INJURIES IN CHILDREN

Introduction

Unintentional injury remains the leading cause of death in New Zealand children aged 1–14 years [183]. In national data for 2004–2008, the most common causes of injury deaths in this age group were related to land transport incidents, either as a vehicle occupant or a pedestrian. Drowning rates are similar to those of pedestrians, with assault being the fifth most common cause of death. In terms of trends, mortality rates from both land transport and non-land transport are decreasing, with the exception of threats to breathing [184].

Age and developmental stage affect the types of injury incurred. For example, children under one year of age are the most likely to die from choking or asphyxiation, while drowning commonly occurs in children aged 1–3 years [184]. The rate of transport-related deaths increases with age, mostly driven by fatal events occurring to pedal cyclists and motorcyclists. For non-transport injury, after drowning and assault, fire and flames, burns and self-harm are the next most common causes of mortality in 0–14 year olds, with the latter cause being more common in those aged 10–14 years [183]. For almost all injury causes, males predominate [183], with mortality from land transport injuries also being higher for Māori children than for children of other ethnic groups [97].

The causes and diagnoses for children hospitalised for injuries also vary with age and the child's developmental stage [185]. The circumstances surrounding falls, a common cause of injury hospitalisation vary with age but dominate all age groups [185], as do injuries from inanimate mechanical forces [97]. In contrast, incidents involving electricity/fire/burns peak at one year of age, while admissions for poisoning are more common at two years of age. Admissions for injuries resulting from falling are most evident in children around five years of age [97].

In terms of prevention, New Zealand has a national Injury Prevention Strategy (NZIPS) that details a philosophical approach to reducing injury and identifies strategies for achieving injury prevention goals [186]. In 2011, childhood injury was identified as a priority area, and various government sectors are likely to collaborate with lead agencies to implement the strategies identified [187]. These may include interventions proven to be effective in reducing injury from some causes. For example, cycle helmets reduce head injury except to the jaw area [188], child restraints should be used by all children but need to be correctly used [189], isolation fencing reduces the risk of young children drowning in domestic swimming pools [190], and smoke detectors alert households so they can leave a potentially burning building [191]. The effectiveness of many interventions is, however, affected by the complexity of the environments in which families live, play and travel. The value of multifaceted interventions is increasingly noted in systematic reviews of interventions to prevent childhood injury [192]. Critical to effectiveness of any proven intervention, is that its implementation is well executed and sustainably resourced.

The following section reviews injuries in children using data from the National Minimum Dataset and the National Mortality Collection. The section concludes with a brief overview of local policy documents and evidence-based reviews which consider the prevention of childhood injuries at the population level.

Data Sources and Methods

Indicator

1. *Hospital Admissions for Injuries in Children Aged 0–14 Years*

Numerator: National Minimum Dataset: Hospital admissions in children aged 0–14 years with a primary diagnosis of Injury (ICD-10-AM S00–T79). Causes of injury were assigned using the ICD-10-AM primary external cause code (E code). The following were excluded: 1) Admissions with an E code in the Y40–Y89 range (complications of drugs/medical/surgical care and late sequelae of injury). 2) Admissions with an Emergency Medicine Specialty code (M05–M08) on discharge.

Causes of injury were assigned using the primary E code (hospital admissions) or the main underlying cause of death as follows: Pedestrian (V01–V09), Cyclist (V10–V19), Motorbike (V20–29), Vehicle Occupant (V40–79), Other Land Transport (V30–39, V80–89); Other Transport (V90–V99); Falls (W00–W19), Mechanical Forces:

Inanimate (W20–W49), Mechanical Forces: Animate (W50–64), Drowning/Submersion (W65–74), Accidental Threat to Breathing (W75–W84), Electricity/Fire/Burns (W85–X19), Accidental Poisoning (X40–X49), Intentional Self-Harm (X60–84), Assault (X85–Y09), Undetermined Intent (Y10–Y34). Broader Categories included Land Transport Injuries (V01–V89) and Unintentional Non-Transport Injuries (W00–W74, W85–X19).

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

2. Mortality from Injuries in Children Aged 0–14 Years

Numerator: National Mortality Collection; Deaths in children aged 0–14 years where the main underlying cause of death was an injury (V01–Y36). Causes of injury were assigned using the codes listed above.

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

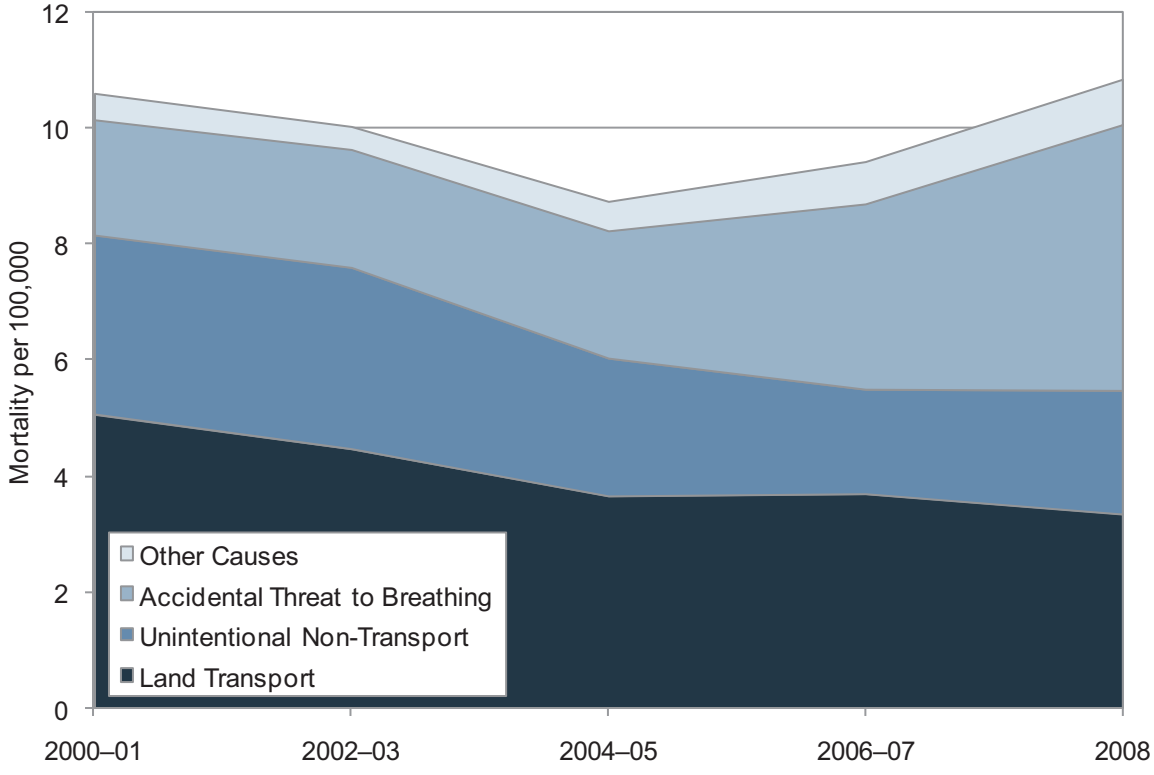
Notes on Interpretation

Note 1: Because of regional inconsistencies in the uploading of Emergency Department cases to the National Minimum dataset (see **Appendix 3**) all hospital admissions with an Emergency Department specialty code on discharge have been excluded. In addition, because of the potential for these inconsistencies to impact significantly on time series analysis, any reviews of long term trends have been restricted to mortality data, with hospital admission data being used to explore cross sectional associations between demographic factors and different injury types. Despite these restrictions, the reader must bear in mind the fact that differences in the ways different DHBs upload their injury cases to the NMDS may also impact on the regional vs. New Zealand analyses presented (see **Appendix 3** for a fuller explanation of these issues).

