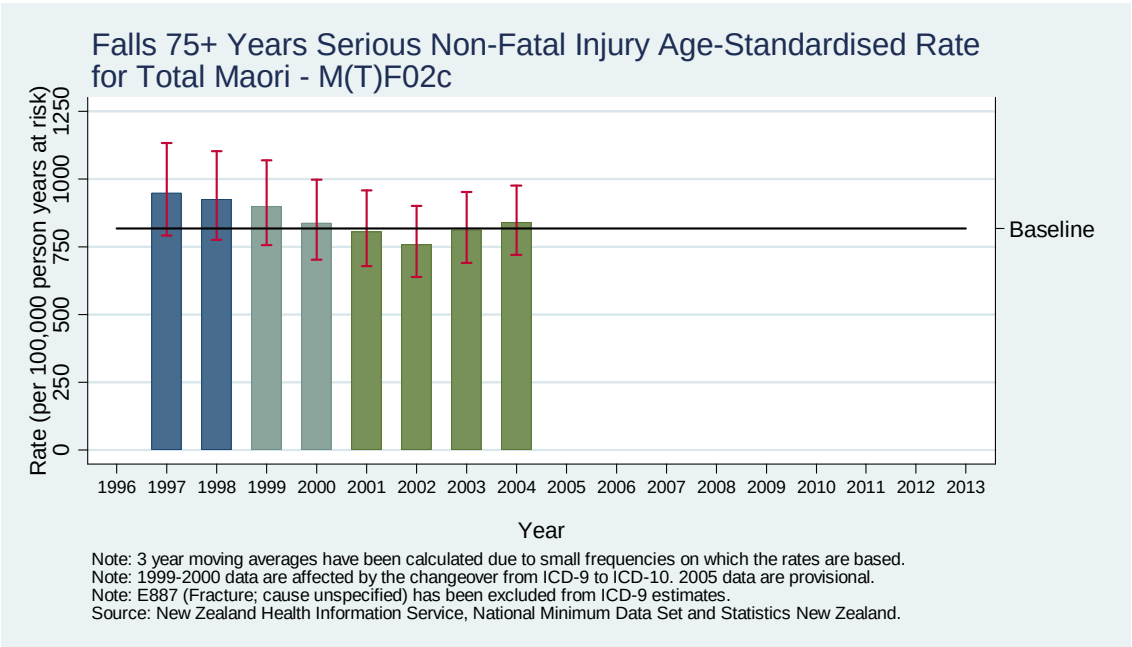
Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2003 data are provisional.
Note: E887 (Fracture; cause unspecified) has been excluded from ICD-9 estimates.
Source: New Zealand Health Information Service, National Minimum Data Set
Source: New Zealand Health Information Service, Mortality Collection and Statistics New Zealand.

The trends since 2000 suggest little apparent change in the frequencies (M(T)F21b) and rates (M(T)F22b) of serious non-fatal injuries resulting from falls for those aged 0-74 years.

Aged 75 years and over

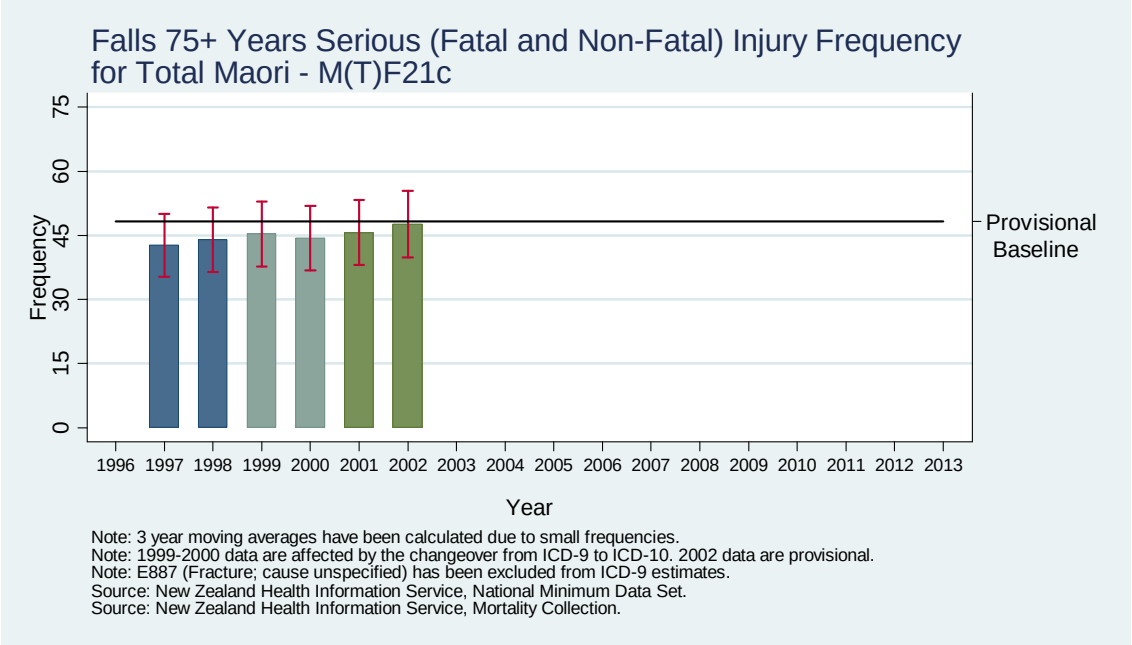
For each of these charts, readers should exercise caution if commenting on trends that include indicator values based on both ICD-9 and ICD-10 coded data, since case ascertainment will be affected by the change.

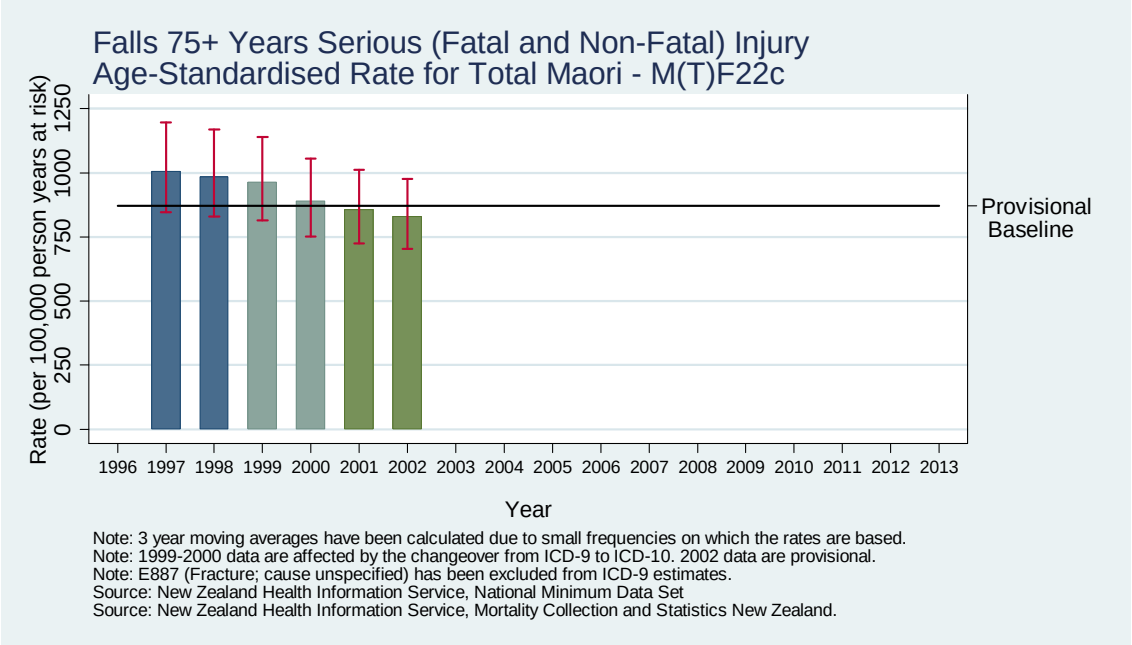




Since 2000 there is a suggestion of an increase in the annual frequencies (M(T)F01c), though little apparent change in the rates (M(T)F02c) of serious non-fatal injuries resulting from falls for those aged 75 years and over.

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. Since 3-year moving averages are used, the most recent year shown below is 2001 (based on data from 2000, 2001 and 2002).

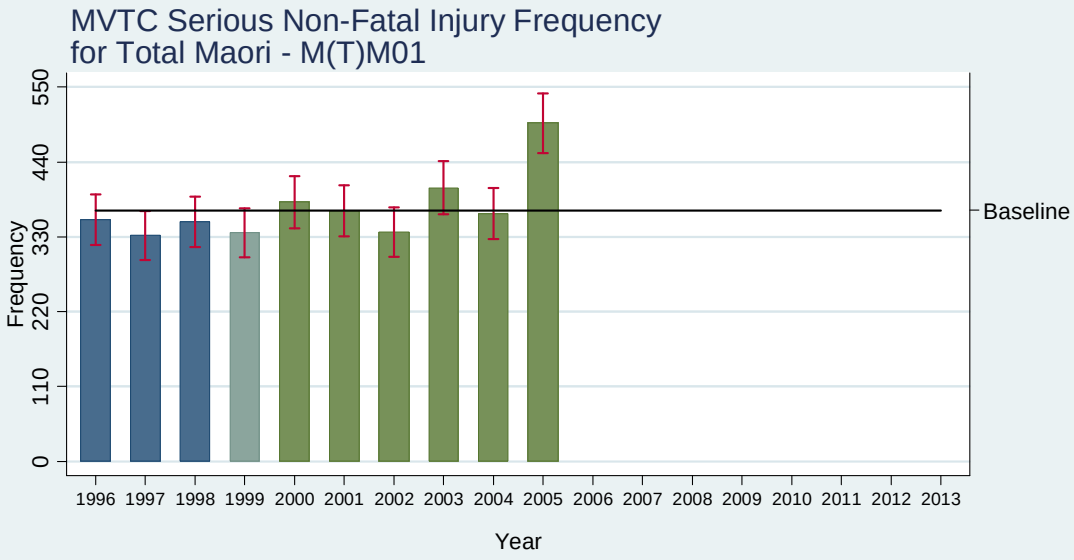




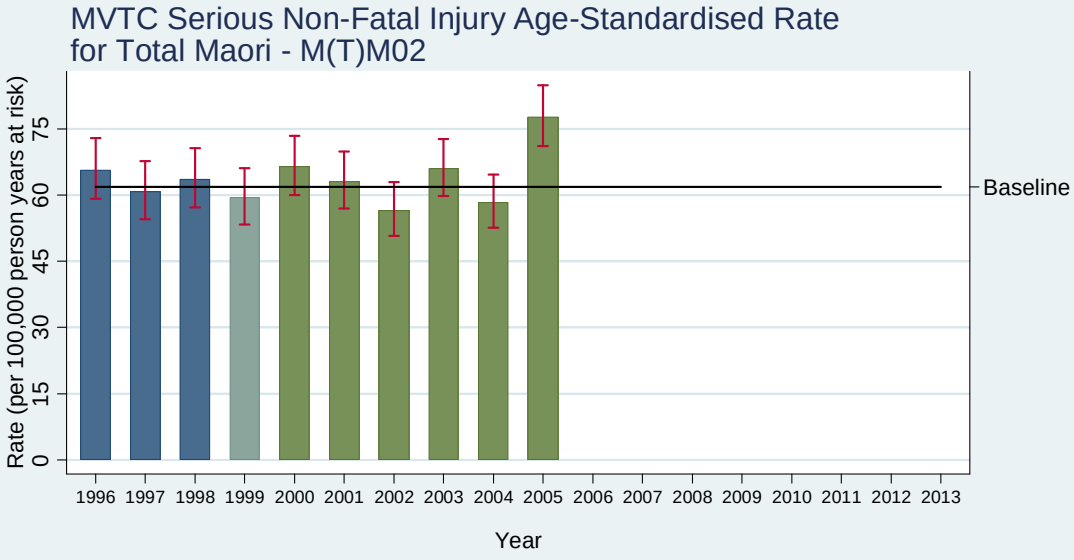
Only the indicator values for 2001 and 2002 are based purely on ICD-10 coded data. Consequently, no comment on the trends for these indicators is appropriate (M(T)F21c and M(T)F22c).

