TE OHONGA AKE

THE HEALTH STATUS OF MĀORI CHILDREN AND YOUNG PEOPLE IN NEW ZEALAND

SERIES TWO

Te Ohonga Ake
The Health Status of Māori Children and Young People in New Zealand
Series Two

New Zealand Child and Youth Epidemiology Service

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While every endeavour has been made to use accurate data in this report, there are currently variations in the way data are collected from DHBs and other agencies that may result in errors, omissions or inaccuracies in the information in this report. The NZCYES does not accept liability for any inaccuracies arising from the use of these data in the production of these reports, or for any losses arising as a consequence thereof.

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EXECUTIVE SUMMARY

This report provides information on the health status of Māori tamariki and rangatahi focusing on findings from selected indicators from New Zealand's national health data collections. A multitude of factors affect how Māori tamariki and rangatahi experience health and the data describing many of these factors are not gathered routinely. This report focuses on indicators available from health sector datasets and provides information on factors that affect the long-term health of children and young people including health outcomes for Māori children and young people living in New Zealand.

This report's findings show there have been improvements in some health outcomes among young Māori over time, however disparities remain very evident across many indicators.

Overall mortality and hospitalisations

Analysis of the data obtained from the Ministry of Health collections show that for Māori, on average, 52 children aged 1–14 years, and 123 young people aged 15–24 years, died each year between 2008 and 2012, and on average, there were 32,385 hospitalisations of 0–14 year olds and 28,080 hospitalisations of 15–24 year olds each year between 2010–2014.

Where are health outcomes improving over time?

The rate of infant mortality among Māori almost halved between 1996 and 2012. The rate fell for both Māori and non-Māori non-Pacific infants, however, the fall was more marked for Māori. The overall rate of sudden unexpected death in infancy (SUDI) fell from over four per 1,000 live births in 1996 to just over one death per 1,000 live births in 2012 and again this reduction was most marked among Māori. Despite this, from 2008 to 2012, Māori infants were still close to being twice as likely to die as non-Māori non-Pacific infants and they were nearly three times more likely than non-Māori non-Pacific infants to die during the post-neonatal period.

The rates for hospitalisation for meningococcal disease among Māori aged 0–24 years have dropped dramatically since 2001 and the disparity in rates between Māori and non-Māori non-Pacific children and young people has reduced. Never-the-less, during 2010–2014, hospitalisation rates for Māori 0–24 year olds with meningococcal disease were still more than three and a half times those of non-Māori non-Pacific children and young people. Among Māori, the youngest children, aged 0 and 1 years, continued to have the highest rates of hospitalisation for meningococcal disease.

A noticeable decrease was seen in hospitalisation rates for skin infections among Māori 0–24 year olds from 2010 to 2014. Disparity remains, however, with Māori hospitalisation rates being more than two and a half times higher than non-Māori non-Pacific rates for 0–14 year olds, and nearly twice as high for 15–24 year olds.

Trends in teenage births

The teenage birth rate has declined markedly for Māori from 2009 onwards. The birth rate for young Māori women aged under 20 years was five times that of non-Māori non-Pacific young women. For Māori, almost 70% of these births were to women aged 18 or 19 years. There has been a decline in the termination of pregnancy rate among Māori women, particularly since 2011, and this decline was most pronounced among 15– 19 year olds.

Areas of considerable concern

A number of conditions that result in death or hospitalisation affect Māori disproportionately. The cost of losing young lives is poorly represented by statistics alone, and in reporting the following indicators, it must be remembered that the reported number or rate of death is only a brief description of deaths that are real for the communities, whānau, hapu, and iwi of these children and young people. This is where the loss of each of these lives continues to be felt.

The report highlights that the rate of suicide among Māori rangatahi remains very high. These rates are of extreme and ongoing concern. The use of mental health services also shows disparities. Māori and non-Māori non-Pacific 0–12 year olds had very similar mental health service use, but with increasing age, the rate for Māori was significantly higher than for non-Māori non-Pacific. There is a peak in the rates of use around age 14–16 years among Māori and the rate remains high even after the age of 17 years. Common mental health diagnoses among Māori 0–24 year olds hospitalised were schizophrenia, schizotypal and delusional disorders, and mood disorders (including depression, mania and bipolar affective disorders).

Among Māori infants, suffocation among infants under one year of age strongly contributes to rates of unintentional injury deaths.

The report also shows that the rates of death from road traffic injury are high for both tamariki and rangatahi.

A number of the conditions described in this report have serious implications for the wellbeing of children and young people. While the acute presentation may be relatively brief, the long term impact of some conditions can be debilitating. For example, the number of cases of Māori with bronchiectasis may be relatively small, but the over-representation of Māori with this condition, which is closely associated with socioeconomic disadvantage, is indicative of serious disparity in a country that is described as a rich nation. Some of the more common illnesses, especially respiratory ones, are associated with socioeconomic disadvantage. The disparity between Māori and non-Māori non-Pacific hospitalisation rates for conditions such as acute upper respiratory tract infections, bronchiolitis among infants, pneumonia among 0–14 year olds, pertussis, and otitis media continues to be a reminder of the importance of warm, dry housing and access to healthy food for better health outcomes.

Further evidence of disparity can be seen in the rates for ambulatory sensitive hospitalisations (ASH) for 0–4 year olds. ASH contains a set of conditions for which intervention at the community level, for example, in primary health care, could be reasonably expected to reduce the number of admissions to hospital. ASH rates for Māori 0–4 year olds were over one and a half times higher than non-Māori non-Pacific ASH rates. The most common ASH conditions for which Māori children were hospitalised were asthma and wheeze, dental procedures, acute upper respiratory infections, gastroenteritis, skin infections and pneumonia.

In recent years, about 2,325 Māori infants have been hospitalised each year for bronchiolitis. The rate for Māori infants was considerably higher than that of non-Māori non-Pacific infants and rose over time. In 2000 the rate for Māori was more than twice that of non-Māori non-Pacific, while in the five years, 2010–2014, the rate for Māori was over three times that of non-Māori non-Pacific infants.

Conclusion

This report provides a set of indicators that can be used to identify key issues for attaining a healthy population in New Zealand. These indicators are also valuable for evaluating whether strategies to improve the health of Māori children and young people are achieving the outcome desired. On their own, data will not make a difference, but wise use in planning and for setting outcomes that are meaningful for improving the health of Māori children and young people and addressing disparities, will make changes.

The findings in this report reinforce the need to continue to focus on meeting the needs of Māori children and young people and the continued need to address the considerable inequities shown across the indicators in this report. It is valuable to reflect on areas where gains are being made, for example, SUDI, and identify strategies that can support improving the health and wellbeing of Māori tamariki and rangatahi. Challenges that are very pressing include poverty related conditions, mental health and suicide.

INTRODUCTION

Background

This report is the second of the Series Two reports on the health of Māori children and young people in New Zealand produced for the Ministry of Health. It fits into the current reporting cycle as follows:

Year 1: The Determinants of Health for Children and Young People (prepared during 2014)

Year 2: The Health Status of Children and Young People (prepared during 2015)

Year 3: Children and Young People with Chronic Conditions and Disabilities (prepared during 2016)

The aim is to provide an overview of the health status of Māori children and young people in New Zealand using routinely collected national data. The intention is to provide the available evidence relevant to developing programmes and interventions to address child and youth health needs, to those who are working to improve child and youth health.

Report sections and indicators

This report is based on an *Indicator Framework* [1] developed in 2007 in which the indicators for each of the three reports in the series were identified. The indicators in this year's report were developed from Craig et al's indicators for the individual and whānau health and wellbeing stream. They are presented in the following sections:

- Issues in infancy
- Issues for all ages 0–24 year olds
- Conditions of the respiratory system
- Common communicable diseases
- Unintentional injury
- Reproductive health
- Mental health

Within each section, data are provided for Māori children and young people aged 0–24 years with comparative non-Māori non-Pacific or national data for selected indicators. Level 1 prioritised ethnicity is used to identify all 0–24 year olds with any Māori ethnicity.

Data quality, statistical significance, and demographic data

Tests of statistical significance: To assist the reader to determine whether tests of statistical significance have been used in a particular section.

Appendix 1 outlines how the significance of the associations presented has been signalled in the text with the words *significant*, or *not significant* in italics. If the words *significant* or *not significant* do not appear in the text, then the associations described do not imply statistical significance or non-significance.

Appendix 2 contains information on the data sources used to develop each indicator. It is advisable to read the contents of these appendices when interpreting any information in this report. To ensure anonymity, where numbers are less than five, these and their associated rates have been suppressed.

Appendix 3 describes the use of ethnicity data in this report, **Appendix 4** outlines the New Zealand Deprivation Index and how it is used and **Appendix 5** lists clinical codes used.

Overview of the health status of children and young people in New Zealand

Figure 1 on the following page provides an overview of the indicators in this report.

Conclusions

This report provides an overview of the health status of Māori children and young people in New Zealand to assist with addressing child and youth health needs in a systematic way. The Ministry of Health, DHBs and others working in the health sector can use the epidemiological data in this report as a complement to knowledge of existing services and key stakeholders' views. All users should be mindful of existing Government policy, and that for any approaches developed to be effective, they need to be congruent with the evidence contained in the current literature. If there is no sound evidence base, planners should build an evaluation arm into their programmes to ensure the best use of available resources.

Figure 1. Summary of the indicators for the health status of Māori children and young people

		Māori		non-Māori non-Pacific	
	Indicator	***n***	**Rate (95% CI)**	***n***	**Rate (95% CI)**
1	Fetal deaths	732	7.83 (7.28–8.41)	1,357	7.13 (6.76–7.52)
2	Preterm births	7,085	8.01 (7.83–8.19)	13,398	7.27 (7.15–7.39)
3	Infant mortality	646	6.96 (6.45–7.52)	747	3.95 (3.68–4.24)
4	Sudden unexpected death in infancy	199	2.14 (1.87–2.46)	91	0.48 (0.39–0.59)
5	Ambulatory sensitive hospitalisations in 0–4 year olds*	31,438	76.24 (75.44–77.06)	52,694	53.95 (53.50–54.40)
6	Acute upper respiratory tract infections in 0–14 year olds	7,806	6.77 (6.63–6.93)	17,517	5.96 (5.87–6.04)
7	Tonsillectomy ± adenoidectomy in 0–14 year olds	3,281	2.85 (2.75–2.95)	11,635	3.96 (3.88–4.03)
8	Otitis media in 0–14 year olds	806	0.70 (0.65–0.75)	1,425	0.48 (0.46–0.51)
9	Grommets in 0–14 year olds	6,604	5.73 (5.59–5.87)	13,782	4.69 (4.61–4.76)
10	Bronchiolitis in infants	11,625	131.35 (129.14–133.59)	7,971	43.23 (42.31–44.16)
11	Pneumonia in 0–24 year olds	5,172	2.90 (2.82–2.98)	8,123	1.57 (1.54–1.61)
12	Asthma in 0–24 year olds	12,299	3.45 (3.39–3.51)	17,015	1.65 (1.63–1.68)
13	Bronchiectasis in 0–24 year olds	504	14.14 (12.95–15.42)	194	1.88 (1.64–2.17)
14	Pertussis in under 1 year olds	318	3.59 (3.22–4.01)	269	1.46 (1.29–1.64)
15	Meningococcal disease in 0–24 year olds	160	8.97 (7.69–10.48)	132	2.56 (2.15–3.03)
16	Tuberculosis in 0–24 year olds	35	0.98 (0.71–1.37)	139	1.35 (1.14–1.59)
17	Acute rheumatic fever in 0–24 year olds	571	32.03 (29.51–34.77)	48	0.93 (0.70–1.23)
18	Rheumatic heart disease in 0–24 year olds	301	16.88 (15.08–18.90)	56	1.08 (0.83–1.41)
19	Any skin infections in 0–24 year olds	20,152	5.65 (5.57–5.73)	25,276	2.45 (2.42–2.48)
20	Gastroenteritis in 0–24 year olds	7,430	2.08 (2.04–2.13)	24,998	2.43 (2.40–2.46)
21	Unintentional injury hospitalisations of 0–24 year olds	23,574	661.16 (652.80–669.63)	56,355	545.95 (541.48–550.47)
22	Teenage births	9,813	58.31 (57.20–59.44)	6,066	11.55 (11.27–11.85)
23	Clients aged 0–24 year olds seen by mental health services	17,339	4,751.08 (4,682.54–4,820.58)	36,817	3,560.72 (3,525.18–3,596.61)
24	Mental health hospitalisations of 0–24 year olds	20,152	565.19 (557.46–573.02)	25,276	245.41 (242.40–248.45)
25	Suicide among 0–24 year olds	247	14.19 (12.53–16.07)	347	6.72 (6.05–7.47)
26	Intentional self-harm in 0–24 year olds	1,131	63.44 (59.85–67.25)	3,553	68.77 (66.55–71.07)

* ED cases included

ISSUES IN INFANCY

BIRTHS AND PERINATAL DEATHS

Introduction

The following section briefly reviews the birth and perinatal period to provide a context for later sections. The following section uses the Birth Registration Dataset, the National Mortality Collection and the National Minimum Dataset to look at births and early deaths of Māori infants in New Zealand.

Data source and methods

Data sources

Livebirths: Birth registration dataset
Deaths: National Mortality Collection

Definitions

Total births are livebirths plus fetal deaths
Fetal death is when the infant is born deceased, weighing 400 grams or more, or is issued from its mother after the 20th week of pregnancy [2]

Fetal death rate = *number of fetal deaths per 1,000 total (live + still) births*

Perinatal death is fetal deaths and early neonatal deaths

Perinatal death rate = *number of fetal and early neonatal deaths per 1,000 total (live + still) births*

Neonatal death is the death of a live-born infant before 28 completed days after birth, and comprises:

- *Early neonatal death* - the death of a live-born infant before seven days (168 completed hours) after birth
- *Late neonatal death* - the death of a live-born infant after seven days and before 28 completed days after birth

Neonatal death rate = *number of early and late neonatal deaths per 1,000 livebirths*
Early neonatal death rate = *number of early neonatal deaths per 1,000 livebirths*
Late neonatal death rate = *number of late neonatal deaths per 1,000 livebirths*

Notes on interpretation

Note 1: An overview of the Birth Registration and National Minimum Datasets is provided in the **Appendix 2**: Datasets used in this report.

National trends and distribution

Between 2008 and 2012, there were 93,529 Māori infants born in New Zealand, an average of 18,706 births per year. Of these, 92,797 (99.2%) were live births and 732 were fetal deaths (also known as stillbirths). The fetal death rate for Māori in this time period was 7.83 deaths per 1,000 total births (**Table 1**).

Between 2008 and 2012, there were 339 deaths of live-born Māori infants in the first 27 days of life (neonatal deaths), an average of 68 deaths per year. Of these neonatal deaths, 273 were before seven days after birth (early neonatal deaths) and 66 deaths occurred after seven days but before 28 completed days after birth (late neonatal deaths). The early neonatal death rate for Māori was 2.94 deaths per 1,000 live births and the late neonatal death rate for Māori was 0.71 deaths per 1,000 live births (**Table 1**).

Table 1. Births and deaths during infancy for Māori, New Zealand 2008–2012

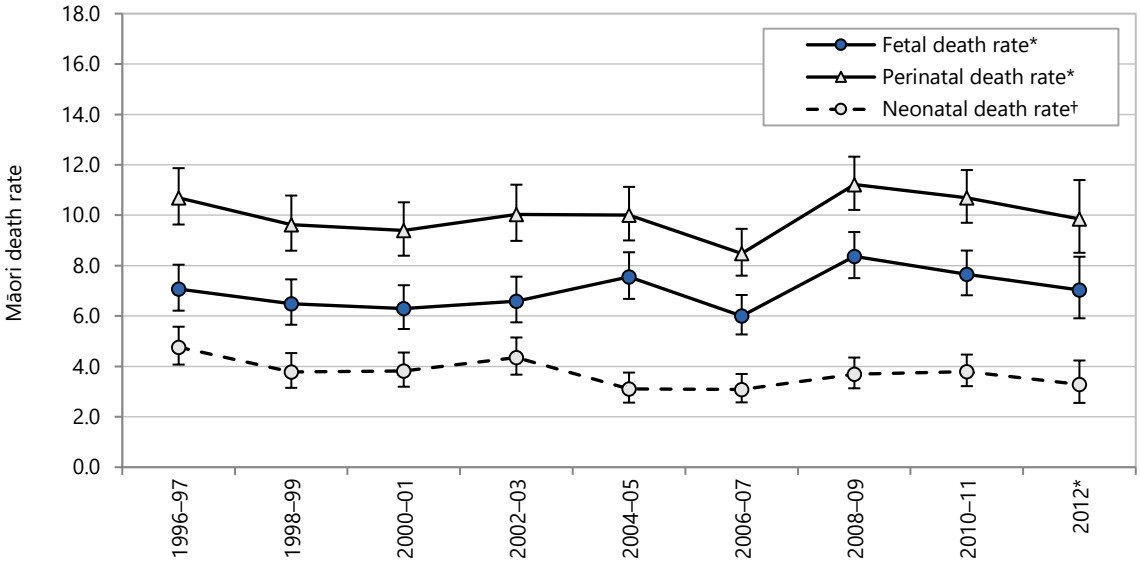
	Number: 2008–2012	Number: annual average	Rate	95% CI
Māori				
Live births	92,797	18,559	..	..
Total births	93,529	18,706	..	..
Fetal deaths*	732	146	7.83	7.28–8.41
Perinatal deaths*	1,005	201	10.75	10.10–11.43
Neonatal deaths†	339	68	3.65	3.29–4.06
Early neonatal deaths†	273	55	2.94	2.61–3.31
Late neonatal deaths†	66	13	0.71	0.56–0.90

Live births: birth registration dataset; Deaths: National Mortality Collection; Ethnicity is level 1 prioritised; * Rate per 1,000 total births; † Rate per 1,000 live births; .. = Not applicable

Deaths that occurred around the time of birth (perinatal deaths) include fetal deaths and early neonatal deaths. Between 2008 and 2012, there were 1,005 perinatal deaths of Māori infants in New Zealand, an average of 201 deaths per year (**Table 1**).

From 1996-97 to 2012, the fetal and perinatal death rates for Māori have been stable with some year-to year variation. The Māori neonatal death rate fell from 4.8 to 3.3 deaths per 1,000 live births (**Figure 2**).

Figure 2. Fetal death, perinatal and neonatal death rates for Māori, New Zealand 1996–2012



Source: Live births: birth registration dataset; Deaths: National Mortality Collection; Ethnicity is level 1 prioritised; * Rate per 1,000 total births; † Rate per 1,000 live births; *2012 is a single year

FETAL DEATHS

Introduction

The following section uses the Birth Registration Dataset, the National Mortality Collection and the National Minimum Dataset to look at fetal deaths for Māori in New Zealand.

Background

A fetal death is defined by the World Health Organization as: "death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy; the death is indicated by the fact that after such separation the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles".[3] In New Zealand, the Births, Deaths, Marriages, and Relationships Registration Act 1995 requires that all stillbirths are registered and it defines a stillbirth as "a dead fetus that weighed at least 400g when it issued from its mother or issued from its mother after the 20th week of pregnancy".[4] The Perinatal and Maternal Mortality Review Committee uses this definition to define a fetal death.[5] Fetal deaths include both spontaneous fetal deaths (often referred to as stillbirths) and deaths due to late termination of pregnancy.

Data sources and methods

Indicator

Fetal deaths

Data sources

Numerator: National Mortality Collection
Denominator: Birth Registration Dataset (live births only) and National Mortality Collection

Definition

Fetal death is when the infant is born deceased, weighing 400 grams or more, or is issued from its mother after the 20th week of pregnancy.[2]
Fetal deaths are further defined as:
Intermediate: Fetal deaths occurring between 20 and 27 weeks gestation.
Late: Fetal deaths occurring 28+ weeks gestation.
Unspecified: Fetal deaths occurring from 20 weeks or more gestation where the main fetal cause of death was unspecified and no additional fetal or maternal causes of death were listed.
Fetal death rate = *number of fetal deaths per 1,000 total (live + still) births*
For gestational age specific rates, the denominator was those remaining in utero at the specified gestational age (e.g. the 22-week denominator excludes all births occurring at 20 and 21 weeks)
In this section, the main (fetal) underlying cause of death was categorised into the following: congenital anomalies (chromosomal, CNS, CVS, other), malnutrition or slow fetal growth, extreme immaturity or low birth weight, intrauterine hypoxia: pre labour onset, intrauterine hypoxia: in labour or unspecified, congenital pneumonia, infections specific to perinatal period, fetal blood loss, unspecified cause, other causes.
In addition, the first maternal cause of death (if present) was categorised into the following: incompetent cervix or premature rupture membranes, oligohydramnios, multiple pregnancy, placenta praevia or other placental separation or haemorrhage, other or unspecified placental anomalies, compression of umbilical cord, chorioamnionitis, maternal hypertensive disorders, placental transfusion syndrome, other causes.

Notes on interpretation

Note 1: Death registration data do not differentiate between spontaneous fetal deaths and late terminations of pregnancy. The admixture of spontaneous and induced fetal deaths is likely to be most prominent at earlier gestations (e.g. the high number of deaths attributed to congenital anomalies prior to 25 weeks gestation) and this must be taken into account when interpreting the data in this section.
Note 2: 95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or *not significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section, and thus (unless the terms significant or non-significant are specifically used) the associations described do not imply statistical significance or non-significance (see **Appendix 1**: Statistical significance testing for further discussion of this issue).
Note 3: An overview of the Birth Registration and National Minimum Datasets is provided in **Appendix 2**: Datasets used in this report.

National trends and distribution

There were 732 fetal deaths of Māori infants in New Zealand between 2008 and 2012, an average of 146 fetal deaths per year and a rate of 7.83 fetal deaths per 1,000 total births. Just over half of the deaths (395 deaths, 54.0%) occurred between 20 and 27 weeks gestation (intermediate fetal deaths) and 330 deaths (45.1%) occurred from 28 weeks gestation (late fetal deaths). In this time period the late fetal death rate for Māori was *significantly higher* than the rate for non-Māori non-Pacific but Māori and non-Māori non-Pacific intermediate and total fetal death rates were *not significantly different* (**Table 2**).

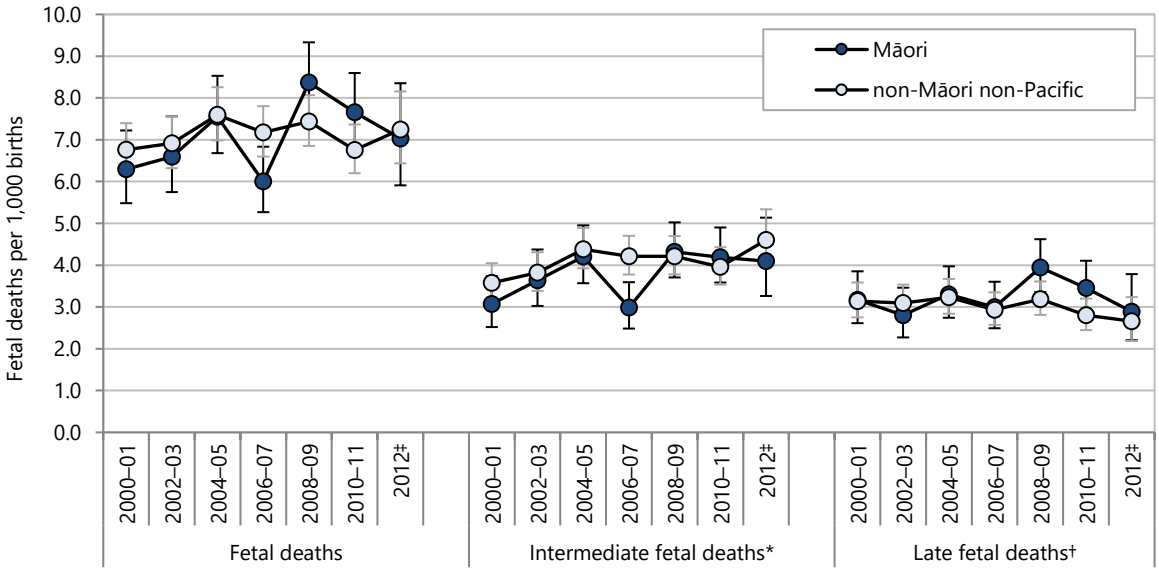
Table 2. Fetal deaths, by type and ethnicity, New Zealand 2008–2012

Ethnicity	Number: total 2008–2012‡	Number: annual average	Rate per 1,000 births	Rate ratio	95% CI
New Zealand					
Fetal deaths					
Māori	732	146	7.83	1.10	1.00–1.20
non-Māori non-Pacific	1,357	271	7.13	1.00	
Intermediate fetal deaths*					
Māori	395	79	4.22	1.01	0.89–1.14
non-Māori non-Pacific	797	159	4.19	1.00	
Late fetal deaths†					
Māori	330	66	3.54	1.21	1.06–1.39
non-Māori non-Pacific	555	111	2.93	1.00	

Numerator: National Mortality Collection; Denominator: Birth registration dataset and national mortality collection; *rate per 1000 births (live births and fetal deaths of 20 weeks gestation or more); †rate per 1000 births (live births and fetal deaths of 28 weeks gestation or more); Ethnicity is level 1 prioritised

The overall fetal death rates for Māori and for non-Māori non-Pacific were stable from 2000 to 2012 with year-to-year fluctuations. There was little difference between Māori and non-Māori non-Pacific rates for fetal deaths, intermediate fetal deaths and late fetal deaths (**Figure 3**).

Figure 3. Fetal deaths, by type and ethnicity, New Zealand 2000–2012



Numerator: National Mortality Collection; Denominator: Birth Registration Dataset and National Mortality Collection; * rate per 1,000 births (live births and fetal deaths of 20 weeks gestation or more); †rate per 1,000 births (live births and fetal deaths of 28 weeks gestation or more); Ethnicity is level 1 prioritised

Distribution by cause

The cause of fetal death was unspecified for 45.1% of Māori fetal deaths; where specified, the most frequent cause was congenital anomalies followed by prematurity or low birth weight and malnutrition or slow fetal growth (**Table 3**).

Table 3. Māori fetal deaths, by main cause of fetal death, New Zealand 2008–2012

Main cause of fetal death	Number: 2008–2012	Number: annual average	Rate per 1,000 births	95% CI	Per cent
Māori					
Fetal deaths					
Congenital anomalies	174	35	1.86	1.60–2.16	23.8
Prematurity or low birth weight	76	15	0.81	0.65–1.02	10.4
Malnutrition or slow fetal growth	51	10	0.55	0.41–0.72	7.0
Fetal blood loss	20	4	0.21	0.14–0.33	2.7
Intrauterine hypoxia	18	4	0.19	0.12–0.30	2.5
Infections specific to perinatal period	11	2	0.12	0.07–0.21	1.5
Hydrops fetalis (non-haemolytic disease)	10	2	0.11	0.06–0.20	1.4
Congenital pneumonia	8	2	0.09	0.04–0.17	1.1
Neonatal aspiration of meconium, amniotic fluid, or mucus	5	1	0.05	0.02–0.13	0.7
Polycythaemia neonatorum	<5	s	s	s	s
Other causes	27	5	0.29	0.20–0.42	3.7
Unspecified cause of fetal death	330	66	3.53	3.17–3.93	45.1
Total	732	146	7.83	7.28–8.41	100.0

Numerator: National Mortality Collection; Denominator: Birth Registration Dataset and National Mortality Collection; * rate per 1,000 births (live births and fetal deaths of 20 weeks gestation or more); † rate per 1,000 births (live births and fetal deaths of 28 weeks gestation or more); Neonatal aspiration‡ = Neonatal aspiration of meconium, amniotic fluid, or mucus;

There was no listed maternal cause for 40.4% of Māori fetal deaths from 2008 to 2012. Where listed, the most common maternal cause of Māori fetal deaths was placenta praevia or placental separation and haemorrhage followed by incompetent cervix or premature rupture of membranes, compression of the umbilical cord, chorioamnionitis, and other abnormalities of the placenta (**Table 4**).

Table 4. Fetal deaths, by type and main maternal cause of fetal death, New Zealand 2008–2012

Main maternal cause of fetal death	Number: 2008–2012	Number: annual average	Rate per 1,000 births	95% CI	Per cent
Māori					
Fetal deaths					
Placenta praevia/placental separation and haemorrhage	87	17	0.93	0.75–1.15	11.9
Incompetent cervix/premature rupture of membranes	48	10	0.51	0.39–0.68	6.6
Compression of umbilical cord	39	8	0.42	0.31–0.57	5.3
Chorioamnionitis	37	7	0.40	0.29–0.55	5.1
Other abnormalities of placenta	35	7	0.37	0.27–0.52	4.8
Multiple pregnancy	28	6	0.30	0.21–0.43	3.8
Oligohydramnios	22	4	0.24	0.16–0.36	3.0
Maternal hypertensive disorders	20	4	0.21	0.14–0.33	2.7
Placental transfusion syndromes	12	2	0.13	0.07–0.22	1.6
Other causes	108	22	1.15	0.96–1.39	14.8
No listed maternal cause	296	59	3.16	2.82–3.55	40.4
Total	732	146	7.83	7.28–8.41	100.0

Numerator: National Mortality Collection; Denominator: Birth Registration Dataset and National Mortality Collection

PRETERM BIRTH

Introduction

The following section reports on Māori preterm birth rates using information from the Birth Registration Dataset.

Background

A preterm birth is defined by the World Health Organization as a baby born alive before 37 completed weeks of pregnancy.[6] Spontaneous preterm birth is the leading cause of neonatal death worldwide (death occurring before 28 days of age).[6] The risk of death is inversely proportional to gestational age. In New Zealand in 2012, 32 percent of all neonatal deaths were reported to be due to spontaneous preterm birth.[5] Although rates of preterm birth are increasing in almost all countries with reliable data,[6] New Zealand rates have stayed fairly constant for the last fifteen years. In New Zealand in 2012, 7.6% of babies were born preterm: 1.3% at less than 32 weeks gestation and 6.3% at 32–36 weeks gestation.[7]

Babies born prematurely, especially those born very prematurely, are at risk of severe morbidity in their early life from conditions including bronchopulmonary dysplasia, respiratory distress syndrome, necrotising enterocolitis, intraventricular haemorrhage, retinopathy of prematurity, and sepsis.[8] They are also at risk of lifelong neurodevelopmental problems including cerebral palsy and learning disorders.[8] The causes of spontaneous preterm birth are currently not well understood and the available interventions are of limited effectiveness.[9] An important function of antenatal care is to identify women at risk of preterm birth. The most significant risk factor by far is a previous history of preterm delivery.[8] At the population level, interventions to reduce smoking and intimate partner violence, improve access to family planning to reduce the number of closely spaced pregnancies, and provide support to socially disadvantaged women could help reduce preterm birth rates.[10]

Data sources and methods

Indicator

Proportion of live babies born prematurely

Data sources

Birth registration dataset
Numerator: Live births between 20–36 weeks gestation
Denominator: Live births
National Minimum Dataset
Numerator: In-hospital live births between 20–36 weeks gestation
Denominator: In-hospital live births

Definition

Preterm birth per 100 live births

Notes on interpretation

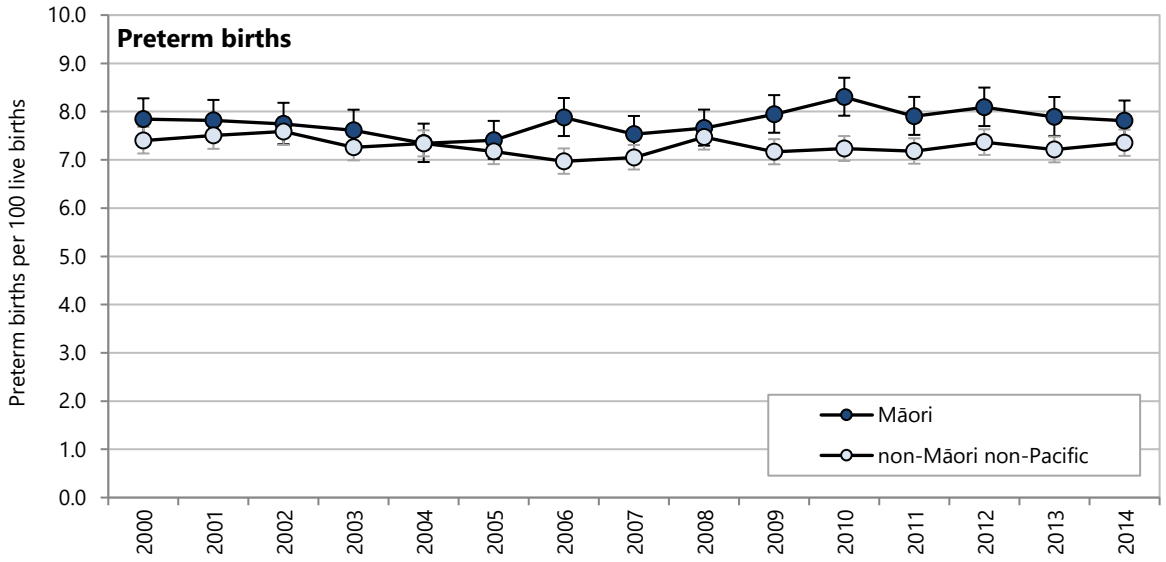
Note 1: Year is year of registration, rather than year of birth.
Note 2: In this analysis, stillborn infants have been excluded due to advice from the Ministry of Health that the Birth Registration dataset provides less reliable information on stillborn infants than the National Mortality Collection. Stillbirth rates, however, are reviewed in the Fetal Deaths section.
Note 3: Preterm births were classified according to the criteria of WHO into groups of 20–27, 28–31, and 32–36 completed weeks (http://www.who.int/mediacentre/factsheets/fs363/en/)
Note 4: In the length of stay analyses (LOS), the set is limited to babies born in-hospital as identified by an event type code of 'BT'. Plurality was assigned using the 'Z38' code.
Note 5: An overview of the Birth Registration and National Minimum Datasets are provided in **Appendix 2**: Datasets used in this report.

National trends and distribution

From 2000 to 2014 the preterm birth rate in New Zealand was stable at around 7.4% of live births. Over the same time period around 0.5% of all live births occurred at 20–27 weeks gestation, 0.8% at 28–31 weeks and around 6.1% at 32–36 weeks.

This stable pattern over time was observed for all ethnic groups, with Māori preterm birth rates generally higher than non-Māori non-Pacific rates (**Figure 4**).

Figure 4. Preterm live births, by ethnicity, New Zealand 2000–2014



Source: Birth Registration Dataset; Numerator: live births between 20–36 weeks gestation. Denominator: live births; Preterm live birth rate is per 100 live births; Ethnicity is level 1 prioritised

Distribution by ethnicity

Between 2010 and 2014 there were *small but significant* disparities between Māori and non-Māori non-Pacific preterm birth rates (**Table 5**).

Table 5. Preterm live births by ethnicity, New Zealand 2010–2014

DHB	Number: total 2010–2014	Number: annual average	Rate per 100 live births	Rate ratio	95% CI
Preterm births					
New Zealand					
Māori	7085	1417	8.01	1.10	1.07–1.13
non-Māori non-Pacific	13398	2680	7.27	1.00	

Source: Birth Registration Dataset; Numerator: live births between 20–36 weeks gestation; Denominator: live births; Rate ratios are unadjusted; Infant ethnicity is level 1 prioritised

INFANT MORTALITY AND SUDI

Introduction

The following section uses information from the National Mortality Collection to review neonatal, post neonatal and total infant mortality, as well as SUDI rates since 1996. The latest year for which data are available from the Ministry of Health's Mortality Collection is 2012.

Background

Infant mortality, the number of deaths of infants aged less than 365 days per 1,000 live births, is often used as a barometer of the social wellbeing of a country.[11] Although infant mortality rates in New Zealand have declined during the past 40 years, the rates remain higher than the OECD average and the rate of decline has been slower in more recent years.[12,13]

Data source and methods

Indicators

Infant mortality
Neonatal mortality
Post neonatal mortality
Sudden Unexpected Death in Infancy (SUDI)

Data sources

Numerator: National Mortality Collection
Denominator: Birth Registration Dataset (live births only)

Definition

All deaths in the first year of life. Cause of death was the main underlying cause of death. Refer to **Appendix 5**: Clinical codes used for the corresponding codes.

Infant mortality Death of a live born infant prior to 365 days of life per 1,000 live births
Neonatal mortality: Death of a live-born infant before 28 completed days after birth per 1,000 live births
Post neonatal mortality: Death of a live-born infant from 28 completed days and before the first year of life is completed per 1,000 live births
Sudden Unexpected Death in Infancy (SUDI): Death of a live born infant before the first year of life is completed (<365 days of life) where the cause of death is Sudden Infant Death Syndrome (SIDS), accidental suffocation or strangulation in bed, inhalation of gastric contents or food, or ill-defined or unspecified causes. Rate is per 1,000 live births

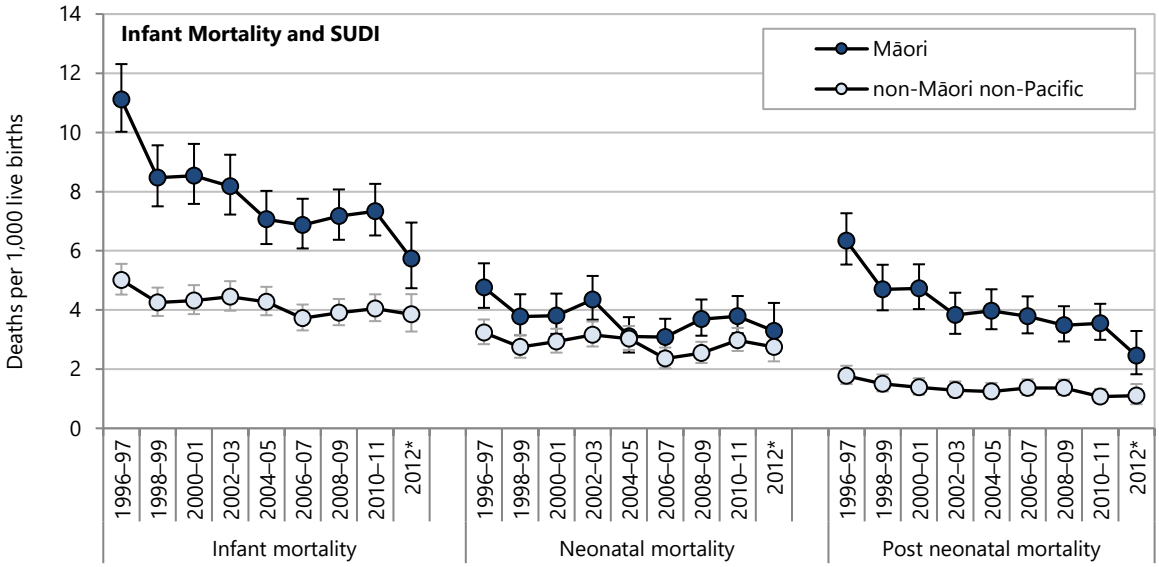
Notes on interpretation

Note 1: SUDI and SIDS: SIDS is defined as "the sudden unexpected death of an infant <1 year of age, with onset of the fatal episode apparently occurring during sleep, and that remains unexplained after a thorough investigation, including performance of a complete autopsy and review of the circumstances of death and the clinical history".[14] Issues have emerged with defining SIDS, possibly as the result of pathologists and coroners becoming increasingly reluctant to label a death as SIDS in the context of equivocal death scene findings (e.g. death of an infant who had been co-sleeping with a parent who had recently consumed alcohol[15]). This has resulted in a fall in the number of SIDS deaths, and a rise in the number of deaths attributed to "suffocation/strangulation in bed" or "unspecified causes".
Note 2: In New Zealand, while SIDS rates have declined, there are still large ethnic differences and SIDS rates are six times higher for Māori infants than for European infants.[1]
Note 3: Two additional codes were added to the SUDI indicator in 2013 (W78: Inhalation of gastric contents; and W79: Inhalation and ingestion of food causing obstruction of the respiratory tract) to ensure consistency with the Child and Youth Mortality Review Committee's SUDI reporting. As a result, the rates in this section are not directly comparable with those presented in NZCYES reports prior to 2013.
Note 4: See **Appendix 2**: Datasets used in this report for an overview of the National Mortality Collection.
Note 5. Unless otherwise stated, ethnicity is level 1 prioritised.