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 2** for further discussion of this issue).

All Injuries

Figure 105. Mortality from Unintentional Injuries in Children Aged 0−14 Years by Main Underlying Cause of Death, New Zealand 2000−2008

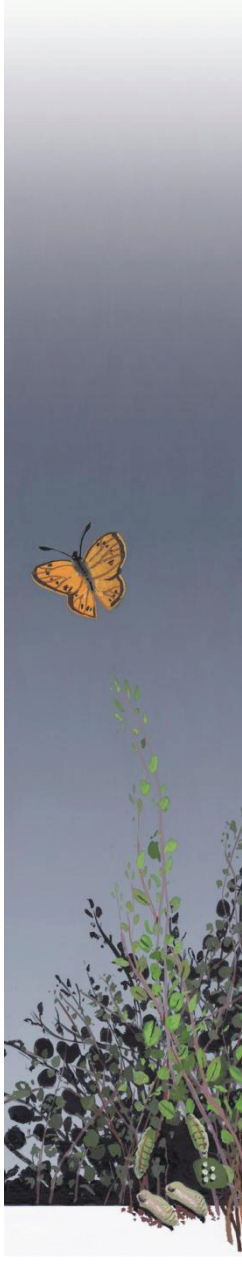


Source: Numerator: National Mortality Collection (Assault and Suicide excluded); Denominator: Statistics NZ Estimated Resident Population

Table 106. Hospital Admissions (2006−2010) and Mortality (2004−2008) from Injuries in New Zealand Children Aged 0−14 Years by Main External Cause of Injury

Main External Cause of Injury	Number: Total per 5 Year Period	Number: Annual Average	Rate per 100,000	Percent (%)
New Zealand				
Injury Admissions 0–14 Years, 2006–2010				
Falls	24,576	4,915.2	550.6	43.1
Mechanical Forces: Inanimate	12,726	2,545.2	285.1	22.3
Mechanical Forces: Animate	2,818	563.6	63.1	4.9
Transport: Vehicle Occupant	1,182	236.4	26.5	2.1
Transport: Motorbike	1,283	256.6	28.7	2.3
Transport: Cyclist	2,926	585.2	65.6	5.1
Transport: Pedestrian	975	195.0	21.8	1.7
Transport: Other Land Transport	976	195.2	21.9	1.7
Transport: Other Transport	108	21.6	2.42	0.2
Electricity / Fire / Burns	1,963	392.6	44.0	3.4
Accidental Poisoning	2,634	526.8	59.0	4.6
Accidental Threat to Breathing	440	88.0	9.86	0.8
Drowning / Submersion	176	35.2	3.94	0.3
Assault	829	165.8	18.6	1.5
Intentional Self-Harm	449	89.8	10.1	0.8
Undetermined Intent	216	43.2	4.84	0.4
No External Cause Listed	7	1.4	0.16	0.0
Other Causes	2,730	546.0	61.2	4.8
New Zealand Total	57,014	11,402.8	1,277.3	100.0
Injury Mortality 0–14 Years, 2004–2008				
Accidental Threat to Breathing	137	27.4	3.08	28.6
Transport: Vehicle Occupant	88	17.6	1.98	18.4
Transport: Pedestrian	46	9.2	1.04	9.6
Transport: Cyclist	12	2.4	0.27	2.5
Transport: Motorbike	9	1.8	0.20	1.9
Transport: Other Land Transport	6	1.2	0.14	1.3
Transport: Other Transport	6	1.2	0.14	1.3
Drowning / Submersion	46	9.2	1.04	9.6
Assault	39	7.8	0.88	8.1
Electricity / Fire / Burns	21	4.2	0.47	4.4
Intentional Self-Harm	20	4.0	0.45	4.2
Falls	12	2.4	0.27	2.5
Mechanical Forces: Inanimate	12	2.4	0.27	2.5
Mechanical Forces: Animate	<3	s	s	s
Accidental Poisoning	8	1.6	0.18	1.7
Undetermined Intent	8	1.6	0.18	1.7
Other Causes	7	1.4	0.16	1.5
New Zealand Total	479	95.8	10.8	100.0

Source: Numerators: National Minimum Dataset and National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population. Note: s: suppressed due to small numbers.



New Zealand Mortality Trends

In New Zealand during 2000–2008, mortality from land transport injuries and unintentional non-transport injuries in children both declined, while mortality from accidental threats to breathing increased. The majority of accidental threats to breathing deaths however, occurred in infants <1 year, who were coded as dying as a result of suffocation or strangulation in bed, and thus the potential exists for some of the increases seen to have arisen from a diagnostic shift in the coding of Sudden Unexpected Death in Infancy (SUDI) [193] (see SUDI section) (**Figure 105**).

New Zealand Distribution by Cause

In New Zealand during 2006–2010 falls, followed by inanimate mechanical forces were the leading causes of injury admissions in children, although transport injuries as a group also made a significant contribution. In contrast, accidental threats to breathing, followed by vehicle occupant injuries were the leading causes of injury mortality in children during 2004–2008 (**Table 106**).

Table 107. Hospital Admissions (2006−2010) and Mortality (2004−2008) from Injuries in Nelson Marlborough Children Aged 0−14 Years by Main External Cause of Injury

Main External Cause of Injury	Number: Total per 5 Year Period	Number: Annual Average	Rate per 100,000	Percent (%)
Nelson Marlborough				
Injury Admissions 0–14 Years, 2006–2010				
Falls	652	130.4	505.1	44.0
Mechanical Forces: Inanimate	201	40.2	155.7	13.6
Mechanical Forces: Animate	66	13.2	51.1	4.5
Transport: Vehicle Occupant	35	7.0	27.1	2.4
Transport: Motorbike	55	11.0	42.6	3.7
Transport: Cyclist	117	23.4	90.6	7.9
Transport: Pedestrian	22	4.4	17.0	1.5
Transport: Other Land Transport	28	5.6	21.7	1.9
Transport: Other Transport	3	0.6	2.32	0.2
Electricity / Fire / Burns	51	10.2	39.5	3.4
Accidental Poisoning	105	21.0	81.3	7.1
Accidental Threat to Breathing	13	2.6	10.1	0.9
Drowning / Submersion	<3	s	s	s
Assault	23	4.6	17.8	1.6
Intentional Self-Harm	12	2.4	9.30	0.8
Undetermined Intent	18	3.6	13.9	1.2
Other Causes	80	16.0	62.0	5.4
Nelson Marlborough Total	1,483	296.6	1,148.8	100.0
Injury Mortality 0–14 Years, 2004–2008				
Accidental Threat to Breathing	3	0.6	2.29	21.4
Transport: Pedestrian	3	0.6	2.29	21.4
Transport: All Other	3	0.6	2.29	21.4
Assault	3	0.6	2.29	21.4
Electricity / Fire / Burns	<3	s	s	s
Nelson Marlborough Total	14	2.8	10.7	100.0

Source: Numerators: National Minimum Dataset and National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population. Note: s: suppressed due to small numbers.