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.



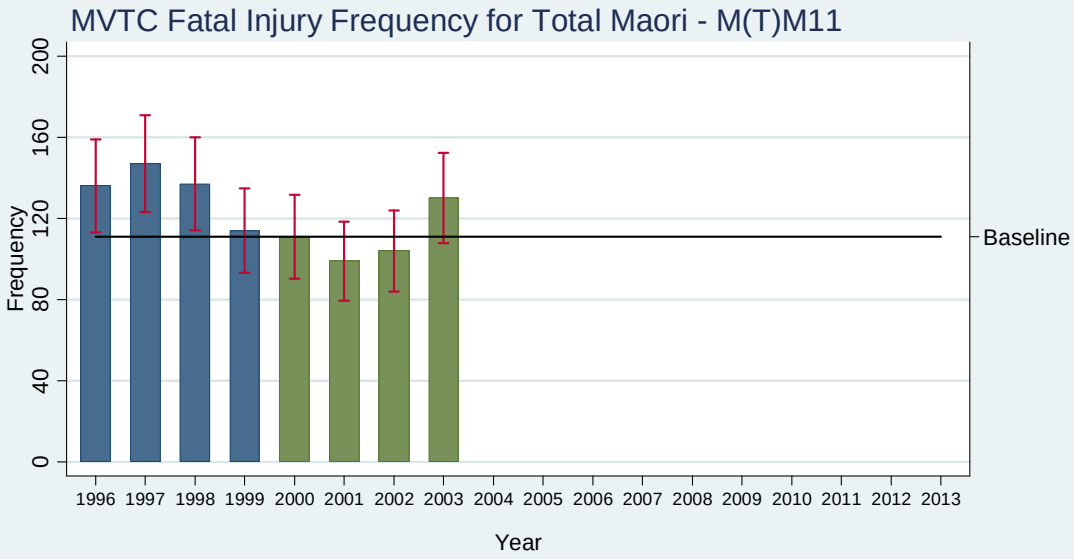
Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2005 data are provisional.
Source: New Zealand Health Information Service, National Minimum Data Set.



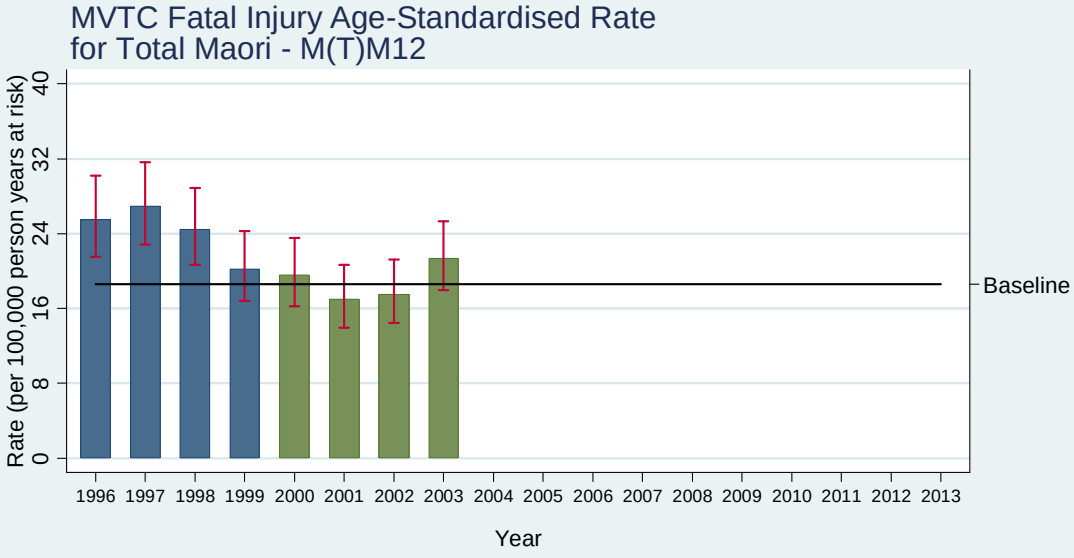
Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2005 data are provisional.
Source: New Zealand Health Information Service, National Minimum Data Set and Statistics New Zealand.

There is little apparent change in the trends in frequency and rates of MVTC-related serious non-fatal injury during the period 2000 to 2004, but with a sharp increase in frequency and rates in 2005.

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.



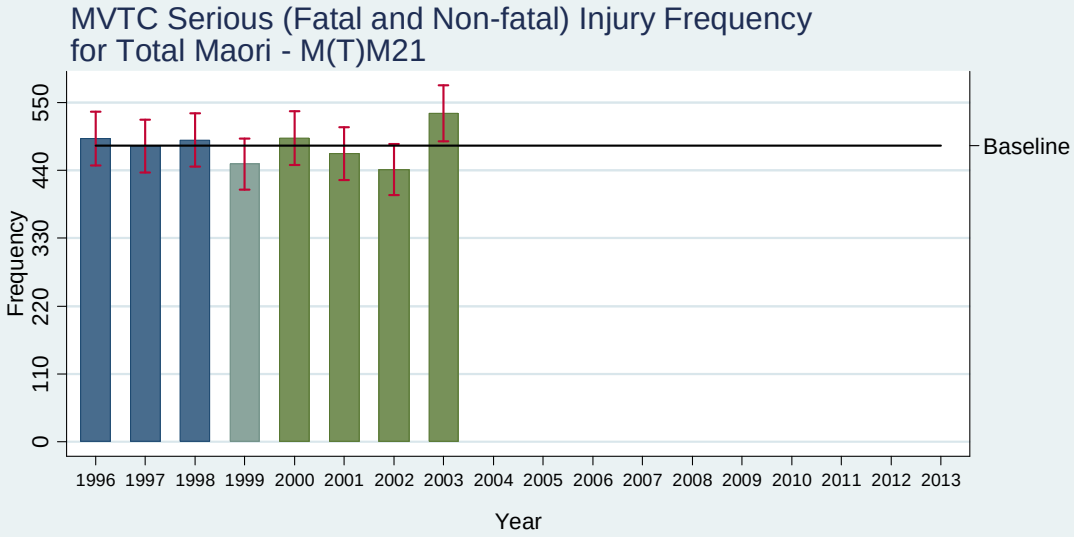
Note: 2003 data are provisional.
Source: New Zealand Health Information Service, Mortality Collection.



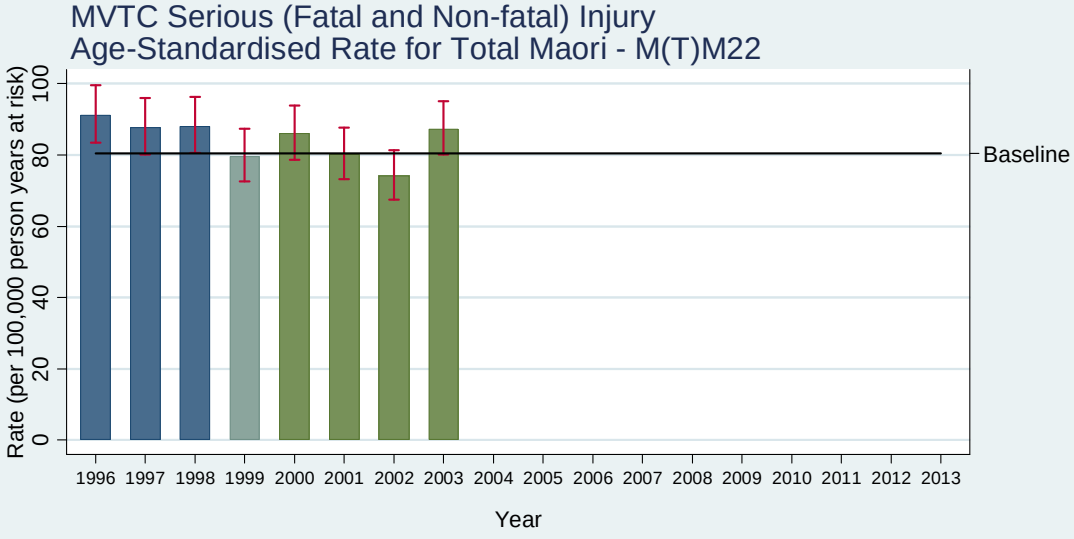
Note: 2003 data are provisional.
Source: New Zealand Health Information Service, Mortality Collection and Statistics New Zealand.

There was no strong evidence of a change in the frequencies (M(T)M11) and the rates (M(T)M12) of MVTC-related fatalities between 2000 and 2003.

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.



Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2003 data are provisional.
Source: New Zealand Health Information Service, National Minimum Data Set.
Source: New Zealand Health Information Service, Mortality Collection.



Note: 1999 data are affected by the changeover from ICD-9 to ICD-10. 2003 data are provisional.
Source: New Zealand Health Information Service, National Minimum Data Set.
Source: New Zealand Health Information Service, Mortality Collection and Statistics New Zealand.

There was no strong evidence of a change in the frequencies (M(T)M21) and the rates (M(T)M22) of MVTC-related serous injury between 2000 and 2003.

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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 [14], 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. [14] 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. [15] 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. [14] [16]

The NZIPS indicators are described below. The Māori injury indicators are identical to these, but obviously are restricted to the Māori population. Only those indicators that are based on sufficient numbers of cases are included in the lists of indicators shown in the boxes below. Additional to the indicators shown, in all instances listed except for work-related indicators, charts of the indicators relating to the frequency and rates of serious (fatal + serious non-fatal) injury indicators have also been produced.

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. [17]

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 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 (ie. work is an activity, not a location).

The scope for this area includes both unintentional and assaultive injury (eg. injury to a retail worker resulting from violence during a robbery). 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 or more of the following:

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

There is still considerable international debate about what should and should not be included. People travelling whilst at work are included within our 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, [18] 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 [18] [19] 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 facility it provides to NZHIS to code 'activity' in their mortality data and in their NMDS of hospitalisations, the opportunity to use these data to identify work-related cases has presented itself. As well, the use of data linkage (eg. the linkage of ACC data to NMDS) has opened up the possible derivation of valid indicators based on routinely collected and processed data.