National trends and distribution

The infant mortality rate for Māori in New Zealand declined from 11.1 deaths per 1000 live births in 1996–97 to 5.7 deaths per 1000 live births in 2012. This fall in rates was more marked for Māori than for non-Māori non- Pacific infants. In 2012, the difference between Māori and non-Māori neonatal mortality rates was *not significant* and the disparity in post neonatal infant mortality rates had reduced considerably (**Figure 5**).

Figure 5. Infant mortality, by type and ethnicity, New Zealand 1990–2012



Numerator: National Mortality Collection; Denominator: Birth Registration Dataset; * 2012 is a single year of data

Distribution by ethnicity

Between 2008 and 2012, infant mortality rates were *significantly higher* for Māori infants compared with non- Māori non-Pacific infants, especially in the post neonatal age group (**Table 6**).

Table 6. Infant mortality, by ethnicity, New Zealand 2008–2012

Ethnicity	Number: 2008–2012	Number: annual average	Rate per 1,000 live births	Rate ratio	95% CI
New Zealand					
Infant mortality					
Māori	646	129	6.96	1.76	1.59–1.96
non-Māori non-Pacific	747	149	3.95	1.00	
Neonatal mortality					
Māori	339	68	3.65	1.33	1.16–1.52
non-Māori non-Pacific	521	104	2.76	1.00	
Post neonatal mortality					
Māori	307	61	3.31	2.77	2.33–3.29
non-Māori non-Pacific	226	45	1.20	1.00	

Numerator: National Mortality Collection; Denominator: Birth Registration Dataset. Note: Rates are per 1,000 live births; Rate ratios are unadjusted; Ethnicity is level 1 prioritised; Decile is NZDep2013

Distribution by cause

Between 2008 and 2012, the most common causes of Māori neonatal deaths were extreme prematurity and congenital anomalies. The most common underlying cause of post neonatal death was sudden unexpected death in infancy (SUDI) which is described further in **Table 7** and on **page 19**.

Table 7. Neonatal and post neonatal infant mortality in Māori infants, by main underlying cause of death, New Zealand 2008–2012

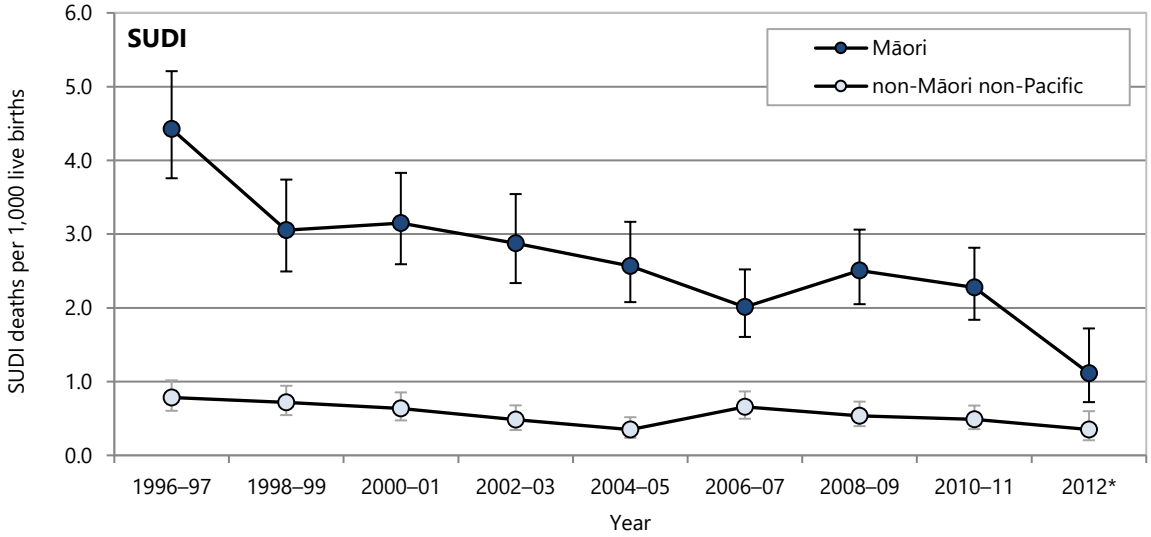
Cause of death	Number: 2008–2012	Number: annual average	Rate per 1,000 live births	Per cent
Māori infants				
Neonatal mortality				
Extreme prematurity	112	22	1.21	33.0
Congenital anomalies: Chromosomal	14	3	0.15	4.1
Congenital anomalies: CNS	10	2	0.11	2.9
Congenital anomalies: CVS	15	3	0.16	4.4
Congenital anomalies: other	32	6	0.34	9.4
Intrauterine hypoxia or birth asphyxia	<5	s	s	s
Other perinatal conditions	121	24	1.30	35.7
SUDI: SIDS	7	1	0.08	2.1
SUDI: all other types	14	3	0.15	4.1
Other causes	10	2	0.11	2.9
Total neonatal mortality	339	68	3.65	100.0
Post neonatal mortality				
SUDI: SIDS	77	15	0.83	25.1
SUDI: suffocation or strangulation in bed	75	15	0.81	24.4
SUDI: All other types	13	3	0.14	4.2
Congenital anomalies: Chromosomal	<5	s	s	s
Congenital anomalies: CNS	<5	s	s	s
Congenital anomalies: CVS	14	3	0.15	4.6
Congenital anomalies: other	11	2	0.12	3.6
Other perinatal conditions	31	6	0.33	10.1
Injury or poisoning	13	3	0.14	4.2
Other causes	67	13	0.72	21.8
Total post neonatal mortality	307	61	3.31	100.0
Total infant mortality	646	129	6.96	

Numerator: National Mortality Collection; Denominator: Birth Registration Dataset

Sudden unexpected death in infancy (SUDI)

From 1996 to 2012, there was an overall *significant fall* in Māori SUDI rates from 4.4 to 1.1 deaths per 1,000 live births. The fall in SUDI rates was more marked for Māori infants than for non-Māori non-Pacific, so that by 2012, the disparity in rates had reduced considerably (**Figure 6**).

Figure 6. Sudden Unexpected Death in Infancy (SUDI), by ethnicity, New Zealand 1996–2012



Numerator: National Mortality Collection; Denominator: Birth Registration Dataset; * 2012 is a single year of data

ISSUES FOR ALL AGES

CAUSES OF DEATH AND HOSPITALISATION

Introduction

This section provides a brief review of the causes of death and hospitalisation for Māori children and young people for the last five years. It provides the context for the subsequent sections of this report covering specific conditions. Infant mortality was described in the previous section and is not repeated here. The following sections use the National Mortality Collection, and the National Minimum Dataset to describe the most common causes of death for Māori children aged 1–14 years and young people aged 15–24 years, and for hospitalisation of children aged 0–14 years and young people aged 15–24 years.

Data source and methods

Indicators

Causes of deaths in 1–24 year olds
Causes of hospitalisations in 0–24 year olds

Data sources

Numerator:
Deaths: National Mortality Collection
Hospitalisations: National Minimum Dataset
Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years)

Definition

Numerator:
Deaths: Deaths in 1–24 year olds by the main underlying cause of death (deaths per 100,000 population)
Hospitalisations: Hospitalisations for 0–24 year olds by primary diagnosis (acute and arranged admissions; excluding neonates) or primary procedure (waiting list admissions; hospitalisations per 1,000 population).
Refer to **Appendix 5**: Clinical codes used for the codes included.
Denominator: 1–14 DHB age range was calculated using Estimated Resident Population extrapolations for 0–14 range and subtracting the number of live births in that period

Notes on interpretation

Note 1: Because hospitalisations during the neonatal period are likely to be heavily influenced by perinatal factors and/or result from preterm infants transitioning through different levels of neonatal care (e.g. from neonatal intensive care, to Level 1–3 special care baby units), neonatal hospitalisations have been excluded from this analysis. Similarly, infant mortality is also likely to be heavily influenced by perinatal factors, and thus this section is restricted to an analysis of mortality in those aged 1–24 years (see Infant mortality section beginning on **page 16** for a review of the causes of mortality in those aged less than one year).
Note 2: An acute admission is an unplanned hospitalisation occurring on the day of presentation, while an arranged admission (sometimes referred to as semi-acute) is a non-acute hospitalisation with an admission date less than seven days after the date the decision was made that the hospitalisation was necessary. A waiting list admission is a planned hospitalisation, where the admission date is seven or more days after the date the decision was made that the hospitalisation was necessary.
Note 3: In order to maintain consistency with the injury section, all injury hospitalisations with an Emergency Medicine Specialty Code on discharge have been excluded (see **Appendix 2**: Datasets used in this report for rationale).
Note 4: **Appendix 2**: Datasets used in this report outlines the limitations of the data utilised from the National Minimum Dataset. The reader is advised to review this information before interpreting any trends.
Note 5: Ethnicity is level 1 prioritised.

Deaths

Between 2008 and 2012, there were 260 deaths of Māori children aged 1–14 years, an average of 52 deaths per year. The most common underlying causes of death were unintentional injury, neoplasm, and suicide (**Table 8**). From 2008–2012 there were 613 deaths of Māori young people aged 15–24 years, an average of 123 deaths per year. Unintentional injury was the most common cause of death in this age group closely followed by suicide (**Table 9**).

Table 8. Deaths in Māori 1–14 year olds, by main underlying cause, New Zealand 2008–2012

Main underlying cause of death	Number: total 2008–2012	Number: annual average	Rate per 100,000 1–14 year olds	95% CI	Per cent
Māori 1–14 year olds					
New Zealand					
Unintentional injury	98	20	9.48	7.78–11.55	37.7
Neoplasm	27	5	2.61	1.79–3.80	10.4
Suicide	25	5	2.42	1.64–3.57	9.6
Congenital anomalies	15	3	1.45	0.88–2.39	5.8
Assault	11	2	1.06	0.59–1.90	4.2
Pneumonia	6	1	0.58	0.27–1.27	2.3
Meningococcal disease	6	1	0.58	0.27–1.27	2.3
Metabolic disorders	5	1	0.48	0.21–1.13	1.9
SUD/SUDI: SIDS & unspecified	5	1	0.48	0.21–1.13	1.9
Other medical	56	11	5.41	4.17–7.03	21.5
Other causes	6	1	0.58	0.27–1.27	2.3
Total	260	52	25.14	22.26–28.39	100.0

Numerator: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population; Excludes infants (age less than one year)

Table 9. Deaths in Māori 15–24 year olds, by main underlying cause, New Zealand 2008–2012

Main underlying cause of death	Number: 2008–2012	Number: annual average	Rate per 100,000 15–24 year olds	95% CI	Per cent
Māori 15–24 year olds					
New Zealand					
Unintentional injury	226	45	36.82	32.32–41.94	36.9
Suicide	222	44	36.17	31.72–41.25	36.2
Neoplasms	32	6	5.21	3.69–7.36	5.2
Assault	20	4	3.26	2.11–5.03	3.3
Congenital anomalies	11	2	1.79	1.00–3.21	1.8
Asthma and wheeze	8	2	1.30	0.66–2.57	1.3
Other medical	85	17	13.85	11.20–17.12	13.9
Other causes	9	2	1.47	0.77–2.79	1.5
Total	613	123	99.88	92.28–108.10	100.0

Numerator: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population

Hospitalisations

0-14 year olds

Between 2010 and 2014 there were 107,631 acute hospitalisations of Māori children aged 0–14 years, 15,287 arranged admissions and 39,007 waiting list admissions. Overall, there were 161,925 hospitalisations in this age group, an average of 32,385 each year. The most common reasons for acute hospitalisation in this age group were injury or poisoning, bronchiolitis, asthma and wheeze, acute upper respiratory tract infections, skin infections and gastroenteritis. The most common reasons for arranged admissions were cancer or cancer treatment (neoplasm, chemotherapy or radiotherapy), injury or poisoning and congenital anomalies. The most common procedures for waiting list admissions were dental procedures, grommets, tonsillectomy and musculoskeletal procedures (**Table 10**).

Table 10. Causes of hospitalisations in Māori 0–14 year olds, by admission type, New Zealand 2010–2014

	Number: 2010–2014	Number: annual average	Rate per 1,000 0–14 year olds	95% CI	Per cent
Māori 0–14 year olds					
Acute admissions by primary diagnosis					
Injury/poisoning	13,438	2,688	11.66	11.47–11.86	12.5
Bronchiolitis	12,837	2,567	11.14	10.95–11.33	11.9
Asthma and wheeze	10,561	2,112	9.16	8.99–9.34	9.8
Acute upper respiratory infections	7,395	1,479	6.42	6.27–6.56	6.9
Skin infections	5,779	1,156	5.02	4.89–5.15	5.4
Gastroenteritis	5,615	1,123	4.87	4.75–5.00	5.2
Other diagnoses	52,006	10,401	45.13	44.75–45.51	48.3
Total	107,631	21,526	93.40	92.87–93.94	100.0
Arranged admissions by primary diagnosis					
Neoplasm/Chemotherapy/Radiotherapy	3,168	634	2.75	2.66–2.85	20.7
Injury/poisoning	1,143	229	0.99	0.94–1.05	7.5
Congenital anomalies	784	157	0.68	0.63–0.73	5.1
Perinatal-related conditions	376	75	0.33	0.29–0.36	2.5
Immune disorders	364	73	0.32	0.29–0.35	2.4
Metabolic disorders	310	62	0.27	0.24–0.30	2.0
Bronchiolitis	263	53	0.23	0.20–0.26	1.7
Other diagnoses	8,879	1,776	7.71	7.55–7.87	58.1
Total	15,287	3,057	13.27	13.06–13.48	100.0
Waiting list admissions by primary procedure					
Dental procedures	12,000	2,400	10.41	10.23–10.60	30.8
Grommets	6,552	1,310	5.69	5.55–5.82	16.8
Tonsillectomy ± adenoidectomy	3,253	651	2.82	2.73–2.92	8.3
Musculoskeletal procedures	3,151	630	2.73	2.64–2.83	8.1
Gastrointestinal procedures	1,340	268	1.16	1.10–1.23	3.4
Procedures on skin or subcutaneous tissue	951	190	0.83	0.77–0.88	2.4
Inguinal hernia repair	890	178	0.77	0.72–0.82	2.3
Other procedures	9,046	1,809	7.85	7.69–8.01	23.2
No procedure listed	1,824	365	1.58	1.51–1.66	4.7
Total	39,007	7,801	33.85	33.52–34.18	100.0
Māori total	161,925	32,385	140.52	139.89–141.15	

Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population; NOS = not otherwise specified

15–24 year olds

Between 2010 and 2014 there were 63,658 acute hospitalisations of Māori young people aged 15–24 years, 14,524 arranged hospitalisations, 52,178 reproductive admissions and 10,040 waiting list admissions. There were 140,400 hospitalisations of Māori young people in this age group, an average of 28,080 hospitalisations per year. The most common reasons for hospitalisation in this age group were pregnancy, delivery or postnatal-related conditions, injury or poisoning, mental health, and termination of pregnancy. The most common reasons for acute hospitalisation were injury or poisoning, mental health, abdominal or pelvic pain and skin infections.

The most common reasons for arranged admissions were dialysis, injury or poisoning, cancer or cancer treatment (neoplasm, chemotherapy or radiotherapy), and mental health. Most of the reproductive admissions (81.7%) were for pregnancy, delivery or postnatal-related conditions. The most common procedures for waiting list admissions were musculoskeletal procedures, gastrointestinal procedures and dental procedures (**Table 11**).

Table 11. Causes of hospitalisations in Māori 15–24 year olds, by primary diagnosis, New Zealand 2010–2014

	Number: 2010–2014	Number: annual average	Rate per 1,000 15–24 year olds	95% CI	Per cent
Māori 15–24 year olds					
Acute admissions by primary diagnosis					
Injury or poisoning	10,351	2,070	16.42	16.11–16.74	16.3
Mental health	6,214	1,243	9.86	9.62–10.10	9.8
Abdominal or pelvic pain	4,168	834	6.61	6.41–6.81	6.5
Skin infections	3,082	616	4.89	4.72–5.06	4.8
Urinary tract infection	1,807	361	2.87	2.74–3.00	2.8
Gastroenteritis	1,623	325	2.57	2.45–2.70	2.5
Asthma and wheeze	1,558	312	2.47	2.35–2.60	2.4
Appendicitis	1,405	281	2.23	2.12–2.35	2.2
STI or pelvic inflammatory disease	1,300	260	2.06	1.95–2.18	2.0
Other diagnoses	32,150	6,430	51.00	50.46–51.54	50.5
Total	63,658	12,732	100.98	100.24–101.72	100.0
Arranged admissions by primary diagnosis					
Dialysis	1,688	338	2.68	2.55–2.81	11.6
Injury/poisoning	1,354	271	2.15	2.04–2.27	9.3
Neoplasm/Chemotherapy/Radiotherapy	850	170	1.35	1.26–1.44	5.9
Mental health	839	168	1.33	1.24–1.42	5.8
Immune disorders	426	85	0.68	0.61–0.74	2.9
Other diagnoses	9,367	1,873	14.86	14.56–15.16	64.5
Total	14,524	2,905	23.04	22.67–23.41	100.0
Reproductive hospitalisations by primary diagnosis					
Pregnancy, delivery, and/or postnatal care	42,483	8,497	133.84	132.66–135.03	81.4
Abortion (failed, medical, other, or unspecified)	7,047	1,409	22.20	21.69–22.72	13.5
Spontaneous abortion or other early pregnancy loss	2,648	530	8.34	8.03–8.67	5.1
Reproductive total	52,178	10,436	164.39	163.10–165.68	100.0
Waiting list admissions by primary procedure					
Musculoskeletal procedures	1,578	316	2.50	2.38–2.63	15.7
Gastrointestinal procedures	1,298	260	2.06	1.95–2.17	12.9
Dental procedures	965	193	1.53	1.44–1.63	9.6
Procedures on skin or subcutaneous tissue	781	156	1.24	1.16–1.33	7.8
Tonsillectomy ± adenoidectomy	755	151	1.20	1.12–1.29	7.5
Other procedures	4,074	815	6.46	6.27–6.66	40.6
No procedure listed	589	118	0.93	0.86–1.01	5.9
Total	10,040	2,008	15.93	15.62–16.24	100.0
Māori total	140,400	28,080			

Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population; Injury ED cases excluded; NOS = not otherwise specified; Reproductive hospitalisations are presented as rates per 1,000 females aged 15–24 years; Termination of pregnancy includes therapeutic, other, or unspecified terminations performed in hospital, and may be an underestimate as NMDS coverage of therapeutic abortions is incomplete

AMBULATORY SENSITIVE HOSPITALISATIONS

Introduction

The following section reports on ambulatory sensitive hospitalisations (ASH) for Māori children aged 0–4 years using the ASH conditions as defined by NZCYES, applied to information from the National Mortality Collection and the National Minimum Dataset.

Background

Ambulatory sensitive hospitalisations (ASH) are hospitalisations for conditions for which hospitalisation could potentially have been avoided.[16] At a community level, high ASH rates may indicate difficulty in accessing primary care in a timely fashion, poor care coordination or care continuity, or structural constraints such as limited supply of primary care workers. However, ASH rates are also affected by other factors including: hospital size and service configuration, capacity for emergency department management, admission policies and practices, as well as health literacy and overall social determinants of health in the community. Not all ASH would be avoidable even in a perfect health system; for example, children who were found to have relatively minor ASH conditions may have come in to hospital for investigations to exclude more serious illness such as meningococcal disease.[17]

There are currently two different ASH algorithms in use in New Zealand. The NZCYES uses paediatric ASH codes developed by Anderson et al[18] with analysis restricted to ages 0–4 years and a population-based denominator. The Health Quality and Safety Commission use a similar but not identical list in 0–14 year olds with a PHO enrolment denominator.[17] Both provide analyses including and excluding ED cases.

In New Zealand children, ASH accounts for approximately 30% of all acute and arranged medical and surgical discharges each year.[17] Pathways to prevent ASH vary by condition. For asthma it may be the use of preventative medicine, whilst for gastroenteritis it may be access to early oral rehydration fluids.[17] Vaccine-preventable disease can be prevented almost entirely with good immunisation coverage while diseases or conditions that can lead to rapid onset of problems, such as gastroenteritis and dehydration, can often be treated in primary care.[16]

Data sources and methods

Indicator

Ambulatory sensitive hospitalisations (ASH) in 0–4 year olds

Data sources

Numerator: National Minimum Dataset
Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years)

Definition

Acute and arranged hospitalisations for ambulatory sensitive conditions in 0–4 year olds
The conditions in this section are based on primary diagnosis, and include:
Asthma and wheeze, bronchiectasis, skin infections, constipation, dental caries and other dental conditions, dermatitis and eczema, gastroenteritis, gastro-oesophageal reflux, nutritional deficiency, bacterial or non-viral pneumonia, rheumatic fever/rheumatic heart disease, otitis media, acute upper respiratory tract infections (excluding croup), vaccine preventable diseases: (neonatal/other tetanus, congenital rubella; pertussis age ≥6 months, diphtheria, hepatitis B, measles, mumps, rubella age ≥16 months, urinary tract infections age >4 years).

Notes on interpretation

Note 1: Age filters: The 0–4 year age group has been selected for this analysis as it aligns with the Ministry of Health's previous paediatric ASH Target (0–4 years). Neonatal hospitalisations (0–27 days) have been excluded on the basis that issues arising in the neonatal period are likely to be heavily influenced by antenatal/perinatal factors, and as a consequence are likely to require different care pathways from conditions arising in the community (e.g. pneumonia in a very preterm infant). The only exceptions are neonatal tetanus and congenital rubella, which are potentially preventable by timely (maternal) access to immunisation. Further, age filters have also been applied to some vaccine preventable diseases (e.g. measles ≥16 months) on the basis that these conditions may not be (primary care) preventable, prior to the age at which immunisation for the relevant condition is due. Similarly, a >4 year age criteria has been applied to urinary tract infections, on the basis that younger children may require hospitalisation for further investigation.

Note 2: *Admission type filters*: An acute hospitalisation is an unplanned hospitalisation occurring on the day of presentation, while an arranged admission is a non-acute hospitalisation with an admission date less than seven days after the decision was made that the admission was required. A waiting list admission is a planned hospitalisation, where the admission date is equal to or greater than seven days after the decision was made that the admission was necessary. In this section, all analyses include acute and arranged admissions only, with the exception of dental conditions, which also include waiting list admissions (as some DHBs routinely admit dental conditions from the waiting list, while others admit the majority as arranged admissions, potentially creating artefactual DHB differences if the entire burden of dental morbidity is not captured). This restriction was applied in order to eliminate the large number of cases where the primary diagnosis was, for example, otitis media, but where the main reason for admission was for the insertion of grommets. It was considered that the role primary care played in preventing acute admissions (e.g. for acute otitis media), was likely to differ from the one it played in ensuring children had access to waiting list procedures (e.g. for the insertion of grommets).

Note 3: *Emergency Department Filters*: In order to deal with the issue of inconsistent uploading of Emergency Department (ED) cases to the National Minimum Dataset (see Appendix 3), the Ministry of Health has traditionally applied a number of filters to its ASH analyses.[19,20] These filters exclude Accident and Emergency cases that meet the following criteria:

- The admission and discharge dates are the same AND,
- The patient was not discharged dead (i.e., discharge type not in 'DD') AND,
- The health specialty code is in ('M05', 'M06', 'M07', or 'M08').

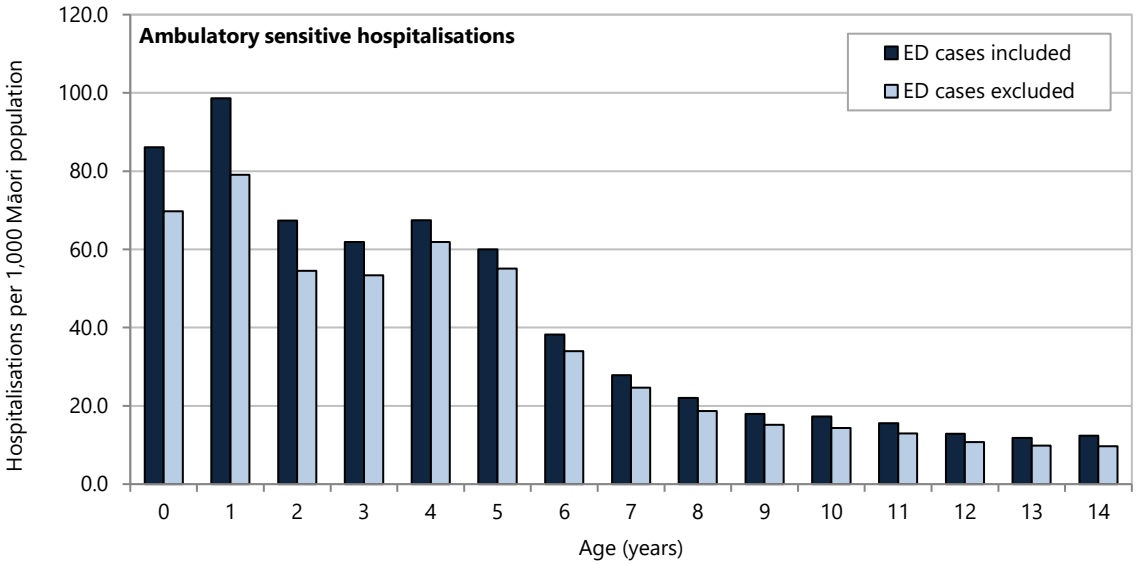
While the NZ Child and Youth Epidemiology service does not recommend the use of such filters in the paediatric population, in order to allow DHBs to assess the impact ED cases have on their ASH rates, all the analyses in this section are presented with both ED cases included and excluded. In contrast to the Ministry of Health filters described above, all ED cases have either been totally included or excluded, not just those admitted and discharged on the same day. (In the paediatric population many presentations occur late in the evening, with children then being discharged in the early hours of the following day, potentially making their total length of stay similar to that of ED day cases).

For those DHBs without a dedicated paediatric emergency department, who assess the majority of their cases in a Paediatric Assessment Unit or on the Paediatric Ward, the ED included and excluded analyses may be identical. Local variations in the way health specialty codes are assigned to such cases may seriously influence the differences seen between the ED included and excluded rates.

Distribution by age

ASH rates were highest for Māori children aged under two years and declined rapidly with increasing age from age five years whether ED cases were included or excluded **(Figure 7)**. The remainder of this section is restricted to 0–4 year olds**.**

Figure 7. Ambulatory sensitive hospitalisations in 0–14 year olds, by age New Zealand 2010–2014

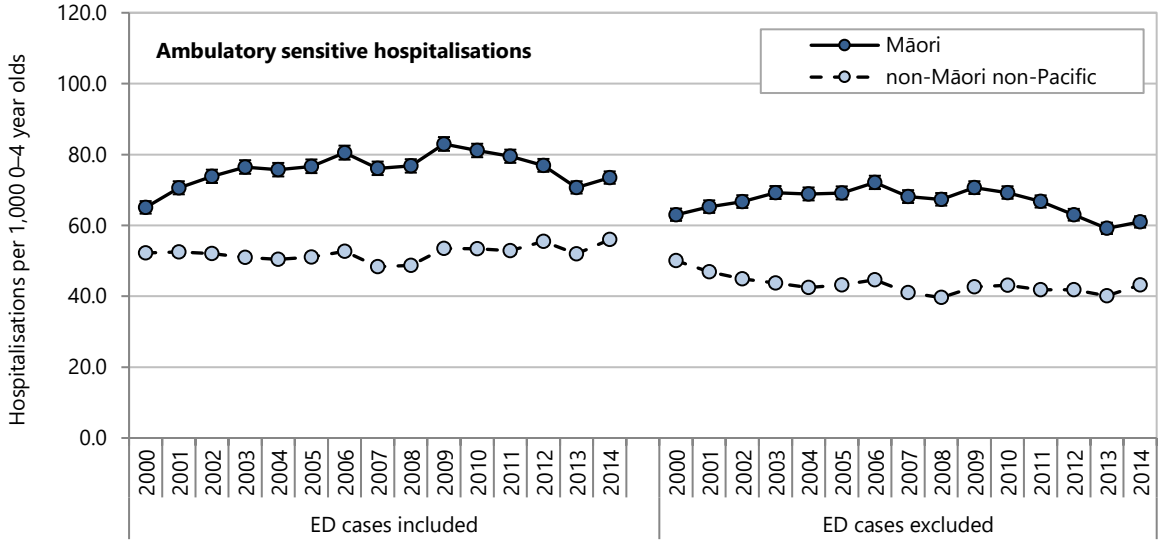


Numerator: National Minimum Dataset (acute and arranged admissions, neonates excluded); Denominator: Statistics NZ Estimated Resident Population

National trends and distribution

From 2000 to 2014 the hospitalisation rate for ambulatory-care sensitive conditions in Māori 0–4 year olds generally rose in the early part of the period and fell in the later part of the period up until 2013, both when ED cases were included and when ED cases were excluded (Error! Reference source not found.).

Figure 8. Ambulatory sensitive hospitalisations in 0–4 year olds, by ethnicity, New Zealand 2000–2014



Numerator: National Minimum Dataset (acute and arranged admissions, neonates excluded); Denominator: Statistics NZ Estimated Resident Population

Distribution by cause

Between 2010 and 2014, there were 31,438 Māori ASH when ED cases were included and 26,274 Māori ASH when ED cases were excluded. The most frequent ASH diagnoses whether ED cases were included or excluded, were asthma and wheeze, followed by dental conditions, upper respiratory tract infections, gastroenteritis and skin infections (**Table 12**).

Distribution by ethnicity

From 2010 to 2014, ASH rates for Māori children aged 0–4 years were *significantly higher* than rates for non-Māori non-Pacific 0–4 year olds, both when emergency department cases were included and when they were excluded. The disparity was *significantly greater* when emergency department cases were excluded than when they were included (**Table 13**).

Table 12. Ambulatory sensitive hospitalisations in Māori 0–4 year olds, by ED status and primary diagnosis, New Zealand 2010–2014

Primary diagnosis	Number: 2010–2014	Number: annual average	Rate per 1,000 0–4 year olds	95% CI	Per cent
Ambulatory sensitive hospitalisations in Māori 0–4 year olds					
Emergency Department cases included					
Asthma and wheeze	7,261	1,452	17.61	17.21–18.02	23.1
Dental	5,673	1,135	13.76	13.41–14.12	18.0
Acute upper respiratory infections (excluding croup)	4,874	975	11.82	11.50–12.15	15.5
Gastroenteritis	4,760	952	11.54	11.22–11.87	15.1
Skin infections	3,358	672	8.14	7.87–8.42	10.7
Pneumonia: bacterial, non-viral	2,749	550	6.67	6.42–6.92	8.7
Dermatitis and eczema	1,202	240	2.92	2.76–3.08	3.8
Otitis media	741	148	1.80	1.67–1.93	2.4
Constipation	368	74	0.89	0.81–0.99	1.2
Gastro-oesophageal reflux	212	42	0.51	0.45–0.59	0.7
Bronchiectasis	136	27	0.33	0.28–0.39	0.4
VPD ≥ 6 months: DTP, Polio, HepB	46	9	0.11	0.08–0.15	0.1
Nutritional deficiencies or anaemias	44	9	0.11	0.08–0.14	0.1
VPD ≥ 16 months: MMR	10	2	0.02	0.01–0.04	0.0
Rheumatic fever or rheumatic heart disease	<5	s	s	s	s
Total	31,438	6,288	76.24	75.44–77.06	100.0
Emergency Department cases excluded					
Asthma and wheeze	5,776	1,155	14.01	13.65–14.37	22.0
Dental	5,662	1,132	13.73	13.38–14.09	21.5
Acute upper respiratory infections (excluding croup)	3,479	696	8.44	8.16–8.72	13.2
Gastroenteritis	3,376	675	8.19	7.92–8.47	12.8
Skin infections	3,175	635	7.70	7.44–7.97	12.1
Pneumonia: bacterial, non-viral	2,451	490	5.94	5.71–6.18	9.3
Dermatitis and eczema	1,131	226	2.74	2.59–2.91	4.3
Otitis media	533	107	1.29	1.19–1.41	2.0
Constipation	275	55	0.67	0.59–0.75	1.0
Gastro-oesophageal reflux	191	38	0.46	0.40–0.53	0.7
Bronchiectasis	135	27	0.33	0.28–0.39	0.5
Nutritional deficiencies or anaemias	41	8	0.10	0.07–0.13	0.2
VPD ≥ 6 months: DTP, Polio, HepB	38	8	0.09	0.07–0.13	0.1
VPD ≥ 16 months: MMR	7	1	0.02	0.01–0.04	0.0
Rheumatic fever or rheumatic heart disease	<5	s	s	s	s
Total	26,274	5,255	63.72	62.98–64.47	100.0

Numerator: National Minimum Dataset (acute and arranged admissions, neonates excluded); Denominator: Statistics NZ Estimated Resident Population; * Acute upper respiratory tract infections excludes croup; s: suppressed due to small numbers; VPD: Vaccine preventable diseases; DTP: diphtheria, tetanus, pertussis; HepB: hepatitis B; MMR: measles, mumps, rubella

Table 13. Ambulatory sensitive hospitalisations in 0–4 year olds (ED cases included and excluded), by ethnicity New Zealand 2010–2014

Ethnicity	Number: 2010–2014	Number: annual average	Rate per 1,000 0–4 year olds	Rate ratio	95% CI
Ambulatory sensitive hospitalisations in 0–4 year olds					
New Zealand					
Emergency Department cases included					
Māori	31,438	6,288	76.24	1.41	1.39–1.43
non-Māori non-Pacific	52,694	10,539	53.95	1.00	
Emergency Department cases excluded					
Māori	26,274	5,255	63.72	1.52	1.49–1.54
non-Māori non-Pacific	41,029	8,206	42.01	1.00	

Numerator: National Minimum Dataset (acute and arranged admissions, neonates excluded, ED included); Denominator: Statistics NZ Estimated Resident Population; Rate ratios are unadjusted; Ethnicity is level 1 prioritised; Decile is NZDep2013

CONDITIONS OF THE RESPIRATORY SYSTEM

UPPER RESPIRATORY TRACT INFECTIONS

Introduction

The following section uses data from the National Minimum Dataset to review acute and arranged admissions for acute upper respiratory infections in Māori 0–14 year olds.

Background

Acute upper respiratory tract infections (URTIs) are a common cause of illness in childhood and responsible for a considerable proportion of children's visits to primary care each year.[21] Although in most cases URTIs are not severe and do not last long, they nevertheless place a significant burden on secondary care services.[22]

The upper respiratory conditions that are common in children are non-specific URTIs, acute pharyngitis (sore throat) and tonsillitis. Non-specific URTIs (including the common cold) are usually of viral origin and are associated with symptoms that include cough, sore through, runny nose, fever and malaise.[23] The available evidence indicates that antibiotic treatment does not alter the course of these illnesses[23] nor is it an effective strategy for preventing complications such as lower respiratory conditions like pneumonia.[24] A minority of cases of pharyngitis and tonsillitis are due to bacteria (group A streptococci) and may, if not treated with antibiotics, result in acute rheumatic fever.[25] Approaches to the prevention of respiratory and infectious diseases take a variety of forms owing to the many factors that contribute (for example, exposure to other people with illness, cigarette smoke, poor nutrition, sub-standard housing, overcrowding). Poverty is linked to higher rates of respiratory and infectious disease through its associations with poor housing, poor nutrition, smoking, air pollution, and difficulties with accessing healthcare.[26]

Data sources and methods

Indicator

Hospitalisations for acute upper respiratory tract infections in 0–14 year olds

Data sources

Numerator: National Minimum Dataset

Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years)

Definition

Acute and arranged hospitalisations for 0–14 year olds with a primary diagnosis of acute upper respiratory tract infection (URTI). Acute URTIs comprise: acute nasopharyngitis (common cold); acute sinusitis; acute pharyngitis; acute tonsillitis; croup, acute laryngitis, or tracheitis; acute URTI multiple or unspecified sites; epiglottitis. Refer to **Appendix 5**: Clinical codes used for the codes included.

Notes on interpretation

Note 1: All of the acute upper respiratory tract infections listed above are considered ambulatory sensitive, with the exception of croup/acute laryngitis/tracheitis, where early access to primary care may not prevent a hospitalisation (e.g. children with croup may require hospitalisation for the management of respiratory distress).

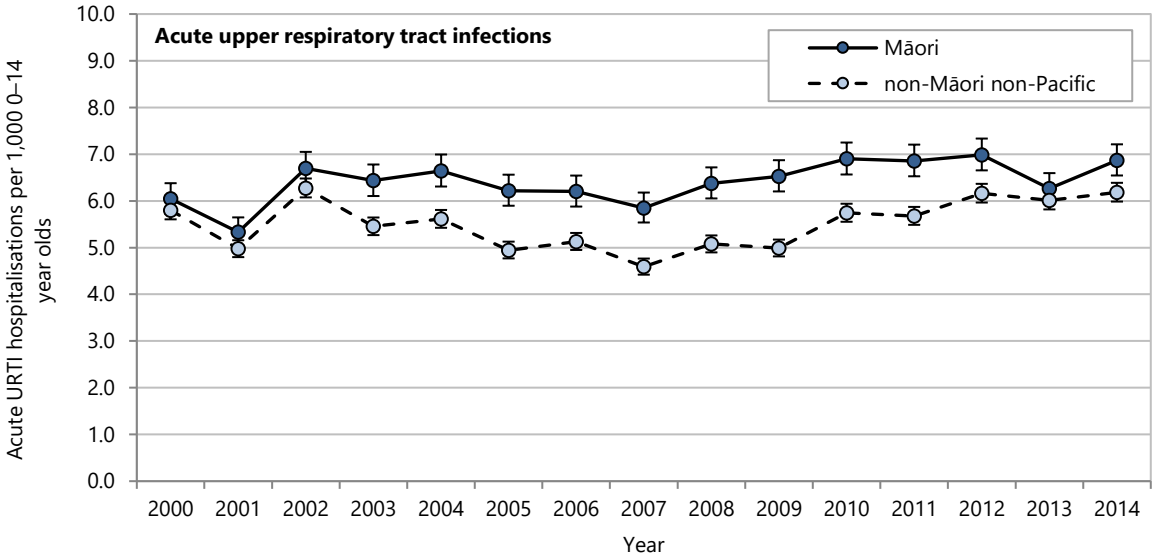
Note 2: An acute admission is an unplanned hospitalisation occurring on the day of presentation, while an arranged admission (also referred to as a semi-acute admission) is a non-acute hospitalisation with an admission date less than seven days after the date the decision was made that hospitalisation was necessary. Because arranged hospitalisations comprise a mix of patients being admitted semi-acutely for the management of medical conditions, and semi-urgently for operative procedures, in this section, arranged hospitalisations have been included.

Note 4: **Appendix 2**: Datasets used in this report outlines the limitations of the data utilised from the National Minimum Dataset. The reader is advised to review this appendix before interpreting any trends.

National trends and distribution

Throughout 2000–2014, Māori hospitalisation rates for acute URTI were higher than non-Māori non-Pacific rates. Rates for both groups were generally stable with year-to-year fluctuations (**Figure 9**).

Figure 9. Hospitalisations for acute upper respiratory tract infections (URTIs) in 0–14 year olds, by ethnicity, New Zealand 2000–2014



Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population; Ethnicity is level 1 prioritised

Distribution by primary diagnosis

Between 2010 and 2014, the primary diagnosis for the majority of Māori acute URTI hospitalisations was unspecified or involved multiple acute URTI sites. Of the remainder, the most frequent diagnoses were croup, acute laryngitis or tracheitis, and acute tonsillitis (**Table 14**).