South Island Distribution by Cause

In the South Island during 2006–2010 falls, followed by inanimate mechanical forces, were the leading causes of injury admissions in children in all DHBs, although transport injuries as a group also made a significant contribution. During 2004–2008, accidental threats to breathing, vehicle occupant, pedestrian and other transport injuries, and assaults were among the leading causes of injury mortality in South Island children (**Table 107** to**Table 112**).

Table 108. Hospital Admissions (2006−2010) and Mortality (2004−2008) from Injuries in South Canterbury Children Aged 0−14 Years by Main External Cause of Injury

Main External Cause of Injury	Number: Total per 5 Year Period	Number: Annual Average	Rate per 100,000	Percent (%)
South Canterbury				
Injury Admissions 0–14 Years, 2006–2010				
Falls	306	61.2	591.2	44.9
Mechanical Forces: Inanimate	90	18.0	173.9	13.2
Mechanical Forces: Animate	43	8.6	83.1	6.3
Transport: Vehicle Occupant	9	1.8	17.4	1.3
Transport: Motorbike	23	4.6	44.4	3.4
Transport: Cyclist	51	10.2	98.5	7.5
Transport: Pedestrian	5	1.0	9.66	0.7
Transport: Other Land Transport	19	3.8	36.7	2.8
Transport: Other Transport	<3	s	s	s
Electricity / Fire / Burns	24	4.8	46.4	3.5
Accidental Poisoning	46	9.2	88.9	6.8
Accidental Threat to Breathing	5	1.0	9.66	0.7
Drowning / Submersion	<3	s	s	s
Assault	6	1.2	11.6	0.9
Intentional Self-Harm	4	0.8	7.73	0.6
Undetermined Intent	10	2.0	19.3	1.5
Other Causes	37	7.4	71.5	5.4
South Canterbury Total	681	136.2	1,315.8	100.0
Injury Mortality 0–14 Years, 2004–2008				
All Causes	3	0.6	5.65	100.0
South Canterbury Total	3	0.6	5.65	100.0

Source: Numerators: National Minimum Dataset and National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population. Note: s: suppressed due to small numbers.

Table 109. Hospital Admissions (2006−2010) and Mortality (2004−2008) from Injuries in Canterbury Children Aged 0−14 Years by Main External Cause of Injury

Main External Cause of Injury	Number: Total per 5 Year Period	Number: Annual Average	Rate per 100,000	Percent (%)
Canterbury				
Injury Admissions 0–14 Years, 2006–2010				
Falls	2,626	525.2	547.3	43.0
Mechanical Forces: Inanimate	1,230	246.0	256.3	20.1
Mechanical Forces: Animate	299	59.8	62.3	4.9
Transport: Vehicle Occupant	92	18.4	19.2	1.5
Transport: Motorbike	111	22.2	23.1	1.8
Transport: Cyclist	309	61.8	64.4	5.1
Transport: Pedestrian	75	15.0	15.6	1.2
Transport: Other Land Transport	89	17.8	18.5	1.5
Transport: Other Transport	12	2.4	2.50	0.2
Electricity / Fire / Burns	168	33.6	35.0	2.8
Accidental Poisoning	497	99.4	103.6	8.1
Accidental Threat to Breathing	45	9.0	9.38	0.7
Drowning / Submersion	18	3.6	3.75	0.3
Assault	124	24.8	25.8	2.0
Intentional Self-Harm	71	14.2	14.8	1.2
Undetermined Intent	17	3.4	3.54	0.3
Other Causes	325	65.0	67.7	5.3
Canterbury Total	6,108	1,221.6	1,273.0	100.0
Injury Mortality 0–14 Years, 2004–2008				
Accidental Threat to Breathing	9	1.8	1.92	30.0
Transport: Vehicle Occupant	5	1.0	1.07	16.7
Drowning / Submersion	4	0.8	0.85	13.3
Accidental Poisoning	3	0.6	0.64	10.0
All Other Causes	9	1.8	1.92	30.0
Canterbury Total	30	6.0	6.39	100.0

Source: Numerators: National Minimum Dataset and National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population

Table 110. Hospital Admissions (2006−2010) and Mortality (2004−2008) from Injuries in West Coast Children Aged 0−14 Years by Main External Cause of Injury

Main External Cause of Injury	Number: Total per 5 Year Period	Number: Annual Average	Rate per 100,000	Percent (%)
West Coast				
Injury Admissions 0–14 Years, 2006–2010				
Falls	191	38.2	605.6	45.4
Mechanical Forces: Inanimate	76	15.2	241.0	18.1
Mechanical Forces: Animate	24	4.8	76.1	5.7
Transport: Vehicle Occupant	14	2.8	44.4	3.3
Transport: Motorbike	14	2.8	44.4	3.3
Transport: Cyclist	26	5.2	82.4	6.2
Transport: Pedestrian	4	0.8	12.7	1.0
Transport: Other Land Transport	12	2.4	38.0	2.9
Electricity / Fire / Burns	14	2.8	44.4	3.3
Accidental Poisoning	18	3.6	57.1	4.3
Accidental Threat to Breathing	3	0.6	9.51	0.7
Drowning / Submersion	<3	s	s	s
Assault	3	0.6	9.51	0.7
Intentional Self-Harm	4	0.8	12.7	1.0
Undetermined Intent	<3	s	s	s
Other Causes	16	3.2	50.7	3.8
West Coast Total	421	84.2	1,334.8	100.0
Injury Mortality 0–14 Years, 2004–2008				
All Causes	3	0.6	9.23	100.0
West Coast Total	3	0.6	9.23	100.0

Source: Numerators: National Minimum Dataset and National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population. Note: s: suppressed due to small numbers.

Table 111. Hospital Admissions (2006−2010) and Mortality (2004−2008) from Injuries in Otago Children Aged 0−14 Years by Main External Cause of Injury

Main External Cause of Injury	Number: Total per 5 Year Period	Number: Annual Average	Rate per 100,000	Percent (%)
Otago				
Injury Admissions 0–14 Years, 2006–2010				
Falls	725	145.0	452.1	42.9
Mechanical Forces: Inanimate	280	56.0	174.6	16.6
Mechanical Forces: Animate	82	16.4	51.1	4.9
Transport: Vehicle Occupant	41	8.2	25.6	2.4
Transport: Motorbike	93	18.6	58.0	5.5
Transport: Cyclist	120	24.0	74.8	7.1
Transport: Pedestrian	22	4.4	13.7	1.3
Transport: Other Land Transport	25	5.0	15.6	1.5
Transport: Other Transport	5	1.0	3.12	0.3
Electricity / Fire / Burns	53	10.6	33.0	3.1
Accidental Poisoning	98	19.6	61.1	5.8
Accidental Threat to Breathing	23	4.6	14.3	1.4
Drowning / Submersion	6	1.2	3.74	0.4
Assault	23	4.6	14.3	1.4
Intentional Self-Harm	28	5.6	17.5	1.7
Undetermined Intent	5	1.0	3.12	0.3
No External Cause Listed	<3	s	s	s
Other Causes	59	11.8	36.8	3.5
Otago Total	1,689	337.8	1,053.2	100.0
Injury Mortality 0–14 Years, 2004–2008				
Transport: All Causes	8	1.6	4.93	53.3
Assault	3	0.6	1.85	20.0
All Other Causes	4	0.8	2.46	26.7
Otago Total	15	3.0	9.24	100.0

Source: Numerators: National Minimum Dataset and National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population. Note: s: suppressed due to small numbers.