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 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)

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. [20]

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.

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 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. [21]

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 may not 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 people aged 0-74 and 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 rates of death and hospitalisation as a result of falls in people aged 75 and over.

The NZIPS injury outcome indicators include:

- 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 injuries amongst people aged 75+. (NZHIS NMDS)
- Age-standardised fall-related serious non-fatal injury rate per 100,000 person-years for people aged 75+. (NZHIS NMDS)

F. Motor vehicle traffic crashes

A motor vehicle traffic crash (MVTC) 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. [21] 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)

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.

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 significant 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 priority areas for which Māori injury indicators were viable.

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. [22 4 5] This source was also used for the majority of the provisional indicators. Exceptions to this are the work-related injury indicators M(T)W01 & M(T)W02, which use ACC data linked to NZHIS NMDS data.

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 is one exception to the use of total population estimates for the denominators: M(T)W02 were be expressed as a rate per 100,000 workers. Full-time and part-time workers aged 15 years and over were included in the denominator. The source of these denominator data was 2001 Census data (SNZ).

B4 Definition of serious non-fatal injury

It has been the experience of staff of the Injury Prevention Research Unit (IPRU) 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. [23] [24]

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 to Māori, this represents around 10% 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.

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) was derived as the product of the probabilities of surviving each of their injuries individually.

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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.

The SRRs for each diagnosis were 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 were 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, that is for the period 1999-2005, 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. 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 were 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. [13]

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) [25] 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). [25]

Changes that occurred in other external causes groups, between 1998 and 1999, were much more consistent with chance variation. For some, the large difference between the figures for 1998 and 1999 were 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 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 result 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) [25]; the US CFs were taken from the paper published by Anderson and colleagues. [26] 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. [25] 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 an increase in the annual frequencies of serious non-fatal injuries (M(T)I01) fatal (M(T)I11) and of serious injuries (M(T)I21), and little evidence of a change in the rates (M(T)I02, M(T)I12, M(T)I22).

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

B7.3 Assault

The trends for the frequencies (M(T)A01) and rates (M(T)A02) of assaultive serious non-fatal injuries are similar. There is some evidence of an increase in the frequencies and rates from 2000 to 2001-5. Likewise, the trends for the frequencies (M(T)A21) and rates (M(T)A22) of serious assaultive injuries are similar. There is some evidence of an increase in the frequencies and rates from 2000 to 2001-3.

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.

B7.4 Work-related injury

The original proposal was to use ACC data on their own to produce the work-related injury indicators. On further discussion with key informants, there was a concern apparent about the possibility of a significant undercount, and potential misclassification of cases, if this approach was taken. Subsequent empirical investigation indicated a significant undercount of Māori when using ACC data alone.

The method used in this report for the calculation of the non-fatal work-related injury indicators was as described in the Cryer 2004 report [2] and used ACC data linked to NMDS of hospitalisations. The ACC data was used to identify work-related status, and the NMDS used to identify serious injury cases, ie with an ICISS $\leq$ 0.941. For this work, the authors could only access ACC-NMDS linked data for the period 2002 to 2004. It is intended that for any future Māori injury indicators chartbook update, that charts covering the period from the year 2001 will be presented.

For this current work, there was no evidence of a change in the frequencies or rates of serious non-fatal work-related injury over the period 2002 to 2004.

B7.5 Intentional self-harm.

Only the indicator values for 2001 and 2002 are based purely on ICD-10 coded data. Consequently, no comment on the trends for these indicators is appropriate (M(T)S11 and M(T)S12). Only after data have been added for further years will we be able to comment more confidently on trends.

There is no evidence of a change in the frequencies (M(T)S21) or rates (M(T)S22) 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 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 M(T)S21 and M(T)S22. 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 in serious injury frequencies or rates 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.

B7.6 Falls

As described earlier (Appendix B7.1), there was a significant change in the coding frames for falls within ICD-10 compared with ICD-9. 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 the chance of comparability.

All ages

The trends since 2000 in the frequency and rates of serious injuries resulting from falls suggest little apparent change (M(T)F01a, M(T)F02a, M(T)F21a, M(T)F22a).

Aged 0-74 years

The trends since 2000 in the frequency and rates of serious injuries resulting from falls suggest little apparent change (M(T)F01b, M(T)F02b, M(T)F21b, M(T)F22b).

Aged 75 years and over

Since 2000 there is a suggestion of an increase in the annual frequencies of serious non-fatal injuries resulting from falls (M(T)F01c), though little apparent change in the rates (M(T)F02c), for those aged 75 years and over. For serious injury, only the indicator values for 2001 and 2002 are based purely on ICD-10 coded data. Consequently, no comment on the trends for these indicators is appropriate (M(T)F21c and M(T)F22c).

B7.7 Motor vehicle traffic crashes

There is little apparent change in the trends in the frequencies and rates of MVTC-related serious non-fatal injury during the period 2000 to 2004, but with a sharp increase in frequency and rates in 2005 (M(T)M01, M(T)M02). There is no strong evidence of a change in the trends for frequencies and rates for fatal and serious injury (M(T)M11, M(T)M12, M(T)M21, M(T)M22).

Appendix C: Indicator specifications.

ID M(T)I01

Name ICISS-based All Serious Non-Fatal Injury Frequency for Total Māori

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

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Cases hospitalised for injury amongst Māori (Total) in a calendar year, who were discharged alive and had 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. [15].

ICISS scores have been calculated using the methods described in [27], [28].

In order to compare to earlier years the definition of an injury hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS NMDS

Denominator N/A

Calculation N/A

ID M(T)I02

Name ICISS-based All Serious Non-Fatal Injury Rate for Total Māori

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

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Cases hospitalised for injury amongst Māori (Total) in a calendar year, who were discharged alive and had 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. [15].

ICISS scores have been calculated using the methods described in [27], [28].

In order to compare to earlier years the definition of an injury hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS NMDS

(continued)

ID M(T)I02 (contd.)

Name ICISS-based All Serious Non-Fatal Injury Rate for Total Māori (contd.)

Denominator

Description Estimated Total Māori population as at 30 June of the relevant year.

Details The estimates used have been published by Statistics New Zealand. They are based on New Zealand Censuses and post-enumeration surveys 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 October 2006).

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-4, 5-9, 10-14, … 50-54, and 55 and above. The standard population was the provisional[g] estimated total Māori 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.

g This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)I11

Name All Fatal Injury Frequency for Total Māori

Concept of Interest Societal burden of fatal injury for Māori.

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Injury fatalities amongst Māori (Total) 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. [29] These are an underlying cause of death e-code in the range E800-E869, E880-E928 or E950-E999.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection

Denominator N/A

Calculation N/A

ID M(T)I12

Name All Fatal Injury Rate for Total Māori

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

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Injury fatalities amongst Māori (Total) 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. [29] These are an underlying cause of death e-code in the range E800-E869, E880-E928 or E950-E999.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October 2006)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-4, 5-9, 10-14, … 50-54, and 55 and above. The standard population was the provisional[h] estimated Total Māori 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.

[h] This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)I21

Name All Serious (Fatal + Non-Fatal) Injury Frequency for Total Māori

Concept of Interest Societal burden of fatal and serious non-fatal injury for Māori.

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Injury fatalities, and hospitalised cases with an ICISS score of 0.941 or less, in a calendar year for Māori.

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 [29]. These are an underlying cause of death e-code in the range E800-E869, E880-E928 or E950-E999.

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 [15].

ICISS scores have been calculated using the methods described elsewhere [27,28].

In order to compare to earlier years the definition of an injury hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection and NMDS

Denominator N/A

Calculation N/A

ID M(T)I22

Name All Serious (Fatal and Non-Fatal) Injury Rate for Total Māori

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

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Injury fatalities, and hospitalised cases with an ICISS score of 0.941 or less, in a calendar year for Māori.

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 [29]. These are an underlying cause of death e-code in the range E800-E869, E880-E928 or E950-E999.

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 [15].

ICISS scores have been calculated using the methods described elsewhere [27,28].

In order to compare to earlier years the definition of an injury hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection and NMDS

(continued)

ID M(T)I22

Name All Serious (Fatal and Non-Fatal) Injury Rate for Total Māori (contd.)

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October 2006)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-4, 5-9, 10-14, … 50-54, and 55 and above. The standard population was the provisional[i] estimated Total Māori 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.

[i] This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)A01

Name Provisional ICISS-based Serious Non-Fatal Assault Injury Frequency for Total Māori

Concept of Interest Societal burden of serious non-fatal injury from Assault for Māori.

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Cases hospitalised for assault amongst Māori (Total) in a calendar year, who were discharged alive, 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]. 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. [15].

ICISS scores have been calculated using the methods described in [27], [28].

In order to compare to earlier years the definition of an assault hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E960-E969. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS NMDS

Denominator N/A

Calculation N/A

ID M(T)A02

Name Provisional ICISS-based Serious Non-Fatal Assault Injury Rate for Total Māori

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

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Cases hospitalised for assault amongst Māori (Total) in a calendar year, who were discharged alive and had 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]. Assault hospitalisations are injury hospitalisations with a first external 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. [15].

ICISS scores have been calculated using the methods described in [27], [28].

In order to compare to earlier years the definition of an assault hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E960-E969. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS NMDS

(continued)

ID M(T)A02

Name Provisional ICISS-based Serious Non-Fatal Assault Injury Rate for Total Māori (contd.)

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October 2006)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-4, 5-9, 10-14, … 50-54, and 55 and above. The standard population was the provisional[j] estimated Total Māori 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.

j This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)A21

Name Provisional Serious (Fatal + Non-Fatal) Assault Injury Frequency for Total Māori

Concept of Interest Societal burden of fatal and serious non-fatal assault injury for Māori.

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Assault fatalities, and hospitalised cases with an ICISS score of 0.941 or less, in a calendar year for Māori.

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 an 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 [29]. These are an underlying cause of death e-code in the range E960-E969.

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]. 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 [15].

ICISS scores have been calculated using the methods described elsewhere [27,28].

In order to compare to earlier years the definition of an assault hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E960-E969. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection and NMDS

Denominator N/A

Calculation N/A

ID M(T)A22

Name Provisional Serious (Fatal + Non-Fatal) Assault Injury Rate for Total Māori

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

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Assault fatalities, and hospitalised cases with an ICISS score of 0.941 or less, in a calendar year for Māori.

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 an 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 [29]. These are an underlying cause of death e-code in the range E960-E969.

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]. 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 [15].

ICISS scores have been calculated using the methods described elsewhere [27,28].

In order to compare to earlier years the definition of an assault hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E960-E969. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection and NMDS

(continued)

ID M(T)A22

Name Provisional Serious (Fatal + Non-Fatal) Assault Injury Rate for Total Māori (contd.)

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October 2006)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-4, 5-9, 10-14, … 50-54, and 55 and above. The standard population was the provisional[k] estimated Total Māori 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.