Table 14. Hospitalisations for acute upper respiratory tract infections in Māori 0–14 year olds, by primary diagnosis, New Zealand 2010–2014

Primary diagnosis	Number: total 2010–2014	Number: annual average	Rate per 1,000 0–14 year olds	95% CI	Per cent
Acute upper respiratory tract infections in Māori 0–14 year olds					
Croup, acute laryngitis, or tracheitis	1,609	322	1.40	1.33–1.47	20.6
Acute tonsillitis	825	165	0.72	0.67–0.77	10.6
Acute pharyngitis	427	85	0.37	0.34–0.41	5.5
Acute nasopharyngitis (common cold)	77	15	0.07	0.05–0.08	1.0
Acute sinusitis	27	5	0.02	0.02–0.03	0.3
Epiglottitis	<5	s	s	s	s
Acute URTI multiple or unspecified sites	4,840	968	4.20	4.08–4.32	62.0
Total	7,806	1,561	6.77	6.63–6.93	100.0

Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population

Distribution by demographic factors

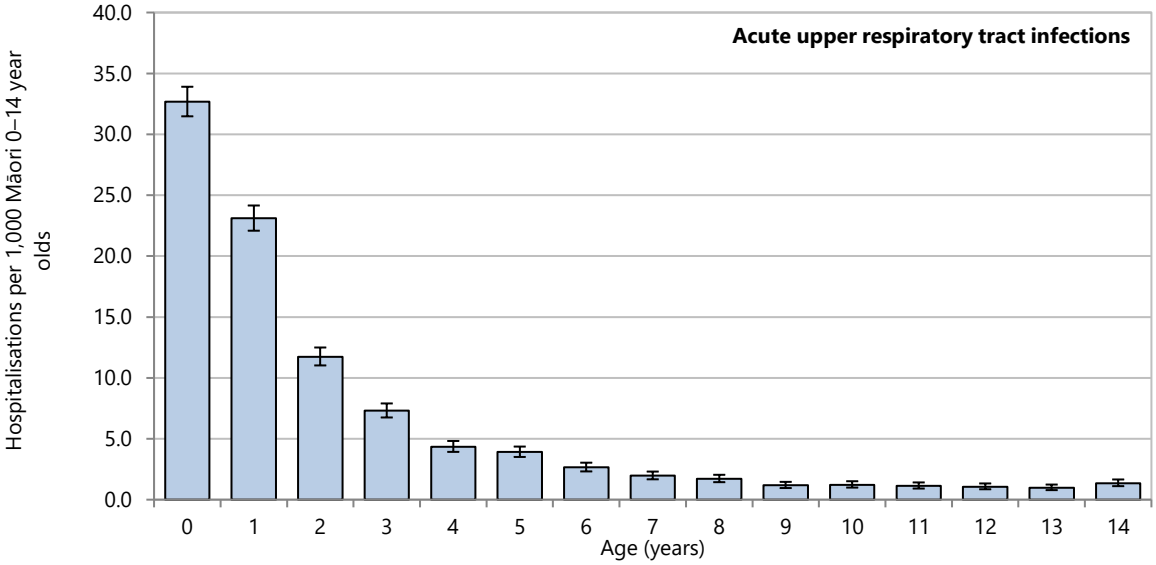
Between 2010 and 2014, acute URTI hospitalisation rates in Māori children were highest in the youngest children and decreased rapidly with increasing age (**Figure 10**).

Between 2010 and 2014, the acute URTI hospitalisation rate in Māori 0–14 year olds was modestly but *statistically significantly* higher than non-Māori non-Pacific 0–14 year olds (**Table 15**).

Distribution by season

There was seasonal variation in acute URTI hospitalisations for Māori children. The highest numbers of hospitalisations were in June to September and the lowest numbers in December to February (**Figure 11**).

Figure 10. Hospitalisations for acute upper respiratory tract infections (URTIs) in Māori 0–14 year olds, by age, New Zealand 2010–2014



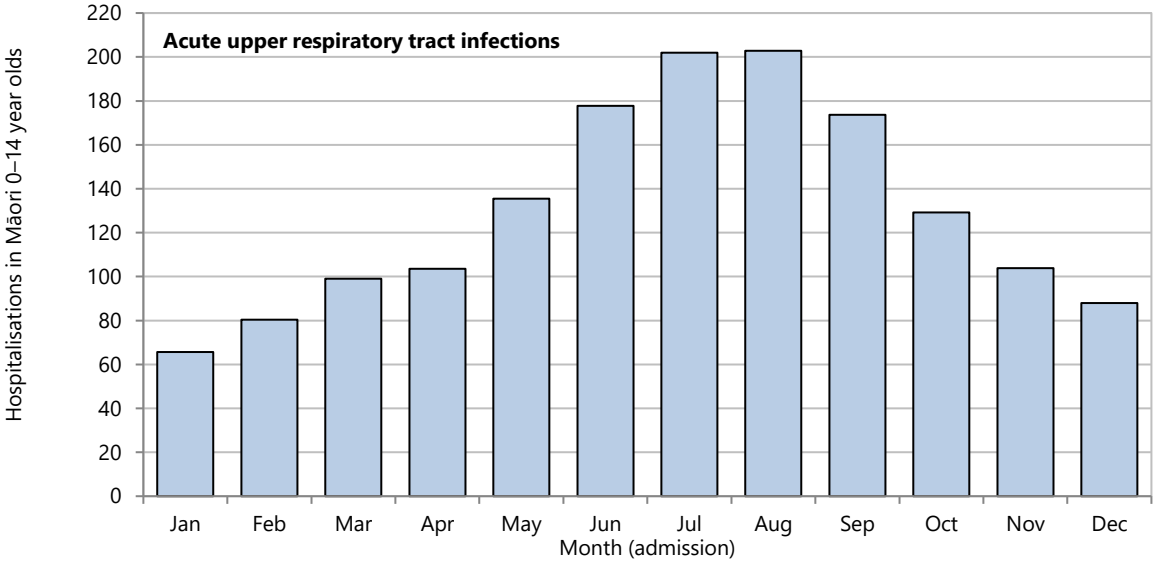
Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population

Table 15. Hospitalisations for acute upper respiratory tract infections in 0–14 year olds, by ethnicity, New Zealand 2010–2014

Ethnicity	Number: 2010–2014	Number: annual average	Rate per 1,000 0–14 year olds	Rate ratio	95% CI
New Zealand 0–14 year olds					
Acute upper respiratory tract infections					
Māori	7,806	1,561	6.77	1.14	1.11–1.17
non-Māori non-Pacific	17,517	3,503	5.96	1.00	

Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population; Rates are per 1,000 0–14 year olds; Rate ratios are unadjusted; Ethnicity is level 1 prioritised

Figure 11. Hospitalisations for acute upper respiratory tract infections (URTIs) in Māori 0–14 year olds, by month, New Zealand 2010–2014



Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population

TONSILLECTOMY

Introduction

The following section uses data from the National Minimum Dataset to review waiting list admissions for tonsillectomy with or without adenoidectomy.

Background

In New Zealand, there are large number of waiting list admissions for tonsillectomy each year.[27] While some tonsillectomies are performed for the management of upper airway obstruction and/or obstructive sleep apnoea, most are for the management of recurrent tonsillitis.[27] There has been considerable controversy regarding the benefits of tonsillectomy for recurrent throat infections, and internationally tonsillectomy is now a much less frequently performed procedure than it was in the past.[28-30] The most significant complication of tonsillectomy is haemorrhage which has been reported as occurring in 2–3% of cases and which, on rare occasions, has proved fatal.[28,31]

Data sources and methods

Indicator

Hospitalisations for tonsillectomy +/− adenoidectomy in 0–14 year olds

Data sources

Numerator: National Minimum Dataset
Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years)

Definition

Arranged or waiting list hospitalisations of 0–14 year olds for tonsillectomy +/− adenoidectomy (hospitalisations per 1,000 population)
Primary diagnoses associated with tonsillectomy and/or adenoidectomy procedures include chronic tonsillitis; hypertrophy of the tonsils/adenoids; sleep apnoea, and other or unspecified chronic diseases of tonsils/adenoids. Refer to **Appendix 5**: Clinical codes used for the codes included.

Notes on interpretation

Note 1: An acute admission is an unplanned hospitalisation occurring on the day of presentation, while an arranged admission (also referred to as a semi-acute admission) is a non-acute hospitalisation with an admission date less than seven days after the date the decision was made that the hospitalisation was necessary. A waiting list admission is a planned hospitalisation, where the admission date is seven or more days after the date the decision was made that the hospitalisation was necessary. Because arranged admissions comprise a mix of patients being admitted semi-acutely for the management of medical conditions, and semi-urgently for operative procedures, in this section arranged admissions have been included.
While in a small number of cases, a single child may have appeared in both the tonsillectomy and acute URTI analyses, in reality, the majority of hospitalisations for tonsillectomy were for chronic upper respiratory conditions (e.g. chronic tonsillitis, obstructive sleep apnoea) and are not included in the acute URTI section.
Note 2: The term "tonsillectomy +/- adenoidectomy" has been used as adenoidectomy is often performed simultaneously with tonsillectomy and it is difficult to exclude those receiving both procedures without excluding a large number of cases of tonsillectomy.
Note 3: **Appendix 2**: Datasets used in this report outlines the limitations of the data utilised from the National Minimum Dataset. The reader is advised to review this appendix before interpreting any trends.

National trends and distribution

Māori tonsillectomy rates were steady from 2000 to 2008, and rose from 2008 to 2014 (**Figure 12**).

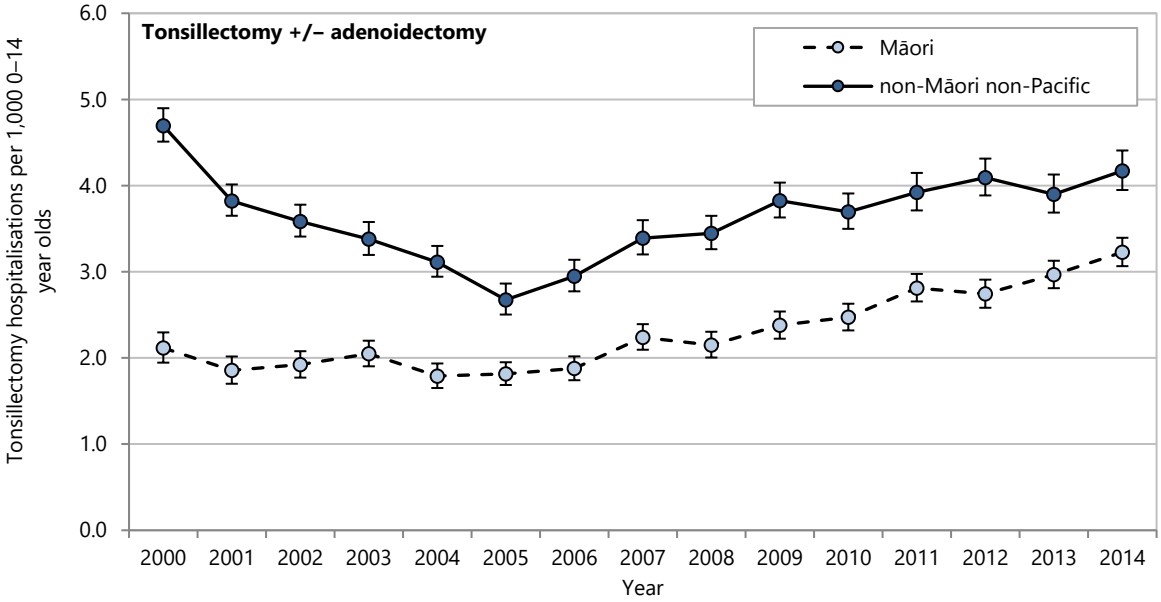
Distribution by primary diagnosis

Between 2010 and 2014, the most common primary diagnosis associated with hospitalisation for tonsillectomy in Māori children was chronic tonsillitis. Hypertrophy of tonsils or adenoids and sleep apnoea were also common (**Table 16**).

Distribution by ethnicity

Māori tonsillectomy rates were *significantly lower* than non-Māori non-Pacific rates between 2010 and 2014 (**Table 17**).

Figure 12. Hospitalisations for tonsillectomy +/– adenoidectomy in 0–14 year olds, by ethnicity, New Zealand 2000–2014



Numerator: National Minimum Dataset (arranged and waiting list admissions only); Denominator: Statistics NZ Estimated Resident Population; Ethnicity is level 1 prioritised

Table 16. Hospitalisations for tonsillectomy +/– adenoidectomy in 0–14 year olds, by primary diagnosis, New Zealand 2010–2014

Primary diagnosis	Number: 2010–2014	Number: annual average	Rate per 1,000 0–14 year olds	95% CI	Per cent
Tonsillectomy +/– adenoidectomy in Māori 0–14 year olds					
New Zealand					
Chronic tonsillitis	1,698	340	1.47	1.41–1.55	51.8
Hypertrophic tonsils and/or adenoids	817	163	0.71	0.66–0.76	24.9
Sleep apnoea	610	122	0.53	0.49–0.57	18.6
Acute tonsillitis	9	2	0.01	s	0.3
Otitis Media	43	9	0.04	0.03–0.05	1.3
Other or unspecified chronic diseases of the tonsils or adenoids	<5	s	s	s	s
Peritonsillar Abscess	<5	s	s	s	s
Perforation or other disorders of tympanic membrane	<5	s	s	s	s
Other diagnoses	99	20	0.09	0.07–0.10	3.0
Total	3,281	656	2.85	2.75–2.95	100.0

Numerator: National Minimum Dataset (arranged and waiting list admissions); Denominator: Statistics NZ Estimated Resident Population

Table 17. Hospitalisations for tonsillectomy +/– adenoidectomy in 0–14 year olds, by ethnicity, New Zealand 2010–2014

Ethnicity	Number: 2010–2014	Number: annual average	Rate per 1,000 0–14 year olds	Rate ratio	95% CI
Tonsillectomy +/– adenoidectomy in 0–14 year olds					
New Zealand					
Māori	3,281	656	2.85	0.72	0.69–0.75
non-Māori non-Pacific	11,635	2,327	3.96	1.00	

Numerator: National Minimum Dataset (arranged and waiting); Denominator: Statistics NZ Estimated Resident Population; Rates are per 1,000 0–14 year olds; Rate ratios are unadjusted; Ethnicity is level 1 prioritised

MIDDLE EAR CONDITIONS: OTITIS MEDIA AND GROMMETS

Introduction

The following section uses data from the National Minimum Dataset to explore acute hospital admission for otitis media in children, as well as arranged and waiting list admissions for the insertion of grommets.

Background

Otitis media is the clinical term for any inflammation of the middle ear.[32] It is a very common condition in children. The two main types of otitis media are acute otitis media (AOM) and otitis media with effusion (OME).

Acute otitis media is a condition of rapid onset that often follows an upper respiratory infection. Symptoms include ear pain, irritability, and fever. If there is perforation of the tympanic membrane (ear drum) there may be otorrhoea (discharge from the ear).[32]Risk factors for AOM include exposure to secondhand smoke, bottle feeding and attendance at childcare.[32] Antibiotics are commonly prescribed for AOM but international guidelines emphasise that in children aged two years or over with uncomplicated AOM antibiotics are of little benefit and treatment should comprise adequate analgesia and watchful waiting.[33-35] Serious complications from AOM are rare. They include mastoiditis, cholesteatoma, labyrinthitis, facial paralysis, and, very rarely, intracranial infection such as meningitis, lateral sinus thrombosis brain abscess.[33]

Otitis media with effusion is defined as an accumulation of non-purulent fluid behind an intact eardrum without signs of acute infection.[33] It is a common condition in early childhood and it causes hearing loss which is usually transient and self-limiting but which may be persistent and associated with educational, language and behavioural problems.[36] For children with long-standing (lasting for more than 3–6 months) bilateral OME, or recurrent AOM, and for children particularly susceptible to OME such as children with Down syndrome or cleft palate, grommets (ventilation or tympanostomy tubes) are often considered as a means of restoring normal hearing. Grommet insertion involves making a small incision in the eardrum (with or without the aspiration of middle ear fluid) and inserting a small ventilation tube. On average, grommets remain in the eardrum for 6–12 months before falling out.[37] Little is known about the long term effects of grommets on children's language, speech or development as very little research has been done in this area.[38]

Data sources and methods

Indicator

Hospitalisations of 0–14 year olds for otitis media or for insertion of grommets

Data sources

Numerator: National Minimum Dataset
Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years).

Definition

Hospitalisations: Acute hospitalisations of 0–14 year olds for otitis media or for other conditions of the middle ear and mastoid.
Arranged and waiting list hospitalisations of 0–14 year olds for the insertion of grommets
Indications for Otitis media and grommets include: chronic tonsillitis; hypertrophy of the tonsils/adenoids; sleep apnoea; and other or unspecified chronic diseases of tonsils/adenoids. Refer to **Appendix 5**: Clinical codes used for the codes included.

Notes on interpretation

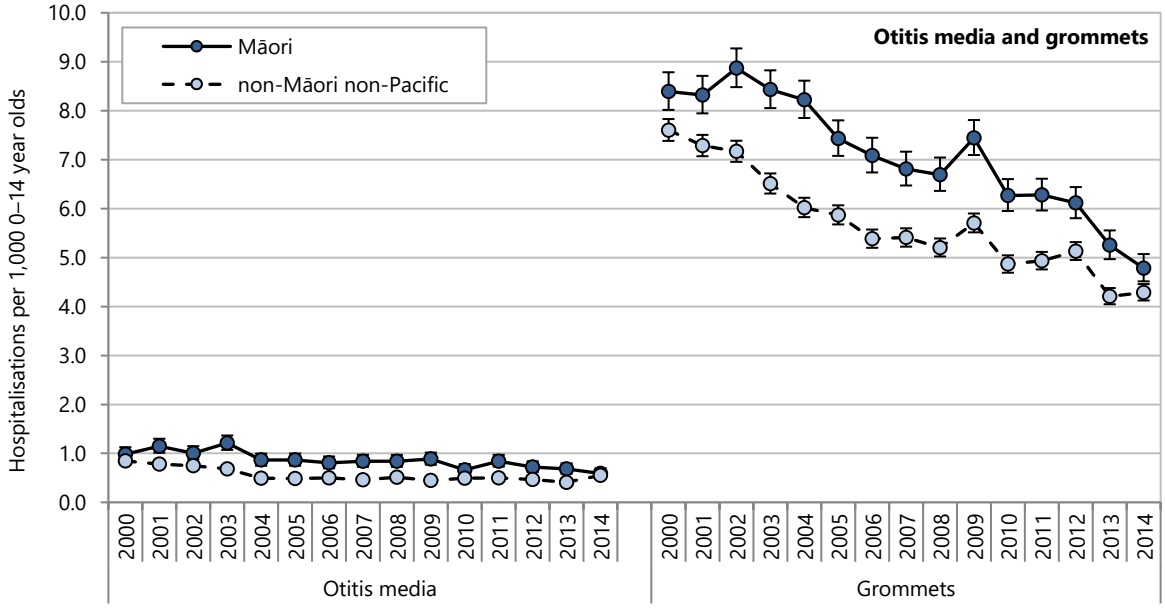
Note 1: An acute admission is an unplanned hospitalisation occurring on the day of presentation, while an arranged admission (also referred to as a semi-acute admission) is a non-acute hospitalisation with an admission date less than seven days after the date the decision was made that the admission was necessary. A waiting list admission is a planned hospitalisation, where the admission date is 7+ days after the date the decision was made that the hospitalisation was necessary.
While the majority of children admitted acutely with a primary diagnosis of otitis media do not receive a surgical intervention, the majority of children admitted from the waiting list with the same primary diagnosis do, with the most common operative procedure being the insertion of grommets. For arranged admissions, the picture is more mixed, with some patients being admitted semi-acutely for the non-surgical management of otitis media, and others for an operative intervention such as grommets. On balance however, more arranged admissions with a primary diagnosis of otitis media are for surgical interventions, and thus in this section arranged admissions have been grouped with the waiting list category (in contrast to other sections where acute and arranged admission are considered together).

Note 2: **Appendix 2**: Datasets used in this report describes the National Minimum Dataset and outlines the limitations of the data utilised from this data collection. The reader is advised to review this appendix before interpreting any trends.
Note 3: 95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms significant or not significant have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section, and thus (unless the terms significant or non-significant are specifically used) the associations described do not imply statistical significance or non-significance (see Appendices for further discussion of this issue).

National trends and distribution

From 2000 to 2014, the hospitalisation rate of Māori 0–14 year olds for otitis media (otitis media hospitalisation rate) fell slightly overall (although there were minor year-to-year fluctuations), while the grommet hospitalisation rate fell steadily. Throughout this period, Māori hospitalisation rates for both otitis media and grommet insertion were higher than non-Māori non-Pacific rates but the trends in both ethnic groups were similar (**Figure 13**).

Figure 13. Hospitalisations for otitis media and grommets in 0–14 year olds, by ethnicity, New Zealand 2000–2014



Numerator: National Minimum Dataset (*Otitis media*: acute admissions; *Grommets*: arranged and waiting list admissions); Denominator: Statistics NZ Estimated Resident Population; Ethnicity is level 1 prioritised

Distribution by primary diagnosis

In Māori children aged 0–14 years hospitalised during 2010–2014 otitis media was by far the most common primary diagnosis in both conditions of the middle ear categories, accounting for 92.0% of hospitalisations for conditions of the middle ear and mastoid and 94.8% of grommet hospitalisations (**Table 18**, **Table 19**).

Table 18. Hospitalisations for conditions of the middle ear and mastoid in Māori 0–14 year olds, by primary diagnosis, New Zealand 2010–2014

Primary diagnosis	Number: 2010–2014	Number: annual average	Rate per 1,000 0–14 year olds	95% CI	Per cent
Conditions of middle ear and mastoid in Māori 0–14 year olds					
Otitis Media	806	161	0.70	0.65–0.75	92.0
Mastoiditis and related disorders	57	11	0.05	0.04–0.06	6.5
Perforation or other disorders of the Tympanic Membrane	9	2	0.01	s	1.0
Cholesteatoma of the Middle Ear	<5	s	s	s	s
Other disorders of the Middle Ear or Mastoid	<5	s	s	s	s
Eustachian tube disorders	0	..	..	..	..
Total	876	175	0.76	0.71–0.81	100.0

Numerator: National Minimum Dataset (acute admissions); Denominator: Statistics NZ Estimated Resident Population; s: suppressed due to small numbers

Table 19. Hospitalisations for grommet insertion in Māori 0–14 year olds, by primary diagnosis, New Zealand 2010–2014

Primary diagnosis	Number: 2010–2014	Number: annual average	Rate per 1,000 0–14 year olds	95% CI	Per cent
Insertion of grommets in Māori 0–14 year olds					
New Zealand					
Otitis Media	6262	1252	5.43	5.30–5.57	94.8
Perforation or other disorders of tympanic membrane	145	29	0.13	0.11–0.15	2.2
Eustachian tube disorders	45	9	0.04	0.03–0.05	0.7
Other disorders of Middle Ear or Mastoid	24	5	0.02	0.01–0.03	0.4
Sleep apnoea	12	2	0.01	0.01–0.02	0.2
Hypertrophic tonsils and/or adenoids	10	2	0.01	<0.01–0.02	0.2
Cholesteatoma of the Middle Ear	6	1	<0.01	s	<0.1
Chronic tonsillitis	5	1	<0.01	s	<0.1
Other diagnoses	95	19	0.08	0.07–0.1	1.44
Total	6604	1321	5.73	5.59–5.87	100

Numerator: National Minimum Dataset (arranged and waiting list admissions); Denominator: Statistics NZ Estimated Resident Population; s: suppressed due to small numbers

Distribution by demographic factors

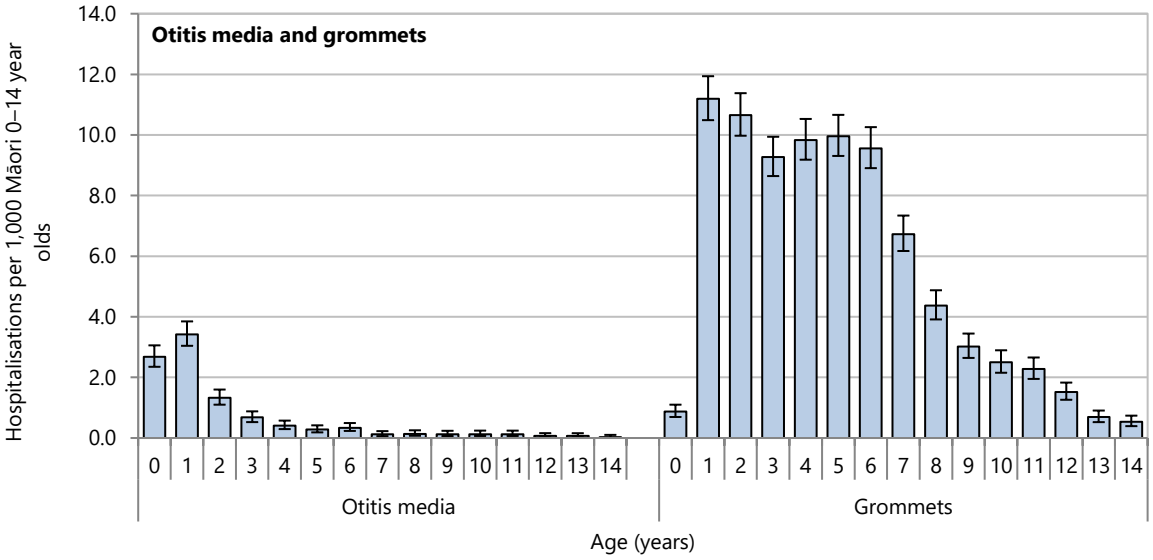
Otitis media hospitalisation rates in Māori children were highest for 0–1 year olds and then decreased rapidly with increasing age from age one to three years and more slowly from age three onwards. Grommet hospitalisations were uncommon in the first year of life: the highest rate was for 1 year olds (although rates were nearly as high in 2–6 year olds). Rates declined markedly with increasing age from age six onwards (**Figure 14**).

Both otitis media and grommet hospitalisation rates were *significantly higher* in Māori 0–14 year olds than in non-Māori non-Pacific 0–14 year olds (**Table 20**).

Distribution by season

There was seasonal variation in Māori children's otitis media hospitalisation rates. The highest numbers of admissions were observed in June–September and the lowest in January-February. There was no seasonal variation in grommet hospitalisations (**Figure 15**).

Figure 14. Hospitalisations for otitis media and grommets in Māori 0–14 year olds, by age, New Zealand 2010–2014



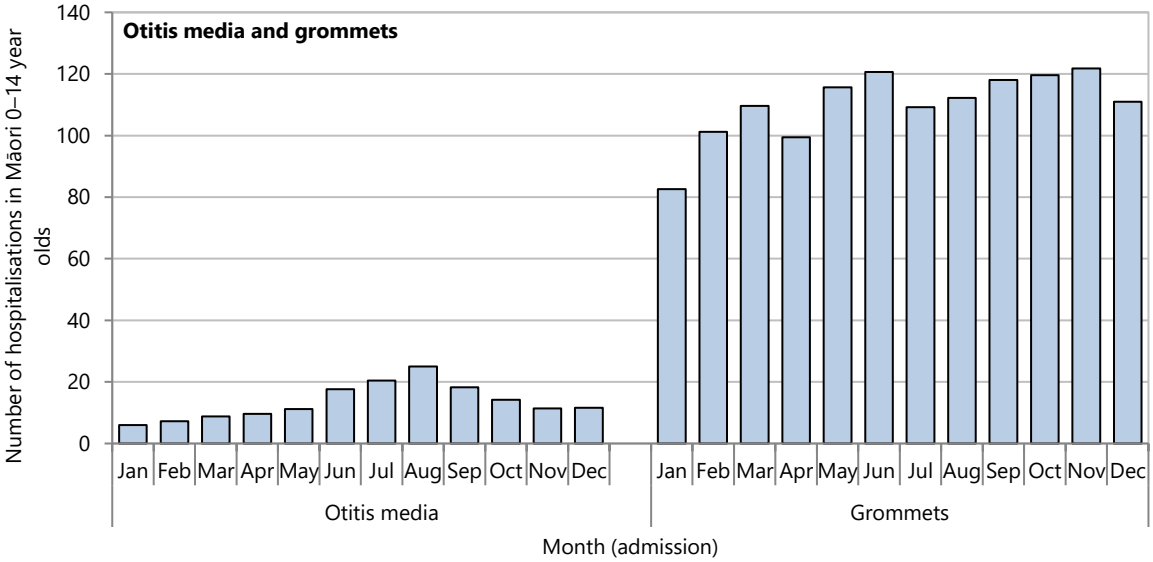
Numerator: National Minimum Dataset (*Otitis media*: acute admissions; *Grommets*: arranged and waiting list admissions); Denominator: Statistics NZ Estimated Resident Population

Table 20. Hospitalisations for otitis media and grommets in 0–14 year olds, by ethnicity, New Zealand 2010–2014

Ethnicity	Number: 2010–2014	Number: annual average	Rate per 1,000 0–14 year olds	Rate ratio	95% CI
New Zealand 0–14 year olds					
Otitis media					
Māori	806	161	0.70	1.44	1.32–1.57
non-Māori non-Pacific	1425	285	0.48	1.00	
Insertion of grommets					
Māori	6604	1321	5.73	1.22	1.19–1.26
non-Māori non-Pacific	13782	2756	4.69	1.00	

Numerator: National Minimum Dataset (acute admissions); Denominator: Statistics NZ Estimated Resident Population; Rates are per 1,000 0–14 year olds; Rate ratios are unadjusted; Ethnicity is level 1 prioritised

Figure 15. Hospitalisations for otitis media and grommets in Māori 0–14 year olds, by month, New Zealand 2010–2014



Numerator: National Minimum Dataset (*Otitis media*: acute admissions; *Grommets*: arranged and waiting list admissions); Denominator: Statistics NZ Estimated Resident Population; Number is annual average, Month is based on hospitalisation admission date

BRONCHIOLITIS

Introduction

The following section reviews bronchiolitis in infants aged less than one year using information from the National Minimum Dataset.

Background

Bronchiolitis occurs mainly in infants aged under one year and is a leading cause of hospital admission in this age group.[39] It is due to viral infection (most commonly with respiratory syncytial virus (RSV)) and tends to occur in seasonal epidemics peaking in late winter.[39,40] Affected infants appear initially to have a cold with a mild fever, a runny nose and a cough but after a few days, this progresses to wheezing and respiratory distress. Feeding and sleeping may be impaired, and very young infants may also have episodes of apnoea. Severely affected infants require hospital care, which consists of supportive therapy with nasal suction to facilitate oral feeding, hydration by nasogastric or intravenous fluids, and supplemental oxygen.[39]

Risk factors for severe illness requiring intensive care include young age (<6 weeks), premature birth, chronic lung disease of prematurity, congenital heart disease and immunodeficiency.[40-42] Risk factors more commonly associated with hospitalisation for less severe bronchiolitis include male sex, age less than six months, birth during the first half of the RSV season, overcrowding, socio-economic disadvantage, older siblings, attendance at day care, lack of breastfeeding and maternal smoking.[43,44] Hospitalisations for bronchiolitis caused by RSV can be prevented by the use of a monthly-injected monoclonal antibody (Palivizumab), but this therapy is very expensive so its use is considered only in very high-risk infants.[45]

Data sources and methods

Indicator

Infants hospitalised for bronchiolitis

Data sources

Numerator:
Hospitalisations: National Minimum Dataset
Denominator: Birth Registration Dataset

Definition

Hospitalisations: Acute and arranged hospitalisations for infants (aged less than one year) with a primary diagnosis of bronchiolitis (per 1,000 livebirths). Refer to **Appendix 5**: Clinical codes used for the codes included.

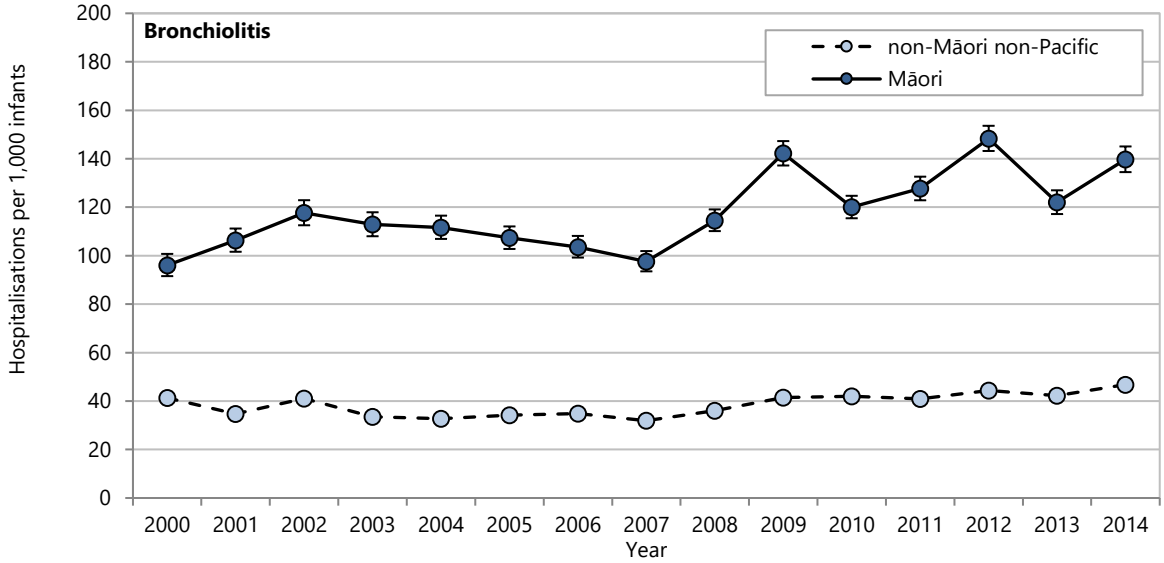
Notes on interpretation

Note 1: An acute admission is an unplanned hospitalisation occurring on the day of presentation, while an arranged admission is a non-acute hospitalisation with an admission date less than seven days after the date the decision was made that hospitalisation was necessary.
Note 2: **Appendix 2**: Datasets used in this report describes the National Minimum Dataset and outlines the limitations of the data utilised from this data collection. The reader is advised to review this appendix before interpreting any trends.

National trends and distribution

Bronchiolitis hospitalisation rates for Māori infants increased overall from 2007 to 2014 (although there were year-to-year fluctuations) and they were consistently more than double non-Māori non-Pacific rates. As Māori rates increased over time but non-Māori non-Pacific rates changed very little, the disparity between the two groups has increased (**Figure 16**).

Figure 16. Hospitalisations for bronchiolitis in infants, by ethnicity, New Zealand 2000–2014



Numerator: National Minimum Dataset (acute and arranged admissions only); Denominator: Birth Registration Dataset; Ethnicity is Level 1 Prioritised

Distribution by ethnicity

Between 2010 and 2014, the bronchiolitis hospitalisation rate for Māori infants was *significantly higher* than the non-Māori non-Pacific rate (**Table 21**).

Table 21. Infants hospitalised for bronchiolitis, by ethnicity, New Zealand 2010–2014

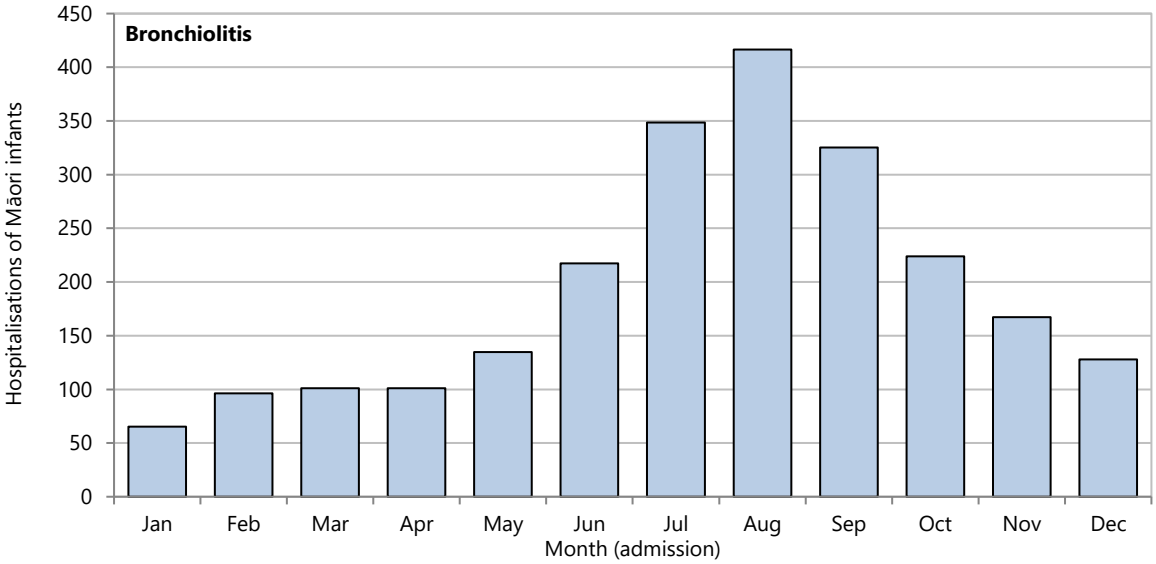
Ethnicity	Number: total 2010–2014	Number: annual average	Rate per 1,000 infants	Rate ratio	95% CI
Bronchiolitis in infants					
New Zealand					
Māori	11,625	2,325	131.35	3.04	2.96–3.12
non-Māori non-Pacific	7,971	1,594	43.23	1.00	

Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Birth Registration Dataset; Rates are per 1,000 livebirths; Rate ratios are unadjusted; Ethnicity is level 1 prioritised

Distribution by season

There was seasonal variation in bronchiolitis hospitalisation rates for Māori infants. The highest numbers of admissions were observed in July to September and the lowest January to April (**Figure 17**).

Figure 17. Hospitalisations for bronchiolitis in Māori infants, by month, New Zealand 2010–2014



Source: National Minimum Dataset (acute and arranged admissions); Number is annual average, Month is based on hospital admission date

PNEUMONIA

Introduction

The following section reviews hospitalisations for pneumonia in Māori children using information from the National Minimum Dataset.

Background

Pneumonia is inflammation of the lungs, usually as the result of a bacterial or viral infection. It often follows an upper respiratory infection. Children with community-acquired pneumonia may present with fever, tachypnoea (rapid breathing), breathlessness or difficulty breathing, cough, wheeze or chest pain. They may also have abdominal pain and/or vomiting and headache.[46] Severely affected children with pneumonia are admitted to hospital but less severely affected children can be safely managed at home. In clinical practice, there is no reliable way of distinguishing viral from bacterial pneumonia, and mixed infections are common, so guidelines recommend that all children with clinical signs of pneumonia should be given antibiotics.[46,47]

Streptococcus pneumoniae (S. pneumoniae) is the most common bacterial cause of pneumonia in children.[46] New Zealand introduced a pneumococcal conjugate vaccine (Prevenar, PCV7) into the childhood immunisation schedule in June 2008.[48] The current schedule includes a 13-valent vaccine, Prevenar 13 (PCV13).[49]

While hospitalisations for pneumonia in young children in New Zealand have decreased since the introduction of PCV7, there are significant ethnic and socio-economic disparities.[50] Research done in Counties Manukau found that Māori and Pacific children were 4–5 times more likely to be admitted to hospital with lower respiratory infections (LRIs), including pneumonia, than European children and that children living in the most socioeconomically deprived deciles (deciles 9 and 10) were 1.4 times more likely to be admitted than children from other deciles.[50] Household characteristics of Counties Manukau children aged less than two years admitted to hospital with LRIs in 2007 indicated that 25% lived with seven or more other people, 33% lived with four or more children, 65% were exposed to cigarette smoke and 27% were in households that used no form of heating.[51]

Data sources and methods

Indicator

Hospitalisations for pneumonia in 0–24 year olds

Data sources

Numerator: *Hospitalisations:* National Minimum Dataset

Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years).