Table 112. Hospital Admissions (2006−2010) and Mortality (2004−2008) from Injuries in Southland Children Aged 0−14 Years by Main External Cause of Injury

Main External Cause of Injury	Number: Total per 5 Year Period	Number: Annual Average	Rate per 100,000	Percent (%)
Southland				
Injury Admissions 0–14 Years, 2006–2010				
Falls	479	95.8	440.3	34.0
Mechanical Forces: Inanimate	313	62.6	287.7	22.2
Mechanical Forces: Animate	65	13.0	59.8	4.6
Transport: Vehicle Occupant	38	7.6	34.9	2.7
Transport: Motorbike	63	12.6	57.9	4.5
Transport: Cyclist	77	15.4	70.8	5.5
Transport: Pedestrian	21	4.2	19.3	1.5
Transport: Other Land Transport	33	6.6	30.3	2.3
Transport: Other Transport	<3	s	s	s
Electricity / Fire / Burns	45	9.0	41.4	3.2
Accidental Poisoning	134	26.8	123.2	9.5
Accidental Threat to Breathing	18	3.6	16.5	1.3
Drowning / Submersion	3	0.6	2.76	0.2
Assault	23	4.6	21.1	1.6
Intentional Self-Harm	10	2.0	9.19	0.7
Undetermined Intent	14	2.8	12.9	1.0
Other Causes	70	14.0	64.4	5.0
Southland Total	1,407	281.4	1,293.4	100.0
Injury Mortality 0–14 Years, 2004–2008				
Accidental Threat to Breathing	3	0.6	2.70	21.4
Transport: All Causes	6	1.2	5.40	42.9
All Other Causes	5	1.0	4.50	35.7
Southland Total	14	2.8	12.60	100.0

Source: Numerators: National Minimum Dataset and National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population. Note: s: suppressed due to small numbers.

Land Transport Injuries

South Island DHBs vs. New Zealand Distribution

During 2006–2010, hospital admissions for land transport injuries in children were *significantly* higher than the New Zealand rate in all of the South Island DHBs except Canterbury, where rates were *significantly* lower. Mortality from land transport injuries during 2004–2008 was also *significantly* lower than the New Zealand rate in Canterbury, although rates in Nelson Marlborough, Otago and Southland were not *significantly* different from the New Zealand rate. Small numbers precluded a valid analysis in South Canterbury while no deaths occurred in the West Coast during this period (**Table 113**).

South Island Distribution by Season

In the South Island during 2006–2010, hospital admissions for land transport injuries in children were lower during the winter months in most DHBs (**Figure 107**).

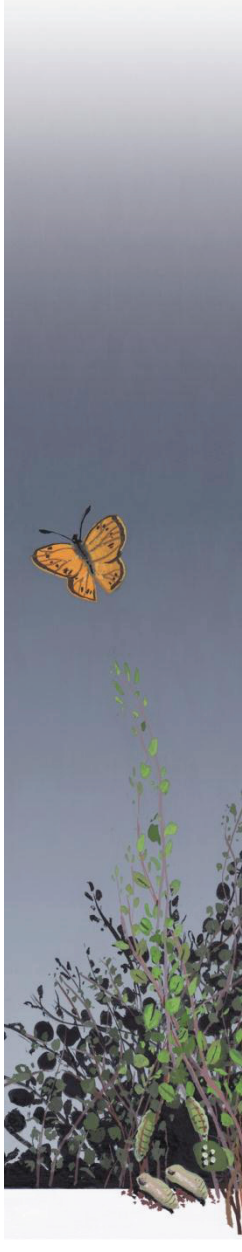
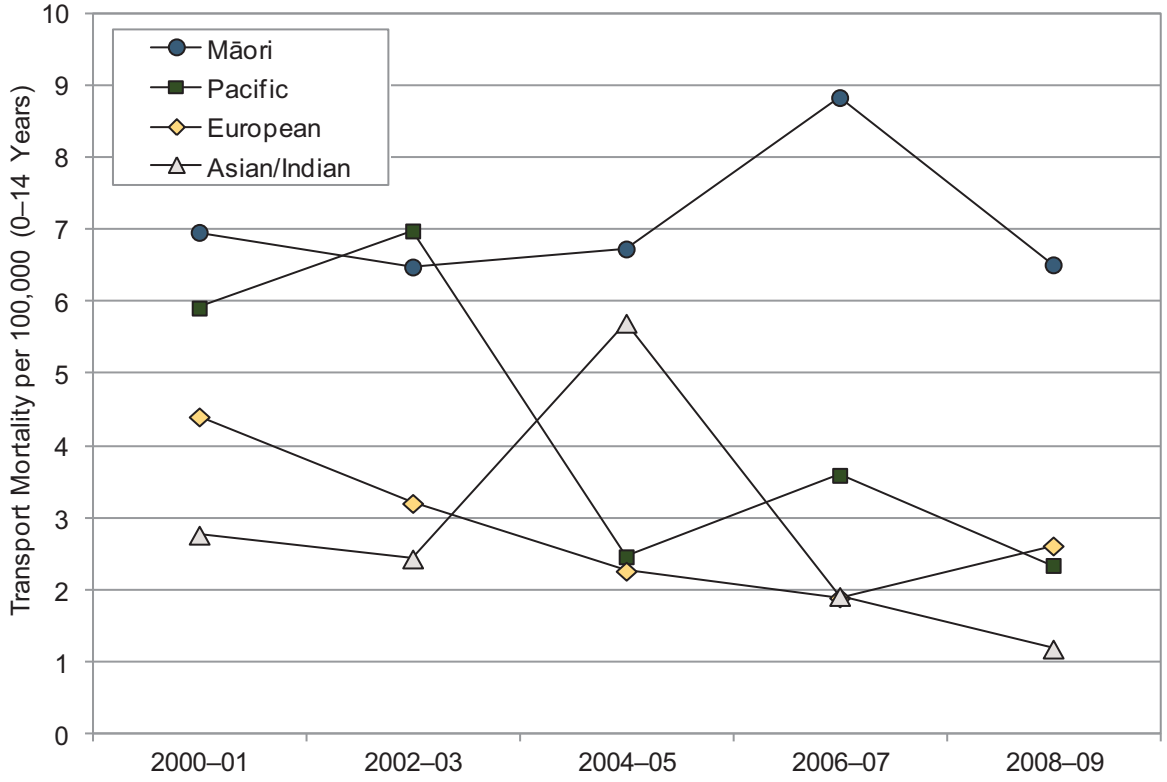