[k] This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)W01

Name Provisional ICISS-based Serious Non-Fatal Work-Related Injury Frequency for Total Māori

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

Scope

Area	All injury
Gender	Both genders
Age	15-84
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description ACC claims for work-related injury for people aged 15 to 84 linked to hospitalisations for Māori (Total) in a calendar year, who were discharged alive, with an ICISS score of 0.941 or less.

Details ACC claims for work-related injury were identified from the Employers and the Self-Employed claims funds for injury that occurred in the relevant year. These ACC claims were linked to hospitalisations.

Hospitalisations have been operationally defined as all publicly funded discharges from hospitals. 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. [15].

ICISS scores have been calculated using the methods described in [27], [28].

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source ACC claims and NZHIS NMDS

Denominator N/A

Calculation N/A

ID M(T)W02

Name Provisional ICISS-based Serious Non-Fatal Work-Related Injury Rate for Total Māori

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

Scope

Area	All injury
Gender	Both genders
Age	15-84
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description ACC claims for work-related injury for people aged 15 to 84 linked to Māori (Total) hospitalisations in a calendar year, who were discharged alive, with an ICISS score of 0.941 or less.

Details ACC claims for work-related injury were identified from the Employers and the Self-Employed claims funds for injury that occurred in the relevant year. These ACC claims were linked to hospitalisations.

Hospitalisations have been operationally defined as all publicly funded discharges from hospitals. 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. [15].

ICISS scores have been calculated using the methods described in [27], [28].

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source ACC claims and NZHIS NMDS

(continued)

ID M(T)W02

Name Provisional ICISS-based Serious Non-Fatal Work-Related Injury Rate for Total Māori (contd.)

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October 2006)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-4, 5-9, 10-14, … 50-54, and 55 and above. The standard population was the provisional[1] estimated Total Māori working 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.

[1] This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)S11

Name Fatal Self-harm Injury Frequency for Total Māori

Concept of Interest Societal burden of fatal self-harm injury for Māori.

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Self-harm injury fatalities amongst Māori (Total) 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 with earlier years the definition of a self-harm fatality has been translated into equivalent ICD-9-CM-A codes. [29] These are an underlying cause of death e-code in the range E950-E959.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection

Denominator N/A

Calculation N/A

ID M(T)S12

Name Fatal Self-harm Injury Rate for Total Māori

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

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Self-harm injury fatalities amongst Māori (Total) 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. [29] These are an underlying cause of death e-code in the range E950-E959.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October, 2006)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-4, 5-9, 10-14, … 50-54, and 55 and above. The standard population was the provisional[m] estimated Total Māori 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.

[m] This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)S21

Name Provisional Serious (Fatal + Non-Fatal) Self-harm Injury Frequency for Total Māori

Concept of Interest Societal burden of fatal and serious non-fatal self-harm injury for Māori.

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Self-harm injury fatalities, and hospitalised cases with an ICISS score of 0.941 or less, in a calendar year for Māori.

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 [29]. These are an underlying cause of death e-code in the range E950-E959.

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]. 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 [15].

ICISS scores have been calculated using the methods described elsewhere [27,28].

In order to compare to earlier years the definition of a self-harm hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E950-E959. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection and NMDS

Denominator N/A

Calculation N/A

ID M(T)S22

Name Provisional Serious (Fatal + Non-Fatal) Self-harm Injury Rate for Total Māori

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

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Self-harm injury fatalities, and hospitalised cases with an ICISS score of 0.941 or less, in a calendar year for Māori.

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[29]. These are an underlying cause of death e-code in the range E950-E959.

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]. 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 [15].

ICISS scores have been calculated using the methods described elsewhere [27,28].

In order to compare to earlier years the definition of a self-harm hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E950-E959. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection and NMDS

(continued)

ID M(T)S22

Name Provisional Serious (Fatal + Non-Fatal) Self-harm Injury Rate for Total Māori (contd.)

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October 2006)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-4, 5-9, 10-14, … 50-54, and 55 and above. The standard population was the provisional[n] estimated Total Māori 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.

[n] This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)F01a

Name ICISS-based Serious Non-Fatal Falls Injury Frequency for Total Māori

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

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Cases hospitalised for falls amongst Māori (Total) in a calendar year, who were discharged alive, 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]. 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. [15].

ICISS scores have been calculated using the methods described in [27], [28].

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS NMDS

Denominator N/A

Calculation N/A

ID M(T)F02a

Name ICISS-based Serious Non-Fatal Falls Injury Rate for Total Māori

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

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Cases hospitalised for falls amongst Māori (Total) in a calendar year, who were discharged alive, 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]. Falls hospitalisations are injury hospitalisations with a first external 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. [15].

ICISS scores have been calculated using the methods described in [27], [28].

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS NMDS

(continued)

ID M(T)F02a

Name ICISS-based Serious Non-Fatal Falls Injury Rate for Total Māori (contd.)

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October, 2006)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-4, 5-9, 10-14, … 50-54, and 55 and above. The standard population was the provisional[o] estimated Total Māori 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.

[o] This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)F21a

Name Serious (Fatal + Non-Fatal) Falls Injury Frequency for Total Māori

Concept of Interest Societal burden of fatal and serious non-fatal falls injury for Māori.

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Falls fatalities, and hospitalised cases with an ICISS score of 0.941 or less, in a calendar year for Māori.

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 e-code in the range W00-W19.

In order to compare to earlier years the definition of a falls fatality has been translated into equivalent ICD-9-CM-A codes [29]. These are an underlying cause of death e-code in the range E880-E886 or E888.

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]. 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 [15].

ICISS scores have been calculated using the methods described elsewhere [27,28].

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection and NMDS

Denominator N/A

Calculation N/A

ID M(T)F22a

Name Serious (Fatal + Non-Fatal) Falls Injury Rate for Total Māori

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

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Falls fatalities, and hospitalised cases with an ICISS score of 0.941 or less, in a calendar year for Māori.

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 e-code in the range W00-W19.

In order to compare to earlier years the definition of a falls fatality has been translated into equivalent ICD-9-CM-A codes[29]. These are an underlying cause of death e-code in the range E880-E886 or E888.

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]. 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 [15].

ICISS scores have been calculated using the methods described elsewhere [27,28].

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection and NMDS

(continued)

ID M(T)F22a

Name Serious (Fatal + Non-Fatal) Falls Injury Rate for Total Māori (contd.)

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October, 2006)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-4, 5-9, 10-14, … 50-54, and 55 and above. The standard population was the provisional[p] estimated Total Māori 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.

[p] This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)F01b

Name ICISS-based Serious Non-Fatal Falls Injury Frequency for Total Māori aged 0-74 years.

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

Scope

Area	All Injury
Gender	Both genders
Age	0-74 years
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Cases hospitalised for falls amongst Māori (Total) in a calendar year, who were discharged alive, 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]. 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. [15].

ICISS scores have been calculated using the methods described in [27], [28].

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS NMDS

Denominator N/A

Calculation N/A

ID M(T)F02b

Name ICISS-based Serious Non-Fatal Falls Injury Rate for Total Māori aged 0-74 years.

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

Scope

Area	All Injury
Gender	Both genders
Age	0-74 years
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Cases hospitalised for falls amongst Māori (Total) in a calendar year, who were discharged alive, 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]. Falls hospitalisations are injury hospitalisations with a first external 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. [15].

ICISS scores have been calculated using the methods described in [27], [28].

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS NMDS

(continued)

ID M(T)F02b

Name ICISS-based Serious Non-Fatal Falls Injury Rate for Total Māori aged 0-74 years (contd.)

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October, 2006)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-4, 5-9, 10-14, … 50-54, and 55 and above. The standard population was the provisional[q] estimated Total Māori 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.

[q] This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)F21b

Name Serious (Fatal + Non-Fatal) Falls Injury Frequency for Total Māori aged 0-74 years

Concept of Interest Societal burden of fatal and serious non-fatal falls injury for Māori.

Scope

Area	All Injury
Gender	Both genders
Age	0-74 years
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Falls fatalities, and hospitalised cases with an ICISS score of 0.941 or less, in a calendar year for Māori.

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 e-code in the range W00-W19.

In order to compare to earlier years the definition of a falls fatality has been translated into equivalent ICD-9-CM-A codes [29]. These are an underlying cause of death e-code in the range E880-E886 or E888.

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]. 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 [15].

ICISS scores have been calculated using the methods described elsewhere [27,28].

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection and NMDS

Denominator N/A

Calculation N/A

ID M(T)F22b

Name Serious (Fatal + Non-Fatal) Falls Injury Rate for Total Māori aged 0-74 years

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

Scope

Area	All Injury
Gender	Both genders
Age	0-74 years
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Falls fatalities, and hospitalised cases with an ICISS score of 0.941 or less, in a calendar year for Māori.

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 e-code in the range W00-W19.

In order to compare to earlier years the definition of a falls fatality has been translated into equivalent ICD-9-CM-A codes[29]. These are an underlying cause of death e-code in the range E880-E886 or E888.

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]. 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 [15].

ICISS scores have been calculated using the methods described elsewhere [27,28].

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection and NMDS

(continued)

ID M(T)F22b

Name Serious (Fatal + Non-Fatal) Falls Injury Rate for Total Māori aged 0-74 years (contd.)

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October, 2006)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-4, 5-9, 10-14, … 50-54, and 55 and above. The standard population was the provisional[r] estimated Total Māori 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.

[r] This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)F01c

Name ICISS-based Serious Non-Fatal Falls Injury Frequency for Total Māori aged 75 years and over

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

Scope

Area	All Injury
Gender	Both genders
Age	75 years and over
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Cases hospitalised for falls amongst Māori (Total) in a calendar year, who were discharged alive, 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]. 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. [15].

ICISS scores have been calculated using the methods described in [27], [28].

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS NMDS

Denominator N/A

Calculation N/A

ID M(T)F02c

Name ICISS-based Serious Non-Fatal Falls Injury Rate for Total Māori aged 75 years and older.

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

Scope

Area	All Injury
Gender	Both genders
Age	75 years and over
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Cases hospitalised for falls amongst Māori (Total) in a calendar year, who were discharged alive, 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]. Falls hospitalisations are injury hospitalisations with a first external 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. [15].

ICISS scores have been calculated using the methods described in [27], [28].

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS NMDS

(continued)

ID M(T)F02c

Name ICISS-based Serious Non-Fatal Falls Injury Rate for Total Māori aged 75 years and older (contd.)

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October, 2006)

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 provisional[s] estimated Total Māori 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.

[s] This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)F21c

Name Serious (Fatal + Non-Fatal) Falls Injury Frequency for Total Māori aged 75 years and older

Concept of Interest Societal burden of fatal and serious non-fatal falls injury for Māori.

Scope

Area	All Injury
Gender	Both genders
Age	75 years and older
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Falls fatalities, and hospitalised cases with an ICISS score of 0.941 or less, in a calendar year for Māori.

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 e-code in the range W00-W19.

In order to compare to earlier years the definition of a falls fatality has been translated into equivalent ICD-9-CM-A codes [29]. These are an underlying cause of death e-code in the range E880-E886 or E888.

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]. 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 [15].

ICISS scores have been calculated using the methods described elsewhere [27,28].