Definition

Hospitalisations: Acute and arranged hospitalisations for 0–24 year olds with a primary diagnosis of pneumonia (hospitalisations per 1,000 population). Refer to **Appendix 5**: Clinical codes used for the codes included.

Notes on interpretation

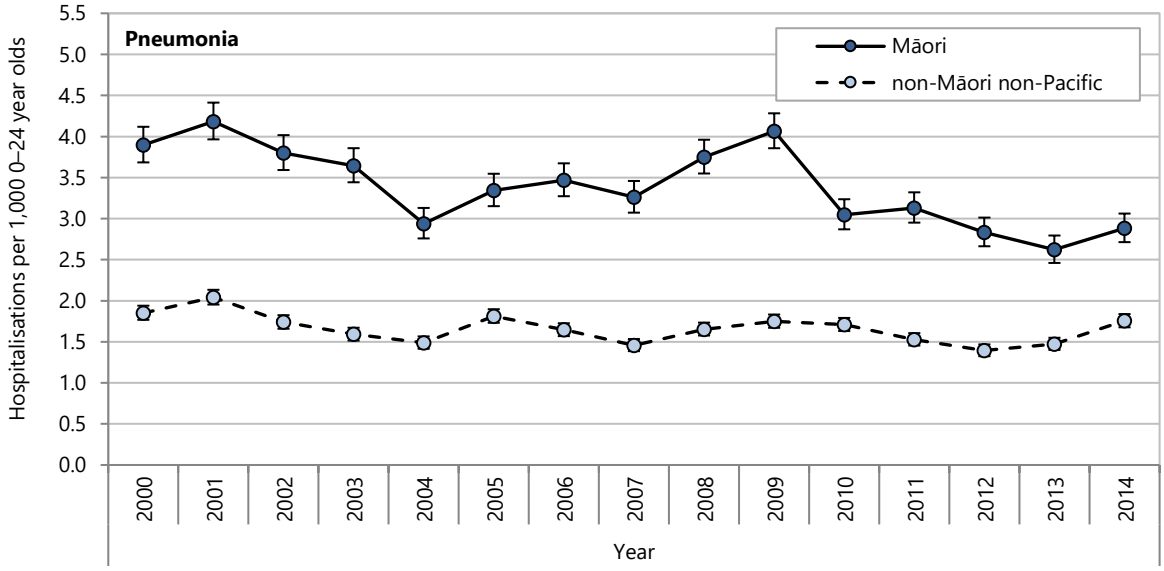
Note 1: An acute hospitalisation is an unplanned hospitalisation occurring on the day of presentation, while an arranged hospitalisation (sometimes referred to as a semi-acute hospitalisation) is a non-acute hospitalisation with an admission date less than seven days after the date the decision was made that the hospitalisation was necessary. A waiting list hospitalisation is a planned hospitalisation, where the admission date is seven or more days after the date the decision was made that the hospitalisation was necessary.

Note 2: **Appendix 2**: Datasets used in this report outlines the limitations of the hospitalisation data used. The reader is advised to review this appendix before interpreting any trends based on hospitalisation data.

National trends and distribution

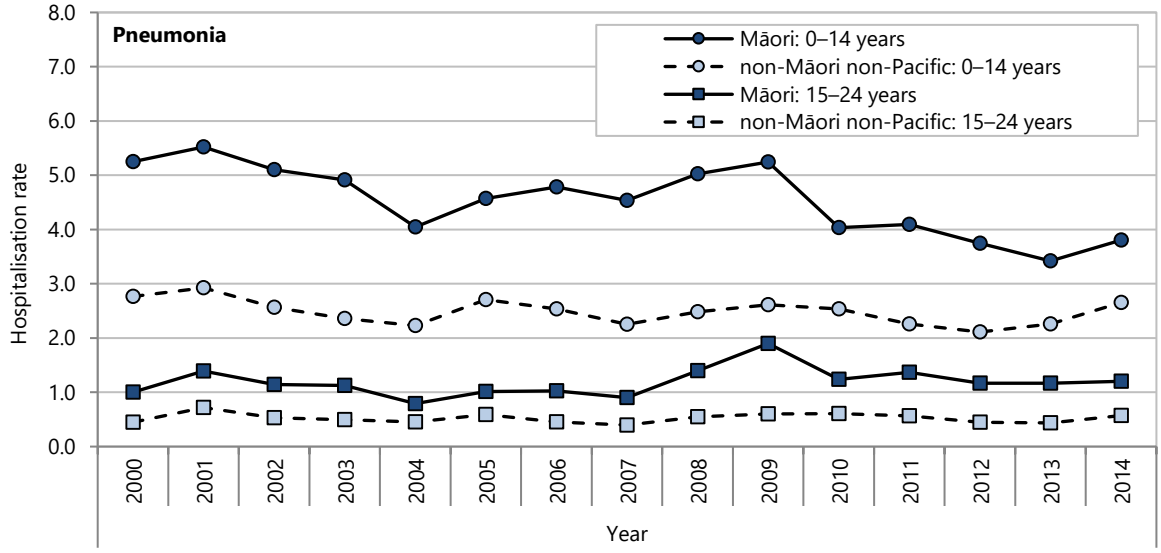
From 2000 to 2014 pneumonia hospitalisation rates for Māori 0–24 year olds fell overall (although there were year to year fluctuations) while rates for non-Māori non-Pacific 0–24 year olds changed little so that the disparity between the two ethnic groups decreased (**Figure 18**). The fall in Māori hospitalisation rates overall was due to a fall in rates for 0–14year olds as the rates in 15–24 year olds were generally steady (**Figure 19**).

Figure 18. Hospitalisations due to pneumonia in 0–24 year olds, by ethnicity, New Zealand 2000–2014



Numerator: National Minimum Dataset (acute and semi-acute admissions only); Denominator: Statistics NZ Estimated Resident Population; Ethnicity is Level 1 Prioritised

Figure 19. Hospitalisations for pneumonia in 0–24 year olds, by age group and ethnicity, New Zealand 2000–2014



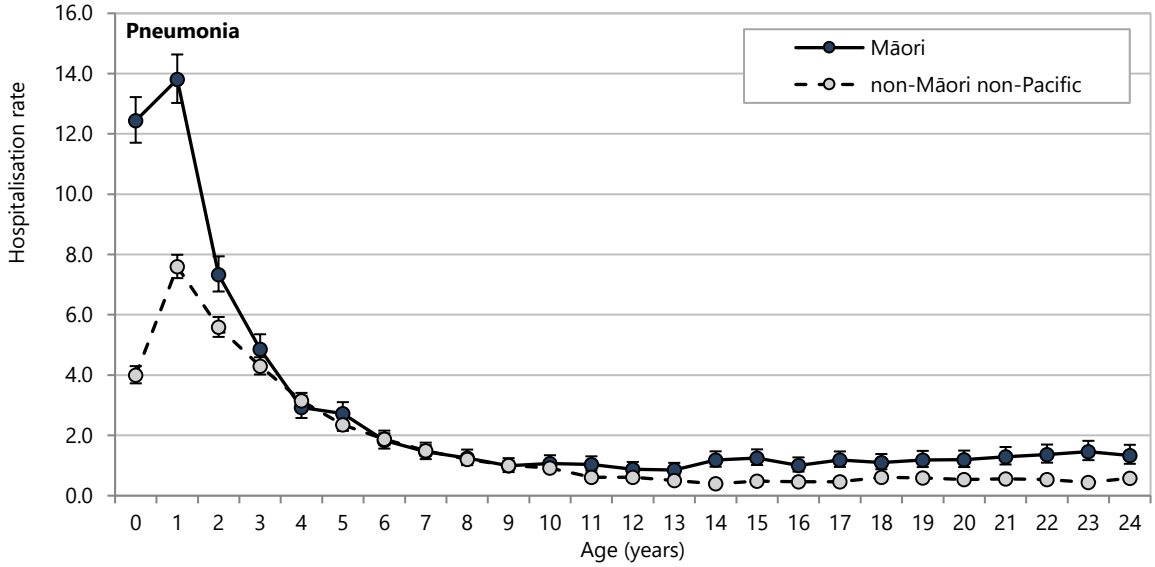
Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population; Rate is per 1,000 age-specific population; Ethnicity is Level 1 Prioritised

Distribution by demographic factors

Between 2010 and 2014 pneumonia hospitalisation rates in both the Māori and non-Māori non-Pacific ethnic groups were highest for one year olds and decreased sharply with increasing age. Compared to non-Māori non-Pacific rates, Māori rates were considerably higher in 0 and 1 year olds, somewhat higher in 2 and 3 year olds, similar in 4–10 year olds, somewhat higher in 11–13 year olds and considerably higher in 14–24 year olds (**Figure 20**).

Between 2010 and 2014, the pneumonia hospitalisation rate for Māori 0–24 year olds collectively was *significantly higher* than for non-Māori non-Pacific 0–24 year olds. The disparity was greater in the 15–24 year age group than in the 0–14 year age group (but *statistically significant* for both age groups) (**Table 22**).

Figure 20. Hospitalisations for pneumonia in 0–24 year olds, by age and ethnicity, New Zealand 2010–2014



Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population; Rate is per 1,000 population; Ethnicity is level 1 prioritised

Table 22. Hospitalisations for pneumonia in 0–24 year olds, by age group and ethnicity, New Zealand 2010–2014

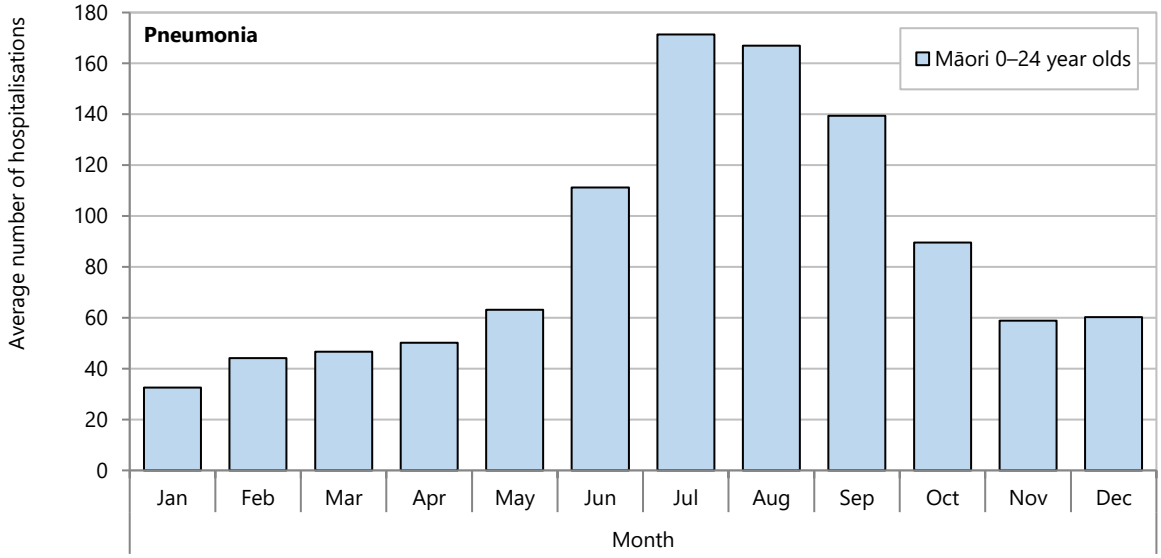
Ethnicity	Number: total 2010–2014	Number: annual average	Rate	Rate ratio	95% CI
Pneumonia in 0–24 year olds					
New Zealand					
0–24 year olds					
Māori	5172	1034	2.90	1.85	1.78–1.91
non-Māori non-Pacific	8123	1625	1.57	1.00	
0–14 year olds					
Māori	4398	880	3.82	1.61	1.55–1.68
non-Māori non-Pacific	6954	1391	2.36	1.00	
15–24 year olds					
Māori	774	155	1.23	2.34	2.13–2.56
non-Māori non-Pacific	1169	234	0.53	1.00	

Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population; Rates are per 1,000 age-specific population; Rate ratios are unadjusted; Ethnicity is level 1 prioritised

Distribution by season

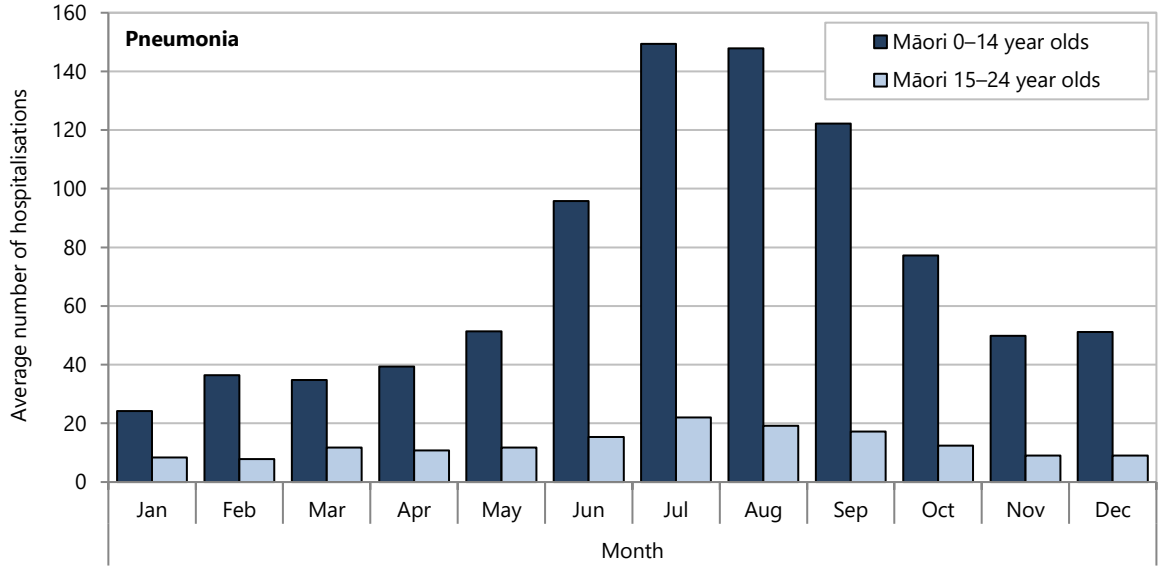
There was seasonal variation in pneumonia hospitalisation rates for Māori 0–24 year olds. The highest numbers of admissions were observed in July–September and the lowest in January–February (**Figure 21**). The seasonal variation was more pronounced in the 0–14 year age group than in the 15–24 year age group (**Figure 22**).

Figure 21. Average number of hospitalisations for pneumonia in Māori 0–24 year olds, by month of admission, New Zealand 2010–2014



Source: National Minimum Dataset (acute and semi-acute admissions only); Number is annual average

Figure 22. Average number of hospitalisations for pneumonia in Māori 0–24 year olds, by age group and month of admission, New Zealand 2010–2014



Source: National Minimum Dataset (acute and semi-acute admissions only); Number is annual average

ASTHMA

Introduction

The following section reports on deaths due to asthma and hospitalisations for asthma and wheeze in children and young people, using information from the National Minimum Dataset.

Background

Asthma is the most common non-communicable disease in children.[52] The diagnosis is a clinical one, based on recurrent episodes of asthma symptoms (more than one of breathlessness, wheezing, chest tightness and cough).[53] It is important to understand that there are many different causes of wheezing in children and that, especially in pre-school children and infants, the commonest clinical pattern is episodes of wheezing, cough and difficulty breathing in association with viral upper respiratory infections.[53] Most of these children will stop having recurrent chest symptoms by school age[53] and so clinicians have become increasingly reluctant to diagnose very young children with asthma. Nevertheless, a high proportion of children diagnosed with chronic asthma in later childhood had their first symptoms and signs of the disorder in their preschool years.[54]

The causes of asthma are not well understood.[52] The strongest risk factors for developing asthma are a genetic predisposition (family history of asthma and/or other allergic diseases such as eczema and allergic rhinitis) together with environmental exposure to inhaled substances and particles that may provoke allergic reactions or irritate the airways, such as house dust mites, pet dander, pollen, mould, and tobacco smoke.[52] Asthma can also be triggered by cold air, exercise and psychological distress.[52] The prevalence of asthma in New Zealand is one of the highest in the world.[55] Although primary prevention of asthma will not be possible until the causes of asthma are better understood, better treatment through improved access to primary care, and educational interventions for parents, children and healthcare providers, has the potential to reduce asthma morbidity and hospitalisation rates.[53]

Data sources and methods

Indicator

Hospitalisations for asthma or wheeze in 0–24 year olds

Data sources

Numerator: *Hospitalisations:* National Minimum Dataset
Denominator: Statistics NZ estimated resident population (with linear extrapolation being used to calculate denominators between Census years).

Definition

Hospitalisations: Acute and arranged hospitalisations of 0–24 year olds with a primary diagnosis of asthma or wheeze (per 1,000 age-specific population). Refer to **Appendix 5**: Clinical codes used for the codes included.

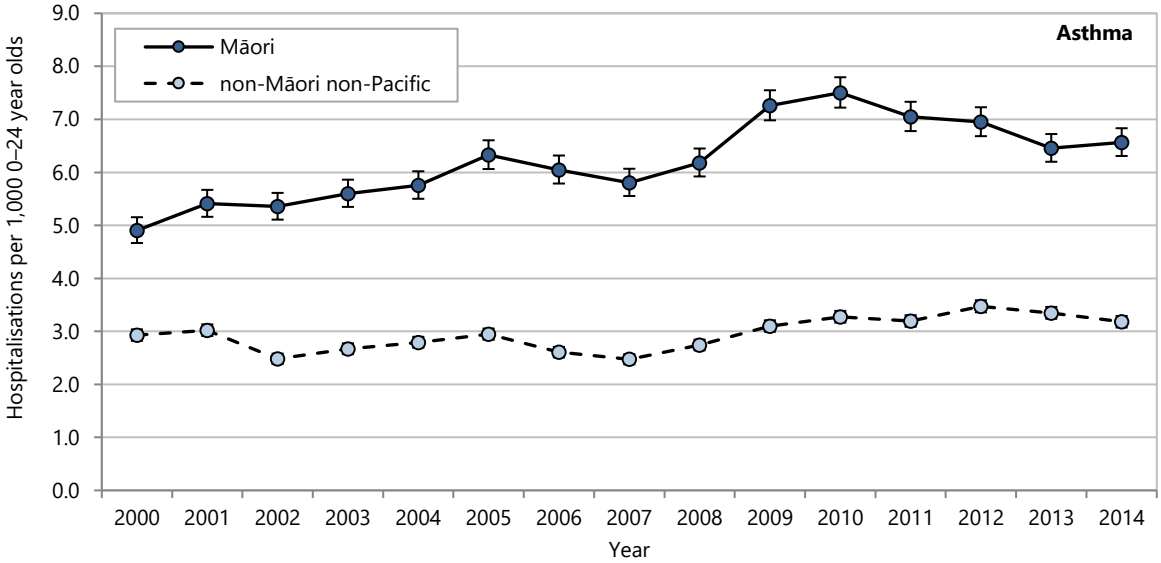
Notes on interpretation

Note 1: In 2013, a number of changes were made to the ICD-10-AM codes included in this indicator. The changes included broadening asthma to include wheeze to take into account a shift in the way paediatricians were diagnosing asthma in preschool children. As a result, the rates in this section are not directly comparable with those presented in NZCYES reports prior to 2013.
Note 2: An acute hospitalisation is an unplanned hospitalisation occurring on the day of presentation, while an arranged hospitalisation (sometimes referred to as a semi-acute hospitalisation) is a non-acute hospitalisation with an admission date less than seven days after the date the decision was made that the hospitalisation was necessary.
Note 3: **Appendix 2**: Datasets used in this report describes the National Minimum Dataset and outlines the limitations of the data utilised from this data collection. The reader is advised to review this appendix before interpreting any patterns.

National trends and distribution

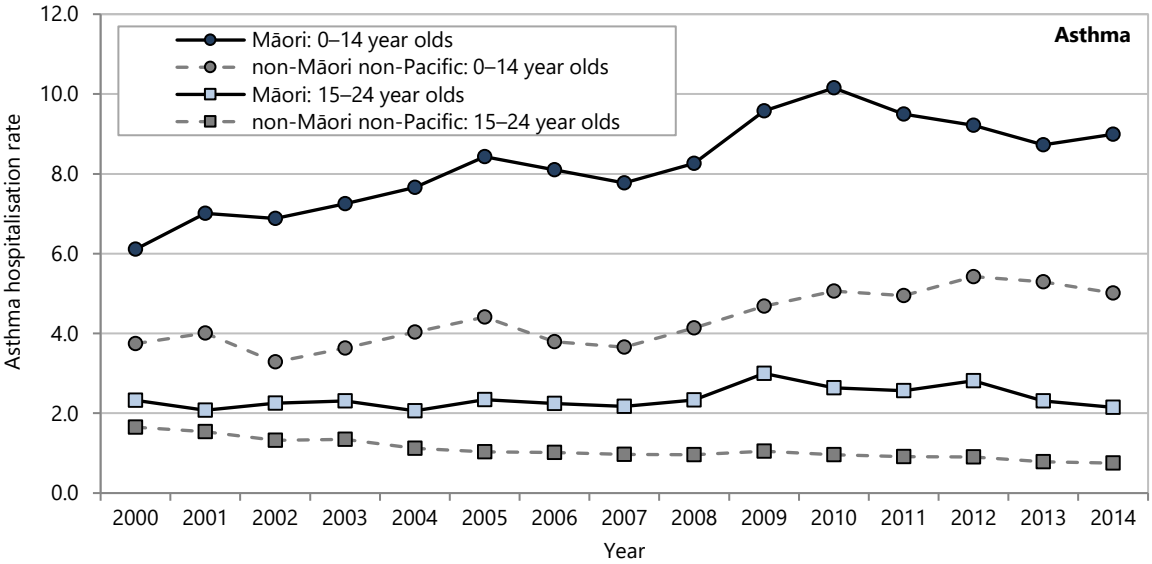
There was an overall increase in the asthma hospitalisation rate for Māori 0–24 year olds from 2000 to 2014 but rates have been falling in recent years from a peak in 2010. The asthma hospitalisation rate for Māori 0–24 year olds has been roughly double the non-Māori non-Pacific rate since 2002, and because the Māori rate has increased while the non-Māori non-Pacific rate has not, the disparity between the two ethnic groups has increased (**Figure 23**). The increase in Māori asthma hospitalisation rates was confined to the 0–14 year age group and rates for the 15–24 year age group rates were steady (**Figure 24**).

Figure 23.Hospitalisations for asthma in 0–24 year olds, by ethnicity, New Zealand 2000–2014



Numerator: National Minimum Dataset (acute and semi-acute admissions); Denominator: Statistics NZ Estimated Resident Population

Figure 24. Hospitalisations for asthma in 0–24 year olds, by ethnicity and age group, New Zealand 2000–2014



Numerator: National Minimum Dataset (acute and semi-acute admissions); Denominator: Statistics NZ Estimated Resident Population. Rate is per 1,000 age-specific population

Distribution by primary diagnosis

During 2010–2014, in Māori 0–24 year olds, 0–14 year olds and 15–24 year olds, the most common primary diagnosis for hospitalisations in the asthma and wheeze category was asthma. The diagnosis of wheeze occurred mainly in 0–14 year olds, where it accounted for 25.8% of hospitalisations (**Table 23**).

Table 23. Hospitalisations for asthma and wheeze in Māori 0–24 year olds, by primary diagnosis, New Zealand 2010–2014

Primary diagnosis	Number: total 2010–2014	Number: annual average	Rate per 1,000 0–24 year olds	95% CI	Per cent of category
Asthma and wheeze in Māori					
0–24 year olds					
Asthma	9,073	1,815	5.09	4.99–5.19	73.8
Status asthmaticus	448	90	0.25	0.23–0.28	3.6
Wheeze	2,778	556	1.56	1.50–1.62	22.6
Total	12,299	2,460	6.90	6.78–7.02	100.0
0–14 year olds					
Asthma	7,604	1,521	6.60	6.45–6.75	70.9
Status asthmaticus	356	71	0.31	0.28–0.34	3.3
Wheeze	2768	554	2.40	2.31–2.49	25.8
Total	10,728	2,146	9.31	9.14–9.49	100.0
15–24 year olds					
Asthma	1,469	294	2.33	2.21–2.45	93.5
Status asthmaticus	92	18	0.15	0.12–0.18	5.9
Wheeze	10	2	0.02	0.01–0.03	0.6
Total	1,571	314	2.49	2.37–2.62	100.0

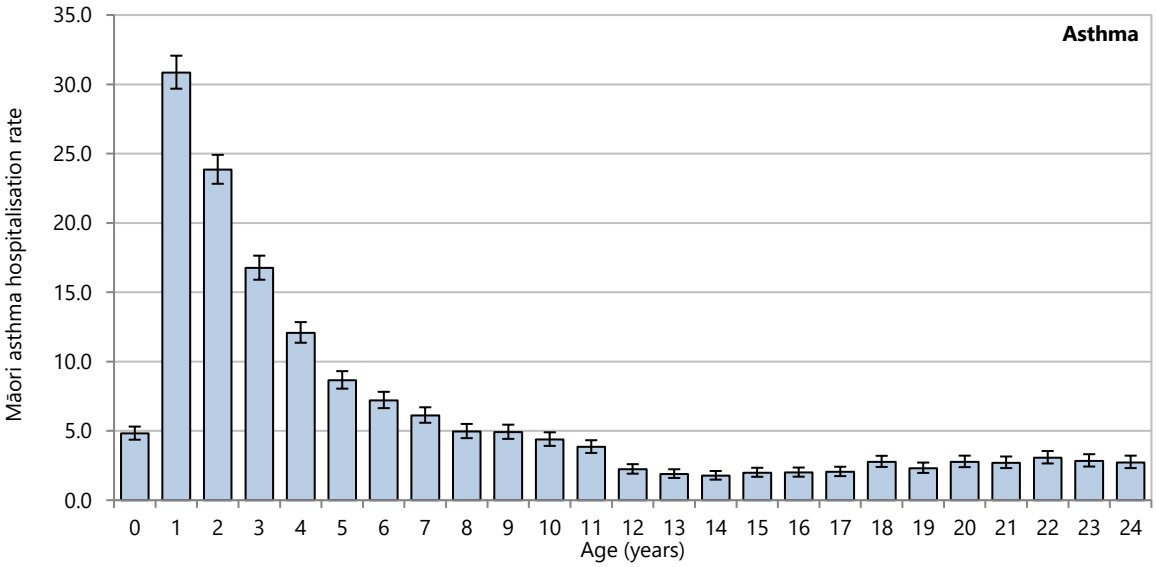
Numerator: National Minimum Dataset (acute and semi-acute admissions); Denominator: Statistics NZ Estimated Resident Population

Distribution by demographic factors

Between 2010 and 2014, the Māori asthma hospitalisation rate was highest for one year olds, fell with increasing age until 13 years and then remained steady with increasing age (**Figure 25**).

Between 2010 and 2014, Māori asthma hospitalisation rates were *significantly higher* than non-Māori non-Pacific rates in the 0–24 years, 0–14 years and 15–24 year age groups (**Table 24**).

Figure 25. Hospitalisations for asthma in Māori 0–24 year olds, by age, New Zealand 2010–2014



Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population; Rate is per 1,000 age-specific population

Table 24. Hospitalisations for asthma in 0–24 year olds, by age group and ethnicity, New Zealand 2010–2014

Ethnicity	Number: 2010–2014	Number: annual average	Rate per 1,000 population	Rate ratio	95% CI
Asthma					
0–24 year olds					
Māori	12,299	2,460	6.90	2.09	2.05–2.14
non-Māori non-Pacific	17,015	3,403	3.29	1.00	
0–14 year olds					
Māori	10,728	2,146	9.31	1.81	1.77–1.86
non-Māori non-Pacific	15,102	3,020	5.13	1.00	
15–24 year olds					
Māori	1,571	314	2.49	2.90	2.71–3.10
non-Māori non-Pacific	1,913	383	0.86	1.00	

Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population; Rates are per 1,000 age-specific population; Rate ratios are unadjusted; Ethnicity is level 1 prioritised

Distribution by season

The lowest numbers of asthma hospitalisation in Māori 0–24 year olds were in January with no clear seasonal variation through the rest of the year.

BRONCHIECTASIS

Introduction

The following section reports on hospitalisations for bronchiectasis in Māori children and young people using information from the National Minimum Dataset.

Background

Bronchiectasis is a lung condition in which the bronchi (air passages) are distended and often thick-walled. These bronchial changes are associated with accumulation of mucus and frequent bacterial infections that can lead to further inflammatory destruction of the bronchial tree. Although in adults these changes are permanent there is at least the potential for the condition to be reversible in children.[56] The main symptom of bronchiectasis is a persistent wet cough lasting for four weeks or more that does not respond to antibiotics. Other symptoms and signs that may be present include shortness of breath with exercise), growth failure, or abnormalities of the shape of the chest wall or the fingertips (the clinical sign of 'clubbing').[57]

Children with bronchiectasis typically have a history of recurrent chest infections and the condition is strongly associated with socioeconomic disadvantage.[58] The number of New Zealand children known to have bronchiectasis increased almost threefold between 2000 and 2008, and is much higher than the reported incidence rates in Finland and the UK.[59-61] Pacific and Māori children are affected disproportionately by bronchiectasis compared with European and other children.[59] Prevention of bronchiectasis involves reducing the risk of respiratory infections, and also ensuring follow up a few weeks after acute chest infections to enable early detection of ongoing disease.[62]

Data sources and methods

Indicator

Hospitalisations for (non-cystic fibrosis) bronchiectasis in 0–24 year olds

Data sources

Numerator: National Minimum Dataset
Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years)

Definition

Hospitalisations: Acute and arranged hospitalisations of 0–24 year olds with a primary diagnosis of bronchiectasis (hospitalisations per 100,000 age-specific population) and excludes records where cystic fibrosis is listed in any of the first 15 diagnoses

Acute and arranged hospitalisations of 0–24 year olds with a diagnosis of bronchiectasis (hospitalisations per 100,000 age-specific population) in any of the first 15 diagnoses and excludes records where cystic fibrosis is listed in any of the first 15 diagnoses. Refer to **Appendix 5**: Clinical codes used for the codes included.

Notes on interpretation

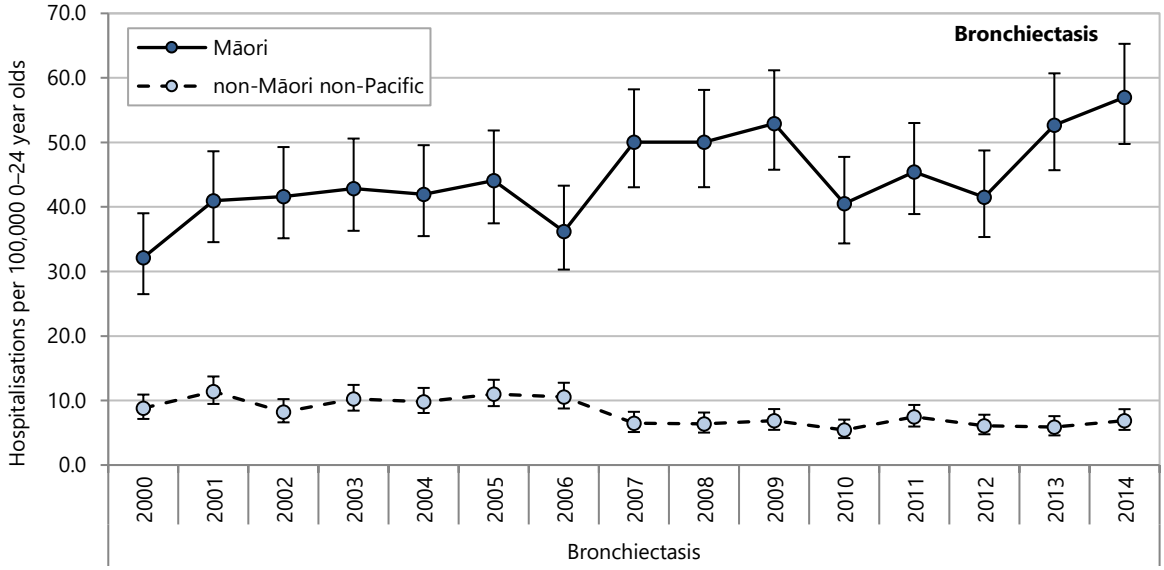
Note 1: Unless otherwise specified, this analysis focuses on hospitalisations of 0–24 year olds with bronchiectasis listed in any of the first 15 diagnoses (rather than on the subset of hospitalisations where bronchiectasis was listed only as the primary diagnosis). The rationale for this wider focus is that many 0–24 year olds with bronchiectasis will not be hospitalised for bronchiectasis per se, but rather for one of its predisposing conditions or resulting complications. For example, during 2005–2009, only 55.4% of hospitalisations for 0–24 year olds with bronchiectasis had bronchiectasis listed as the primary diagnosis, with 19.8% having pneumonia and/or other diseases of the respiratory system listed as the primary diagnosis and a further 11.5% having agranulocytosis or immune deficiencies listed as the primary diagnosis.[63]
Note 2. The rationale for excluding bronchiectasis cases where cystic fibrosis is also documented arises from the differing aetiology of cystic fibrosis and non-cystic fibrosis bronchiectasis and that bronchiectasis typically develops over time in people with cystic fibrosis.
Note 3. An acute hospitalisation is an unplanned hospitalisation occurring on the day of presentation, while an arranged hospitalisation (sometimes referred to as a semi-acute hospitalisation) is a non-acute hospitalisation with an admission date less than seven days after the date the decision was made that the hospitalisation was necessary.
Note 4. The limitations of the data utilised from the National Minimum Dataset is provided in **Appendix 2**: Datasets used in this report. The reader is advised to review this before interpreting any trends.

National trends and distribution

From 2000 to 2014 the bronchiectasis hospitalisation rates for Māori 0–24 year olds increased overall but it should be noted that the rates are based on relatively small numbers of cases and the year to year variations in

rates were sometimes quite large (**Figure 26**). Rates for Māori 0–24 year olds were consistently much higher than rates for non-Māori non-Pacific 0–24 year olds (**Figure 26**).

Figure 26. Hospitalisations for bronchiectasis in 0–24 year olds, by ethnicity, New Zealand 2000–2014

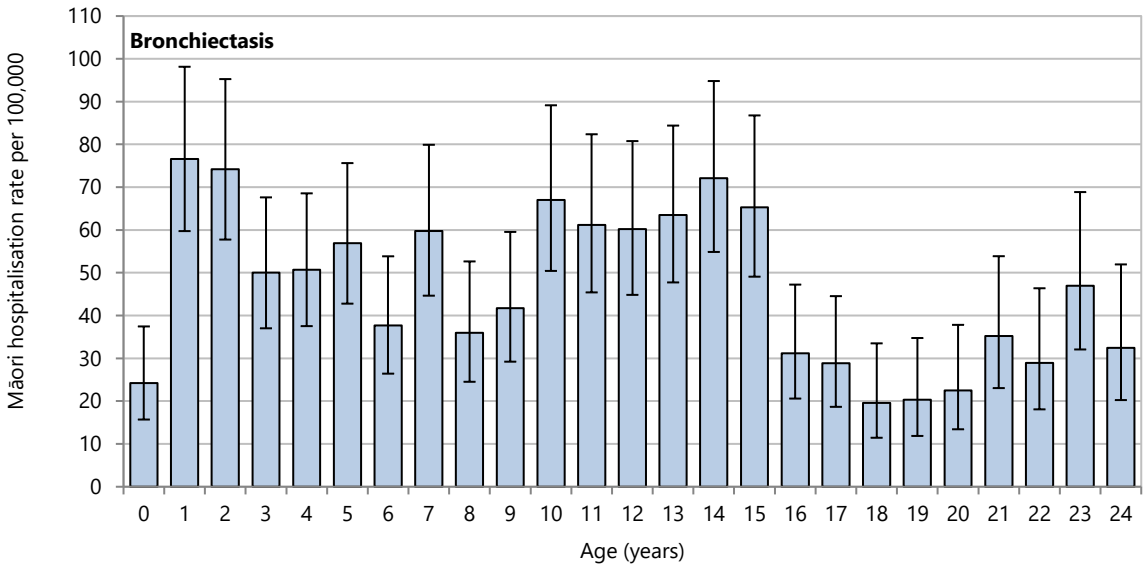


Numerator: National Minimum Dataset (acute and arranged admissions, cystic fibrosis cases excluded); Denominator: Statistics NZ Estimated Resident Population; All cases include bronchiectasis listed in any of first 15 diagnoses; Ethnicity is level 1 prioritised; Hospitalisations per 100,000 ethnic-specific population aged 0–24 years

Distribution by demographic factors

Between 2010 and 2014 bronchiectasis hospitalisation rates for Māori were generally higher in those aged one to 15 years than in those aged 16 to 24 years (**Figure 27**). The bronchiectasis hospitalisation rate for Māori 0−24 year olds in 2010–2014 was *significantly higher* than that for non-Māori non-Pacific 0–24 year olds (**Table 25**).

Figure 27. Hospitalisations for bronchiectasis in Māori 0–24 year olds, by age at discharge, New Zealand 2010−2014



Numerator: National Minimum Dataset (acute and semi-acute admissions only, cystic fibrosis cases excluded); Denominator: Statistics NZ Estimated Resident Population; Ethnicity is level 1 prioritised; Hospitalisations per 100,000 Māori 0–24 year olds; Rates are based on hospitalisations with bronchiectasis listed in any of first 15 diagnoses

Table 25. Hospitalisations for bronchiectasis in 0–24 year olds, by ethnicity. New Zealand 2010–2014

Ethnicity	Number: 2010–2014	Number: annual average	Rate per 100,000 0–24 year olds	Rate ratio	95% CI
Bronchiectasis in 0–24 year olds					
New Zealand					
Māori	847	169	47.5	7.48	6.59–8.50
non-Māori non-Pacific	328	66	6.3	1.00	

Numerator: National Minimum Dataset (acute and semi-acute admissions only, cystic fibrosis cases excluded); Denominator: Statistics NZ Estimated Resident Population; Number of cases includes all cases with bronchiectasis listed in any of the first 15 diagnoses; Ethnicity is level 1 prioritised

Distribution by season

Between 2010 and 2014 there was no marked seasonal variation in bronchiectasis hospitalisation rates for Māori 0–24 year olds, regardless of whether rates were based on hospitalisation with a primary diagnosis of bronchiectasis or on rates derived from hospitalisations with bronchiectasis in any of the first 15 diagnoses.

COMMON COMMUNICABLE DISEASES

PERTUSSIS

Introduction

The following section reviews pertussis rates in infants aged less than one year using information from the National Minimum Dataset and Mortality Collection.