Table 113. Hospital Admissions (2006−2010) and Mortality (2004−2008) from Land Transport Injuries in Children Aged 0−14 Years, South Island DHBs vs. New Zealand

DHB	Number: Total per 5 Year Period	Number: Annual Average	Rate per 100,000	Rate Ratio	95% CI
Land Transport Injuries					
Hospital Admissions in Children 0–14 Years, 2006–2010					
Nelson Marlborough	257	51.4	199.1	1.21	1.07–1.37
West Coast	70	14.0	221.9	1.35	1.07–1.71
Canterbury	676	135.2	140.9	0.86	0.79–0.93
South Canterbury	107	21.4	206.7	1.26	1.04–1.52
Otago	301	60.2	187.7	1.14	1.02–1.28
Southland	232	46.4	213.3	1.30	1.14–1.48
New Zealand	7,342	1,468.4	164.5	1.00	
Mortality in Children 0–14 Years, 2004–2008					
Nelson Marlborough	6	1.2	4.58	1.26	0.56–2.86
West Coast	0	0.0			
Canterbury	7	1.4	1.49	0.41	0.19–0.88
South Canterbury	<3	s	s	s	s
Otago	8	1.6	4.93	1.36	0.67–2.76
Southland	3	0.6	2.70	0.74	0.24–2.33
New Zealand	161	32.2	3.62	1.00	

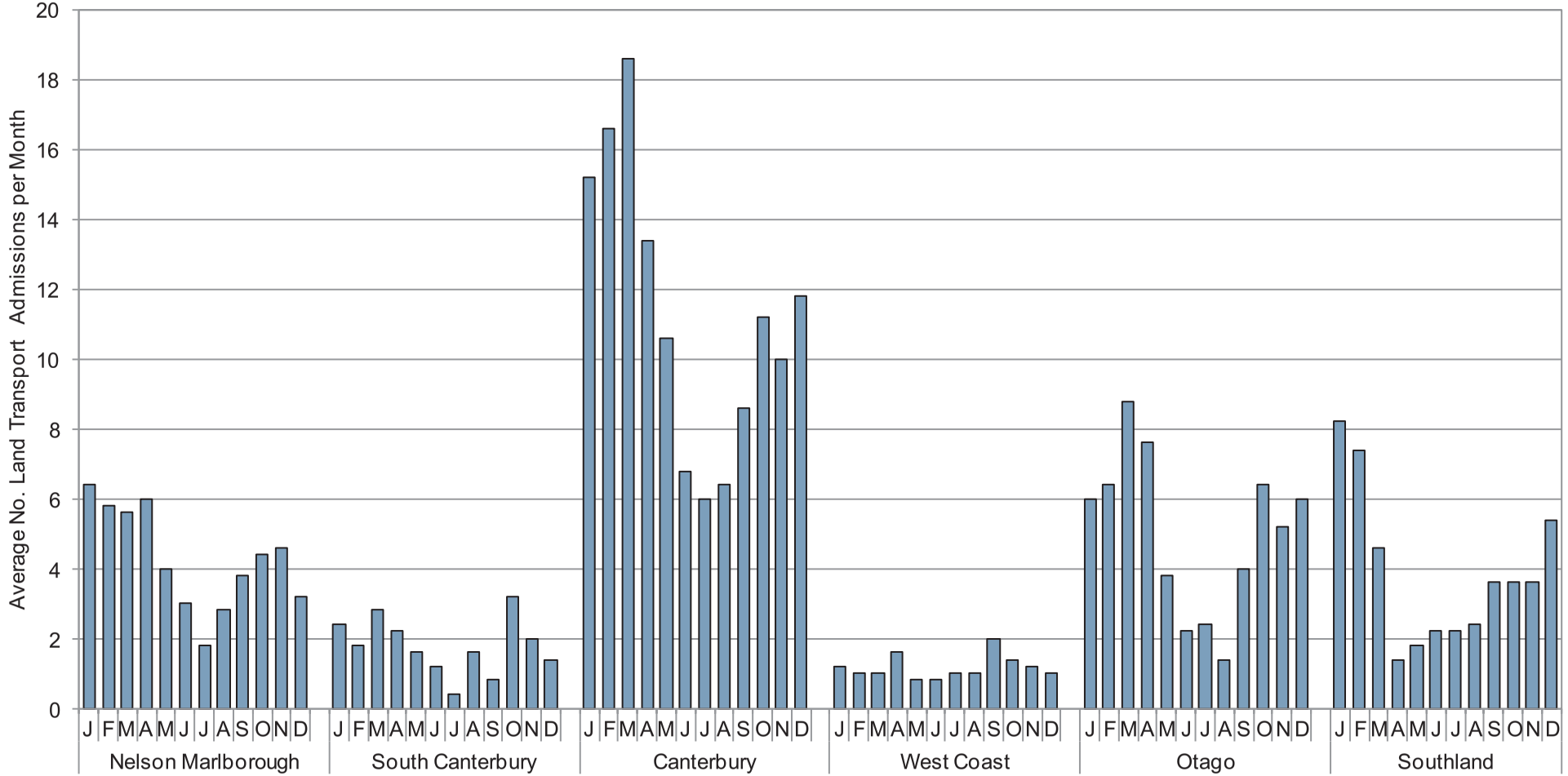
Source: Numerators: National Minimum Dataset and National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population. Note: s: suppressed due to small numbers.

Figure 106. Mortality from Land Transport Injuries in Children Aged 0−14 Years by Ethnicity, New Zealand 2000−2008



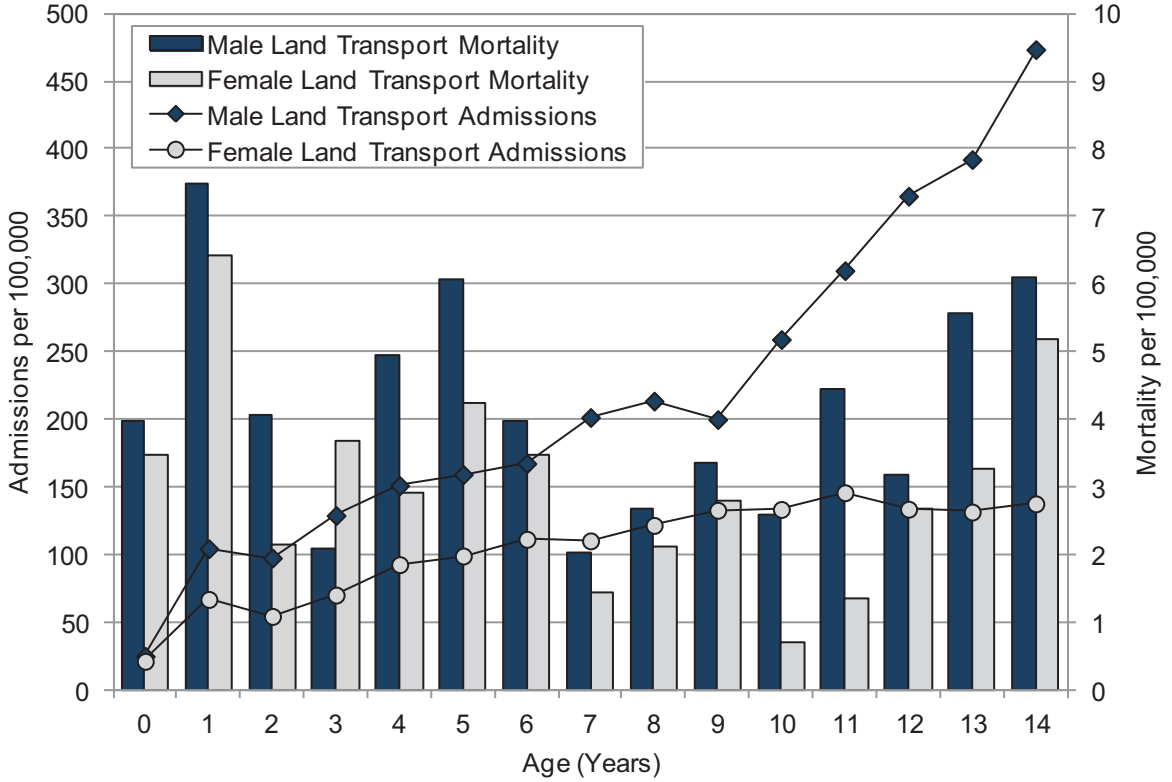
Source: Numerator: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population. Note: Ethnicity is Level 1 Prioritised.