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection and NMDS

Denominator N/A

Calculation N/A

ID M(T)F22c

Name Serious (Fatal + Non-Fatal) Falls Injury Rate for Total Māori aged 75 years and older

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

Scope

Area	All Injury
Gender	Both genders
Age	75 years and older
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Falls fatalities, and hospitalised cases with an ICISS score of 0.941 or less, in a calendar year for Māori.

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 [3]. Falls fatalities are injury fatalities with an underlying cause of death e-code in the range W00-W19.

In order to compare to earlier years the definition of a falls fatality has been translated into equivalent ICD-9-CM-A codes[29]. These are an underlying cause of death e-code in the range E880-E886 or E888.

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]. 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 [15].

ICISS scores have been calculated using the methods described elsewhere [27,28].

In order to compare to earlier years the definition of a falls hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. 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. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection and NMDS

(continued)

ID M(T)F22c

Name Serious (Fatal + Non-Fatal) Falls Injury Rate for Total Māori aged 75 years and older (contd.)

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October, 2006)

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 provisional[t] estimated Total Māori 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.

[t] This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)M01

Name ICISS-based Serious Non-Fatal MVTC Injury Frequency for Total Māori

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

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Cases hospitalised following MVTC amongst Māori (Total) in a calendar year, who were discharged alive, 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]. 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. [15].

ICISS scores have been calculated using the methods described in [27], [28].

In order to compare to earlier years the definition of a MVTC hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E810-E819. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS NMDS

Denominator N/A

Calculation N/A

ID M(T)M02

Name ICISS-based Serious Non-Fatal MVTC Injury Rate for Total Māori

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

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description Cases hospitalised following MVTC amongst Māori (Total) in a calendar year, who were discharged alive, 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]. 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. [15].

ICISS scores have been calculated using the methods described in [27], [28].

In order to compare to earlier years the definition of a MVTC hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E810-E819. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS NMDS

(continued)

ID M(T)M02

Name ICISS-based Serious Non-Fatal MVTC Injury Rate for Total Māori (contd.)

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October, 2006)

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 provisional[u] estimated Total Māori 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.

[u] This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)M11

Name Fatal MVTC Injury Frequency for Total Māori

Concept of Interest Societal burden of fatal MVTC injury for Māori.

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description MVTC fatalities amongst Māori (Total) 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 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).

In order to compare with earlier years the definition of a MVTC fatality has been translated into equivalent ICD-9-CM-A codes. [29] These are an underlying cause of death e-code in the range E810-E819.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection

Denominator N/A

Calculation N/A

ID M(T)M12

Name Fatal MVTC Injury Rate for Total Māori

Concept of Interest Individuals' average annual risk of fatal MVTC injury for Māori.

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description MVTC injury fatalities amongst Māori (Total) 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 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).

In order to compare to earlier years the definition of a MVTC fatality has been translated into equivalent ICD-9-CM-A codes. [29] These are an underlying cause of death e-code in the range E810-E819.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October, 2006)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-4, 5-9, 10-14, … 50-54, and 55 and above. The standard population was the provisional[v] estimated Total Māori 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.

[v] This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

ID M(T)M21

Name Serious (Fatal + Non-Fatal) MVTC Injury Frequency for Total Māori

Concept of Interest Societal burden of fatal and serious non-fatal MVTC injury for Māori.

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description MVTC fatalities, and hospitalised cases with an ICISS score of 0.941 or less, in a calendar year for Māori.

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 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).

In order to compare to earlier years the definition of a MVTC fatality has been translated into equivalent ICD-9-CM-A codes [29]. These are an underlying cause of death e-code in the range E810-E819.

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]. 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 [15].

ICISS scores have been calculated using the methods described elsewhere [27,28].

In order to compare to earlier years the definition of a MVTC hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E810-E819. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection and NMDS
(continued)

ID M(T)M21

Name Serious (Fatal + Non-Fatal) MVTC Injury Frequency for Total Māori (contd.)

Denominator N/A

Calculation N/A

ID M(T)M22

Name Serious (Fatal + Non-Fatal) MVTC Injury Rate for Total Māori

Concept of Interest Individuals' average annual risk of fatal and serious non-fatal MVTC injury for Māori.

Scope

Area	All Injury
Gender	Both genders
Age	All ages
Ethnicity	Māori (Total)

Source Organisation Developed by IPRU and Ngai Tahu Māori Health Research Unit for NZIPS.

Numerator

Description MVTC injury fatalities, and hospitalised cases with an ICISS score of 0.941 or less, in a calendar year for Māori.

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 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).

In order to compare to earlier years the definition of a MVTC fatality has been translated into equivalent ICD-9-CM-A codes[29]. These are an underlying cause of death e-code in the range E810-E819.

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]. 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 [15].

ICISS scores have been calculated using the methods described elsewhere [27,28].

In order to compare to earlier years the definition of a MVTC hospitalisation has been translated into equivalent ICD-9-CM-A codes [29]. These are a principal diagnosis in the range 800-904 or 910-995 and a first e-code in the range E810-E819. An equivalent ICISS threshold for the ICD-9-CM-A data is estimated as an ICISS score of 0.96 or less.

Māori ethnicity was allocated to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori, either sole or total, in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

Source NZHIS Mortality Collection and NMDS

ID M(T)M22

Name Serious (Fatal + Non-Fatal) MVTC Injury Rate for Total Māori (contd.)

Denominator

Description Estimated Total Māori 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 New Zealand Censuses and post-enumeration surveys 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 October, 2006)

Source Statistics New Zealand

Calculation Age standardised rate. Age standardisation was via the direct method with age groups of 0-4, 5-9, 10-14, … 50-54, and 55 and above. The standard population was the provisional[w] estimated Total Māori 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.

[w] This is due to be updated in 2007 based on figures from the 2006 Census. This will be too late for this Chartbook. In subsequent Chartbooks, the updated figures should be used.

Appendix D: Validation of the "ever-Māori" approach for hospitalisations and deaths

Background

When deriving counts for total Māori using NZHIS Mortality Collection and NMDS of hospital discharges, historically there has been an undercount for Māori. For deaths, the New Zealand Census Mortality Study (NZCMS) has provided estimates of that undercount, compared with the Census, for the period 1996 to 1999. [30 31 32] Within NZCMS, these have been presented as adjustment ratios. These adjustment ratios could be used to derive the fatal injury indicators for 1996 to 1999, but they cannot be extrapolated to the period 2000 to 2005, nor can they be used to adjust for an undercount in hospitalisation data.

For the calculation of these national indicators, an alternative method was sought. The ever-Māori method was recommended in our discussions with Craig Wright (PHI), Tony Blakely and Bridget Robson (Wellington School of Medical and Health Sciences), and Joanne Baxter (Dunedin School of Medicine), and has been used in some recent reports produced or published by the Ministry of Health. [11 12] This is the method we chose to use. There is a question of how well the ever-Māori method corrects for the Māori undercount and the numerator-denominator bias between numerators produced from

a) the NZHIS Mortality Collection and
b) the NMDS of hospitalisations,

and denominators derived from the Census data over the period 1996 to 2005. This appendix seeks to investigate that question.

The specific research questions, to test the validity of the ever-Māori approach, were as follows.

1. **Fatal injury – trend comparison.**
   Do the fatal injury trends when using the ever-Māori method reflect the trends produced when NZCMS adjustment ratios are applied to the total Māori count?

2. **Fatal injury – adjustment ratio comparisons.**
   For injury deaths, for all ages and for specific age groups, how similar are the percentage increases from the NZHIS Mortality Collection total Māori count, to the Māori count using the ever-Māori method, for the period 1996 to 1999, compared with the NZCMS adjustment ratios for "injury/suicide"?

3. **Hospital data – adjustment ratio comparisons.**
   How similar are the percentage increases from the NMDS-based total Māori count to the count when using the "ever Māori" method for (a) serious non-fatal injuries and for (b) injury deaths in hospital – separately for the periods 1996-1999, and 2000-2005?

4. **Fatal and non-fatal injury – ever-Māori versus unadjusted trends.**
   How similar are the trends when using the ever-Māori method compared with those using total Māori from single records – from the Mortality Collection for the fatal injury indicators, and from the NMDS of hospitalisations for the serious non-fatal injury indicators?

In respect of the questions (1) to (3), if the ever-Māori method is appropriately adjusting for undercount and / or bias, then the result will be that each of these will show similar trends and similar adjustment ratios. (4) is a final test of whether the method used to identify Māori matters when the interest is in trends over time – rather than absolute counts.

The NZCMS adjustment ratios used in (1) and (2) were derived as follows. [31] For the period 1996-1999, the NZCMS study team linked the mortality data for 1997-1999 to 1996 census data. For high probability links, the counts for Māori from the mortality data were contrasted with those from the census data - from which adjustment ratios were derived. This was done overall and for a number of strata including gender and age. The age categories used were 0-14, 15-24, 25-44, 45-64, and 65-77. Interpolation and extrapolation (with the exception of those <1 years of age which was derived by comparing birth registrations to census counts for Māori) were used to generate adjustment ratios for the following age categories: <1, 1-4, 5-9, ... 75-79. 80-84, and 85+ years. [31]

Method

The ever Māori method allocated Māori ethnicity to a case according to whether or not any previous admission for patients (as identified by their unique NHI identifiers) had been recorded as Māori in any NMDS admission record (1982-2006), cancer registry record (1948-2006), PHO data (2006), or on the Mortality Collections (1988-2003).

1. Fatal injury – trend comparison.

We compared trends in the fatal injury indicators for the period 1996 to 1999 for counts derived using:
(a) ever-Māori;
(b) NZCMS adjustment ratios applied to NZHIS total Māori counts from the Mortality Collection.

For (a), the age categories of 0-4, 5-9, 10-14, …, 50-54, 55+ were used in the age-standardisation of ever-Māori counts. For (b) we used 5-year age categories when applying the NZCMS adjustment ratios and also used them for standardisation of rates. These adjustment ratios can be found on pp 60-61 of Ajwani et al. (2003). [30]

2. Fatal injury – adjustment ratio comparisons.

This approach to validation is similar to that used in the reports 'Tatau Kahukura: Māori Health Chartbook' (2006) and 'Unequal Impact' (2006). [11] [12]

For the Mortality Collection data, the ever-Māori adjustment ratios were estimated as the percentage increase in the Māori count using the "ever Māori" method compared with total Māori count for the period 1996 to 1999. This was compared with the 10% increase (ie. adjustment ratio = 1.10) obtained in the NZCMS for "injury/suicide", published in Ajwani et al. (2003). [31]

For the period 1996-1999, we also compared the increase in Māori counts using the ever-Māori method against NZCMS adjustment ratios for each age group. NZCMS age groups 0-14, 15-24, 25-44, 45-64, and 65-77. For these age groups, the NZCMS adjustment ratios are: 1.08, 1.13. 1.10, 1.05, and 1.07, respectively. [31]

3. Hospital data – adjustment ratio comparisons.

From the NMDS data, we estimated and compared the percentage increases from the NMDS-based total Māori count to the count when using the "ever Māori" method for (a) serious non-fatal injuries and for (b) injury deaths in hospital – separately for the periods 1996-1999, and 2000-2005. If there was no residual undercount when using the "ever-Māori" method for admissions in general, the inflation in counts (adjustment ratios) for the non-fatal and the fatal cases were expected to be similar.