Background

Pertussis (whooping cough) is a highly contagious acute respiratory tract infection. "Classic" pertussis follows an incubation period of a few days to a few weeks and is recognised as having three stages: a catarrhal stage with a runny nose and sneezing (1–2 weeks), a paroxysmal stage (2–6 weeks) in which prolonged bursts of uninterrupted coughing are followed by a characteristic inspiratory whoop, and a convalescent stage (≥ 2 weeks). Young infants in their first few months of life, who make up more than 90% of the fatalities from pertussis, do not display the classic stages and initially apnoea and cyanosis may be the only signs of the disease. Young infants suspected of having pertussis need hospitalisation and the most severely affected can require intubation, drug-induced paralysis and ventilation.[64]

Routine pertussis vaccination began in New Zealand in 1960 and the current schedule recommends vaccination at six weeks, three months, and five months of age with booster doses at four years and 11 years, and during pregnancy at 28 to 38 weeks' gestation.[49] Neither vaccination nor natural disease provides complete or lifelong immunity.[64] Immunity wanes over time, and *Bordetella pertussis* is endemic in the older child and adult population so there is always the potential for an incompletely vaccinated infant to be infected by an older person with pertussis who may not have any symptoms other than a persistent cough and may not be especially unwell.[49] The fact that neither natural infection nor vaccination provides long term immunity is the reason why pertussis epidemics continue to recur in two to five-yearly epidemic cycles, just as they did before routine immunisation (albeit with much lower rates of disease). New Zealand had a pertussis epidemic from 2011 to 2014 with several hundred infant hospitalisations and three deaths.[65]

Besides improving coverage and timeliness of infant vaccination, which is the most important strategy, the Global Pertussis Initiative recommends universal preschool booster doses, universal adolescent immunisation, universal adult immunisation, selective immunisation of new mothers, family, and close contacts of newborns (the "cocoon strategy"), selective immunisation of healthcare workers, and selective immunisation of childcare workers.[66,67]

Data sources and methods

Indicator

Hospitalisations for pertussis in infants

Data sources

Numerator: *Hospitalisations*: National Minimum Dataset
Denominator: Birth Registration Dataset

Definition

Hospitalisations: Acute and arranged hospitalisations of infants (up to one year old) with a primary diagnosis of pertussis (per 1,000 age-specific population).
Pertussis or whooping cough was used to identify hospitalisations. This includes:

Whooping cough due to *Bordetella pertussis*
Whooping cough due to *Bordetella parapertussis*
Whooping cough due to other *Bordetella* species
Whooping cough, unspecified

Refer to **Appendix 5**: Clinical codes used for the codes included.

Rate

Hospitalisations per 1,000 age-specific population

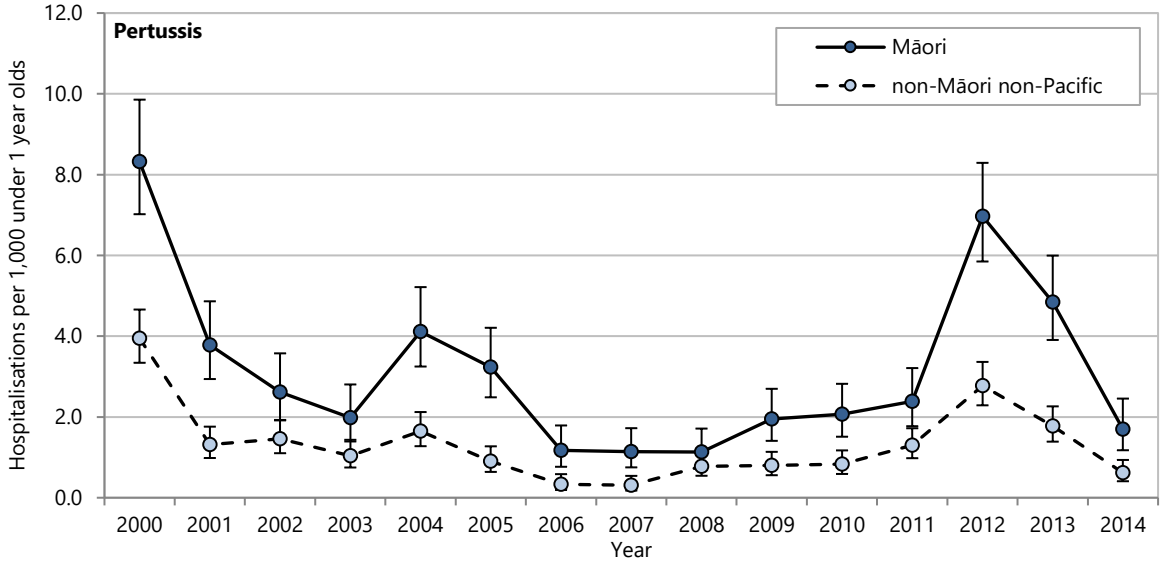
Notes on interpretation

Note 1: An acute hospitalisation is an unplanned hospitalisation occurring on the day of presentation, while an arranged hospitalisation (also referred to as a semi-acute hospitalisation) is a non-acute hospitalisation with an admission date less than seven days after the date the decision was made that the hospitalisation was necessary.
Note 2: **Appendix 2**: Datasets used in this report describes the National Minimum Dataset and outlines the limitations of the data utilised from this collection. The reader is advised to review this appendix before interpreting any trends.

National trends and distribution

Between 2000 and 2014, hospitalisations for pertussis in Māori infants fluctuated, with peaks occurring in 2000, 2004 and 2012 (**Figure 28**). During this period hospitalisations for pertussis were consistently higher for Māori infants than for non-Māori non-Pacific infants.

Figure 28. Hospitalisations for pertussis in under 1 year olds, by ethnicity, New Zealand 2000–2014



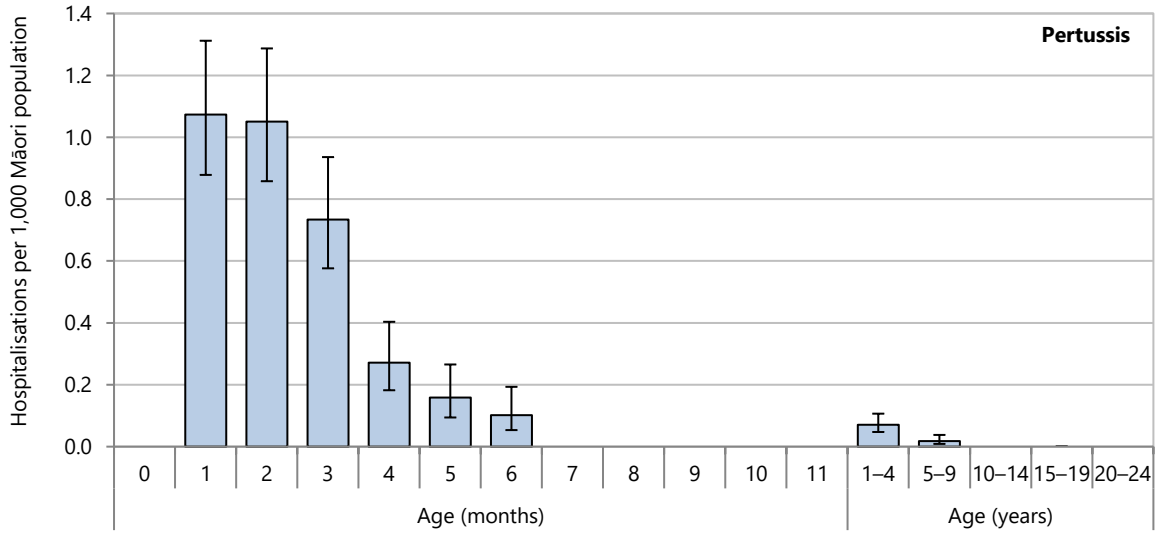
Numerator: National Minimum Dataset (acute and arranged admissions only); Denominator: Birth Registration Dataset; Rate is per 1,000 age-specific population

Distribution by demographic factors

Between 2010 and 2014, hospitalisation rates for pertussis were highest in Māori infants aged one and two months. Rates then declined rapidly with increasing age (**Figure 29**).

During the same period, hospitalisation rates for pertussis were *significantly higher* for Māori than non-Māori non-Pacific infants aged under one year old (**Table 26**).

Figure 29. Hospitalisations for pertussis in Māori 0–24 year olds, by age, New Zealand 2010–2014



Numerator: National Minimum Dataset (acute and arranged admissions); Denominators: under 1 year: Birth registration Dataset; 1–24 years: Statistics NZ Estimated Resident Population; Hospitalisations are per 1000 age-specific Māori population

Table 26. Hospitalisations of under 1 year olds for pertussis, by ethnicity, New Zealand 2010–2014

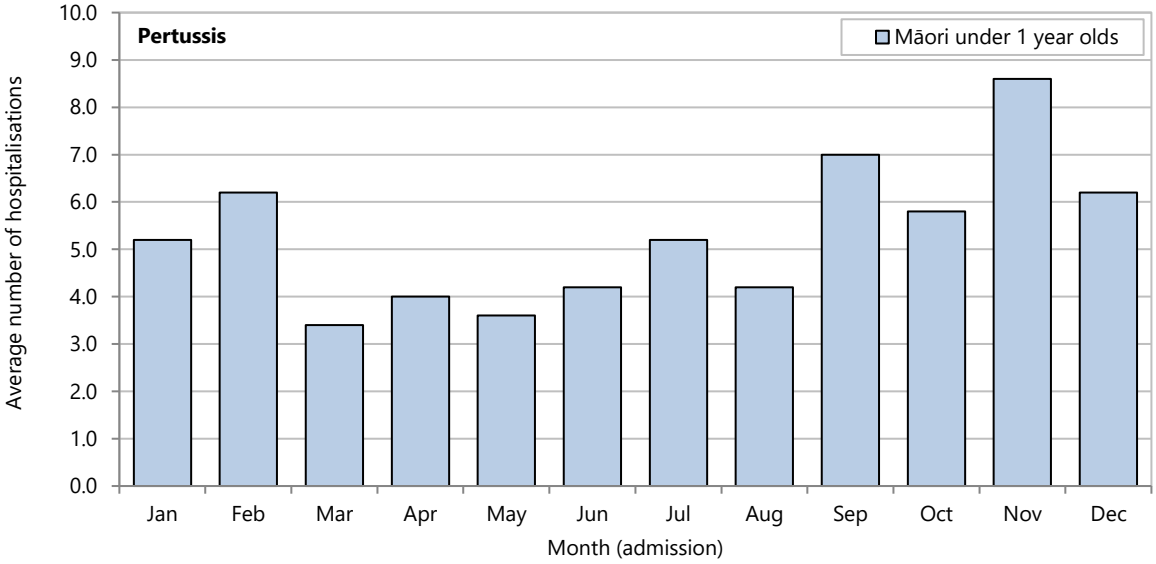
Ethnicity	Number: total 2010–2014	Number: annual average	Rate per 1,000 under 1 year olds	Rate ratio	95% CI
Pertussis in under 1 year olds					
New Zealand					
Māori	318	64	3.59	2.46	2.09–2.90
non-Māori non-Pacific	269	54	1.46	1.00	

Numerator: National Minimum Dataset (acute and semi-acute admissions); Denominator: Birth Registration Dataset; Rates are per 1,000 infants; Rate ratios are unadjusted; Ethnicity is level 1 prioritised

Distribution by season

Between 2010 and 2014, the greatest numbers of hospitalisations for pertussis in Māori infants aged under one year were in July to September (**Figure 30**).

Figure 30. Average number of hospitalisations for pertussis in Māori under 1 year olds, by month, New Zealand 2010–2014



Source: National Minimum Dataset (acute and semi-acute admissions); Number is annual average

MENINGOCOCCAL DISEASE

Introduction

The following section reports on hospitalisations for meningococcal disease in Māori children and young people using information from the National Minimum Dataset.

Background

Neisseria meningitis bacteria can cause a serious invasive disease that begins suddenly as a flu-like illness and rapidly progresses to potentially fatal septicaemia and, in severe cases, to shock and multi-organ failure. Children with meningococcal disease typically experience acute fever, malaise, nausea, myalgia, arthralgia and prostration with a rash in about two-thirds of cases. Infants present with less-specific features.[68]

The highest age-specific rates of meningococcal disease are seen in infants aged under one year. Infection rates are consistently higher for Māori than non-Māori non-Pacific people, and Māori infants aged under one year have highest rates of any group.[49] About 15% of the New Zealand population carry *N. meningitidis* in the nasopharynx without any outward symptoms. Causal factors for invasive meningococcal disease are poorly understood but include a combination of factors related to the organism, the susceptible child and the external environment. There tends to be a seasonal pattern with more cases in winter and spring.[68] Early detection and prompt follow-up of contacts with antibiotics to reduce nasopharyngeal carriage of *N. meningitidis* are key components of control of meningococcal disease. Living in crowded dwellings and exposure to environmental tobacco smoke are risk factors and can be addressed through social planning and effective health promotion.[69]

Data sources and methods

Indicator

Hospitalisations for meningococcal disease in 0–24 year olds

Data sources

Numerator: *Hospitalisations*: National Minimum Dataset

Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years)

Definition

Hospitalisations: Acute and arranged hospitalisations of 0–24 year olds with a primary diagnosis of meningococcal disease (hospitalisations per 100,000 age-specific population)

Meningococcal disease includes: meningococcal meningitis; Waterhouse-Friderichsen syndrome; acute meningococcaemia; chronic meningococcaemia; meningococcaemia unspecified; meningococcal heart disease; other meningococcal infections; and meningococcal infection unspecified

Refer to **Appendix 5**: Clinical codes used for the codes included.

Notes on interpretation

Note 1: While in the datasets used it was not possible to break down the cases identified by strain, it was likely that a mix of group B and C strains predominated. The ESR review of meningococcal disease notifications during 2011 found that of the 100 notified cases where the strain type was identified (92.6% of all notifications), 37.0% were group B:P1.7-2,4 and 27.0% were group C:P1.5-1,10-8.[70].

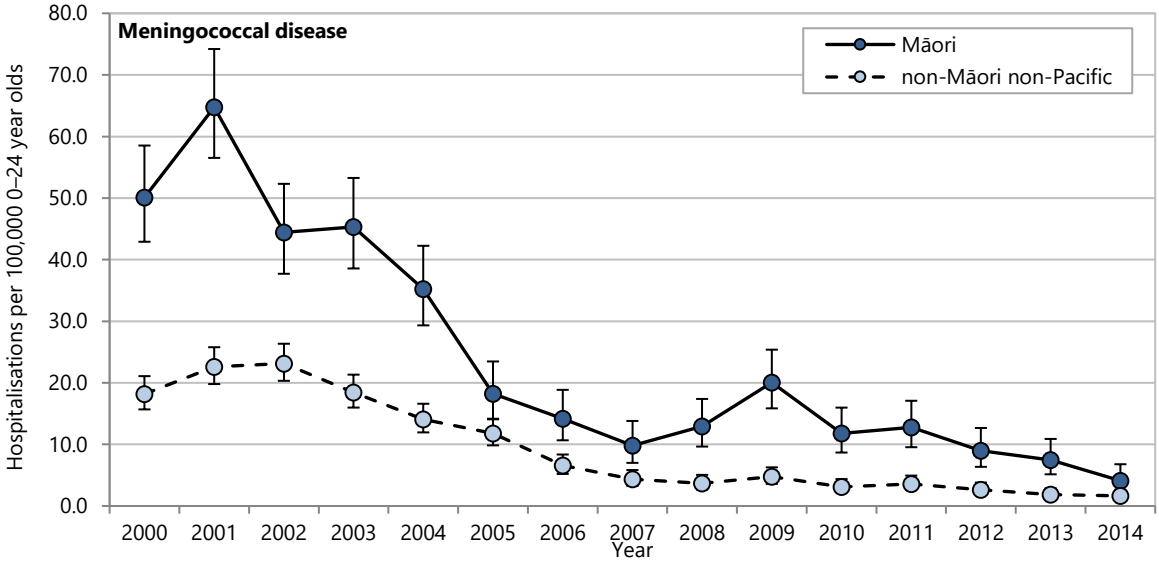
Note 2: An acute admission is an unplanned hospitalisation occurring on the day of presentation, while an arranged admission (also referred to as a semi-acute admission) is a non-acute hospitalisation with an admission date less than seven days after the date the decision was made that the hospitalisation was necessary.

Note 3: **Appendix 2**: Datasets used in this report outlines the limitations of the data utilised from the National Minimum Dataset. The reader is advised to review this appendix before interpreting any trends.

National trends and distribution

From 2000 to 2014, the hospitalisation rate for meningococcal disease in Māori 0–24 year olds declined rapidly from 2000 to 2007 and continued to decline overall, albeit at a much slower rate, over subsequent years. Rates for both the Māori and non-Māori non-Pacific ethnic groups fell over the period and ethnic differences reduced considerably as Māori rates fell to a greater degree than non-Māori non-Pacific rates (**Figure 31**).

Figure 31. Hospitalisations for meningococcal disease in 0–24 year olds, by ethnicity, New Zealand 2000–2014

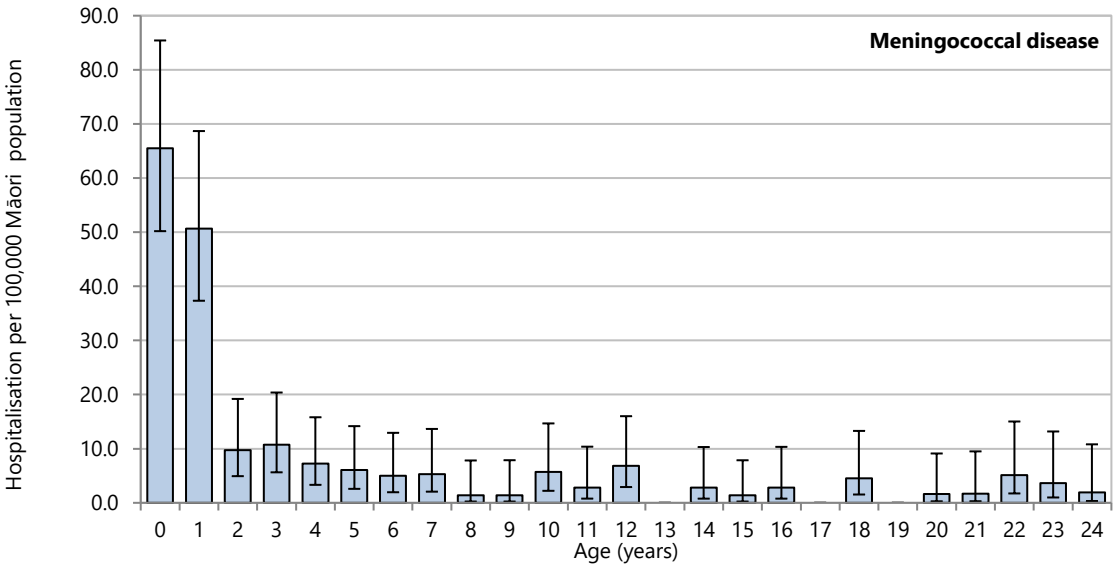


Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population

Distribution by demographic factors

Between 2010 and 2014 Māori hospitalisation rates for meningococcal disease in were highest in infants under one year, and next highest in one year olds. Rates in other age groups were much lower (**Figure 32**). Rates for meningococcal disease were *significantly higher* for Māori than non-Māori non-Pacific 0–24 year olds (**Table** 27).

Figure 32. Hospitalisations for meningococcal disease in Māori 0–24 year olds, by age at discharge, New Zealand 2010–2014



Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population; Rate is age-specific per 100,000

Table 27. Hospitalisations for meningococcal disease in 0–24 year olds, by ethnicity, New Zealand 2010–2014

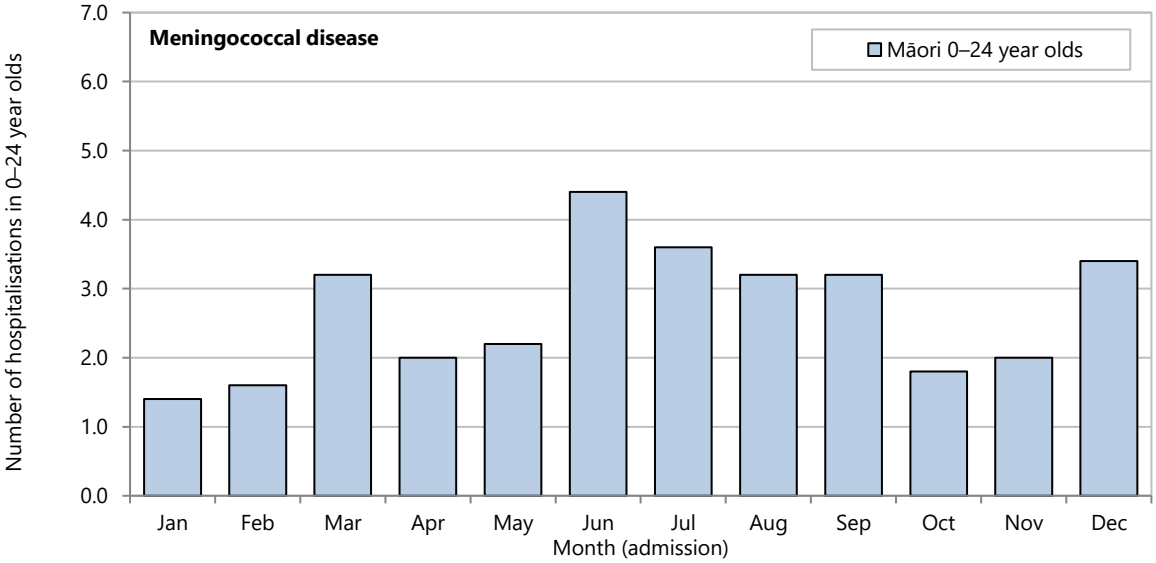
Ethnicity	Number: 2010–2014	Number: annual average	Rate per 100,000 0– 24 year olds	Rate ratio	95% CI
Meningococcal disease in 0–24 year olds					
New Zealand					
Māori	160	32	8.97	3.51	2.79–4.42
non-Māori non-Pacific	132	26	2.56	1.00	

Numerator: National Minimum Dataset (acute and semi-acute admissions); Denominator: Statistics NZ Estimated Resident Population; Rates are per 100,000 0–24 year olds; Rate ratios are unadjusted; Ethnicity is level 1 prioritised

Distribution by season

There was no clear seasonal variation in meningococcal hospitalisation rates in Māori 0–24 year olds as the average number of hospitalisations in any one month was low (**Figure 33**).

Figure 33. Average number of hospitalisations for meningococcal disease in Māori 0–24 year olds, by admission month, New Zealand 2010–2014



Numerator: National Minimum Dataset (acute and semi-acute admissions); Number is annual average

TUBERCULOSIS

Introduction

The following section reports on hospitalisations for tuberculosis in children and young people using information from the National Minimum Dataset.

Background

The overall rate of active tuberculosis (TB) in New Zealand is low compared with many countries, although TB remains one of the most common notifiable infectious diseases.[49] TB is a chronic bacterial infection caused by *Mycobacterium complex*, including *M .tuberculosis* and *M. bovis.* The lung is the most common site of infection, but any organ can be affected. Young children with active TB may present with symptoms of fever, lassitude and cough, while older children and adults may present with loss of appetite, fatigue, weight loss, chills, night sweats, cough, blood in sputum or chest pain. The disease may be active or latent; the risk of progression from latent to active TB disease is much higher for children than for healthy adults.[71]

Most children with TB are infected as a result of contact with an infectious adult in their family although there have been outbreaks of TB among New Zealand children in the past.[72,73] The proportion of notified cases who are children varies significantly by ethnicity such that children account for a higher proportion of cases among Māori than among European people. The very youngest children appear to be most susceptible, with just over half the cases of childhood TB occurring in children aged under 5 years.[71] In all countries TB mostly affects the poorest and most vulnerable communities and in Auckland the notification rates in the least affluent parts of the region are 60 times higher than notification rates in the most affluent.[71] The most common risk factor for TB infection is contact with a known case of TB.[71] Vaccination can protect neonates and infants at high risk from severe forms of TB disease.[49] The mainstay of tuberculosis control in New Zealand is early identification of people with the disease and public health follow-up of cases and contacts.[71]

Data sources and methods

Indicator

Hospitalisations for tuberculosis in 0–24 year olds

Data sources

Numerator: National Minimum Dataset
Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years)

Definition

Acute and arranged hospitalisations of 0–24 year olds with a primary diagnosis of tuberculosis (hospitalisations per 100,000 0−24 year olds). Refer to **Appendix 5**: Clinical codes used for the codes included.

Notes on interpretation

Note 1: An acute admission is an unplanned hospitalisation occurring on the day of presentation, while an arranged admission (also referred to as a semi-acute admission) is a non-acute hospitalisation with an admission date less than seven days after the date the decision was made that the hospitalisation was necessary
Note 2: **Appendix 2**: Datasets used in this report outlines the limitations of the data utilised from the National Minimum Dataset. The reader is advised to review this appendix before interpreting any trends.

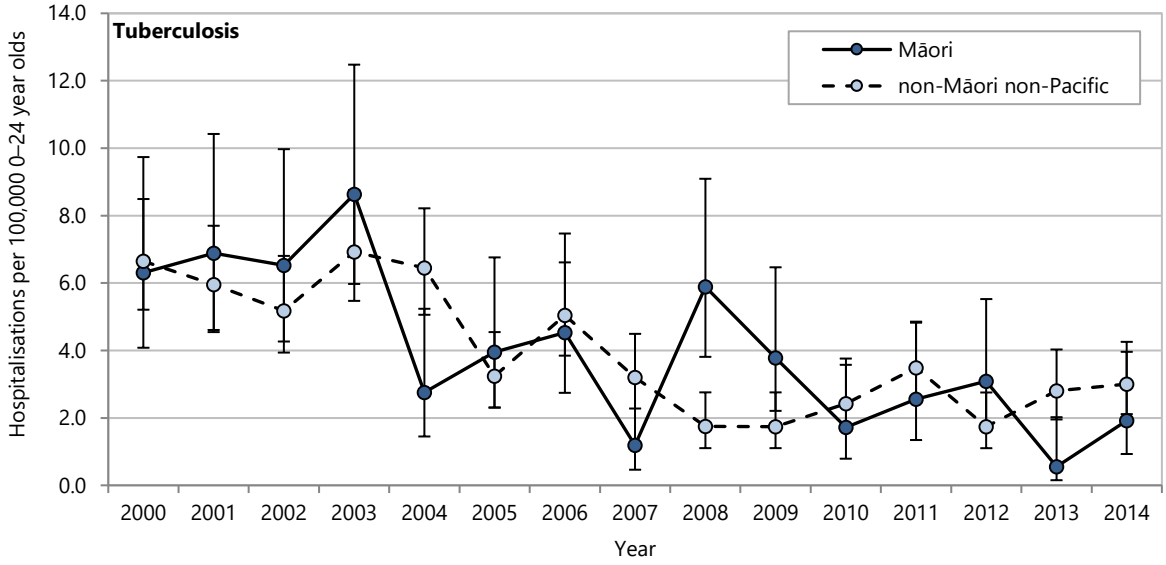
National trends and distribution

The hospitalisation rate for tuberculosis in Māori 0–24 year olds declined overall from 2000 to 2014 although there was considerable year-to-year variation as the result of the small numbers of cases. Rates declined for both Māori and non-Māori non-Pacific 0–24 year olds and there were no consistent difference in rates between the two groups (**Figure 34**).

Distribution by demographic factors

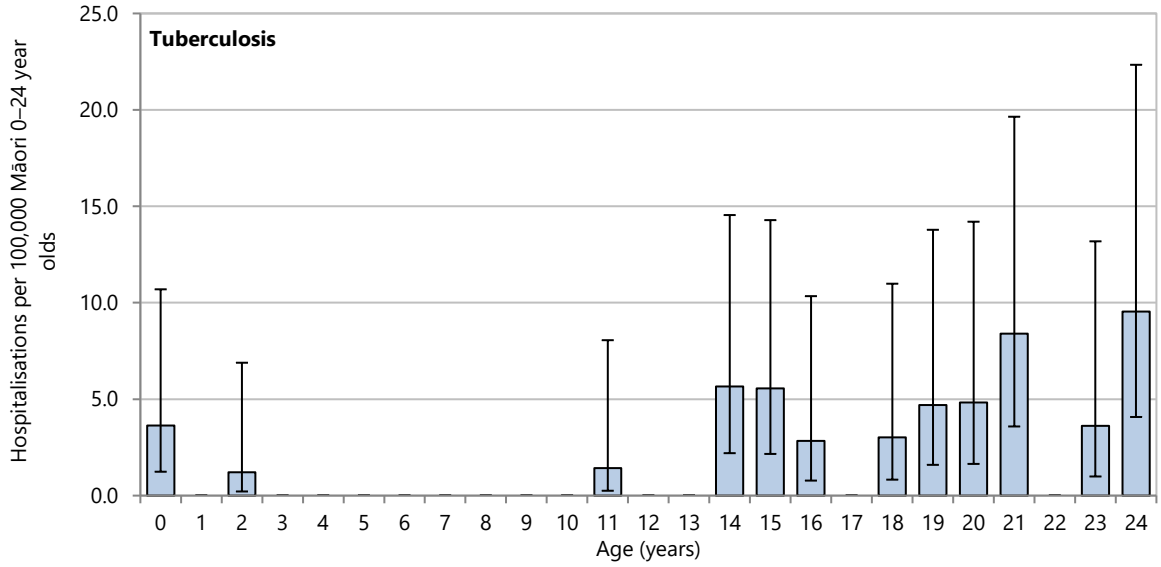
Between 2010 and 2014 tuberculosis hospitalisation rates for Māori 0–24 year olds were highest amongst those in their late teens and early twenties (**Figure 35**). There were *no significant differences* between Māori and non-Māori non-Pacific rates (**Table 28**).

Figure 34. Hospitalisations for tuberculosis in 0–24 year olds, by ethnicity, New Zealand 2000–2014



Numerator: National Minimum Dataset (acute and semi-acute admissions); Denominator: Statistics NZ Estimated Resident Population

Figure 35. Hospitalisations for tuberculosis in Māori 0–24 year olds, by age New Zealand 2010–2014



Numerator: National Minimum Dataset (acute and semi-acute admissions); Denominator: Statistics NZ Estimated Resident Population

Table 28. Hospitalisations for tuberculosis in 0–24 year olds, by ethnicity, New Zealand 2010–2014

Ethnicity	Number: 2010–2014	Number: annual average	Rate per 100,000 0–24 year olds	Rate ratio	95% CI
Tuberculosis in 0–24 year olds					
New Zealand					
Māori	35	7	1.96	0.73	0.50–1.06
non-Māori non-Pacific	139	28	2.69	1.00	

Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population; Rates are per 100,000 0–24 year olds; Rate ratios are unadjusted; Ethnicity is level 1 prioritised; Decile is NZDep2013

RHEUMATIC FEVER AND RHEUMATIC HEART DISEASE

Introduction

The following section reports on hospitalisations for rheumatic fever and rheumatic heart disease in Māori children and young people using information from the National Minimum Dataset.

Background

Acute rheumatic fever (RF) is an autoimmune reaction that occurs two to three weeks after a throat infection with the bacterium *Streptococcus pyogenes*, also known as group A *Streptococcus* (GAS).[68,74] Rheumatic fever mainly affects the heart, joints, brain and skin. A child with RF will usually present with sore or swollen joints and may also have a skin rash, fever, stomach pains and jerky movements.[75] If a person experiences several attacks of RF they may develop rheumatic heart disease (RHD) and damage to the heart valve which may require cardiac surgery. Primary episodes of RF usually occur in children aged 5–15 years and so interventions are targeted at this group.[76]

Rates of acute rheumatic fever in New Zealand are among the highest reported in any developed country. Observed inequality between ethnic groups has increased over time with much higher rates for Māori compared with non-Māori non-Pacific children aged 5–14 years.[76] Reducing the incidence of RF by two-thirds is one of the results set by the Government as part of the priority to support vulnerable children through delivery of better public services.[77] Effective strategies to reduce the incidence of RF include preventing transmission of GAS infections, for example, by addressing household crowding and socioeconomic factors that predispose to it, and early detection and treatment of GAS infections through improved community awareness and capacity, for example, by improving health literacy, health service access and early diagnosis and treatment. Patients presenting with a sore throat in primary care or emergency departments, who are recognised as being at high risk for RF, should have a throat swab if follow-up is possible and be started on 10 days of empiric penicillin or amoxicillin or given a single dose of IM benzathine penicillin. High risk patients identified in school sore throat clinics should have a throat swab and, only if this is positive for group A streptococcus (GAS), be given 10 days of antibiotics.[78] Monthly injections of long-acting benzathine penicillin G (secondary prevention) for at least 10 years after diagnosis can prevent RF recurrences and reduce the risk of severe rheumatic heart disease.[68,79]

Data sources and methods

Indicator

Hospitalisations of 0–24 year olds for acute rheumatic fever or rheumatic heart disease

Data sources

Numerator: *Hospitalisations* National Minimum Dataset
Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years).

Definition

Hospitalisations: Acute and arranged hospitalisations of 0–24 year olds with a diagnosis of acute rheumatic fever or chronic rheumatic heart disease (hospitalisations per 100,000 population). Refer to **Appendix 5**: Clinical codes used for the codes included.

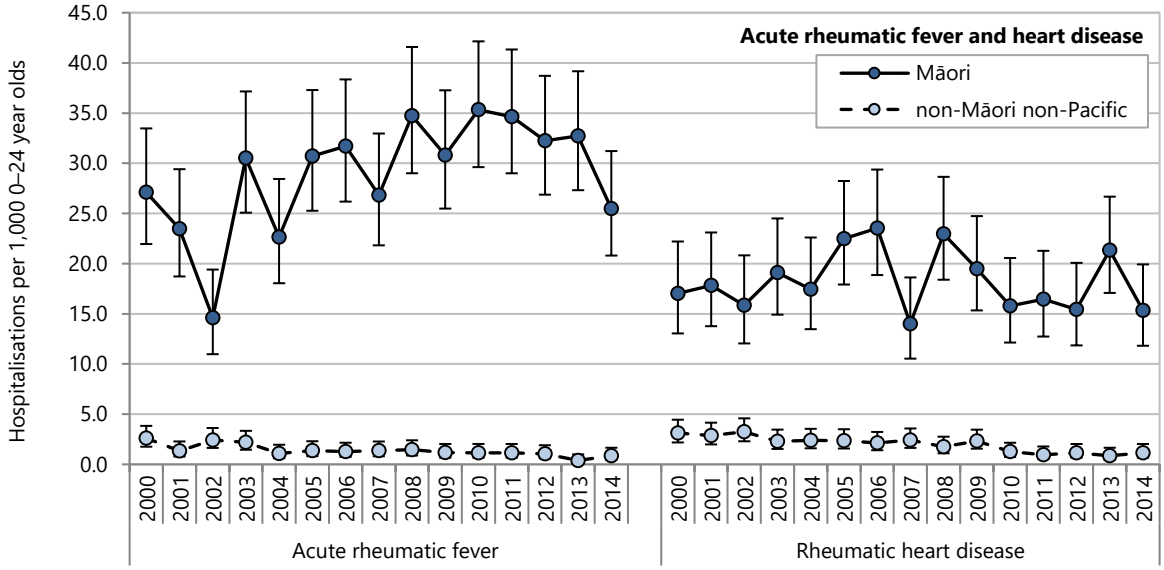
Notes on interpretation

Note 1: Unless otherwise specified, this analysis focuses on hospitalisations of 0–24 year olds with either acute rheumatic fever (as the primary diagnosis) or chronic rheumatic heart disease (listed in any of the first 15 diagnoses). The rationale for this wider focus for chronic rheumatic heart disease was that many 0–24 year olds with chronic rheumatic heart disease would not be hospitalised for their heart disease per se, but rather for one of its complications. For example, during 2005–2009 only 39.0% of hospitalisations for 0–24 year olds with rheumatic heart disease had this listed as the primary diagnosis, with 11.8% being admitted for pregnancy and childbirth, and 11.0% for other cardiovascular diagnoses.
Note 2: An acute admission is an unplanned hospitalisation occurring on the day of presentation, while an arranged admission (also referred to as a semi-acute hospitalisation) is a non-acute hospitalisation with an admission date less than seven days after the date the decision was made that the hospitalisation was necessary.
Note 3: **Appendix 2**: Datasets used in this report describes the National Minimum Dataset and outlines the limitations of the data utilised from this collection. The reader is advised to review this appendix before interpreting any trends.
Note 4: All data presented are based on counts of hospitalisations (not individuals) and some individuals may have had multiple hospitalisations.

National trends and distribution

From 2000 to 2014 hospitalisation rates for Māori 0–24 year olds with a primary diagnosis of acute rheumatic fever were stable with year-to-year fluctuations. Rheumatic heart disease hospitalisation rates for Māori 0−24 year olds were also stable (**Figure 36**). Over the same period, for the non-Māori non-Pacific ethnic group, acute rheumatic fever hospitalisation rates were stable while rheumatic heart disease hospitalisation rates declined. Rates for both conditions were consistently much higher for Māori 0–24 year olds than for non-Māori non-Pacific 0–24 year olds (**Figure 36**).

Figure 36. Hospitalisations for acute rheumatic fever and rheumatic heart disease in 0–24 year olds, by ethnicity, New Zealand 2000–2014



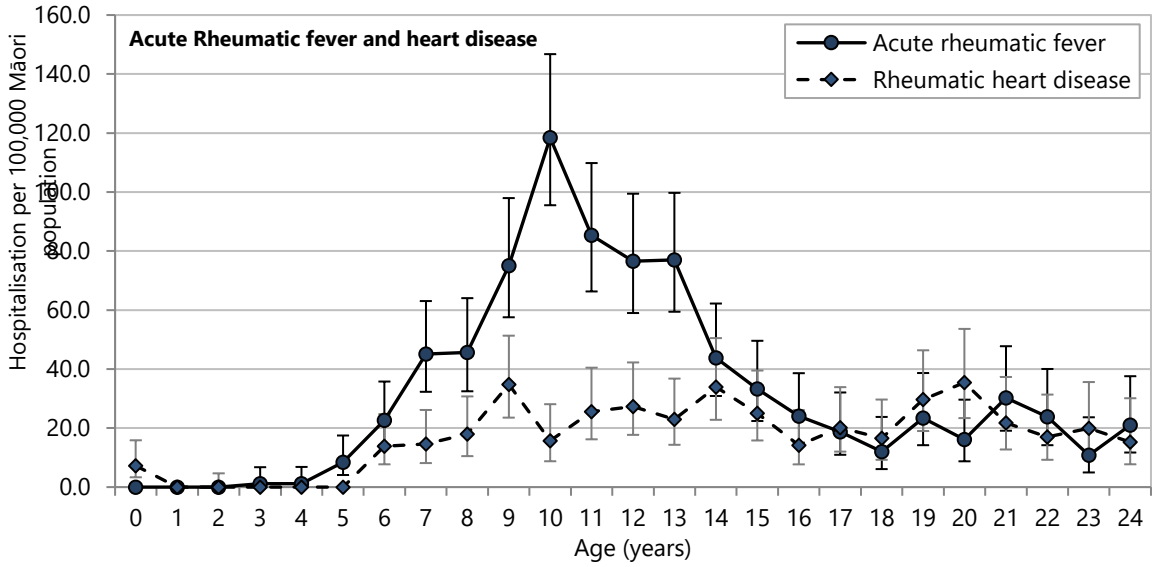
Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population; Rate is per 100,000 age-specific population; Acute rheumatic fever is primary diagnosis; Chronic rheumatic heart disease is listed in any of the first 15 diagnoses

Distribution by demographic factors

Between 2010 and 2014 acute rheumatic fever hospitalisation rates for Māori 0–24 year olds were low in preschool children, rose rapidly with increasing age from 5 years to peak at 10 years, then fell until 18 years, after which they did not vary much with age (**Figure 37**). Hospitalisation rates for rheumatic heart disease were low in under six year olds, rose from six to nine years and then showed no clear pattern with increasing age (**Figure 37**).

During 2010–2014 acute rheumatic fever hospitalisation rates for Māori 0−24 year olds, 0−14 year olds and 15−24 year olds were all significantly higher than the corresponding non-Māori non-Pacific rates (**Table 29**). During the same period rheumatic heart disease hospitalisation rates for Māori 0−24 year olds, 0−14 year olds and 15−24 year olds were also all significantly higher than the corresponding non-Māori non-Pacific rates (**Table 29**).