Figure 107. Average Number of Hospital Admissions for Land Transport Injuries per Month in Children Aged 0−14 Years, the South Island DHBs 2006−2010



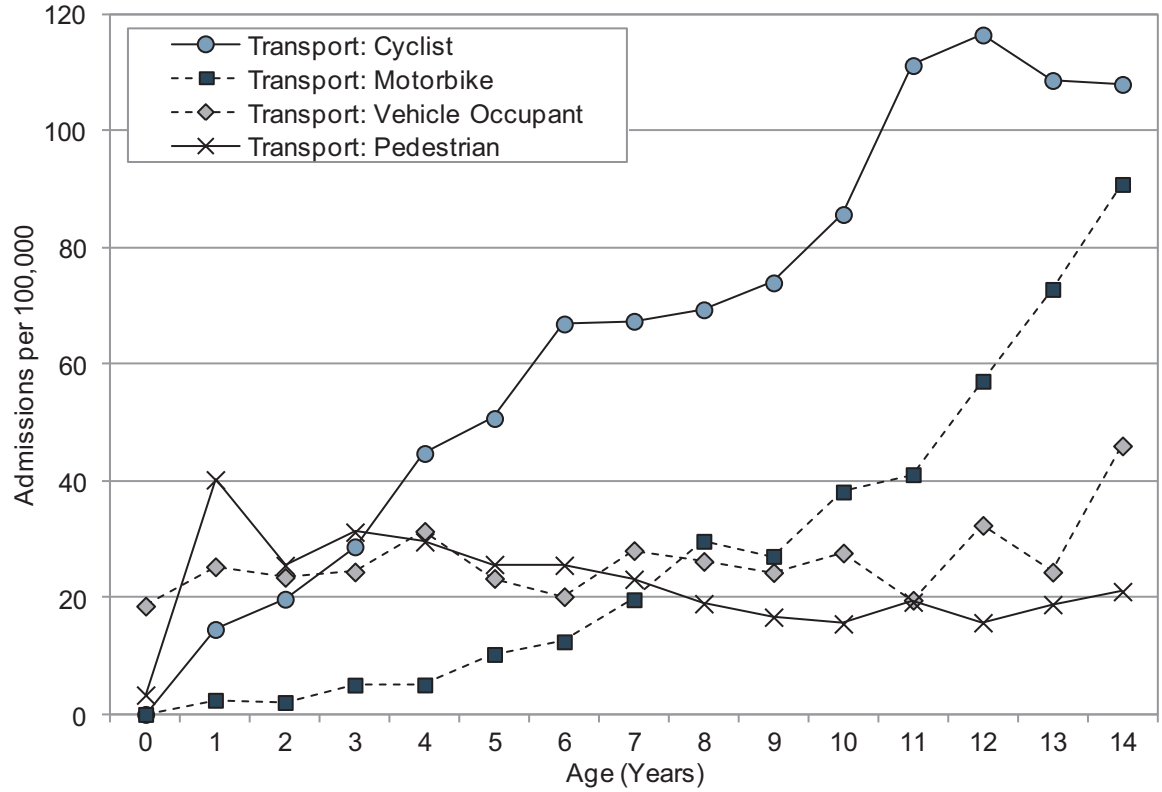
Source: National Minimum Dataset

Figure 108. Hospital Admissions (2006−2010) and Deaths (2004−2008) from Land Transport Injuries in New Zealand Children 0–14 Years by Age and Gender



Source: Numerators: National Minimum Dataset and National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population

Figure 109. Hospital Admissions for Transport Injuries in Children 0–14 Years by Age and Injury Type, New Zealand 2006−2010



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population

New Zealand Mortality Trends by Ethnicity

In New Zealand during 2000–2008, land transport mortality was consistently higher for Māori than for European and Asian/Indian children. Mortality for Māori children was also higher than for Pacific children from 2004–05 onwards (**Figure 106**).

New Zealand Distribution by Age

Age and Gender: In New Zealand during 2006–2010, hospital admissions for land transport injuries were lowest in infants <1 year, with rates increasing progressively thereafter. After infancy, admission rates were consistently higher for males than females, with the rate of increase with age being particularly rapid for males after nine years of age. Gender differences were less marked for land transport mortality during 2004–2008 although a male predominance was evident in many age categories (**Figure 108**).

Age and Cause: In New Zealand during 2006–2010, hospital admissions for cycle and motorbike injuries increased with increasing age, although cycle injuries began to taper off after 12 years of age, while motorbike injuries continued to increase. In contrast (with the exception of the first year), admissions for pedestrian injuries were more evenly distributed by age, as were admissions for vehicle occupant injuries (**Figure 109**).

New Zealand Distribution by Ethnicity, NZDep Index Decile and Gender

Pedestrian Injuries: In New Zealand during 2006–2010, hospital admissions for pedestrian injuries were *significantly* higher for males, Pacific and Māori > European and Asian/Indian children and those from average-to-more deprived (NZDep decile 3–10) areas (**Table 114**).

Cyclist Injuries: In New Zealand during 2006–2010, hospital admissions for cycle injuries were *significantly* higher for males, and for Māori and European > Pacific > Asian/Indian children. Socioeconomic differences were not large, although once grouped by NZDep quintile, admission rates were *significantly* higher for those from NZDep deciles 5–10 (**Table 115**).