4. Fatal and non-fatal injury – ever-Māori versus unadjusted trends.

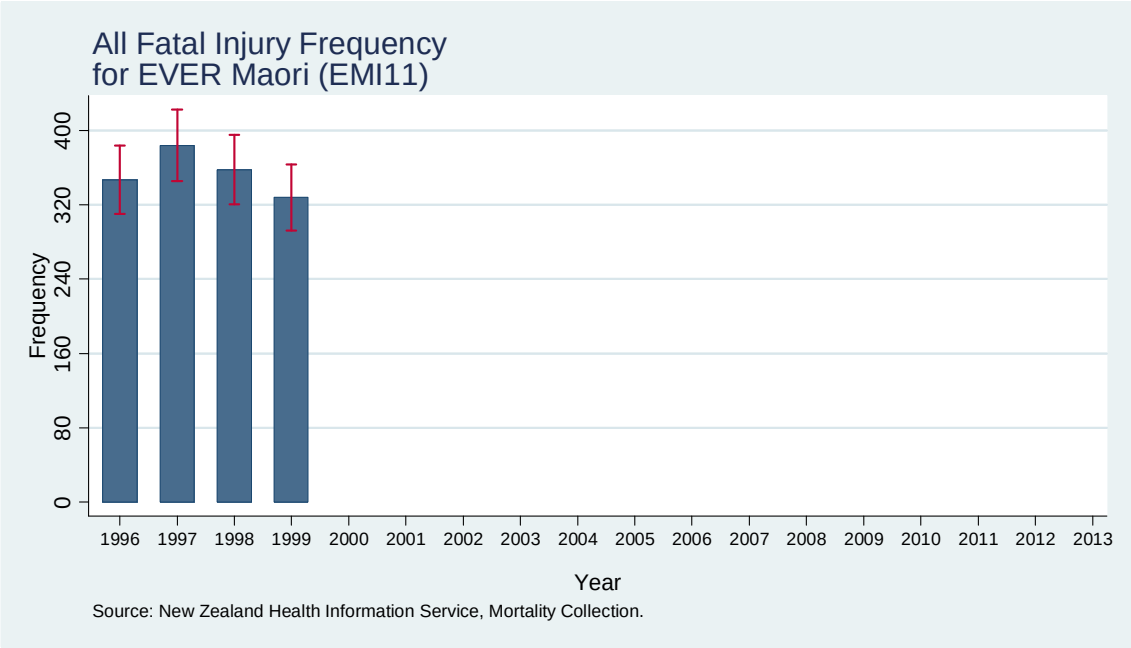
There was a concern that the ever-Māori method may tend to over-count cases of Māori in the more recent years. In order to investigate this, we were encouraged to carry out comparisons of trends when using ever-Māori with total Māori – the latter from single records (from the Mortality Collection for the fatal injury indicators, and from the NMDS of hospitalisations for the serious non-fatal injury indicators). If the ever-Māori method was over-counting in the most recent years, it would cause a bias in the slope of the trend – biased in the positive direction. This would not be the case when using ethnic group classification from single records to identify Māori.

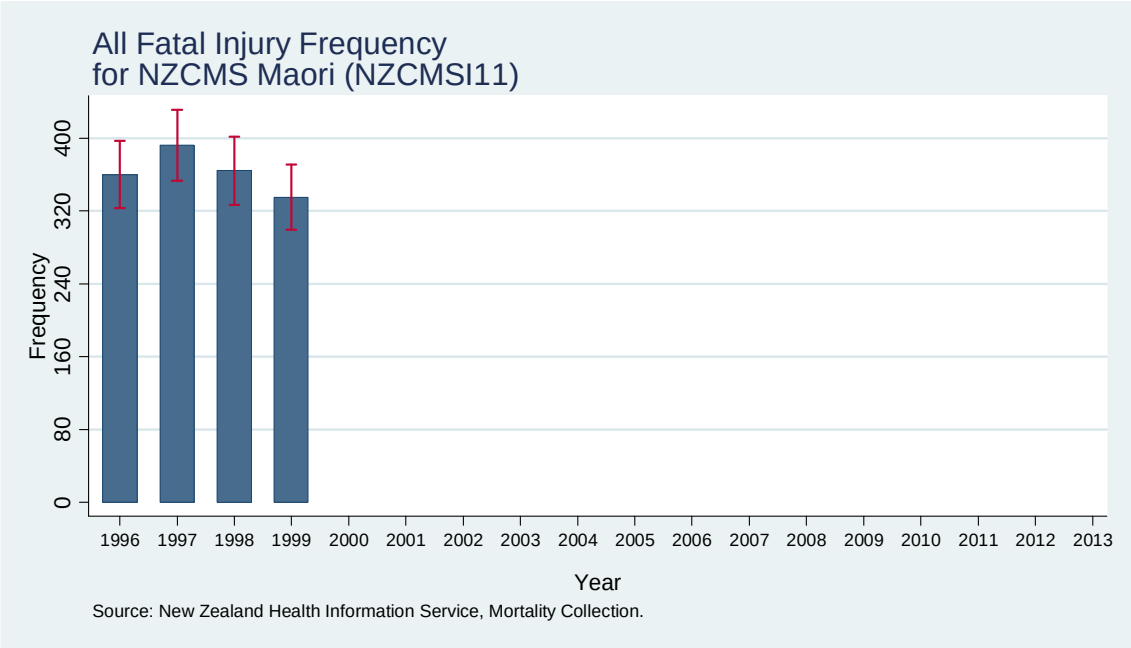
Results

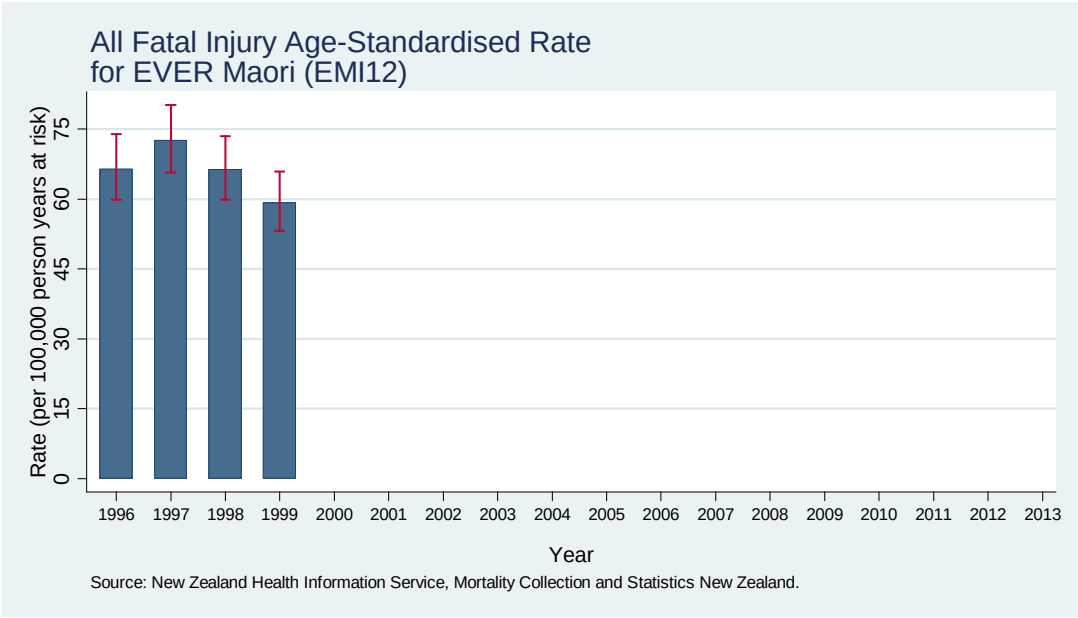
1. Fatal injury – trend comparison.

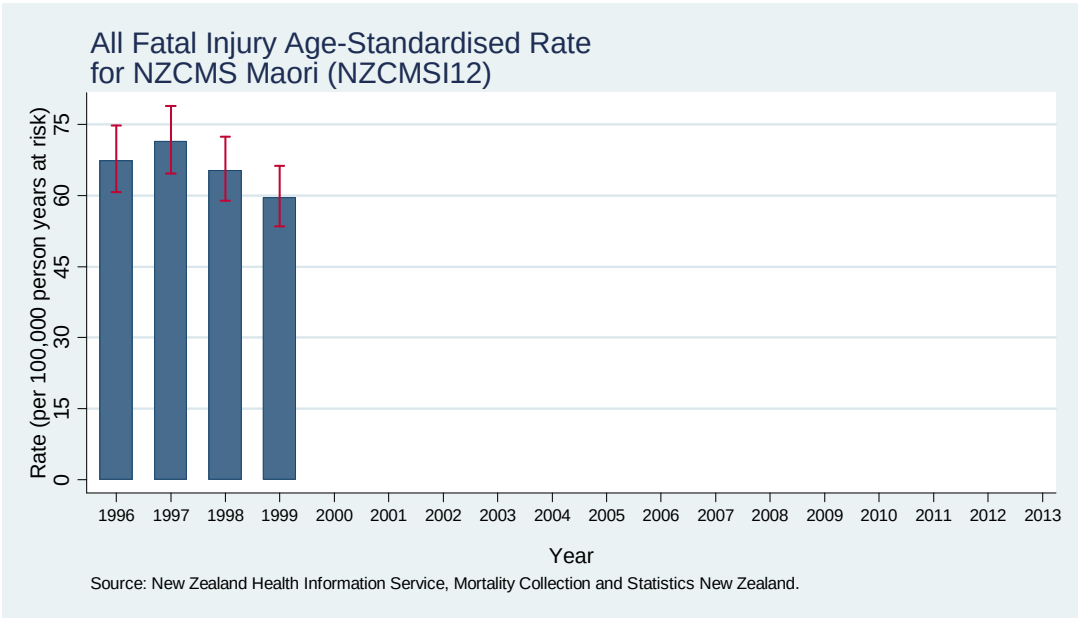
Trends for the period 1996 to 1999 are shown in Figure 1 based on (a) the ever-Māori method and (b) using NZCMS weights.

Figure 1: All fatal injury frequencies and rates for 1996 to 1999 for Māori estimated using (a) the ever-Māori method and (b) NZCMS weights.









The frequencies, rates and the trends are very similar for the NZHIS Mortality Collection undercount corrected using the ever-Māori method or using the NZCMS adjustment ratios.

2. Fatal injury – adjustment ratio comparisons.

We compared the inflation of the Māori counts when using the ever-Māori method with NZCMS adjustment ratios, for the period 1996 to 1999 across all ages and for specific age groups. This is shown in Table 2. In this table, the value of 1.09 represents a 9% increase in Māori counts.

Table 2: Adjustment ratios for injury for the ever-Māori method and from the NZCMS, 1996-1999.

Age group	Adjustment ratios	
	Ever-Māori	NZCMS
0-14	1.09	1.08
15-24	1.06	1.13
25-44	1.07	1.10
45-64	1.06	1.05
65-77	1.16	1.07
All ages	1.07	1.10

This table indicates that the ever-Māori method over-compensated for the undercount for people aged 65 and over, and under-compensated for people aged 15-44.