Figure 37. Hospitalisations for acute rheumatic fever and rheumatic heart disease in 0–24 year olds, by age, New Zealand 2010–2014



Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population; Acute rheumatic fever is primary diagnosis; Chronic rheumatic heart disease is listed in any of the first 15 diagnoses

Table 29. Hospitalisations for acute rheumatic fever and rheumatic heart disease in 0–24 year olds, by age group and ethnicity, New Zealand 2010–2014

Ethnicity	Number: total 2010–2014	Number: annual average	Rate	Rate ratio	95% CI
Acute rheumatic fever					
0–24 year olds					
Māori	571	114	32.03	34.47	25.68–46.28
non-Māori non-Pacific	48	10	0.93	1.00	
0–14 year olds					
Māori	435	87	37.75	34.70	24.23–49.69
non-Māori non-Pacific	32	6	1.09	1.00	
15–24 year olds					
Māori	136	27	21.57	30.00	17.87–50.35
non-Māori non-Pacific	16	3	0.72	1.00	
Rheumatic heart disease					
0–24 year olds					
Māori	301	60	16.88	15.58	11.71–20.72
non-Māori non-Pacific	56	11	1.08	1.00	
0–14 year olds					
Māori	165	33	14.32	15.60	10.38–23.43
non-Māori non-Pacific	27	5	0.92	1.00	
15–24 year olds					
Māori	136	27	21.57	16.55	11.08–24.71
non-Māori non-Pacific	29	6	1.30	1.00	

Numerator: National Minimum Dataset (acute and semi-acute admissions); Denominator: Statistics NZ Estimated Resident Population; Acute rheumatic fever is primary diagnosis; Chronic rheumatic heart disease is listed in any of the first 15 diagnoses; Rates are per 100,000 age-specific population; Rate ratios are unadjusted; Ethnicity is level 1 prioritised

Distribution by season

There was no clear seasonal pattern in Māori hospitalisations for either acute rheumatic fever or rheumatic heart disease.

SERIOUS SKIN INFECTIONS

Introduction

The following section reports on hospitalisations for serious skin infections in Māori children and young people using information from the National Minimum Dataset.

Background

Serious skin infections are bacterial infections of the skin or subcutaneous tissue that require hospitalisation and sometimes surgery. Such infections may be associated with a primary disease of the skin such as eczema or may follow trauma to the skin, for example from insect bites.[80]

New Zealand has one of the highest rates of childhood skin infections in the western world.[81] Between 1990 and 2007 skin infection hospitalisation rates almost doubled with disproportionate increases in infection rates in Māori and Pacific children and children from areas with high socioeconomic deprivation scores.[82] An initial study suggested that there may be 14 cases treated in the community (primary care/GP) for every serious skin infection hospitalisation.[83] A number of socioeconomic factors are linked to the increasing frequency of skin infections including affordability of hot water, washing machines and dryers, access to medical care, household crowding, and inadequate nutrition.[84] Other reasons for the development of serious skin infection include lack of awareness or knowledge about skin infection, and community attitudes which normalise such infection or stigmatise it so that people keep the condition hidden.[81]

Data sources and methods

Indicator

Hospitalisations involving serious skin infections in 0–24 year olds

Data sources

Numerator: National Minimum Dataset

Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years).

Definition

Hospitalisations:

Hospitalisations of 0–24 year olds with a diagnosis of a serious skin infection in any of the first 15 diagnoses (hospitalisations per 1,000 age-specific population)

The following select conditions were identified as the primary diagnosis among the hospitalisations involving serious skin infections: impetigo, cutaneous abscess, furuncle, or carbuncle, cellulitis, acute lymphadenitis, pilonidal cyst with abscess, other infections of skin and subcutaneous tissue, infections of other anatomical sites, infected, unspecified, or other dermatitis, insect or spider bites, post traumatic or open wound infection, scabies, and varicella with other complications.

Notes on interpretation

Note 1: This section utilises hospitalisations with relevant codes (see **Appendix 5**: Clinical codes used) in ANY of the first 15 diagnoses, rather than the primary diagnosis.

Note 2: This section utilises a broader set of the diagnostic codes compared to those utilised in the sections covering ambulatory sensitive hospitalisations (ASH) or hospitalisations with a social gradient. Select codes external to the skin infection codes have been incorporated, such as insect and spider bites, infected and unspecified eczema, infected open wounds, and infections at specific anatomical sites (e.g. the genitalia), based on review by O'Sullivan and Baker of skin infections in children.[82]

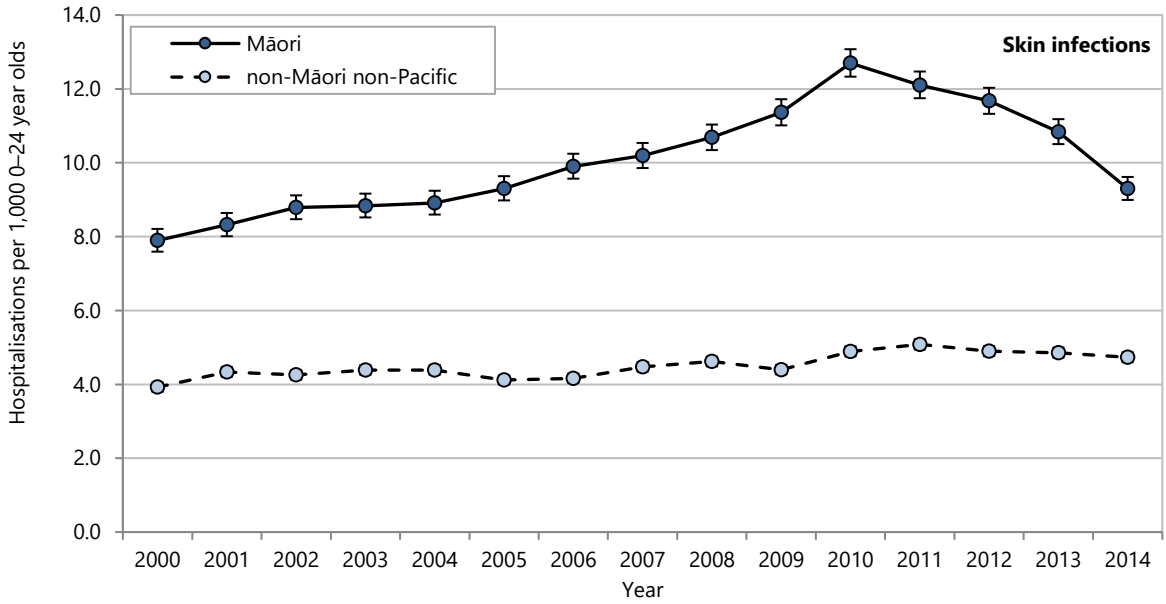
Note 3: The rates presented here differ from those presented in the ambulatory sensitive hospitalisations (ASH) or hospitalisations with a social gradient sections. As these indicators utilise primary diagnoses and full assessment and sector consultation has not yet occurred regarding these sections adopting of the revised coding convention, as utilised in this section.

Note 4: **Appendix 2**: Datasets used in this report outlines the limitations of the data utilised from the National Minimum Dataset. The reader is advised to review this appendix before interpreting any trends.

National trends and distribution

The hospitalisation rate for skin infections in Māori 0–24 year olds rose steadily from 2000 to 2010 and then declined (**Figure 38**). The rate in Māori 0–24 year olds was consistently at least double the non-Māori non-Pacific rate (which increased only slightly over the period) (**Figure 38**).

Figure 38. Hospitalisations involving skin infections in 0–24 year olds, by ethnicity, New Zealand 2000–2014



Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population; skin infections in any of the first 15 diagnoses

Distribution by cause

Between 2010 and 2014 cutaneous abscesses/furuncles/ carbuncles and cellulitis were the most frequent primary diagnoses in Māori 0–24 year olds hospitalised with serious skin infections (**Table 30**).

Table 30. Hospitalisations for skin infections in Māori 0–24 year olds, by primary diagnosis, New Zealand 2010–2014

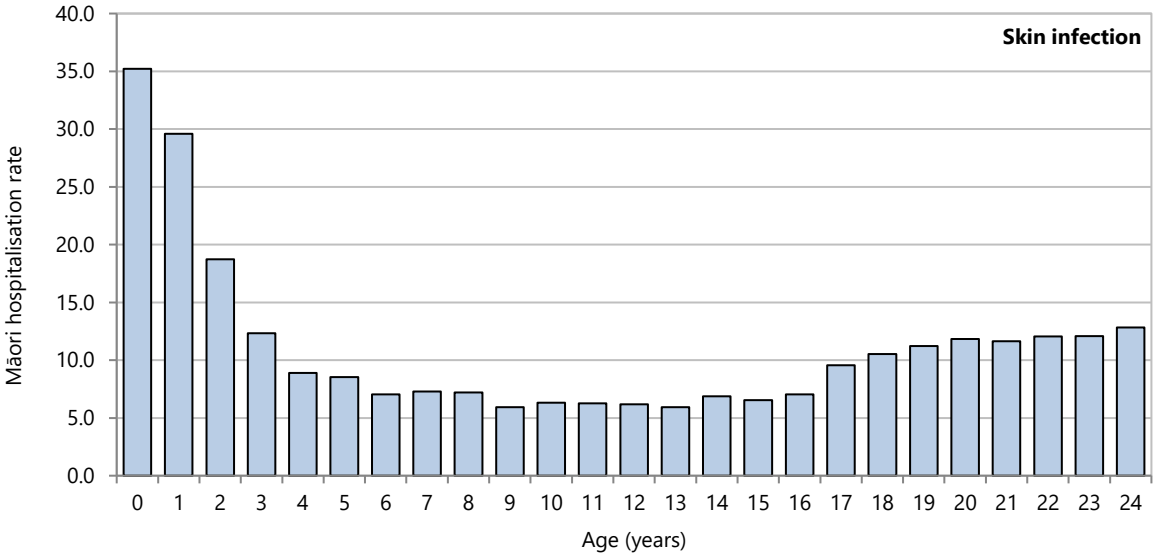
Primary diagnosis	Number: 2010–2014	Number: annual average	Rate per 1,000 0–24 year olds	95% CI	Per cent
Skin infections in Māori 0–24 year olds					
New Zealand					
Cutaneous abscess, furuncle, or carbuncle	3,952	790	2.22	2.15–2.29	19.6
Cellulitis	3,459	692	1.94	1.88–2.01	17.2
Infected, unspecified, or other dermatitis	1,485	297	0.83	0.79–0.88	7.4
Infections of other anatomical sites	1,010	202	0.57	0.53–0.60	5.0
Pilonidal cyst with abscess	491	98	0.28	0.25–0.30	2.4
Acute lymphadenitis	448	90	0.25	0.23–0.28	2.2
Impetigo	427	85	0.24	0.22–0.26	2.1
Scabies	335	67	0.19	0.17–0.21	1.7
Insect or spider bites	277	55	0.16	0.14–0.17	1.4
Other infections of skin and subcutaneous tissue	264	53	0.15	0.13–0.17	1.3
Varicella with other complications	207	41	0.12	0.10–0.13	1.0
Post traumatic or open wound infection	88	18	0.05	0.04–0.06	0.4
Other diagnoses	7,709	1,542	4.32	4.23–4.42	38.3
Total	20,152	4,030	11.30	11.2–11.5	100.0

Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population; skin infections in any of the first 15 diagnoses; Rates are per 1,000 0–24 year olds

Distribution by demographic factors

Between 2010 and 2014 skin infection hospitalisation rates for Māori 0–24 year olds were highest for infants less than one year old and decreased sharply with increasing age from zero to four years. From age 15 years, rates rose somewhat with increasing age before levelling off from 20 years (**Figure 39**).

Figure 39. Hospitalisations involving skin infections in Māori 0–24 year olds, by age, New Zealand 2010–2014



Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population; Rates are per 1,000 age-specific population; skin infections in any of the first 15 diagnoses

Between 2010 and 2014 in 0–14 year olds there were disparities in skin infection hospitalisation rates by ethnicity. Rates for Māori 0–24 year olds, 0–14 year olds and 15–24 year olds were all *significantly higher* than the corresponding non-Māori non-Pacific rates. The disparity was *significantly greater* in the 0–14 year age group than in the 15–24 year age group (**Table 31**).

Table 31. Hospitalisations involving skin infections in 0–24 year olds, by age group and ethnicity, New Zealand 2010–2014

Ethnicity	Number: 2010–2014	Number: annual average	Rate per 1,000 population	Rate ratio	95% CI
Skin infections					
0–24 year olds					
Māori	20,152	4,030	11.30	2.31	2.27–2.35
non-Māori non-Pacific	25,276	5,055	4.89	1.00	
0–14 year olds					
Māori	13,629	2,726	11.83	2.67	2.60–2.73
non-Māori non-Pacific	13,045	2,609	4.43	1.00	
15–24 year olds					
Māori	6,523	1,305	10.35	1.88	1.83–1.94
non-Māori non-Pacific	12,231	2,446	5.50	1.00	

Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population; Rates are per 1,000 age-specific population; skin infections in any of the first 15 diagnoses; Rate ratios are unadjusted; Ethnicity is level 1 prioritised

Distribution by month

There was no great variation in hospitalisation for serious skin infections by month in Māori 0–24 year olds in 2010–2014.

GASTROENTERITIS

Introduction

The following section reports on hospitalisations for gastroenteritis in children and young people using information from the National Minimum Dataset.

Background

Acute gastroenteritis is the sudden onset of diarrhoea with three or more loose stools per day. It may be accompanied by vomiting. It is most commonly caused by micro-organisms spread by the faecal-oral route and is only rarely due to chemical contamination of water or food.[68] Gastroenteritis caused by rotavirus is extremely common, estimated to affect almost all children, and has an illness spectrum more severe than diarrhoea from other causes. Clinical presentation of rotavirus can vary from asymptomatic infection to severe dehydrating gastroenteritis; the latter occurs predominantly in children between the ages of three months and two years.[49]

Certain categories of acute gastroenteritis are notifiable conditions. These include cases of infectious gastroenteritis where there is a suspected common source (e.g. norovirus or rotavirus outbreaks), single cases in a high-risk category (e.g. early childhood education worker), single cases of chemical, bacterial or toxic food poisoning (e.g. botulism), and disease caused by toxin-producing *Escherichia coli* or other organisms of public health importance. These must all be reported to the local medical officer of health without delay.[68] The most important factors in preventing the spread of gastroenteritis are: washing hands with soap in warm running water; careful drying (especially after going to the toilet or changing nappies and before preparing, serving or eating food); keeping children away from school until at least 48 hours after the last episode of diarrhoea or vomiting; and keeping children away from swimming in pools until two weeks after the last episode of diarrhoea.[68,85] However because rates of rotavirus illness are similar in developed and developing countries it is likely that good hygiene and clean water supplies do not have a significant impact on primary prevention of rotaviral disease and immunisation is the primary public health measure for the reduction of rotavirus disease burden. Since July 2014 rotavirus vaccine has been funded at ages 6 weeks, 3 and 5 months as part of the National Immunisation Schedule.[49]

Data sources and methods

Indicator

Hospitalisations for gastroenteritis in 0–24 year olds

Data sources

Numerator: National Minimum Dataset

Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years).

Definition

Hospitalisations: Acute and arranged hospitalisations for 0–24 year olds with a primary diagnosis of gastroenteritis. Refer to **Appendix 5**: Clinical codes used for the codes included.

Notes on interpretation

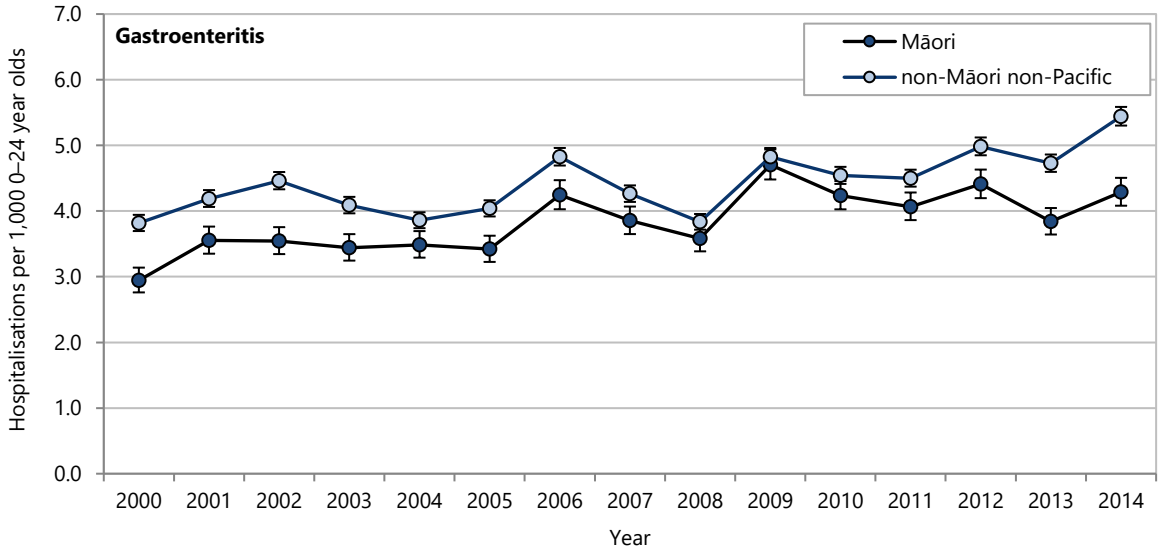
Note 1: An acute admission is an unplanned hospitalisation occurring on the day of presentation, while an arranged admission (also referred to as a semi-acute hospitalisation) is a non-acute hospitalisation with an admission date less than seven days after the date the decision was made that the hospitalisation was necessary.

Note 2: **Appendix 2**: Datasets used in this report outlines the limitations of the data utilised from the National Minimum Dataset. The reader is advised to review this appendix before interpreting any trends.

National trends and distribution

From 2000 to 2014 the gastroenteritis hospitalisation rate for Māori 0–24 year olds rose slightly overall although there were year-to-year fluctuations (**Figure 40**). Rates for non-Māori non-Pacific 0–24 year olds followed the same overall pattern but Māori rates were consistently lower than non-Māori non-Pacific rates.

Figure 40. Hospitalisations for gastroenteritis in 0–24 year olds, by ethnicity, New Zealand 2000–2014



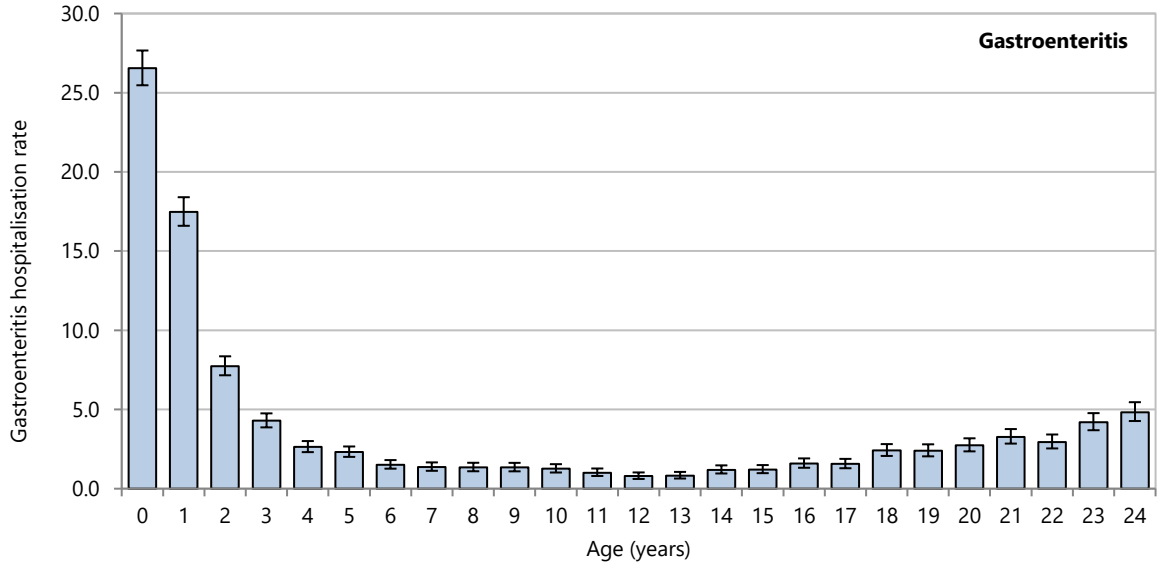
Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population

Distribution by demographic factors

Between 2010 and 2014 gastroenteritis hospitalisation rates for Māori 0–24 year olds were highest for babies under one year old, decreased steeply with increasing age from zero to five years, and then changed little with increasing age from age six years, although there was a small increase from age 15 to 24 years (**Figure 41**).

Between 2010 and 2014 gastroenteritis hospitalisation rates in Māori 0–24 year olds, 0–14 year olds and 15–24 year olds were *significantly lower* than the corresponding rates for non-Māori non-Pacific age groups (**Table 32**).

Figure 41. Hospitalisations for gastroenteritis in Māori 0–24 year olds, by age New Zealand 2010–2014



Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population; Rate is per 100,000 age-specific population

Table 32. Hospitalisations for gastroenteritis in 0–24 year olds, by age group and ethnicity, New Zealand 2010–2014

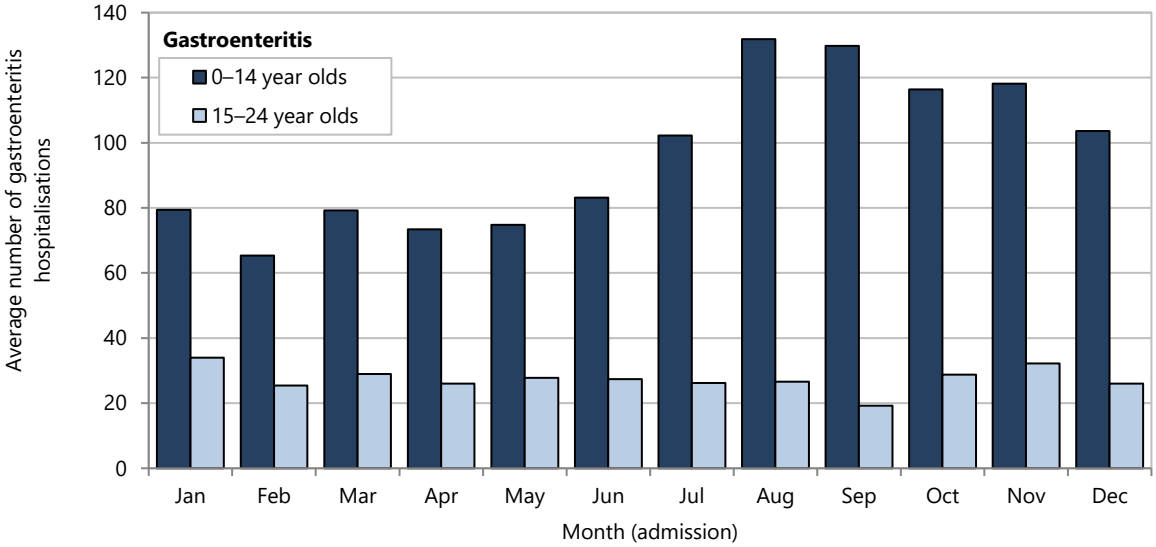
Ethnicity	Number: 2010–2014	Number: annual average	Rate per 100,000 age specific population	Rate ratio	95% CI
Gastroenteritis					
0–24 year olds					
Māori	7,430	1,486	4.17	0.86	0.84–0.88
non-Māori non-Pacific	24,998	5,000	4.84	1.00	
0–14 year olds					
Māori	5,787	1,157	5.02	0.80	0.78–0.82
non-Māori non-Pacific	18,460	3,692	6.28	1.00	
15–24 year olds					
Māori	1,643	329	2.61	0.89	0.84–0.94
non-Māori non-Pacific	6,538	1,308	2.94	1.00	

Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population; Rates are per 1,000 age-specific population; Rate ratios are unadjusted; Ethnicity is level 1 prioritised

Distribution by month

There was seasonal variation in gastroenteritis hospitalisation rates for Māori 0–14 year olds during 2010–2014. Rates were higher in late winter, spring and early summer. There was no seasonal variation in rates for Māori 15–24 year olds (**Figure 42**).

Figure 42. Average number of hospitalisations for gastroenteritis in 0–24 year olds, by month, New Zealand 2010–2014



Numerator: National Minimum Dataset (acute and arranged admissions); Number is annual average

UNINTENTIONAL INJURIES

UNINTENTIONAL INJURIES

Introduction

The following sections review the main causes of injury for 0–24 year olds using data from the National Minimum Dataset and the National Mortality Collection.

Background

Injury is a leading cause of death in New Zealand among children and young people and unintentional injury is the largest contributor.[86] There are two common causes of unintentional injury deaths in this age group: suffocation in infants under 12 months of age and road traffic injury in 15–24 year olds. The rate of traffic crash deaths has fallen over the last decade, and the rate for injury has been falling since 2007.[87] Since 2009 there has been a decrease in the rate of sudden unexpected death in infancy (SUDI) to which the rate of suffocation contributes.[88] Drowning is the next most common cause of death for all age groups.

There are effective interventions for these and other causes of injury. What is needed is consistent and ongoing implementation. Evidence of the effectiveness of interventions is seen in New Zealand where implementation of regulations and strategies for road safety have reduced the road toll:[89] for example, speed limits, the Graduated Drivers Licence, child restraint use, alcohol limits, median strips, and the changes that have been made in the construction of cars.

Death is not the only serious outcome as a result of injury.[90,91] Serious injury such as traumatic head injury can result in long term physical, cognitive and behavioural problems with implications for the individual and their whanau as well as for health and other services.[92] Injury such as burns and near drowning can also result in high personal and resource costs.

Internationally concern is expressed regarding the lack of sustained, strategically-planned action to reduce injury at the country level, and the lack of focus on unintentional injury globally, particularly when injury has been implicated as the leading cause of inequalities for children in the EU.[93]

Data sources and methods

Indicators

Deaths of 0–24 year olds from unintentional injury
Hospitalisations of 0–24 year olds for unintentional injury

Data sources

Numerators:	*Deaths:* National Mortality Collection *Hospitalisations:* National Minimum Dataset
Denominator:	Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years)

Definition

Death of 0–24 year olds where the main underlying cause of death was an unintentional injury
Hospitalisation of 0–24 year olds with a primary diagnosis of injury (excluding cases involving intentional injury, complications of drugs/medical/surgical care and late sequelae of injury or where there was an Emergency Medicine Specialty code on discharge). Refer to **Appendix 5**: Clinical codes used for the codes included.

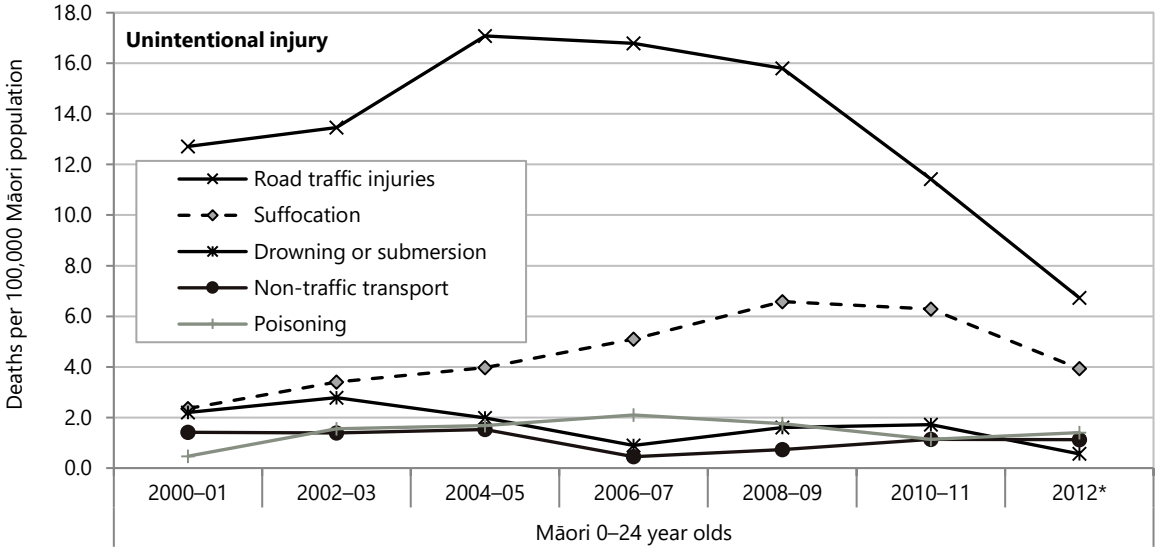
Notes on interpretation

Appendix 2: Datasets used in this report describes the National Minimum Dataset and outlines the limitations of the data utilised from this collection. Please read this appendix before interpreting any trends.

National trends and distribution

Figure 43 shows the main causes of injury death for Māori 0–24 year olds indicates a substantial reduction in the rate of road traffic injury from 2004–05. The suffocation rate (most evident in under one year olds) rose from 2000–2001 to 2008–09 and fell from then on. Suffocation occurred most commonly in bed and these events are included in Sudden Unexpected Death in Infancy (SUDI) (see **page 19**).

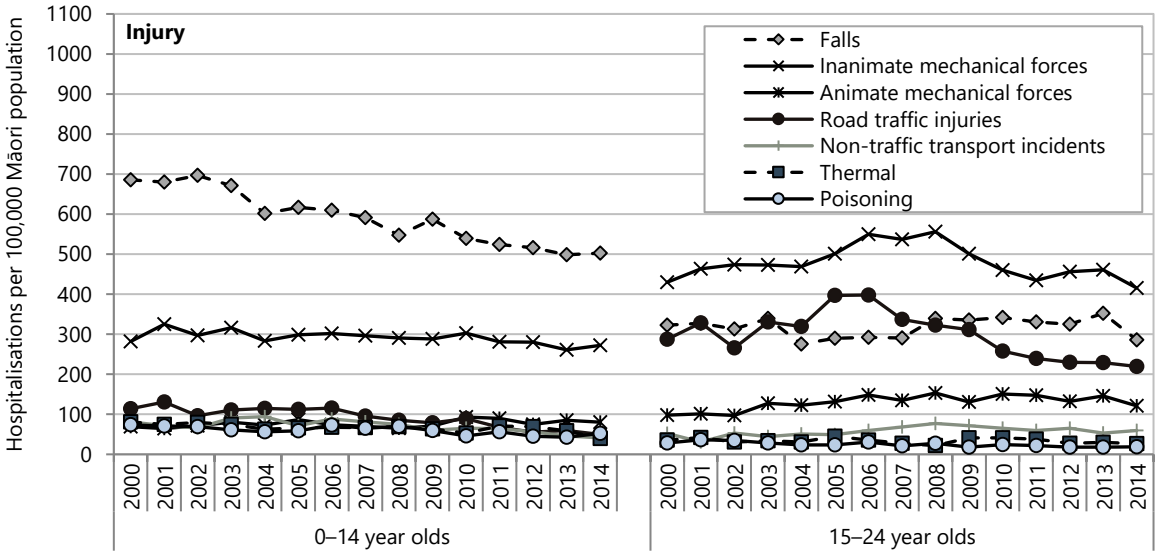
Figure 43. Deaths due to unintentional injuries in Māori 0–24 year olds, by age group, year of discharge, and injury type, New Zealand, 2000–2012



Numerator: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population; * rates for 2012 are derived from a single year's data

Figure 44 shows the trends in the main causes of injury hospitalisations for Māori 0–14 year olds and 15–24 year olds during 2000–2014. Notable in 0–14 year olds were substantial declines in hospitalisations for falls, road traffic injuries, non-traffic transport injuries and thermal injuries, and modest declines in hospitalisations for poisoning. Hospitalisation rates for injuries due to inanimate mechanical forces were steady and rates for injuries due to animate mechanical forces increased. In 15–24 year olds hospitalisation rates for injuries due to road traffic injuries decreased substantially from 2006 to 2014, while rates for injuries due to animate mechanical forces increased somewhat overall from 2000–2014. Rates for injuries due to poisoning decreased overall from 2000–2014 and rates for injuries in other categories varied from year to year without any clear trend being apparent.

Figure 44. Hospitalisations from unintentional injuries in Māori 0–24 year olds, by age group, year of discharge, and injury type, New Zealand 2000–2014



Numerator: National Minimum Dataset (acute and arranged admissions; excludes ED cases); Denominator: Statistics NZ Estimated Resident Population; Rates are per 100,000 age-specific Māori population; Ethnicity is level 1 prioritised

Distribution by cause

From 2008 to 2012 there were 196 deaths of Māori 0–14 year olds and 226 deaths of Māori 15–24 year olds from unintentional injury; a total of 422 deaths. Among those aged 0–14 years, 50.5% were from suffocation

(predominantly aged under 1 year), 20.9% from road traffic injuries (RTI), 9.7% from drowning and 7.7% from non-traffic transport events. Among 15–24 year olds 75.7% were from RTI with 7.5% from poisoning and 4.4% from falls (**Table 33**).

During 2010 to 2014, 42.3% of unintentional injury hospitalisations for Māori 0–14 year olds were from falls and 23.9% were from inanimate mechanical forces (**Table 34**). For Māori 15–24 year olds, inanimate mechanical forces and falls comprised 30.5% and 22.8% respectively of the hospitalisations for injury (**Table** 34). Detail of hospitalisation data for specific types of injury follows later in this section.

Distribution by demographic factors

Certain causes of unintentional injury have noticeable age distributions. In 2010–2014, Māori injury hospitalisation rates for thermal injury and poisoning peaked around ages 1 to 2 years. Hospitalisation rates for inanimate mechanical forces (which includes struck against or by, caught between, and contact with sharp items or machinery) also peaked at ages one to two years, fell steadily from ages one to seven years, remained steady until age 13 years, before rising with increasing age to form a second broader peak at ages 20–23 years. Rates for injury due to falls peaked at 5–6 years of age. Rates for injury due to animate mechanical forces and road traffic crashes were higher among those older than 15 years (**Figure 45**).

Road traffic injury

Death rates from road traffic injuries rates fell steeply from 17.1 deaths per 100,000 Māori 0–24 year olds in 2004–2005 to 6.7 in 2012 (**Figure 43**). Between 2008 and 2012 there were 41 deaths of 0–14 year olds and 171 deaths of 15–24 year olds as a result of road traffic injury (RTI) (**Table 33**). The majority of those who died as a result of road traffic injury in both age groups were vehicle occupants but there were small numbers who died as a result of injuries sustained as pedestrians, cyclists or motor cyclists.

Hospitalisation rates for RTI fell from 2006 onwards in Māori 0–14 year olds and in Māori 15–24 year olds from so that rates in 2014 were around half those in 2006 (**Figure 44**). Of the 737 Māori 0–14 year olds hospitalised for RTIs, 272 were injured as vehicle occupants, 222 as cyclists, 187 as pedestrians and 50 as motorcyclists (**Table 34**). Of the 1,503 Māori 15–24 year olds hospitalised for RTIs, 1,021 were injured as vehicle occupants, 215 as motorcyclists, 132 as pedestrians and 96 as cyclists (**Table 34**).

Falls

There are few injury deaths resulting from falls among Māori aged 0–24 years. Between 2008 and 2012, there were less than five deaths of Māori 0–14 year olds and 10 deaths of Māori 15–24 year olds (**Table 33**). Falls were the most common reason for unintentional injury hospitalisation among Māori 0–14 year olds and the second most common reason in Māori 15–24 year olds. Between 2010 and 2014 there were 5944 hospitalisations of Māori 0–14 year olds for injury from falls, more than twice the 2,061 hospitalisations for 15−24 year olds (**Table 34**).

Inanimate mechanical force

Between 2008 and 2012 injury from inanimate mechanical force resulted in fewer than five deaths both of Māori 0–14 year olds and of Māori 15–24 year olds (**Table 33**). Injury from exposure to inanimate forces was a major cause of hospitalisation. Over the five years 2010–2014 there were 3,219 hospitalisations of 0–14 year olds and 2,807 of 15–24 year olds for this type of injury (**Table 34**).

Animate mechanical force

Between 2008 and 2012, there were fewer than five deaths of Māori 0–14 year olds and none of Māori 15–24 year olds as a result of animate mechanical force (**Table 33**). Between 2010 and 2014, there were 976 hospitalisations of Māori 0–14 year olds and 878 of Māori 15–24 year olds for injuries resulting from animate mechanical forces (**Table 34**).

Non-traffic transport injury

Between 2008 and 2012, there were 15 deaths as a result of injuries from non-traffic transport (i.e. events occurring off road) among Māori children aged 0–14 years and less than five deaths among 15–24 year olds. The deceased was most commonly a pedestrian among 0–14 year olds (15 deaths) (**Table 33**).

The hospitalisation rate for non-traffic injuries in Māori 0–14 year olds fell from 2006 to 2014 while the rate for 15–24 year olds rose overall from 2001 to 2008 and declined overall from 2008 to 2014 (**Figure 44**).

Thermal injury

Between 2008 and 2012, there were less than five deaths of Māori 0–14 year olds and less than five deaths of Māori 15–24 year olds as a result of thermal injury (**Table 33**). Between 2010 and 2014 thermal injury resulted in 670 hospitalisations for 0–14 year olds and 205 hospitalisations of 15–24 year olds (**Table 34**).

Poisoning

Between 2008 and 2012, there were eight deaths of Māori 0–14 year olds and 17 deaths of Māori 15–24 year olds as a result of unintentional poisoning (**Table 33**). Between 2010 and 2014 there were 559 hospitalisations of Māori 0–14 year olds and 127 of Māori 15–24 year olds for poisoning (**Table 34**).