Table 114. Hospital Admissions for Pedestrian Injuries in Children Aged 0−14 Years by Gender, Ethnicity and NZ Deprivation Index Decile, New Zealand 2006−2010

Variable	Rate	Rate Ratio	95% CI	Variable	Rate	Rate Ratio	95% CI
New Zealand							
Pedestrian Injuries 0–14 Years							
NZ Deprivation Index Decile				NZ Deprivation Index Quintile			
Decile 1	9.27	1.00		Decile 1–2	11.1	1.00	
Decile 2	13.0	1.40	0.94–2.10	Decile 3–4	15.1	1.36	1.04–1.77
Decile 3	14.3	1.54	1.03–2.30	Decile 5–6	19.6	1.76	1.37–2.27
Decile 4	15.8	1.71	1.16–2.51	Decile 7–8	18.8	1.69	1.32–2.17
Decile 5	16.4	1.77	1.19–2.63	Decile 9–10	40.3	3.63	2.91–4.53
Decile 6	22.2	2.40	1.66–3.45	Prioritised Ethnicity			
Decile 7	16.3	1.76	1.19–2.59	European	14.0	1.00	
Decile 8	21.0	2.26	1.57–3.25	Māori	35.4	2.53	2.19–2.93
Decile 9	37.4	4.03	2.87–5.66	Pacific	36.3	2.59	2.15–3.13
Decile 10	42.7	4.61	3.31–6.41	Asian/Indian	13.7	0.98	0.74–1.29
Gender							
Female	15.6	1.00					
Male	27.8	1.78	1.56–2.03				

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population.
Note: Rate is per 100,000; Ethnicity is Level 1 Prioritised; Decile is NZDep2001.

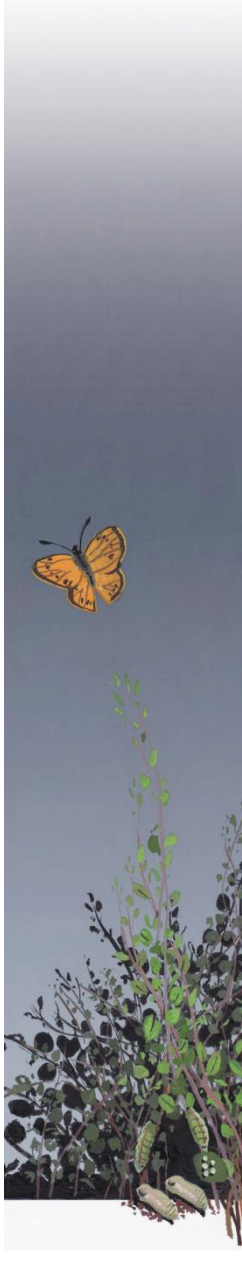


Table 115. Hospital Admissions for Cyclist and Motorbike Injuries in Children Aged 0−14 Years by Gender, Ethnicity and NZ Deprivation Index Decile, New Zealand 2006−2010

Variable	Rate	Rate Ratio	95% CI	Variable	Rate	Rate Ratio	95% CI
New Zealand							
Cyclist Injuries 0–14 Years							
NZ Deprivation Index Decile				NZ Deprivation Index Quintile			
Decile 1	57.7	1.00		Decile 1–2	56.1	1.00	
Decile 2	54.5	0.94	0.79–1.13	Decile 3–4	61.0	1.09	0.96–1.23
Decile 3	65.1	1.13	0.95–1.34	Decile 5–6	64.7	1.15	1.02–1.30
Decile 4	57.2	0.99	0.83–1.18	Decile 7–8	68.5	1.22	1.08–1.37
Decile 5	63.6	1.10	0.93–1.32	Decile 9–10	73.9	1.32	1.18–1.48
Decile 6	65.5	1.14	0.96–1.34	Prioritised Ethnicity			
Decile 7	65.9	1.14	0.96–1.35	European	73.9	1.00	
Decile 8	70.7	1.23	1.04–1.44	Māori	68.1	0.92	0.85–1.00
Decile 9	81.9	1.42	1.21–1.66	Pacific	40.7	0.55	0.47–0.64
Decile 10	67.2	1.16	0.99–1.37	Asian/Indian	26.1	0.35	0.29–0.43
Gender							
Female	31.0	1.00					
Male	98.5	3.18	2.91–3.46				
Motorbike Injuries 0–14 Years							
NZ Deprivation Index Decile				NZ Deprivation Index Quintile			
Decile 1	22.6	1.00		Decile 1–2	27.2	1.00	
Decile 2	32.0	1.41	1.09–1.83	Decile 3–4	37.6	1.38	1.17–1.64
Decile 3	39.8	1.76	1.37–2.26	Decile 5–6	28.2	1.04	0.87–1.25
Decile 4	35.6	1.57	1.22–2.02	Decile 7–8	27.1	1.00	0.83–1.19
Decile 5	26.5	1.17	0.89–1.55	Decile 9–10	23.3	0.86	0.72–1.02
Decile 6	29.7	1.31	1.01–1.70	Prioritised Ethnicity			
Decile 7	31.4	1.39	1.07–1.80	European	41.3	1.00	
Decile 8	23.4	1.04	0.79–1.36	Māori	19.3	0.47	0.40–0.54
Decile 9	27.7	1.23	0.94–1.59	Pacific	3.75	0.09	0.06–0.15
Decile 10	19.5	0.86	0.66–1.13	Asian/Indian	1.65	0.04	0.02–0.08
Gender							
Female	7.85	1.00					
Male	48.7	6.21	5.28–7.29				

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population. Note: Rate is per 100,000; Ethnicity is Level 1 Prioritised; Decile is NZDep2001.

Motorbike Injuries: In New Zealand during 2006–2010, hospital admissions for motorbike injuries were *significantly* higher for males and for European > Māori > Pacific and Asian/Indian children. Admission rates also tended to be higher for those living in average (NZDep decile 2–7) areas (**Table 115**).

Vehicle Occupant Injuries: In New Zealand during 2006–2010, hospital admissions for vehicle occupant injuries were *significantly* higher for males, Māori > Pacific > European > Asian/Indian children and those from average-to-more deprived (NZDep decile 5–10) areas (**Table 116**).

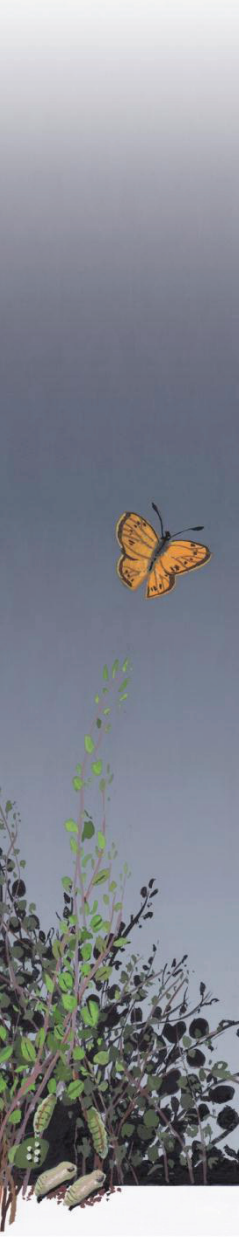


Table 116. Hospital Admissions for Vehicle Occupant Injuries in Children 0−14 Years by Gender, Ethnicity and NZ Deprivation Index Decile, New Zealand 2006−2010