3. Hospital data – adjustment ratio comparisons.

The ever-Māori adjustment ratio for (a) serious non-fatal injuries and for (b) injury deaths in hospital – separately for the periods 1996-1999, and 2000-2005 - are shown in Table 3.

Table 3: Ever-Māori adjustment ratio for (a) serious non-fatal injuries and for (b) injury deaths in hospital – separately for the periods 1996-1999, and 2000-2005

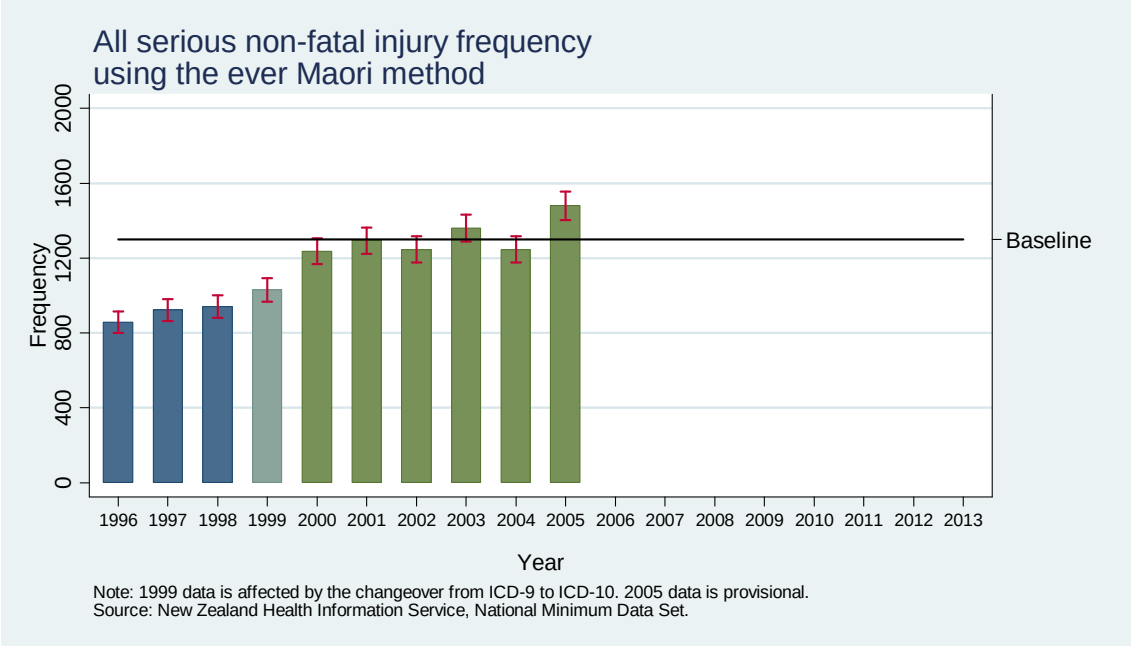
Period	Ever-Māori adjustment ratios	
	Fatals	Non-fatals
1996-99	1.37	1.35
2000-05	1.15	1.23

If there was no residual undercount when using the "ever-Māori" method for admissions in general, the adjustment ratios for the non-fatal and the fatal cases would be expected to be similar. This is the case for the period 1996-99. Surprisingly, the adjustment ratio for the serious non-fatal injury was greater than the equivalent ratio for fatal injury for the period 2000-05.

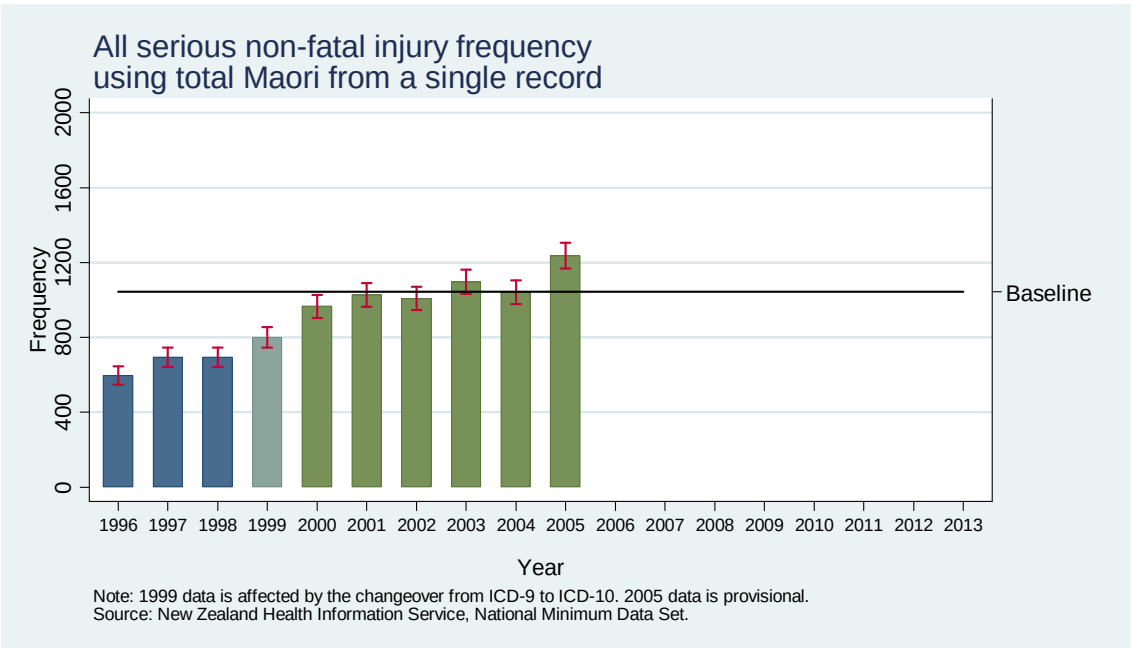
4. Fatal and non-fatal injury – ever-Māori versus unadjusted trends.

Each of the following trends shows a lower count when just using the ethnic group classification from single Mortality Collection records or NMDS hospital discharge records than when using the ever-Māori method (Figure 2). Nevertheless, the trends show similar patterns.

Figure 2: Charts contrasting rates and frequencies using the ethnic group classification from the Mortality Collection record or the NMDS hospital discharge record compared with when using the ever-Māori method

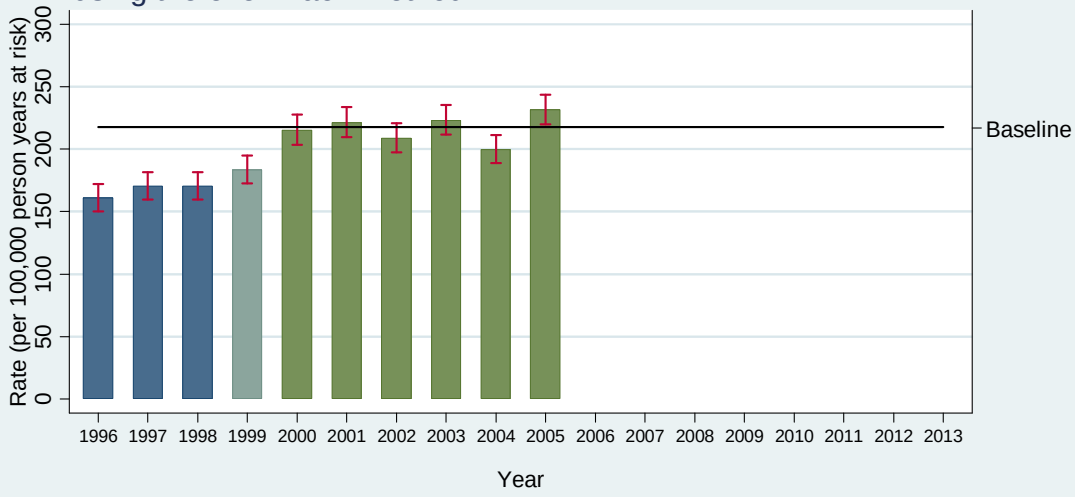


Note: 1999 data is affected by the changeover from ICD-9 to ICD-10. 2005 data is provisional.
Source: New Zealand Health Information Service, National Minimum Data Set.



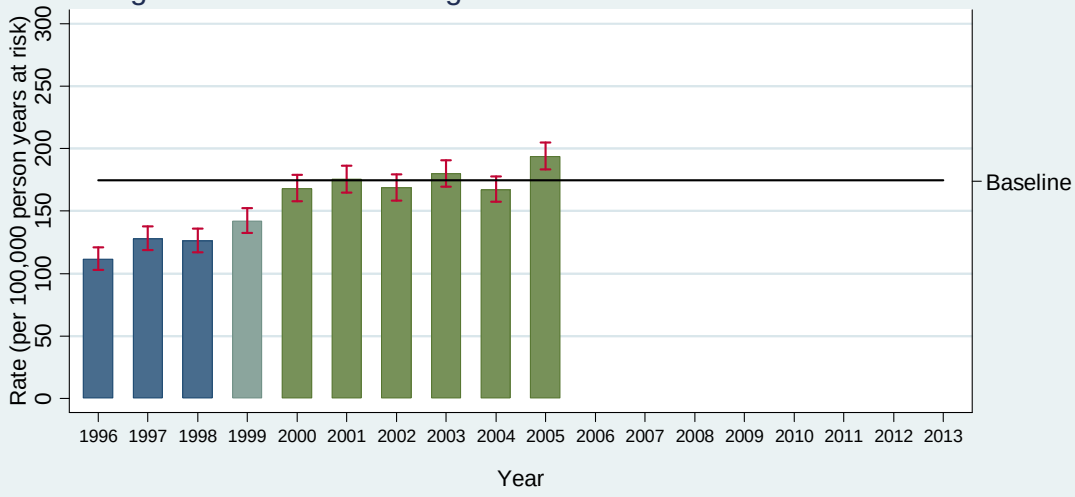
Note: 1999 data is affected by the changeover from ICD-9 to ICD-10. 2005 data is provisional.
Source: New Zealand Health Information Service, National Minimum Data Set.