Table 33. Deaths due to unintentional injuries in Māori 0–24 year olds, by age group and cause of injury, New Zealand, 2008–2012

Deaths by cause of unintentional injury	Number: 2008–2012	Number: annual average	Rate per 100,000 population	95% CI	Per cent
Unintentional injury deaths in Māori 0–24 year olds					
0–14 year olds					
Suffocation	99	20	8.8	7.22–10.69	50.5
Road traffic crashes	41	8	3.6	2.68–4.93	20.9
Drowning or submersion	19	4	1.7	1.08–2.63	9.7
Non-traffic transport accidents	15	3	1.3	0.81–2.20	7.7
Poisoning	8	2	0.7	0.36–1.40	4.1
Inanimate mechanical forces	<5	s	s	s	s
Falls	<5	s	s	s	s
Thermal injury	<5	s	s	s	s
Animate mechanical forces	<5	s	s	s	s
Other or unspecified land transport	<5	s	s	s	s
Other transport	<5	s	s	s	s
Other causes	<5	s	s	s	s
Total	196	39	12.4	10.53–14.66	100.0
15–24 year olds					
Road traffic crashes	171	34	27.9	23.99–32.36	75.7
Poisoning	17	3	2.8	1.73–4.44	7.5
Falls	10	2	1.6	0.89–3.00	4.4
Drowning or submersion	6	1	1.0	0.45–2.13	2.7
Suffocation	<5	s	s	s	s
Inanimate mechanical forces	<5	s	s	s	s
Thermal injury	<5	s	s	s	s
Other transport	<5	s	s	s	s
Non-traffic transport accidents	<5	s	s	s	s
Other or unspecified land transport	<5	s	s	s	s
Other causes	<5	s	s	s	s
Total	226	45	8.6	6.60–11.29	100.0

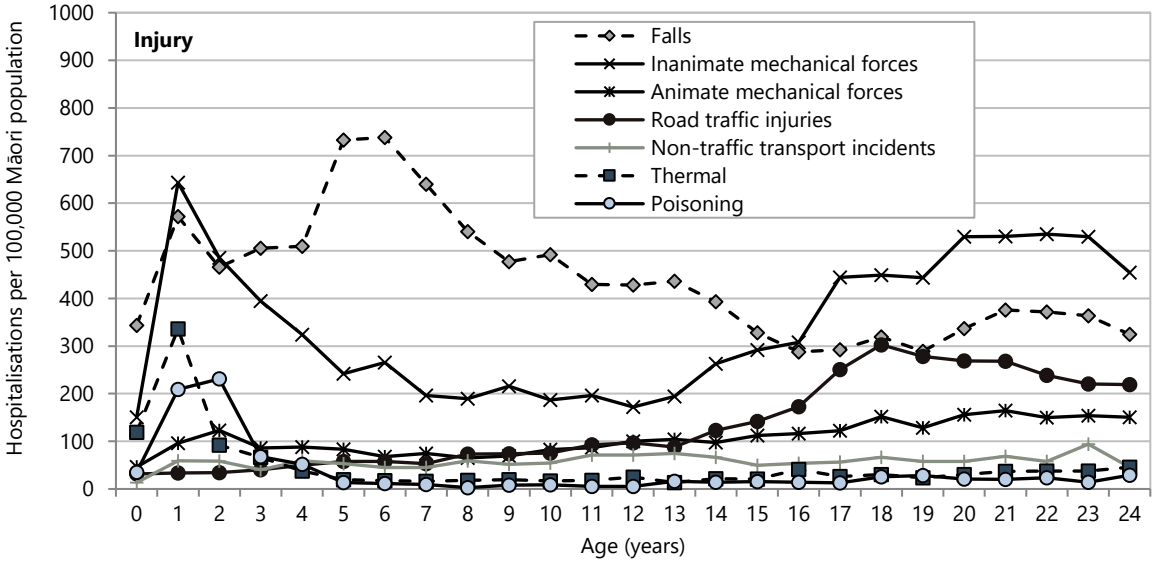
Numerator: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population; Rates are per 100,000 age-specific population

Table 34. Hospitalisations from unintentional injuries in Māori 0–24 year olds, by external cause of injury, New Zealand 2010–2014

Hospitalisations by main external cause of unintentional injury	Number: 2010–2014	Number: annual average	Rate per 100,000 population	95% CI	Per cent
Māori					
0–14 year olds					
Falls	5,944	1,189	515.82	502.91–529.07	42.8
Inanimate mechanical forces	3,219	644	279.35	269.87–289.15	23.2
Animate mechanical forces	976	195	84.70	79.55–90.18	7.0
Road traffic crash	737	147	63.96	59.50–68.74	5.3
Vehicle occupant	*272*	*54*	*23.60*	*20.96–26.58*	*2.0*
Motorbike	*50*	*10*	*4.34*	*3.29–5.72*	*0.4*
Cyclist	*222*	*44*	*19.27*	*16.89–21.97*	*1.6*
Pedestrian	*187*	*37*	*16.23*	*14.06–18.73*	*1.3*
Other or unspecified	*6*	*1*	*0.52*	*0.24–1.14*	*0.0*
Thermal injury	670	134	58.14	53.90–62.71	4.8
Non-traffic transport incidents	626	125	54.32	50.23–58.75	4.5
Vehicle occupant	*25*	*5*	*2.17*	*1.47–3.20*	*0.2*
Motorbike	*112*	*22*	*9.72*	*8.08–11.69*	*0.8*
Cyclist	*321*	*64*	*27.86*	*24.97–31.07*	*2.3*
Pedestrian	*106*	*21*	*9.20*	*7.61–11.12*	*0.8*
Other or unspecified	*62*	*12*	*5.38*	*4.20–6.90*	*0.4*
Poisoning	559	112	48.51	44.65–52.70	4.0
Other or unspecified land transport	176	35	15.27	13.18–17.70	1.3
Suffocation	102	20	8.85	7.29–10.74	0.7
Drowning or submersion	69	14	5.99	4.73–7.58	0.5
Other transport	6	1	0.52	0.24–1.14	0.0
Other causes	708	142	61.44	57.08–66.13	5.1
Undetermined intent	91	18	7.90	6.43–9.69	0.7
Total	13,883	2,777	1,204.77	1,185.01–1,224.85	100.0
15–24 year olds					
Inanimate mechanical forces	2,807	561	445.26	429.12–462.00	30.9
Falls	2,061	412	326.92	313.13–341.32	22.7
Road traffic crash	1,481	296	234.92	223.27–247.18	16.3
Vehicle occupant	*1,021*	*204*	*161.96*	*152.33–172.19*	*11.2*
Motorbike	*215*	*43*	*34.10*	*29.84–38.98*	*2.4*
Cyclist	*96*	*19*	*15.23*	*12.47–18.59*	*1.1*
Pedestrian	*132*	*26*	*20.94*	*17.66–24.83*	*1.5*
Other or unspecified	*17*	*3*	*2.70*	*1.68–4.32*	*0.2*
Animate mechanical forces	878	176	139.27	130.36–148.79	9.7
Non-traffic transport incidents	381	76	60.44	54.67–66.81	4.2
Vehicle occupant	*37*	*7*	*5.87*	*4.26–8.09*	*0.4*
Motorbike	*160*	*32*	*25.38*	*21.74–29.63*	*1.8*
Cyclist	*84*	*17*	*13.32*	*10.76–16.49*	*0.9*
Pedestrian	*20*	*4*	*3.17*	*2.05–4.90*	*0.2*
Other or unspecified	*80*	*16*	*12.69*	*10.20–15.79*	*0.9*
Thermal injury	205	41	32.52	28.36–37.28	2.3
Poisoning	127	25	20.15	16.93–23.97	1.4
Other or unspecified land transport	123	25	19.51	16.35–23.28	1.4
Other transport	20	4	3.17	2.05–4.90	0.2
Drowning or submersion	8	2	1.27	0.64–2.50	0.1
Suffocation	7	1	1.11	0.54–2.29	0.1
Other causes	810	162	128.49	119.94–137.64	8.9
Undetermined intent	189	38	29.98	26.00–34.57	2.1
Total	9,097	1,819	1,443.00	1,413.86–1,472.74	100.0

Numerator: National Minimum Dataset (acute and arranged admissions); Denominator: Statistics NZ Estimated Resident Population; Rates are per 100,000 age-specific Māori population; Ethnicity is level 1 prioritised

Figure 45. Hospitalisations from selected unintentional injuries in Māori 0–24 year olds, by age and injury type, New Zealand 2010–2014



Numerator: National Minimum Dataset (acute and arranged admissions; excludes ED cases); Denominator: Statistics NZ Estimated Resident Population; Rates are per 100,000 age-specific Māori population; Ethnicity is level 1 prioritised

REPRODUCTIVE HEALTH

BIRTHS

Introduction

The following section reports on teenage birth rates using information from the Birth Registration Dataset.

Background

New Zealand's teenage fertility rates are relatively high by OECD standards. Teenage fertility rates are declining in New Zealand and in other developed countries.[94] In New Zealand, the decline in fertility has been greatest for younger teenagers so that births to teenage mothers are now mostly occurring among older teenagers (aged 18 and 19 years). Teenage fertility rates are considerably higher in areas of high socio-economic deprivation.[95]

Māori have long had higher teenage birth rates than non-Māori non-Pacific have, but their rates are declining at a similar rate to those of non-Māori non-Pacific. Māori teenage birth rates are higher than European at all levels of socio-economic deprivation (NZDep2013).[95]

Research, both internationally and in New Zealand, suggests that the main factors responsible for declining teenage fertility rates are a decline in sexual activity among teenagers and increasing contraceptive use.[94] The abortion rate for women aged 15 to 19 years in New Zealand has declined.[96] For many young parents, having a baby can be a turning point in their lives that increases their motivation to take responsibility for their future and raise their educational and employment aspirations. Coordinated social services which support teen parents into education, training and employment are critical to improving outcomes for teenage parents and their children.[95]

Data sources and methods

Indicator:

Teenage birth rates

Data sources

Numerator: Birth registration dataset (live births)
Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years).
Definition: Teenager is defined as a woman aged 10–19 years
Teenage birth rate: The number of live births per 1,000 women aged 15–19 years
Age-specific fertility rates: The number of live births per 1,000 women for a particular age group in a given year
General fertility rate: The number of live births per 1,000 female estimated resident population in each age group

Notes on interpretation

Unless specified otherwise, the denominator is out of women aged 15–19 years
In the analysis of total teenage pregnancy rates, miscarriage rates were estimated at 10% of induced abortions and 20% of live births using miscarriage methodology based on Dickson, N., et. al.[97]
The teenage birth rates presented here may vary slightly from previous years, as the Ministry of Health no longer provides stillbirth data in the Birth Registration Dataset due to concerns about data quality. Thus the current analysis is restricted to teenage live births (as compared to total teenage birth rates (including stillbirths) which were presented in previous years).
An overview of the strengths and limitations of the Birth Registration Dataset is provided in **Appendix 2**: Datasets used in this report.

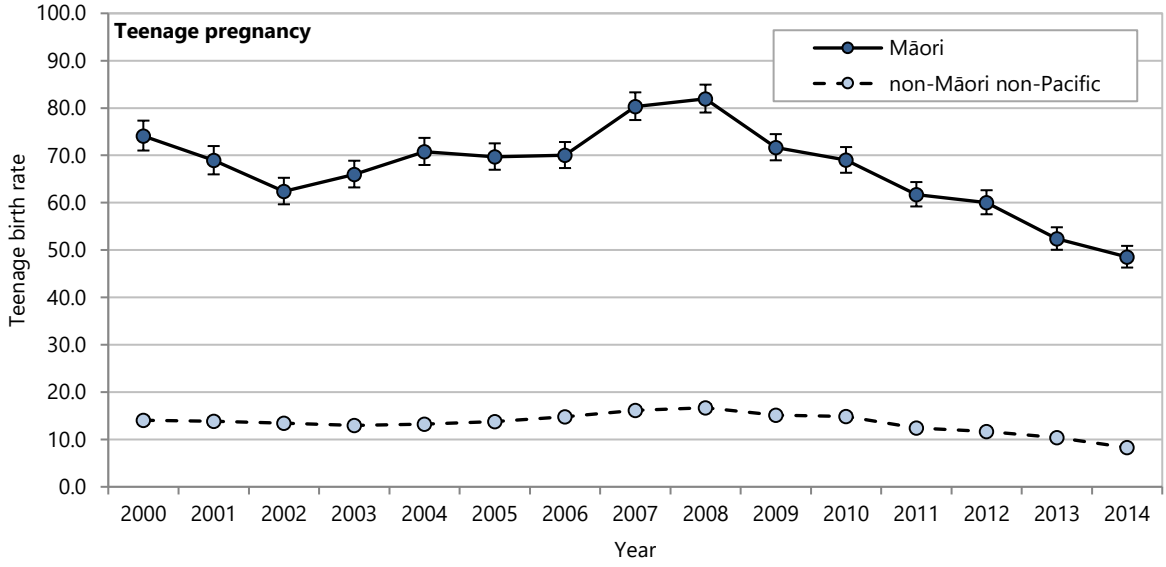
National trends and distribution

Birth rates for Māori women aged under 20 years declined year by year from 2008 to 2014. They were consistently four to five times higher than rates for non-Māori non-Pacific women aged under 20 years (**Figure** 46). The Māori teenage birth rate increased steeply with increasing age so that almost 70% of all Māori teenage births were to mothers aged 18 and 19 years (**Figure 47**).

Distribution by demographic factors

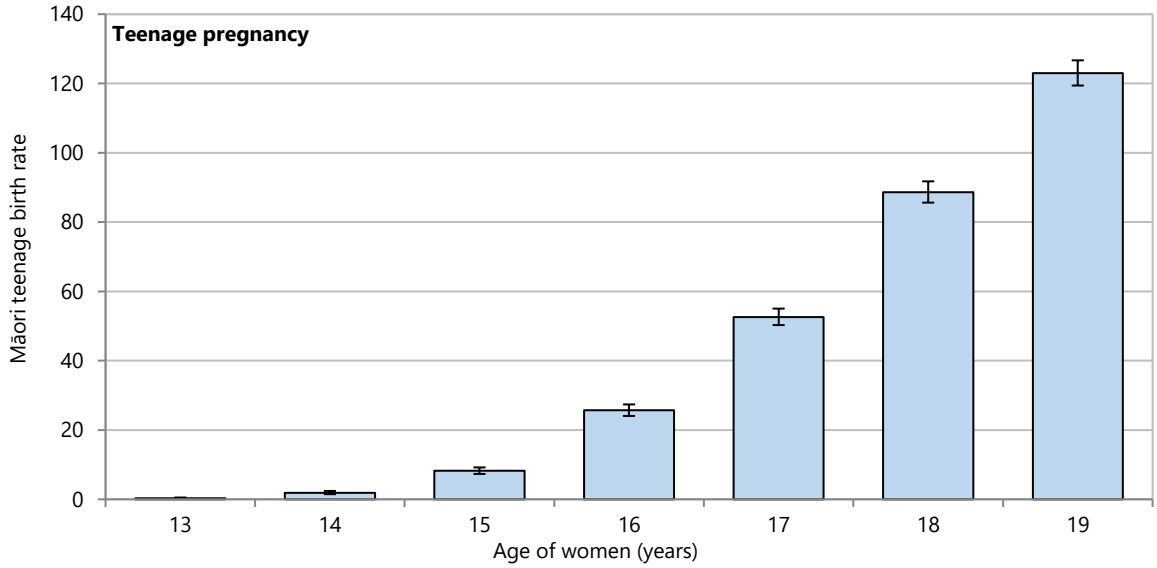
Between 2010 and 2014 the Māori teenage birth rate was *significantly higher* than non-Māori non-Pacific rate (**Table 35**).

Figure 46. Teenage birth rate, by ethnicity, New Zealand, 2000–2014



Numerator: Birth registration dataset (births registered to women aged under 20 years); Denominator: Statistics NZ Estimated Resident Population (15–19 year olds females); Ethnicity is level 1 prioritised

Figure 47. Māori Teenage birth rate, by age, New Zealand, 2000–2014



Numerator: Birth registration dataset (births registered to women aged under 20 years); Denominator: Statistics NZ Estimated Resident Population (female aged 15–19 years); Ethnicity is level 1 prioritised

Table 35. Birth rates among 10–19 year olds, by ethnicity, New Zealand 2010–2014

Ethnicity	Number: total 2010–2014	Number: annual average	Rate per 1,000 15-19 year old females	Rate ratio	95% CI
Teenage births among 0–19 year olds					
New Zealand					
Māori	9,813	1,963	58.3	5.05	4.89–5.21
non-Māori non-Pacific	6,066	1,213	11.6	1.00	

Numerator: Birth registration dataset (births registered to women aged under 20 years); Denominator: Statistics NZ Estimated Resident Population (15–19 year old females); Rates are per 1,000 15–19 year old females, Ethnicity is level 1 prioritised

TERMINATIONS OF PREGNANCY

Introduction

The following section reviews terminations of pregnancy using information from the Abortion Supervisory Committee.

Background

All District Health Boards in New Zealand are required to provide publicly funded termination of pregnancy services, although some DHBs have chosen to sub-contract these services to other DHBs.[98] Under New Zealand law, grounds for termination of pregnancy include serious danger to the life or mental or physical health of the woman and fetal abnormality.[99] The vast majority of abortions are carried out on the grounds of danger to a woman's mental health (97.6% in 2014).[100] Terminations of pregnancy have a very low rate of complications, but the rate of complications increases with gestational age so it is important that women have timely access to termination services and referral pathways are not unduly complicated.[101] The 2014 report of the Abortion Supervisory Committee[100] contains New Zealand's latest abortion-related statistics. The Committee noted that there have been improvements in the provision of abortion services in provincial areas but expressed concern at the lack of a local abortion service for women living in South Auckland.[100] Abortion rates in New Zealand have been falling steadily over recent years, from 20.1 per 1,000 (women aged 15–44 years) in 2007 to 15.4 per 1,000 in 2013, but they are still higher than those in some other developed countries, such as the Netherlands (which has a rate of around nine per 1,000).[100]

The Committee noted the particularly sharp decline in rates for 15–19 year olds, and suggested that this was partly attributable to the licensing and funding of a long acting subcutaneous implant (Jadelle®) in August 2010.[100] Intra-uterine devices (IUDs) are another very effective form of long-acting reversible contraception and the American College of Obstetricians and Gynaecologists has stated that IUDs are effective and safe in nulliparous adolescents.[102] Encouraging more effective use of contraception is key to reducing abortion rates as, among those having induced abortion in 2013, 54.7% had used no contraception and 25.4% had used condoms.[100]

Data sources and methods

Indicator

Legally induced terminations of pregnancy registered in New Zealand

Data sources

Source: Abortion Supervisory Committee

Notes on interpretation

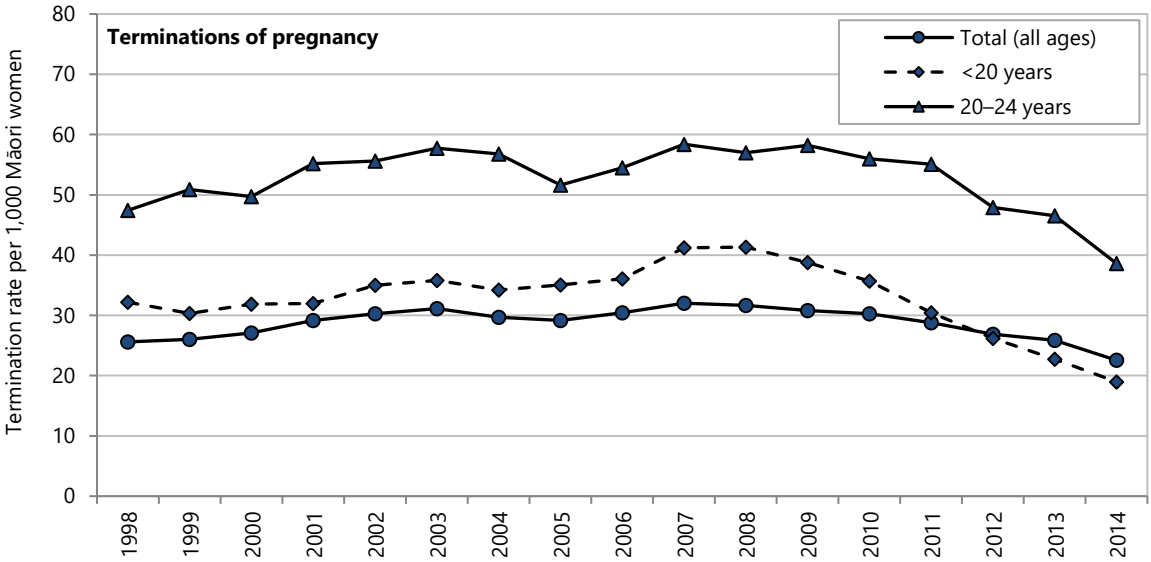
Note 1: In New Zealand, information on the domicile of women presenting for a termination of pregnancy has only been recorded by the Abortion Supervisory Committee since 2004, with an agreement existing between the Committee and Statistics NZ that the only geographical breakdown of termination data will be at regional council level. Therefore information on terminations of pregnancy by DHB or NZDep Index decile is unavailable.

Note 2: In its reporting of terminations, Statistics NZ uses total response ethnicity, and thus women will appear in each ethnic group with which they identified (in both the numerator and denominator).

National trends and distribution

Termination of pregnancy rates in Māori women collectively have since fallen overall since 2009 and particularly since 2011. The decline (since 2008) has been particularly pronounced among 15–19 year olds (**Figure 48**).

Figure 48. Proportion of Māori women who had a termination, by total and select age group of women, New Zealand, 1980–2014



Source: Abortion Supervisory Committee via Statistics New Zealand; General termination rate corresponds to abortions per 1,000 mean estimated number of women aged 15–44 years

Mental health

ACCESS TO MENTAL HEALTH SERVICES

Introduction

The following section uses data from the Programme for the Integration of Mental Health Data to review mental health service provision including substance use disorders for 0-24 year olds.

Background

Globally, mental health and substance use disorders are the leading cause of disability in those aged 0–24 years.[103] Most high prevalence disorders emerge during adolescence and early adulthood, with an earlier age of onset associated with a longer duration of untreated illness and poorer outcomes.[104] In New Zealand, research on the community prevalence of mental health disorders in children and young people is scarce. The most recent data are from the Youth2000 Survey Series.[105] The 2012 survey found that among secondary students almost 9% of males and over 16% of females had significant depressive symptoms and that a slightly higher percentages of males and females had suicidal ideation.[106] Te Rau Hinengaro, the national mental health survey conducted in 2003–04, found that the 12-month prevalence for any mental disorder in 16–24 year olds was almost 30%[107] and that it was higher for Māori than non-Māori non-Pacific young people, although the difference was reduced after adjustment for age, sex, education and household income.[89]

In most countries mental healthcare services for children and young people do not provide satisfactory care, and the gap between need and access is broadest for those aged 12–25 years.[108] Those with the most severe disorders tend to receive mental health services, but studies in various countries have indicated that fewer than half of young people with current mental disorders receive mental health specialty treatment.[109]

In New Zealand the proportion of children and young people accessing specialist services has increased[110,111] and the focus of services has broadened to address the needs of those who have mild to moderate mental health issues, recognising the benefits of early intervention in a person's life course and course of illness, and of building resilience.[112-114] Māori young people have been significantly less likely than non-Māori non-Pacific young people to have had a visit to any service for a mental health problem, suggesting that relative to need, Māori are less likely than non-Māori non-Pacific people to have contact with services.[89]

Data source and methods

Indicators

Number of 0–24 year olds accessing mental health services
Number of 0–24 year olds accessing mental health services with a mental health diagnosis

Data sources

Numerator: PRIMHD (Programme for the Integration of Mental Health Data)

Denominator: Statistics NZ Estimated Resident Population

Definition

Clients accessing mental health services refers to any individual that has had a contact within the period of interest as captured within PRIMHD

Notes on interpretation

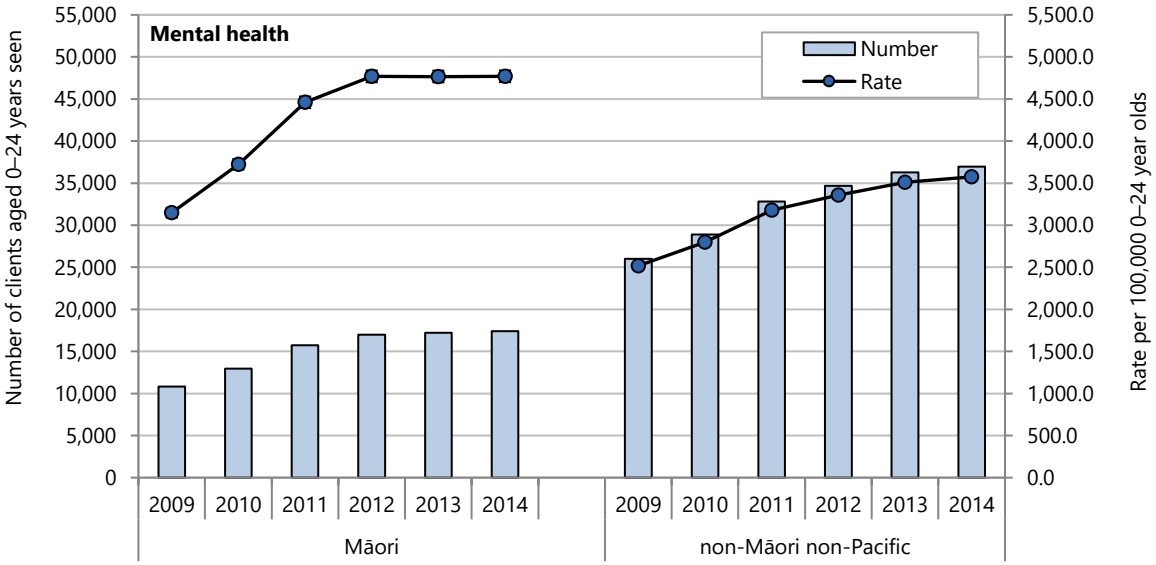
Note 1: PRIMHD is the Ministry of Health's national database covering the provision of publicly funded secondary mental health and alcohol and drug services. Commencing on 1 July 2008, it integrates information from the previous Mental Health Information National Collection (MHINC) and the MH-SMART data collection. It includes secondary inpatient, outpatient and community care provided by hospitals and non-government organisations (although data from NGOs are incomplete). It does not include information on outpatient visits to paediatricians. If local referral pathways result in children seeing a paediatrician rather than a mental health professional for behavioural or emotional problems, this may significantly underestimate the prevalence of mental health issues (e.g. autism, ADHD, learning disorders) in the community. Referral pathways are likely to vary both by region (depending on the availability of specialist child and youth mental health services) and by age (with the role of the paediatrician decreasing with increasing age). Paediatric outpatient data are currently not coded by diagnosis, making it difficult to assess the underlying prevalence of mental health conditions in the community. The PRIMHD may provide a better reflection of access to secondary services for mental and behavioural issues in young people.
Note 2. Between 2009 and 2012, more NGOs began reporting to PRIMHD and some of the reported rate increases will represent an increase in reporting rather than an increase in services accessed.[115]
Note 3: Age is derived from first contact in year
Note 4: PRIMHD has utilised multiple coding systems for capturing mental health diagnoses. In this analysis the data have been aligned to DSM-IV. Please refer to the appendices for the corresponding codes.
Note 5: PRIMHD records principal, secondary, and provisional diagnoses for clients at each contact, although in a large number of cases diagnoses was missing or deferred. In this section, individuals have been assigned a diagnosis, if they ever received this

diagnosis (principal/secondary/provisional) in the period under review (i.e. numbers = total number of individuals receiving the diagnosis; rates = total number of individuals with the diagnosis divided by the number in the population at the mid-point of this period (i.e. 2012)). Where individuals were assigned multiple diagnoses (e.g. ADHD and a conduct disorder), they appear multiple times in the analysis. Therefore the figures in the tables do not sum to 100 per cent, making it difficult to assess the contribution each diagnosis made to the total volume of services accessed during this period.
Note 6: In PRIMHD each diagnosis has a specified start and finish date. In this analysis, all 0–24 year olds have been included if they accessed mental health services during 2011–2013 (with year being determined by the service start date rather than the finish date) and the diagnostic period for this report commences in mid-2010. This is to account for individuals accessing services where their diagnosis was assigned prior to the period of interest (2011–2013 for this report), but continued through the period under review.

National trends and distribution

Rates at which 0–24 year olds were recorded as being seen by mental health services from 2009 to 2012 were consistently higher for Māori than for non-Māori non-Pacific. Māori rates rose from 2009 to 2012 and then were steady until 2014 while non-Māori non-Pacific rates rose from year to year throughout 2009−2014 (**Figure 49**).

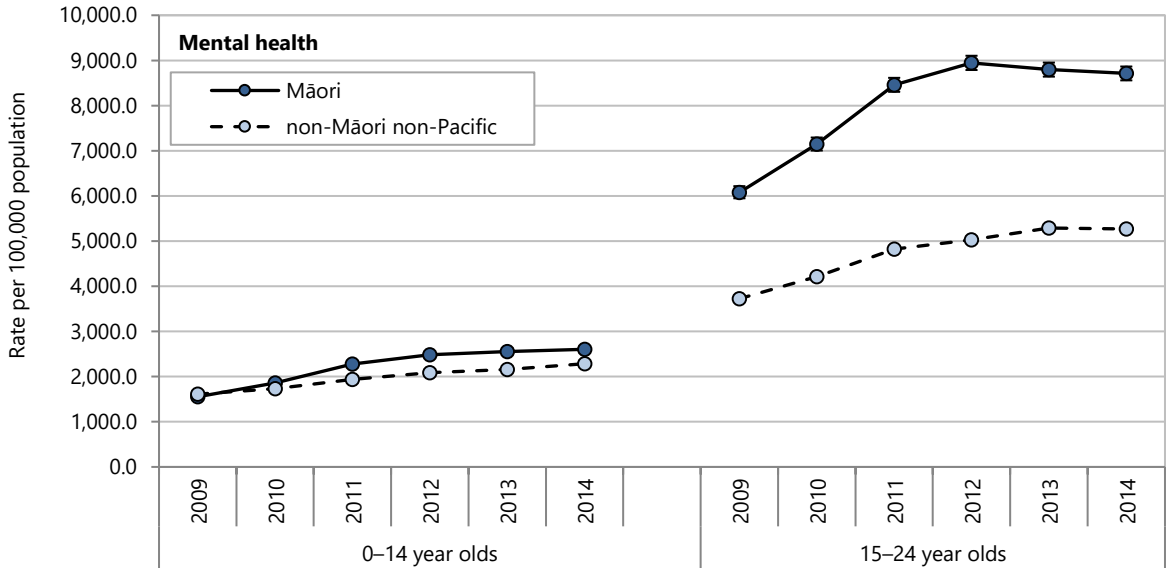
Figure 49. Clients aged 0–24 years seen by mental health services, by ethnicity, New Zealand 2009–2014



Numerator: PRIMHD; Denominator: Statistics NZ Estimated Resident Population; Ethnicity is level 1 prioritised; Some clients may be seen in multiple years

Rates for Māori and non-Māori non-Pacific 0–14 year olds were very similar during 2009–2014 with Māori rates only very slightly higher than non-Māori non-Pacific rates, and both rates increasing over time, but rates for Māori 15–24 year olds were considerably higher than those for non-Māori non-Pacific 15–24 year olds (**Figure 50**). The Māori 15–24 years rate rose steadily from 2009 to 2012 and then fell slightly while the non-Māori non-Pacific 15–24 years rate rose from 2009 to 2013 and then levelled off (**Figure 50**).

Figure 50. Individuals aged 0–24 years seen by mental health services, by ethnicity and age group, New Zealand 2009–2014

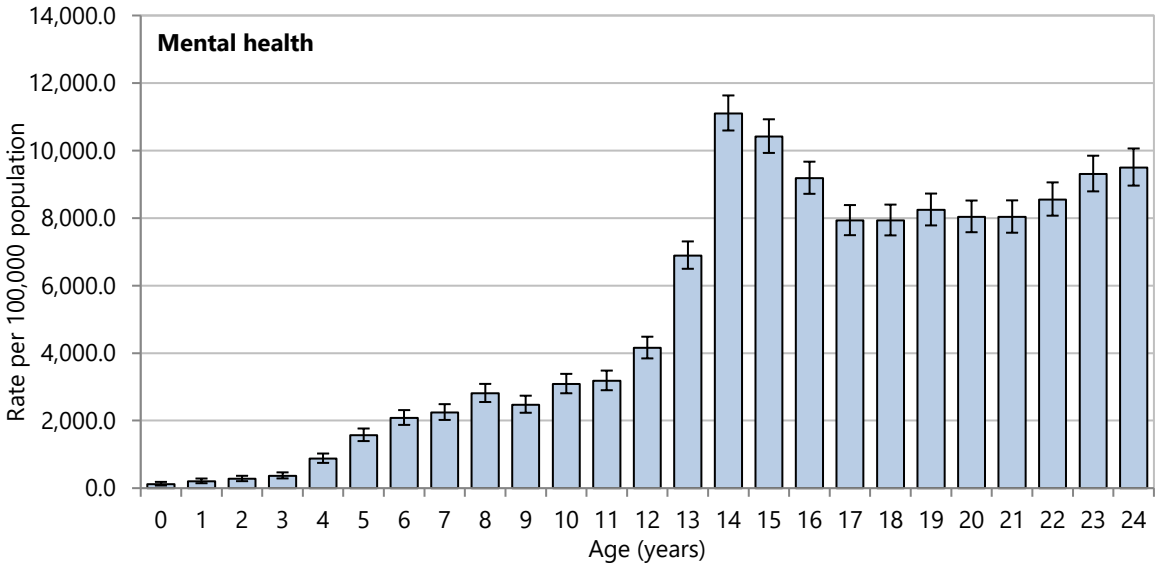


Numerator: PRIMHD; Denominator: Statistics NZ Estimated Resident Population; Rates are per 100,000 age specific population; Age is derived from first contact in year; Some clients may be seen in multiple years; Some clients may be seen in multiple years; Ethnicity is level 1 prioritised

Distribution by demographic factors

In 2014 few Māori children aged less than four years were seen by mental health services. From ages four to eight years, there was a steady increase in the rate of being seen with increasing age, after which rates were fairly steady until the age of eleven years. There was a sharp increase in rates from age 12 to age 14 years. Rates fell from ages 14 to 17 years, and were more or less steady thereafter (**Figure 51**).

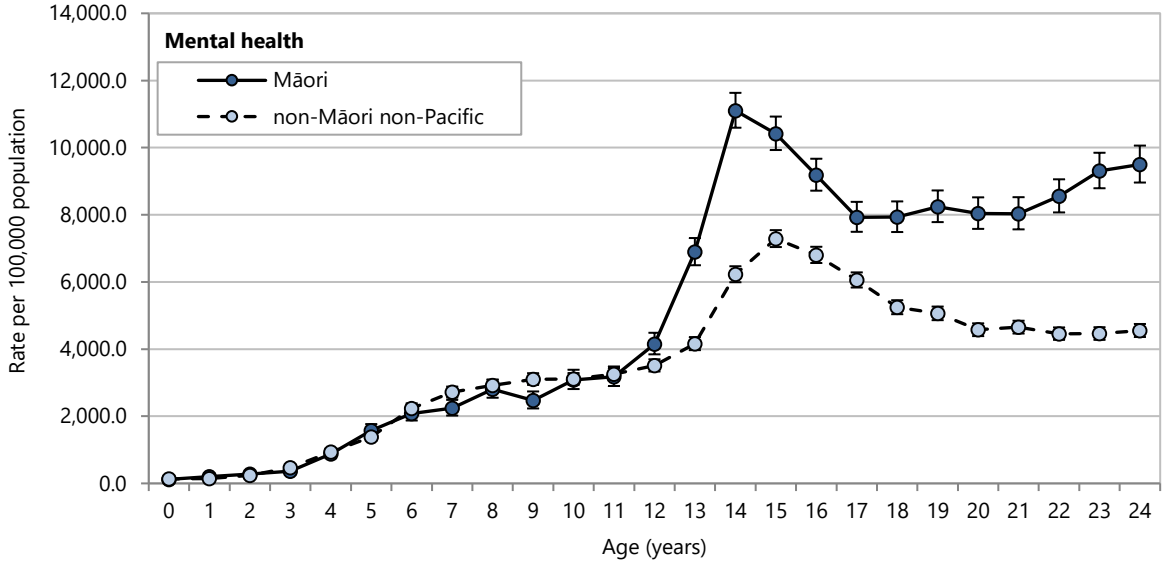
Figure 51. Māori individuals aged 0–24 years seen by mental health services, by age at first contact of year, New Zealand, 2014



Numerator: PRIMHD; Denominator: Statistics NZ Estimated Resident Population; Age is derived from first contact in year; Ethnicity to level 1 prioritised

In 2014, Māori and non-Māori non-Pacific children aged 0–12 years had very similar patterns of being seen by mental health services. From age 12 to age 15 years the Māori rate rose more steeply than the non-Māori non-Pacific rate so that Māori rates were higher than non-Māori non-Pacific rates from age 12 onwards. Māori rates fell from age 14, levelled off and then rose slightly from ages 21 to 24 years while non-Māori non-Pacific rates fell from age 15 to age 20 years and then levelled off (**Figure 52**).

Figure 52. Clients aged 0–24 years seen by mental health services, by age and ethnicity, New Zealand 2014



Numerator: PRIMHD; Denominator: Statistics NZ Estimated Resident Population; Age is derived from first contact in year; Ethnicity is level 1 prioritised

In 2014 the rate of being seen by mental health services was *significantly higher* for Māori than non-Māori non-Pacific 0–24 year olds (**Table 36**).

Table 36. Clients aged 0–24 years seen by mental health services, by ethnicity, New Zealand 2014

DHB	Number: 2014	Rate per 100,000 population	Rate ratio	95% CI
Clients seen by mental health services				
0–24 year olds				
Māori	17,406	4,769.44	1.33	1.31–1.36
non-Māori non-Pacific	36,968	3,575.33	1.00	

Numerator: PRIMHD; Denominator: Statistics NZ Estimated Resident Population; Rates are per 100,000 age-specific population; Rate ratios are unadjusted

MENTAL HEALTH HOSPITALISATIONS

Introduction

The following section contains information on Māori mental health hospitalisations in New Zealand using the National Minimum Dataset.

Data source and methods

Indicator

Hospitalisations of 15–24 year olds with a mental health diagnosis

Data sources

Numerator: National Minimum Dataset

Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years).

Definition

Hospitalisations of 15–24 year olds with a primary diagnosis of a mental or behavioural disorder, excluding hospitalisations with an Emergency Medicine specialty code on discharge. Refer to **Appendix 5**: Clinical codes used for the codes included.

Notes on interpretation

Note 1: The limitations of the National Minimum Dataset are discussed in the appendices. The reader is urged to review this information before interpreting any analyses based on Hospitalisation data. In particular, due to inconsistent uploading of Emergency Department (ED) cases to the NMDS, all hospitalisations with an ED health specialty code on discharge have been excluded.

National trends and distribution

The most common mental health diagnoses among hospitalised Māori 0–24 year olds were schizophrenia, schizotypal and delusional disorders, and mood disorders (including depression, mania and bipolar affective disorders). In contrast, among non-Māori non-Pacific 0–24 year olds hospitalised for mental health conditions, the most common diagnoses were mood disorders, substance use disorders and eating disorders (**Table 37**).

Table 37. Hospitalisations for mental health conditions in 0–24 year olds, by ethnicity and primary diagnosis, New Zealand 2010–2014

Primary diagnosis	Number: 2010–2014	Number: annual average	Rate per 100,000 0–24 year olds	95% CI	Per cent
Mental health conditions 0–24 year olds					
Māori					
Schizophrenia	1655	331	92.8	88.5–97.4	26.5
Schizotypal and delusional disorders	1312	262	73.6	69.7–77.7	21.0
Mood (affective) disorders: total	1202	240	67.4	63.7–71.3	19.2
Depression (single and recurrent)	654	131	36.7	34.0–39.6	10.5
Mania or bipolar affective disorders	462	92	25.9	23.7–28.4	7.4
Mood (affective) disorders: Other mood disorders	86	17	4.8	3.91–5.96	1.4
Substance use disorders*	752	150	42.2	39.3–45.3	12.0
Alcohol	279	56	15.6	13.9–17.6	4.5
Cannabis	237	47	13.3	11.7–15.1	3.8
Other specified drugs	236	47	13.2	11.7–15.0	3.8
Stress or adjustment disorder#	470	94	26.4	24.1–28.9	7.5
Other mental health and behavioural issues	859	172	48.2	45.1–51.5	13.7
Total	6250	1250	350.6	342.0–359.4	100.0
non-Māori non-Pacific					
Mood (affective) disorders: total	3508	702	67.9	65.7–70.2	27.4
Depression (single and recurrent)	2360	472	45.7	43.9–47.6	18.4
Mania or bipolar affective disorders	887	177	17.2	16.1–18.3	6.9
Mood (affective) disorders: Other mood disorders	261	52	5.1	4.48–5.70	2.0
Schizotypal and delusional disorders	1446	289	28.0	26.6–29.5	11.3
Substance use disorders*	1286	257	24.9	23.6–26.3	10.1
Alcohol	610	122	11.8	10.9–12.8	4.8
Cannabis	284	57	5.5	4.89–6.17	2.2
Other specified drugs	392	78	7.6	6.87–8.38	3.1
Eating disorders	1304	261	25.2	23.9–26.7	10.2
Stress or adjustment disorder#	1047	209	20.3	19.1–21.5	8.2
Schizophrenia	974	195	18.9	17.7–20.0	7.6
Personality disorders	941	188	18.2	17.1–19.4	7.4
Other mental health and behavioural issues	2287	457	44.3	42.5–46.1	17.9
Total	12793	2559	247.6	243.4–252.0	100.0

Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population; Primary diagnosis is based on the ICD-10-AM clinical coding system; ED cases removed; Ethnicity is level 1 prioritised

SUICIDE AND SELF-HARM

Introduction

The following section uses information from the National Minimum Dataset and the National Mortality Collection to review hospitalisations for intentional self-harm and mortality from suicide in Māori 0–24 year olds.