All serious non-fatal injury age-standardised rate using the ever Maori method

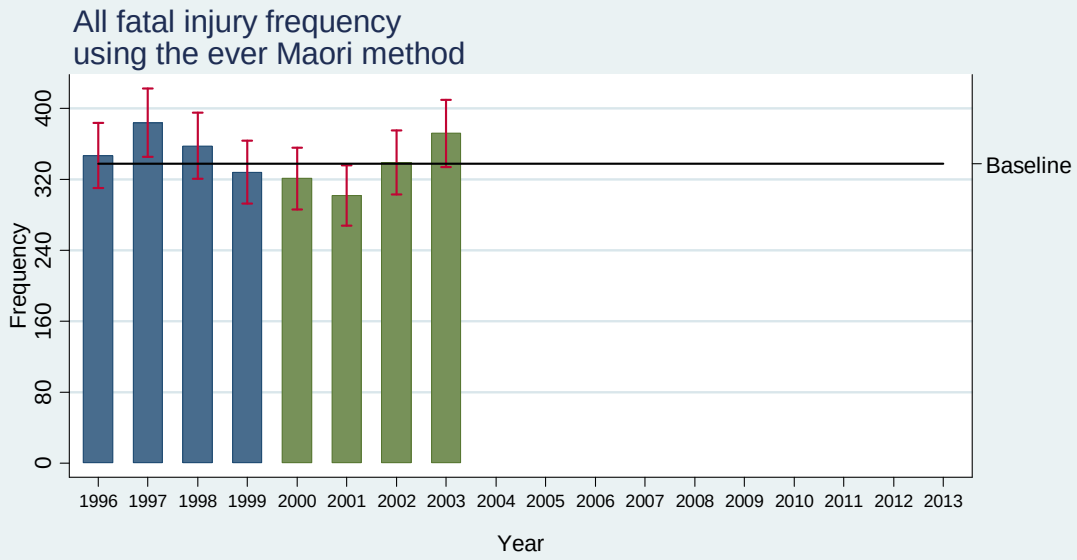


Note: 1999 data is affected by the changeover from ICD-9 to ICD-10. 2005 data is provisional.
Source: New Zealand Health Information Service, National Minimum Data Set and Statistics New Zealand.

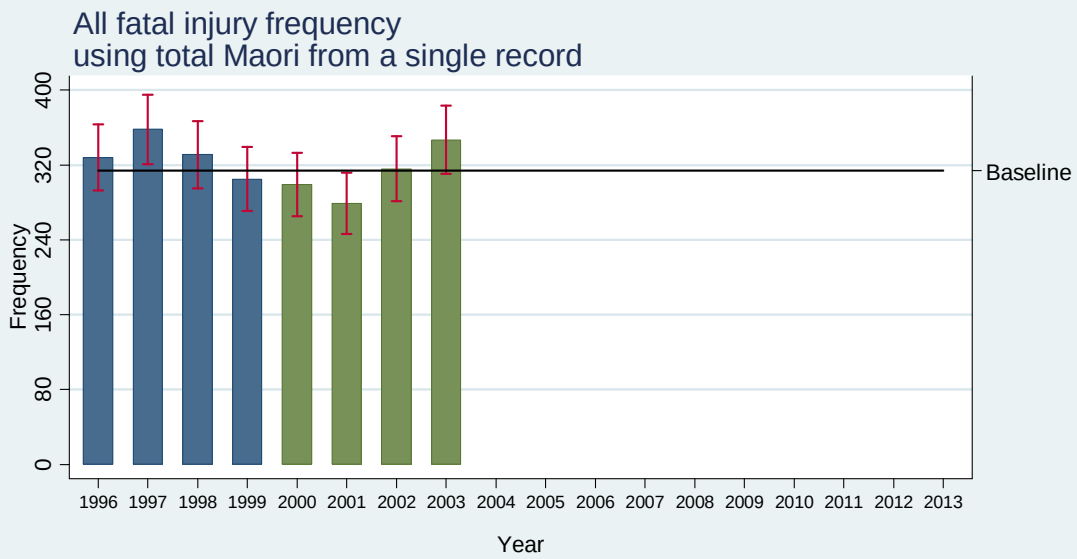
All serious non-fatal injury age-standardised rate using total Maori from a single record



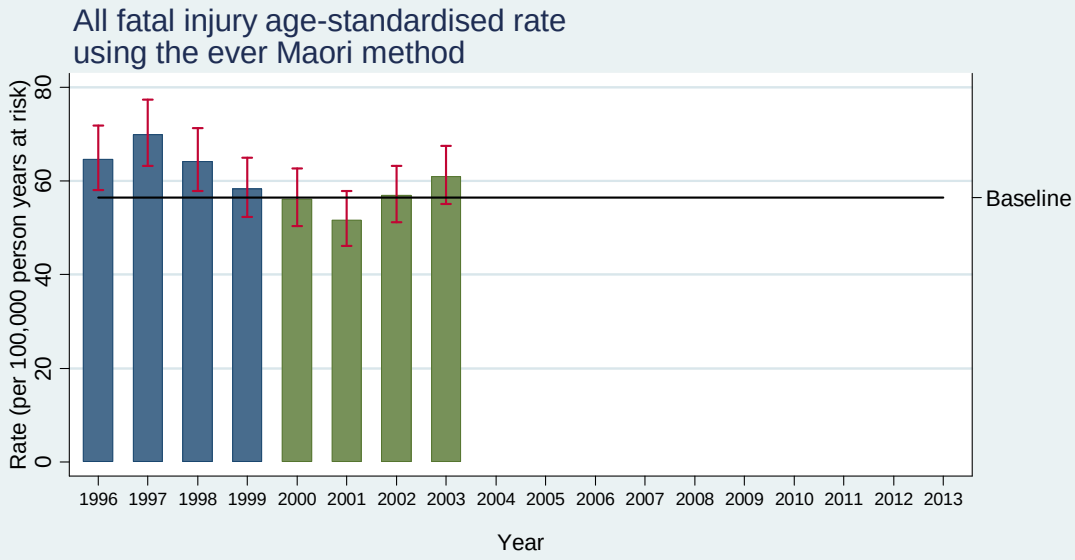
Note: 1999 data is affected by the changeover from ICD-9 to ICD-10. 2005 data is provisional.
Source: New Zealand Health Information Service, National Minimum Data Set and Statistics New Zealand.



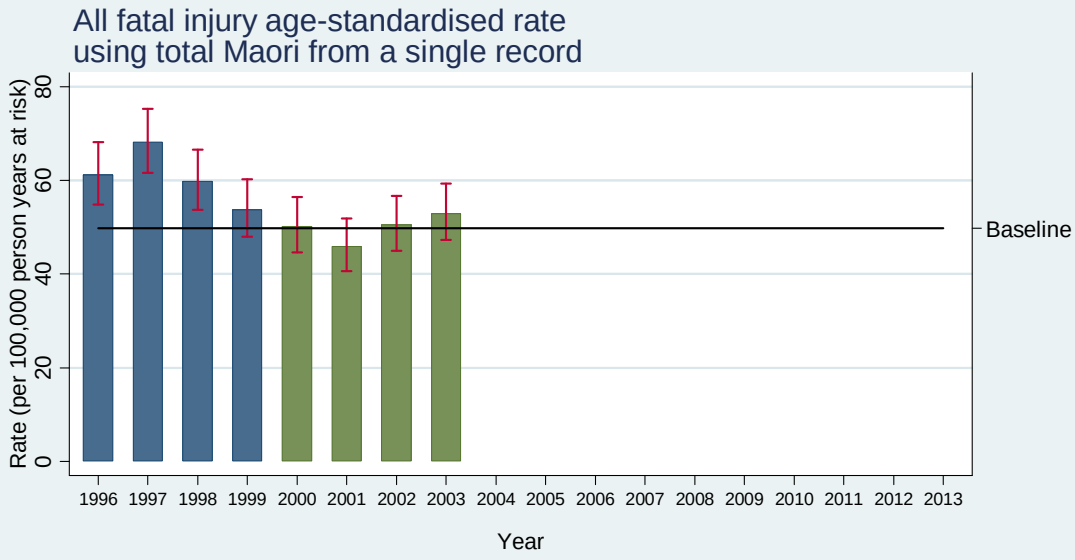
Note: 2003 data is provisional.
Source: New Zealand Health Information Service, Mortality Collection.



Note: 2003 data is provisional.
Source: New Zealand Health Information Service, Mortality Collection.



Note: 2003 data is provisional.
Source: New Zealand Health Information Service, Mortality Collection and Statistics New Zealand.



Note: 2003 data is provisional.
Source: New Zealand Health Information Service, Mortality Collection and Statistics New Zealand.

Discussion

Fatal injury

For the period 1996-1999, age-specific adjustment ratios in Māori counts using the ever-Māori method show some variance from the NZCMS adjustment ratios for equivalent age groups. This would suggest that the ever-Māori method under-inflates the counts for the ages 15-44, and over-inflates for people aged 65 and over. Nevertheless, this seems to even itself out for these 'all age' indicators. The ever-Māori method appears to produce very similar trends in the 'all injury' indicators compared with the indicators produced using NZCMS adjustment ratios. This is reassuring and suggests that for this period, the ever-Māori method produces 'all age' counts to an acceptable level of accuracy.

Non-fatal injury

The methods used to validate the ever-Māori method, when applied to NMDS hospitalisation data, appears to show almost identical adjustment ratios for fatal and non-fatal injuries for the period 1996 to 1999. This suggests no undercount, but it is not definitive proof for the following reason. The ever-Māori adjustment ratio derived from the Mortality Collection was based on cases identified as injuries from the underlying cause of death field. We have found that around 60% of people who are admitted to hospital with a primary diagnosis of injury and who subsequently die in hospital, were found on the NZHIS Mortality Collection with an underlying cause of death other than injury (eg. circulatory disease). [33] [34] Consequently, even though the ever-Māori method seems to have acceptable validity compared with the NZCMS approach, when based on injury as classified in the NZHIS Mortality Collection data, the same will not necessarily be true for the much greater number of cases admitted to hospital with a primary diagnosis of injury, who die in hospital.

The adjustment ratio for serious non-fatal injury was greater than the equivalent ratio for fatal injury for the period 2000 to 2005 (Table 3). The difference is in the opposite direction to what one might expect, since the ever-Māori method is able to draw on an additional data source (namely the Mortality Collection) for fatal cases, compared with non-fatal injury cases. Consequently, one would expect the underlying adjustment ratios to be equivalent or for it to be greater for fatals than non-fatals.

The NZCMS adjustment ratios for the period 2000 to 2005 are yet to be published. These are currently being derived by researchers involved in the Health Inequalities Research Programme at the Wellington School of Medical and Health Sciences. Until they are, we do not know how good the ever-Māori method is when using the data from the Mortality Collection for the 2000-2005 time period. It is conceivable that the ever-Māori method is now over-counting cases of Māori deaths during this period; however it may be no worse for fatals than for the non-fatal hospital discharge cases.

This uncertainty regarding an over-count will not be resolved until the NZCMS adjustment ratios for 2000 to 2005 are available. Draft results produced by Tony Blakely and his team suggests there should be no adjustment for this period (Tony

Blakely, personal correspondence, 16 May 2007). Unpublished work of Bridget Robson and her colleagues suggests that the number of deaths classified to Māori using the ever Māori method has increased in recent years. Their work in progress suggests that this method produces counts around 8% higher for 2000-2004 than using death registration ethnicity only. (Bridget Robson, personal correspondence, 28 April).

Despite the above, the results relating to question 4 do not suggest a bias in the trends sufficient to threaten the validity of our fatal or our non-fatal indicators (see below).

Comparison of the trends in counts using two methods.

The trends shown in the results section in relation to question 4 (Figure 2) show a lower count when just using the ethnic group classification from the Mortality Collection record or the NMDS hospital discharge record than when using the ever-Māori method. Nevertheless, the trends show similar patterns. This is reassuring since it suggests that the ever-Māori method is not discernibly over-estimating Māori in later years compared with earlier. Additionally, it suggests that for trend analyses, the direction of the trends do not appear to be critically dependent on the ethnic group classification method that is used.