Background

New Zealand has the highest youth suicide rate in the OECD.[116] Māori ethnicity, socioeconomic disadvantage and child welfare care are associated with higher suicide rates among young people in New Zealand.[117,118] The degree to which mental illness contributes to suicide is debated[119-123] although around 90% of suicide cases may have a mental disorder[124] and, in New Zealand in 2011, 40% of the 10–64 year olds who died by suicide or undetermined intent were mental health service users.[116] The risk factor profiles for suicide mortality and hospitalisations for intentional self-harm differ. While males have higher rates of suicide, hospitalisation rates for self-harm are higher in women and highest for young women aged 15 to 19 years.[116] For Māori youth, risk factors for suicide attempt have been found to be depressive symptoms, having a close friend or family member commit suicide, being 12–15 years old compared to 16–18 years old, having anxiety symptoms, witnessing family violence, and being uncomfortable in New Zealand European social settings.[125]

The evidence base for suicide and self-harm interventions in young people is not well-established.[126,127] A caring parent or other family member and a fair, safe school environment with higher levels of health services appear to be protective against suicide attempts.[128,129] A variety of psychosocial interventions for self-harm are probably efficacious including cognitive and other behavioural therapies; family, interpersonal, and psychodynamic approaches; and mentalization-based therapy.[130,131] Some school, community and healthcare based interventions have a significant effect on suicidal ideation, suicide attempts or deliberate self-harm including psychotherapeutic interventions and also less formal approaches such as social support, psychoeducation and motivational interviewing. A combination of individual therapy, particularly for suicidal ideation, and group therapy for suicide attempts, may achieve the best results.[132] Early intervention is important to support young people who self-injure and successful interventions may be those that promote mindfulness, resilience and self- esteem.[133]

Data source and methods

Indicator

Deaths from suicide among 0–24 year olds

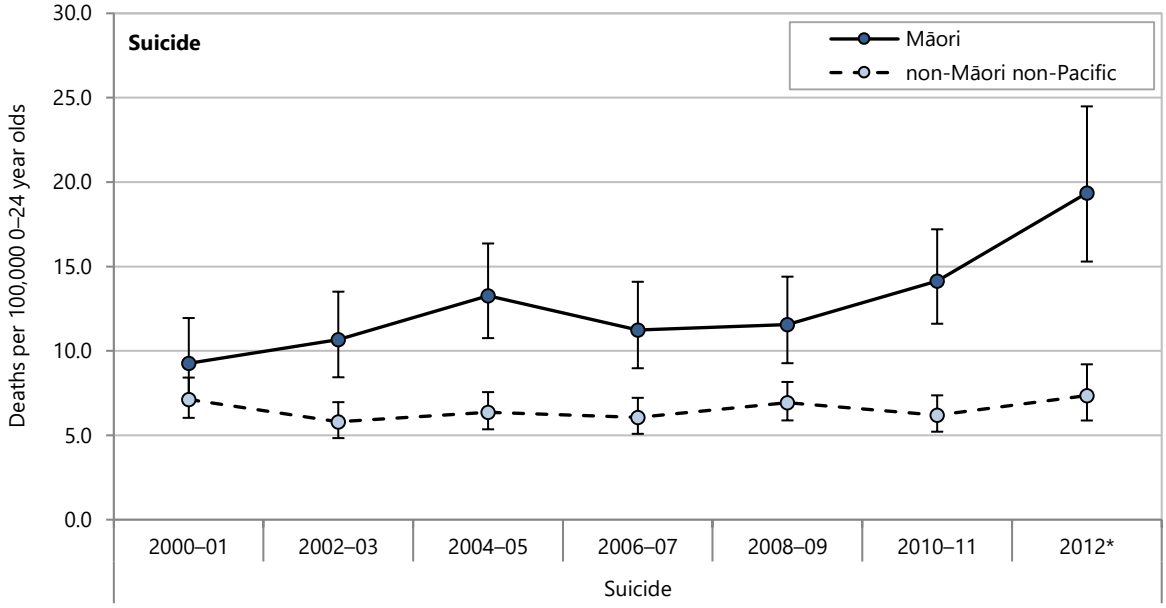
Data sources

Numerator:	National Mortality Collection
Denominator:	Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years)

National suicide trends and distribution

From 2000 to 2011 suicide rates in Māori 0–24 year olds increased, particularly from 2008–09 to 2012, whereas rates in non-Māori non-Pacific 0–24 year olds remained stable. Rates for Māori 0–24 year olds were consistently higher than those for non-Māori non-Pacific 0–24 year olds during 2000–2012, and the disparity increased over the period (**Figure 53**).

Figure 53. Deaths from suicide among 0–24 year olds, by ethnicity, New Zealand 2000–2012



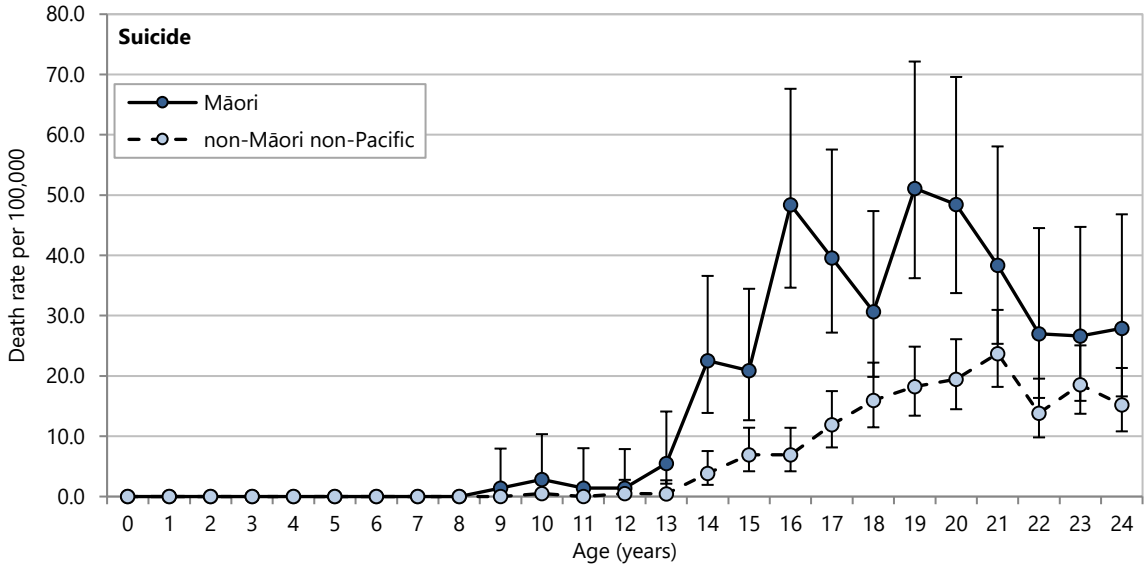
Numerator: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population; Numbers and rates are per two-year period except for 2012, which is for a single year

Distribution by demographic factors

There were no Māori or non-Māori non-Pacific suicides in children aged less than nine years. Rates for both ethnic groups rose with increasing age from around age 13 years, and then fell, from the age of 19 years in Māori, and from 21 years in non-Māori non-Pacific (**Figure 54**). Māori rates were higher than non-Māori non-Pacific rates at all ages beyond eight years (**Figure 54**).

Māori suicide rates were *significantly higher* than non-Māori non-Pacific rates for 0–24 year olds, 0−14 year olds, and 15–24 year olds (**Table 38**).

Figure 54. Deaths from suicide in 0–24 year olds, by age and ethnicity, New Zealand 2000–2012



Numerator: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population; Rates are per two-year period except for 2012, which is for a single year; Rate is per 100,000 age-specific ethnic population

Table 38. Deaths from suicide in 0–24 year olds, by age group and ethnicity, New Zealand 2008–2012

Ethnicity	Number: total 2008–2012	Number: annual average	Rate per 100,000 age specific population	Rate ratio	95% CI
Suicide in 0–24 year olds					
New Zealand					
0–24 year olds					
Māori	247	49	14.19	2.11	1.79–2.49
non-Māori non-Pacific	347	69	6.72	1.00	
0–14 year olds					
Māori	25	5	2.22	5.94	2.92–12.1
non-Māori non-Pacific	11	2	0.37	1.00	
15–24 year olds					
Māori	222	44	36.17	2.39	2.02–2.83
non-Māori non-Pacific	336	67	15.15	1.00	

Numerator: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population; Rates are per 100,000 age-specific population; Rate ratios are unadjusted

Intentional Self Harm

Data source and methods

Indicator

Hospitalisations for injuries arising from intentional self-harm in 0–24 year olds

Data sources

Numerator: National Minimum Dataset

Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years)

Definition

Hospitalisations: Hospitalisations of 0–24 year olds with a primary diagnosis of injury and an external cause code (e-code) of intentional self-harm

Hospitalisations with an Emergency Medicine specialty code on discharge were excluded

Notes on Interpretation

The limitations of the National Minimum Dataset are discussed in the Appendices

National intentional self-harm trends and distribution

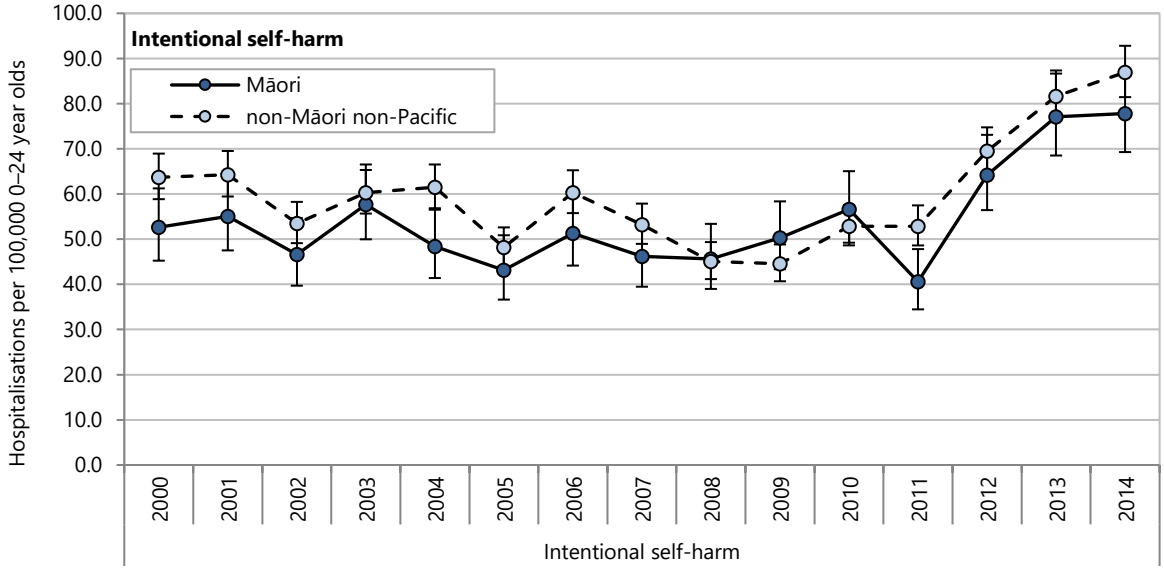
From 2000 to 2011 hospitalisation rates of both Māori and non-Māori non-Pacific 0–24 year olds for intentional self-harm remained relatively stable. From 2012 rates increased in parallel for both ethnic groups (**Figure 55**).

Distribution by demographic factors

From 2010 to 2014 there were no hospitalisations for intentional self-harm for either Māori or non-Māori children aged under eight years. From age 12 years, age-specific hospitalisation rates for intentional self-harm increased sharply in both ethnic groups, peaking at 14 years for Māori and 16 years for non-Māori non-Pacific young people. Rates were similar in both ethnic groups at most ages (**Figure 56**).

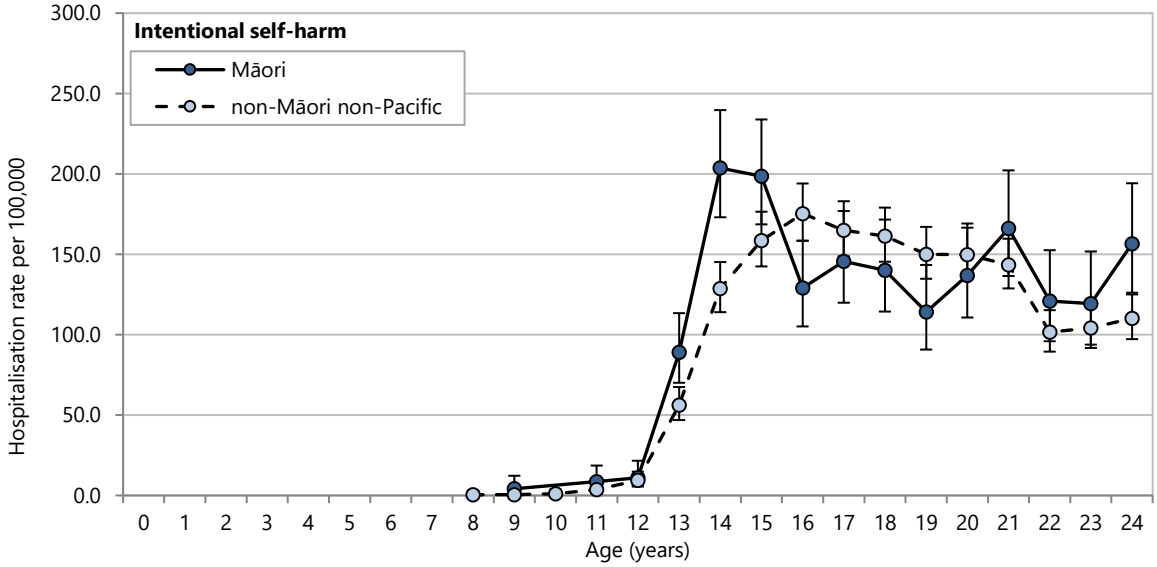
Between 2010 and 2014 hospitalisation rates for intentional self-harm were *significantly lower* for Māori than for non-Māori non-Pacific 0–24 year olds (**Table 39**).

Figure 55. Hospitalisations for intentional self-harm in 0–24 year olds, by ethnicity, New Zealand 2000–2014



Numerator: National Minimum Dataset (excludes emergency department cases); Denominator: Statistics NZ Estimated Resident Population

Figure 56. Hospitalisations for intentional self-harm in 0–24 year olds, by age and ethnicity, New Zealand 2010–2014



Numerator: National Minimum Dataset (excludes emergency department cases); Denominator: Statistics NZ Estimated Resident Population

Table 39. Hospitalisations for intentional self-harm in 0–24 year olds, by age group and ethnicity, New Zealand 2010–2014

Ethnicity	Number: total 2010–2014	Number: annual average	Rate per 100,000 0–24 year olds	Rate ratio	95% CI
Intentional self-harm 0–24 year olds					
New Zealand					
Māori	1,131	226	63.4	0.92	0.86–0.99
non-Māori non-Pacific	3,553	711	68.8	1.00	

Numerator: National Minimum Dataset (excludes emergency department cases); Denominator: Statistics NZ Estimated Resident Population; Rate ratios are unadjusted; Ethnicity is level 1 prioritised

APPENDICES AND REFERENCES

APPENDIX 1: STATISTICAL SIGNIFICANCE TESTING

Inferential statistics are used when a researcher wishes to use a sample to draw conclusions about a larger population as a whole (for example, weighing a class of 10 year old boys, in order to estimate the average weight of all 10 year old boys in New Zealand). The findings obtained from the sample provide an estimate for the population, but will always differ from it to some degree, simply due to chance. Similarly, samples are used when a researcher questions whether the risk of developing a particular condition is different between two groups, and the fit of the estimate obtained from the samples to the actual population needs to be carefully considered. An example of this would be a study examining whether lung cancer is more common in smokers or non-smokers: researchers using sample groups would have to consider the possibility that some of the differences observed arose from chance variations in the populations sampled.

Over time, statisticians have developed a range of measures to quantify the uncertainty associated with random sampling error. These measures can assign a level of confidence to estimates and conclusions drawn from samples, allowing researchers to assess, for example, whether the average weight of boys in the sample reflects the true weight of all 10 year old boys, or the rates of lung cancer in smokers are really different to those in non-smokers. Two of the most frequently used statistical significance tests are:

P values: The p value from a statistical test measures the probability of finding a difference at least as large as the one observed between groups, if there were no real differences between the groups studied. For example, if statistical testing of the difference in lung cancer rates between smokers and non-smokers resulted in a p value of 0.01, this tells us that the probability of such a difference occurring if the two groups were identical is 0.01 or 1%. Traditionally, results are considered to be statistically significant if the p value is <0.05; that is, when the probability of the observed differences occurring by chance is less than 5%.[134]

Confidence Intervals: When sampling from a population a confidence interval is a range of values that contains the measure of interest. While a confidence interval for the average height of 10 year old boys could be 20cm to 200cm, for example, the smaller range of 130cm to 150cm is a more informative statistic. A 95% confidence interval suggests that if you were to repeat the sampling process 100 times, 95 times out of 100 the confidence interval would include the true value.[134]

Statistical significance testing in this report

When tests of statistical significance have been applied in a particular section, the statistical significance of the associations presented has been signalled in the text with the words *significant*, or *not significant* in italics. Where the words *significant* or *not significant* do not appear in the text, then the associations described do not imply statistical significance or non-significance. Several data sources are used in this report. In general they belong to one of two groups: 1) population surveys or 2) routine administrative datasets. The relevant statistical testing for each of these data sources are as follows:

Population surveys: Some of indicators reported on here are derived from data from national surveys where information from a sample has been used to make inferences about the population as a whole. In this context, statistical significance testing is appropriate and, where such information is available in published reports, it has been included in the text accompanying graphs and tables. In a small number of cases, information on statistical significance was not available, and any associations described do not imply statistical significance.

Numbers derived from routine administrative data: A large number of the indicators included in this report are based on data from New Zealand's administrative datasets, for example the National Mortality Collection, which capture information on all of the events occurring in a particular category.

Rate ratios derived from routine administrative data: To facilitate comparisons between different time periods, and for examining the data from New Zealand in a wider context, whenever measures of association (rate ratios) are presented in this report, 95% confidence intervals have been provided.[135]

APPENDIX 2: DATASETS USED IN THIS REPORT

This report contains information derived from several national administrative datasets. These are described briefly below, and limitations to be aware of when interpreting results drawn from these sources are outlined.

The National Mortality Collection

The National Mortality Collection is a dataset managed by the Ministry of Health that contains information on the underlying cause, or causes, of death along with basic demographic data for all deaths registered in New Zealand since 1988. Fetal and infant death data are a subset of the Mortality Collection, with cases in this subset having additional information on factors such as birth weight and gestational age.[2] Each of the approximately 28,000 deaths occurring in New Zealand each year is coded manually by Ministry of Health staff. For most deaths the Medical Certificate of Cause of Death provides the information required, although coders also have access to information from other sources such as Coronial Services, Police, NZ Transport Agency, the NZ Cancer Registry, the Institute of Environmental Science and Research, and Water Safety NZ.[136]

The National Minimum Dataset

The National Minimum Dataset (NMDS) is national hospital discharge dataset and is maintained by the Ministry of Health. It is used for policy formation, performance monitoring, and research purposes, providing key information about the delivery of hospital inpatient and day patient health services both nationally and on a provider basis. It is also used for funding purposes.[137] Information in the NMDS includes principal and additional diagnoses, procedures, external causes of injury, length of stay and sub-specialty codes; and demographic information such as age, ethnicity and usual area of residence. Data have been submitted by public hospitals electronically since the original NMDS was implemented in 1993, with additional data dating back to 1988 also included. The private hospital discharge information for publicly funded events has been collected since 1997. The current NMDS was introduced in 1999.[137]

The Birth Registration Dataset

Since 1995 all NZ hospitals and delivering midwives have been required to notify the Department of Internal Affairs within five working days of the birth of a live or stillborn baby. This applies to stillborn babies born at or more than 20 weeks gestation, or those weighing 400g or more; prior to 1995, only stillborn babies reaching more than 28 weeks of gestation required birth notification. Information on the hospital's notification form includes maternal age, ethnicity, multiple birth status, and the baby's sex, birth weight and gestational age. In addition, parents must jointly complete a birth registration form as soon as reasonable practicable after the birth, and within two years of delivery, which duplicates the above information with the exception of birth weight and gestational age. Once both forms are received by Internal Affairs the information is merged into a single entry. This two-stage process it is thought to capture 99.9% of births occurring in New Zealand and cross-checking at the receipting stage allows for the verification of birth detail.[138]

PRIMHD

PRIMHD (Programme for the Integration of Mental Health Data) is the Ministry of Health's dataset that contains information on mental health and addiction service activity and outcomes for people using services. The district health boards and non-governmental organisations (NGOs) working in mental health provide data on client referrals and service activities to the Ministry and DHBs also provide information on any outcomes. The Ministry of Health's "*NGO Guide to PRIMHD*" explains that the information gathered is intended to enhance service planning and provision by service providers at national and local levels. The intention is for PRIMHD to help determine whether services are being provided to people who need them, whether services are being provided at the right time and in the right place, and what effects on outcomes services are having. Further information is available on PRIMHD on the Ministry of Health's website: http://www.health.govt.nz/nz-health-statistics/national-collections-and-surveys/collections/primhd-mental-health-data.

Dataset limitations

There are limitations when using any of these datasets. The following are of particular relevance to this report:

Clinical coding accuracy and coding changes over time

The quality of data submitted to the administrative national datasets may vary. While the data for the National Mortality Collection and the Birth Registration Dataset are coded by single agencies, the clinical information held in the NMDS is entered by health providers before being collated by the Ministry of Health. In a 2001 review of the quality of coding in the data submitted to the NMDS, 2,708 events were audited over ten sites during a three month period. Overall the audit found that 22% of events required a change in coding, although this also included changes at a detailed level. Changes to the principal diagnosis involved 11% of events, to additional diagnoses 23%, and to procedure coding, 11%. There were 1,625 external causes of injury codes, of which 15% were re-coded differently.[139] These findings were similar to an audit undertaken a year previously. While the potential for such coding errors must be taken into consideration when interpreting the findings of this report, the average 16% error rate indicated by the 2001 review may be an overestimate as, in the majority of the analyses undertaken in this report, only the principal diagnosis is used to describe the reason for admission.

Changes in the coding systems used over time may result in irregularities in time series analyses.[136]
New Zealand hospitals use the clinical coding classification developed by the World Health Organization and modified by the National Centre for Classification in Health, Australia. The current classification is called The International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM), the Australian Classification of Health Interventions (ACHI) and Australian Coding Standards (ACS). The introduction of ICD-10-AM represented the most significant change in classification in over 50 years, expanding the number of codes from ~5,000 to ~8,000, to provide for recently recognised conditions and allow greater specificity about common diseases.

From 1988 until 1999, clinical information in the NMDS was coded using versions of the ICD-9 classification system. From July 1999 onwards, the ICD-10-AM classification system has been used. Back and forward mapping between the two systems is possible using predefined algorithms,[140] and for most conditions there is a good correspondence between ICD-9 and ICD-10-AM codes. Care should still be taken when interpreting time series analyses which include data from both time periods as some conditions may not be directly comparable between the two coding systems.

Variation in reporting hospitalisations to the NMDS

Historically, there have been differences in the way New Zealand's 20 district health boards (DHBs) have reported their emergency department (ED) hospitalisations to the NMDS, which can affect the interpretation of hospitalisation data. Inconsistent recording of ED cases has resulted from differing definitions of the time spent in the ED, and at what point this time constitutes an admission. This is important in paediatrics where hospitalisations for acute onset infectious and respiratory diseases in young children especially are mainly of short duration. In addition, there are regional differences in treatment processes for paediatric emergency cases. This report includes all ED day cases in its analyses of hospitalisations for medical conditions. This approach differs from that commonly used by the Ministry of Health when analysing NMDS hospital discharge data, which the Ministry of Health uses to minimise the impact of the inconsistent reporting of ED cases. Short stay ED events are often excluded from the Ministry's analyses to improve comparability between regions. However, as noted above, the treatment of children in acute cases differs from that of adults, and the inclusion of ED day cases is justified when considering hospitalisations for medical conditions, despite inconsistencies in the dataset. The Ministry of Health's practice of filtering out ED day cases for hospitalisations for injuries is followed in this report as it is considered that the processes for injury assessments are relatively consistent around the country. Further information on the details of the inconsistencies can be seen in earlier reports by the NZCYES http://www.otago.ac.nz/ncyes

Changes in the way ethnicity information has been recorded over time

Due to inconsistencies in the way ethnicity information was recorded in the health sector, and in census data before 1996, all ethnic group specific analyses in this report are for the year 1996 onwards. See **Appendix 3**: Ethnicity data for a brief review of the changes in the recording of ethnicity information over the past 35 years in New Zealand.

APPENDIX 3: ETHNICITY DATA

Due to inconsistencies in the manner by which ethnicity information in New Zealand was collected prior to 1996, all ethnic group specific analyses presented in this report are for the 1996 year onwards, and reflect self- identified concepts of ethnicity. Details of the changes made in the census question on ethnicity, and why they were made, can be found on the Statistics New Zealand website http://www.stats.govt.nz.

This report presents ethnic-specific analyses for 1996 onwards and, unless otherwise specified, prioritised ethnic group has been used to ensure that each health event is only counted once.

Despite significant improvements in the quality of ethnicity data in New Zealand's national health collections since 1996, care must still be taken when interpreting the ethnic-specific rates as the potential still remains for Māori and Pacific children and young people to be undercounted in our national data collections. The authors of Hauora IV developed a set of adjusters which could be used to minimise the bias such undercounting introduced when calculating population rates and rate ratios. These, or similar, adjusters were not utilised in this report because previous research has shown that ethnicity misclassification can change over time and ethnic misclassification may vary significantly by district health board. Adjusters developed using national level data (as in Hauora IV21) may not be applicable to district health board level analyses with separate adjusters needing to be developed for each.

In addition, the development of adjusters requires the linkage of the dataset under review with another dataset for which more reliable ethnicity information is available, and this process is resource-intensive and not without error, particularly if the methodology requires probabilistic linkage of de-identified data. The development of a customised set of period and age specific adjusters was seen as being beyond the scope of the current project. The data presented in this report may undercount Māori and Pacific children to a variable extent depending on the dataset used, and that in the case of the hospital admission dataset for Māori, this undercount may be as high as 5–6%.

APPENDIX 4: NZ INDEX OF DEPRIVATION

The NZ index of deprivation (NZDep) was first created using information from the 1991 census, and has been updated following each census. It is a small area index of deprivation, and is used as a proxy for socioeconomic status. The main concept underpinning small area indices of deprivation is that the socioeconomic environment in which a person lives can confer risks or benefits which may be independent of their own social position within a community.[141] They are aggregate measures, providing information about the wider socioeconomic environment in which a person lives, rather than information about their individual socioeconomic status.
The latest index, NZDep2013, combines nine variables from the 2013 census to reflect eight dimensions of material and social deprivation (**Table 40**). Each variable represents a standardised proportion of people living in an area who lack a defined material or social resource. These are combined to give a score representing the average degree of deprivation experienced by people in that area. Individual area scores are ranked and placed on an ordinal scale from 1 to 10, with decile 1 reflecting the least deprived 10% of small areas and decile 10 reflecting the most deprived 10% of small areas.[142]

The advantage of the NZDep2013 is its ability to assign measures of socioeconomic status to the older population, the unemployed and to children, to whom income and occupational measures often don't apply, as well as to provide proxy measures of socioeconomic status for large datasets when other demographic information is lacking. Small area indices have limitations, however, as not all individuals in a particular area are accurately represented by their area's aggregate score. While this may be less of a problem for very affluent or very deprived neighbourhoods, in average areas, aggregate measures may be much less predictive of individual socioeconomic status.[141] Despite these limitations, the NZDep2013 has been shown to be predictive of mortality and morbidity from a number of diseases in New Zealand.

Table 40. Variables used in NZDep2013 index of deprivation

Dimension	Variable in order of decreasing weight in the index
Communication	People aged < 65 with no access to the Internet at home
Income	People aged 18 - 64 receiving a means tested benefit
Income	People living in equivalised* households with income below an income threshold
Employment	People aged 18 - 64 unemployed
Qualifications	People aged 18 - 64 without any qualifications
Owned home	People not living in own home
Support	People aged < 65 living in a single parent family
Living space	People living in equivalised* households below a bedroom occupancy threshold
Transport	People with no access to a car

*The setting of the household equivalised income threshold was based on two principles: 1) the proportion of the population identified as being socioeconomically deprived by the threshold should be broadly consistent with the other variables in the index, and 2) the threshold should be broadly consistent with other measures of income poverty.[142]

APPENDIX 5: CLINICAL CODES USED

Select health specialty codes

Category	Health specialty codes
Emergency Medicine	M05–M08

Select procedures

Category	ICD-10-AM codes
Grommets	41632-00, 41632-01
Tonsillectomy ± adenoidectomy	41789-00, 41789-01

Diagnosis codes used for identifying ambulatory sensitive hospitalisations

Category	ICD-10-AM codes	ICD-9-CM codes
Asthma and wheeze	J45–46, R06.2	493.00, 493.01
Bronchiectasis	J47	494
Skin infections	H00.0, H01.0, J340, L01–L04, L08, L98.0	680–684, 685.0, 686, 910.(1,3,5,7,9)–917.(1,3,5,7,9), 919.(1,3,5,7,9)
Constipation	K59.0	564.0
Dental caries/other dental conditions	K02, K04, K05	521.0, 522, 523
Dermatitis and Eczema	L20–30	690–693, 698
Gastroenteritis	A02–A09, R11, K529	001–009, 787.0, 558.9
Gastro-oesophageal reflux	K21	530.11, 530.81
Nutritional Deficiency	D50–D53, E40–E46, E50–E56, E58–E61, E63–E64	260–269, 280–281
Bacterial or non-viral pneumonia	J13–J16, J18	481–483, 485, 486
Rheumatic fever and /or rheumatic heart disease	I00–I09	390–398
Otitis media	H65–H67	381.0–381.4, 382
Acute upper respiratory tract infections*	J00–J03, J06	460–463, 465, 464.0, 464.1, 464.2
Urinary Tract Infections	N10, N12, N30.0, N39.0, N30.9, N13.6	590, 595.0–595.3, 595.9, 599.0
Vaccine-preventable:		
Neonatal or obstetric tetanus	A33, A34	771.3, 670.04
Congenital Rubella	P35.0	771.0
Pertussis	A37	033
Diphtheria	A36	032
Hepatitis B	B16, B18.0, B18.1	070.2, 070.3
Polio	A80	045
Tetanus	A35	037
Measles, Mumps, Rubella	B05, B06, B26, M01.4	055, 056, 072, 056.71

Selected diagnosis codes

Category	ICD-10-AM codes	ICD-9-CM codes
Acute upper respiratory tract infections excl croup	J00–J03, J06	460–463, 465, 464.0, 464.1, 464.2
Acute URTI: Acute nasopharyngitis (common cold)	J00	460
Acute URTI: Acute pharyngitis	J02	462
Acute URTI: Acute sinusitis	J01	461
Acute URTI: Acute tonsillitis	J03	463
Acute URTI: Croup, acute laryngitis, or tracheitis	J04, J05.0	464.0–464.2, 464.4–464.5
Acute URTI: multiple or unspecified sites	J06	465
Asthma and wheeze	J45–46, R06.2	493.00, 493.01
Bronchiectasis	J47	494

Bronchiolitis	J21	466.1
Chorioamnionitis	P02.7	762.7
Compression of umbilical cord	P02.5	762.5
Congenital anomalies	Q00–Q99	740–759
Congenital anomalies: chromosomal	Q90–Q99	758
Congenital anomalies: CNS	Q00–Q07	740–742
Congenital anomalies: CVS	Q20–Q28	745–747
Congenital anomalies: other	Q08–Q89	743–759
Congenital pneumonia	P23	770
Constipation	K59.0	564.0
Dental caries or other dental conditions	K02, K04, K05	521.0, 522, 523
Dermatitis and eczema	L20–30	690–693, 698
Epiglottitis	J05.1	464.3
Extreme prematurity	P07.2	765
Fetal blood loss	P50	772.0
Gastroenteritis	A00–A09, R11, K52.9	001–009, 558.9, 787.0
Hydrops fetalis (non-haemolytic disease)	P832	778
Hypertrophy of the tonsils and/or adenoids	J35.1–J35.3	474.10–474.12
Incompetent cervix or premature rupture of membranes	P01.0, P01.1	761.0, 761.1
Infections specific to perinatal period	P35–P39	771
Inhalation and ingestion of food causing obstruction of the respiratory tract	W79	
Inhalation of gastric contents	W78	
Injury	S00–T79	800–904, 910–995
Injury or poisoning	V01–Y36	800–999
Intentional self-harm	X60–X84	950–959
Intrauterine hypoxia	P20.0	768.0–768.4
Intrauterine hypoxia or birth asphyxia	P20, P21	768
Malnutrition or slow fetal growth	P05	764
Maternal hypertensive disorders	P00.0	760.0
Meningococcal disease	A39	036.0–036.9
Middle ear or mastoid: Cholesteatoma of the middle ear	H71	385.3
Middle ear or mastoid: Chronic tonsillitis	J35.0	474.0
Middle ear or mastoid: Eustachian tube disorders	H68, H69	381.5–381.9
Middle ear or mastoid: Mastoiditis and related disorders	H70	383
Middle ear or mastoid: Other disorders of the middle ear or mastoid	H74–H75	385.0–385.2, 385.4–385.9
Middle ear or mastoid: Otitis media	H65–H67	381.0–381.4, 382
Middle ear or mastoid: Perforation or other disorders of the tympanic membrane	H72–H73	384
Multiple pregnancy	P01.5	761.5
Neonatal aspiration of meconium, amniotic fluid, or mucus	P240, P241	770.1
Nutritional deficiency	D50–D53, E40–E46, E50–E56, E58–E61, E63–E64	260–269, 280–281
Oligohydramnios	P01.2	761.2
Other abnormalities of placenta	P02.2	762.2
Other or unspecified chronic diseases of tonsils or adenoids	J35.8–J35.9	474.2–474.9
Other perinatal conditions	P00–P19; P22–P96	760–779
Pertussis or whooping cough	A37	033
Pertussis: Whooping cough due to *Bordetella parapertussis*	A37.1	033.1
Pertussis: Whooping cough due to *Bordetella pertussis*	A37.0	033.0
Pertussis: Whooping cough due to other *Bordetella* species	A37.8	033.8
Pertussis: Whooping cough, unspecified	A37.9	033.9
Placenta praevia or placental separation and haemorrhage	P02.0, P02.1	762.0, 762.1

Placental transfusion syndromes	P02.3	762.3
Pneumonia: bacterial, non-viral, or unspecified	J13–J16, J18	481–483, 078.88, 485, 486, 514
Pneumonia: viral	J10.0, J11.0, J12	487.0, 480
Polycythaemia neonatorum	P611	776.4
Prematurity or low birthweight	P07.0, P07.2	765
Rheumatic Fever and Rheumatic Heart Disease	I00–I09	390–398
Skin infections: Acute lymphadenitis	L04	683
Skin infections: Cellulitis	L03	682
Skin infections: Cutaneous abscess, furuncle, or carbuncle	L02	680
Skin infections: Impetigo	L01.0, L01.1	684
Skin infections: Infected, unspecified, or other dermatitis	L30.3, L30.8, L30.9	690.8, 702.8
Skin infections: Infections of other anatomical sites	A46, H00.0, H05.0, H60.0, H60.1, H60.2, H60.3, H62.0, H62.4, J34.0, K61.0, N48.2, N49.2, N49.9, N76.4	035, 373.1, 376.01, 380.10, 380.14, 380.13, 478.1, 566, 607.2, 608.4, 616.4
Skin infections: Insect or spider bites	S10.13, S10.83, S10.93, S20.13, S20.33, S20.43, S20.83, S30.83, S30.93, S40.83, S50.83, S60.83, S70.83, S80.83, S90.83, T09.03, T11.08, T13.03, T14.03, T63.3, T63.4, T00.9	910.4, 910.5, 911.4, 911.5, 912.5, 912.6, 913.4, 913.5, 914.5, 915.5, 916.4, 916.5, 917.4, 917.5, 919.4, 919.5, 919.8, 989.5
Skin infections: Other infections of skin and subcutaneous tissue	L08	686
Skin infections: Pilonidal cyst with abscess	L05.0	685.0
Skin infections: Post traumatic or open wound infection	T79.3, T89.01, T89.02	958.3
Skin infections: Scabies	B86	133.0
Skin infections: Varicella with other complications	B01.8	052.7, 052.8
Sleep apnoea	G47.3	780.51
SUDI: inhalation of gastric contents or food	W78, W79	E911
SUDI: SIDS	R95	798
SUDI: suffocation or strangulation in bed	W75	E913.0
SUDI: unspecified	R96, R98, R99	798.1, 798.2, 798.9
Tuberculosis	A15–A19	010–018
Unspecified cause of fetal death	P95, R99	768.0, 799.9

Selected diagnosis codes for unintentional injury

Category	ICD-10-AM codes	ICD-9-CM codes
Falls	W00–W19	880–888
Inanimate mechanical forces	W20–W49	914–916, 918–925
Animate mechanical forces	W50–W64	906, 917
Drowning or submersion	W65–W74	910
Suffocation	W75–W84	911–915
Thermal injury	W85–X19	890–899, 926
Poisoning	X40–X49	850–869
Intentional self-harm	X60–X84	950–959
Assault	X85–Y09	960–969
Undetermined intent	Y10–Y34	980–989
Road traffic		
Vehicle occupant	V40–V48.(5, 6, 7, 9), V50–V58.(5, 6, 7, 9), V60–V68.(5, 6, 7, 9), V70–V78.(5, 6, 7, 9)	810–819.(0, 1)
Motorbike	V20–V28.(4, 5, 9), V29.(4, 5, 6, 9)	825.2, 81x.(2, 3)
Cyclist	V10–V18.(4, 5, 9), V19.(4, 5, 6, 9)	81x.6
Pedestrian	V00–V06.(1), V09.(2, 3)	814, 81x.7

Other land transport	V30–V38.(5, 6, 7, 9), V39.(4, 5, 6, 9), V81.1, V82.(1, 9), V83–V86.(0, 1, 2, 3)	
Non-traffic land transport incidents		
Vehicle occupant	V40–V48.(0, 1, 2, 3), V50–V58.(0, 1, 2, 3), V60–V68.(0, 1, 2, 3), V70–V78.(0, 1, 2, 3), V49.(0, 1, 2, 3), V59.(0, 1, 2, 3), V69.(0, 1, 2, 3), V79.(0, 1, 2, 3)	820–825.(0, 1)
Motorbike	V20–V28.(0, 1, 2), V29.(0, 1, 2, 3)	820–825.(2, 3)
Cyclist	V10–V18.(0, 1, 2), V19.(0, 1, 2, 3)	826, 82x.6
Pedestrian	V00–V06.(0), V09.(0, 1)	82x.7
Other land transport	V30–V38.(0, 1, 2, 3), V39.(0, 1, 2, 3), V87, V89.(2, 3), V81.0, V82.0, V83–V86.(5, 6, 7, 9), V88, V89.(0, 1)	
Land transport: other or unspecified	V00–V89, V98–V99	800–829
Other transport	V90–V97	830–845

Diagnosis codes used for mental health hospitalisations

Category	ICD-10-AM codes
Mental and behavioural disorders due to use of:	
Alcohol	F10
Cannabis	F12
Tobacco	F17
Other specified drugs	F11, F13, F14, F15, F16, F18, F19
Schizophrenia	F20
Schizotypal and delusional disorders	F21–F29
Mood (affective) disorders	
Mania or bipolar affective disorders	F30, F31
Depression (single and recurrent)	F32 or F33
Other mood disorders	F34, F38, or F39
Anxiety disorders	F40 or F41
Obsessive Compulsive Disorder (OCD)	F42
Reaction to severe stress and/or adjustment disorder	F43
Eating disorders	F50
Personality disorders	F60 or F61
Other personality and behaviour disorders	F62–F69
Pervasive developmental disorders	F84
Conduct disorders	F91 or F92
Mental disorder associated with puerperium	F53
Gender identity disorders	F64
Other mental health and behavioural issues	Rest of F codes

Exclude F54 and F82

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