Variable	Rate	Rate Ratio	95% CI	Variable	Rate	Rate Ratio	95% CI
New Zealand							
Vehicle Occupant Injuries 0–14 Years							
NZ Deprivation Index Decile				NZ Deprivation Index Quintile			
Decile 1	12.9	1.00		Decile 1–2	13.1	1.00	
Decile 2	13.3	1.03	0.71–1.49	Decile 3–4	16.8	1.28	1.00–1.64
Decile 3	15.3	1.18	0.83–1.70	Decile 5–6	23.8	1.82	1.45–2.30
Decile 4	18.1	1.41	1.00–1.98	Decile 7–8	27.4	2.10	1.68–2.62
Decile 5	21.5	1.67	1.19–2.34	Decile 9–10	43.9	3.36	2.73–4.13
Decile 6	25.9	2.01	1.46–2.76	Prioritised Ethnicity			
Decile 7	27.8	2.15	1.57–2.96	European	20.2	1.00	
Decile 8	27.1	2.10	1.54–2.87	Māori	45.2	2.24	1.98–2.54
Decile 9	43.9	3.40	2.54–4.56	Pacific	25.5	1.26	1.03–1.56
Decile 10	44.0	3.41	2.56–4.55	Asian/Indian	12.7	0.63	0.48–0.83
Gender							
Female	24.1	1.00					
Male	28.7	1.19	1.06–1.33				

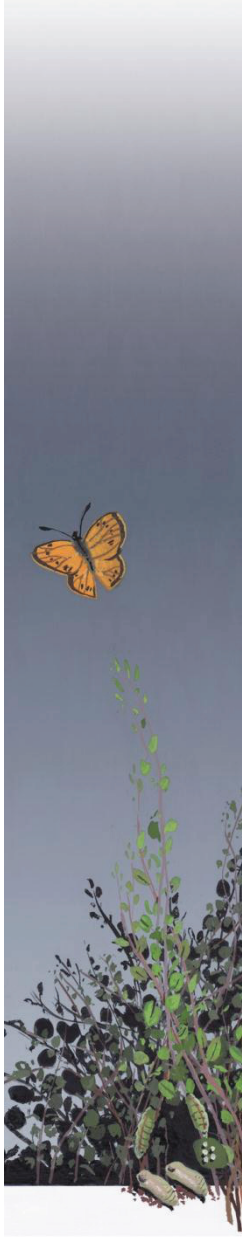
Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population. Note: Rate is per 100,000; Ethnicity is Level 1 Prioritised; Decile is NZDep2001.

Unintentional Non-Transport Injuries

Table 117. Hospital Admissions (2006−2010) and Mortality (2004−2008) from Unintentional Non-Transport Injuries in Children Aged 0−14 Years, South Island DHBs vs. New Zealand

DHB	Number: Total per 5 Year Period	Number: Annual Average	Rate per 100,000	Rate Ratio	95% CI
Unintentional Non-Transport Injuries					
Hospital Admissions in Children 0–14 Years, 2006–2010					
Nelson Marlborough	972	194.4	753.0	0.80	0.75–0.85
West Coast	306	61.2	970.2	1.02	0.92–1.15
Canterbury	4,341	868.2	904.7	0.96	0.93–0.99
South Canterbury	465	93.0	898.5	0.95	0.87–1.04
Otago	1,146	229.2	714.6	0.75	0.71–0.80
Southland	905	181.0	832.0	0.88	0.82–0.94
New Zealand	42,259	8,451.8	946.7	1.00	
Mortality in Children 0–14 Years, 2004–2008					
Nelson Marlborough	<3	s	s	s	s
West Coast	<3	s	s	s	s
Canterbury	8	1.6	1.71	0.81	0.40–1.68
South Canterbury	<3	s	s	s	s
Otago	3	0.6	1.85	0.88	0.28–2.79
Southland	4	0.8	3.60	1.72	0.63–4.68
New Zealand	93	18.6	2.09	1.00	

Source: Numerators: National Minimum Dataset and National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population. Note: s: suppressed due to small numbers.



South Island DHBs vs. New Zealand Distribution

In Nelson Marlborough, Canterbury, Otago and Southland during 2006–2010, hospital admissions for unintentional non-transport injuries in children were *significantly* lower than the New Zealand rate, although in the case of Canterbury the difference was only small. Admissions in the West Coast and South Canterbury were not *significantly* different from the New Zealand rate. Mortality from unintentional non-transport injuries during 2004–2008 was not *significantly* different form the New Zealand rate in Canterbury, Otago and Southland, although in Nelson Marlborough, the West Coast and South Canterbury small numbers precluded a valid analysis (**Table 117**).

South Island Distribution by Season

In Canterbury during 2006–2010, hospital admissions for unintentional non-transport injuries were lowest during the winter months, although in the other South Island DHBs seasonal variations were less evident (**Figure 110**).

New Zealand Distribution by Age

Age and Gender: In New Zealand during 2006–2010, hospital admissions for unintentional non-transport injuries were lowest in infants <1 year, with rates rising rapidly thereafter, to reach a peak at one year of age. Admission rates then tapered off during the pre-school years, with another small peak being evident at 5 years of age. At every age, admission rates were higher for males than for females. Mortality during 2004–2008 was also highest at one year of age, with rates declining thereafter. A male predominance was also evident at most ages (with the exception of those aged 8–11 years) (**Figure 111**).

Age and Cause: In New Zealand during 2006–2010, hospital admissions for electricity/fire/burns and accidental poisoning increased rapidly after the first year, with admissions for electricity/fire burns peaking at one year, and admissions for accidental poisoning at 2 years of age (**Figure 112**). Admissions for falls and injuries arising from inanimate mechanical forces were lowest in infants <1 year, with admissions for inanimate mechanical forces peaking at one year, and falls at five years of age (**Figure 113**).

New Zealand Distribution by Ethnicity, NZDep Index Decile and Gender

Accidental Poisoning: In New Zealand during 2006–2010, hospital admissions for accidental poisoning were *significantly* higher for males, for European and Māori > Pacific > Asian/Indian children and those from average-to-more deprived (NZDep decile 5–10) areas (**Table 118**).

Falls: In New Zealand during 2006–2010, hospital admissions for falls were *significantly* higher for males, Māori > European > Asian/Indian children and those from average-to-more deprived (NZDep deciles 5 and 7–10) areas (**Table 119**).

Electricity/Fire/Burns: In New Zealand during 2006–2010, hospital admissions for injuries arising from electricity/fire/burns were *significantly* higher for males, Pacific and Māori > European and Asian/Indian children and those from average-to-more deprived (NZDep decile 3–10) areas (**Table 119**).

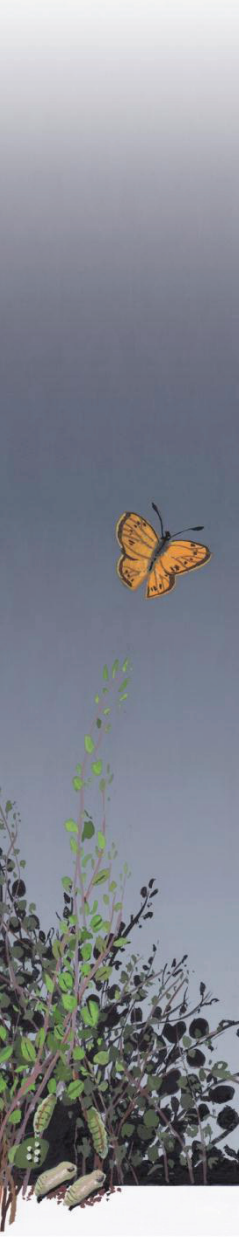
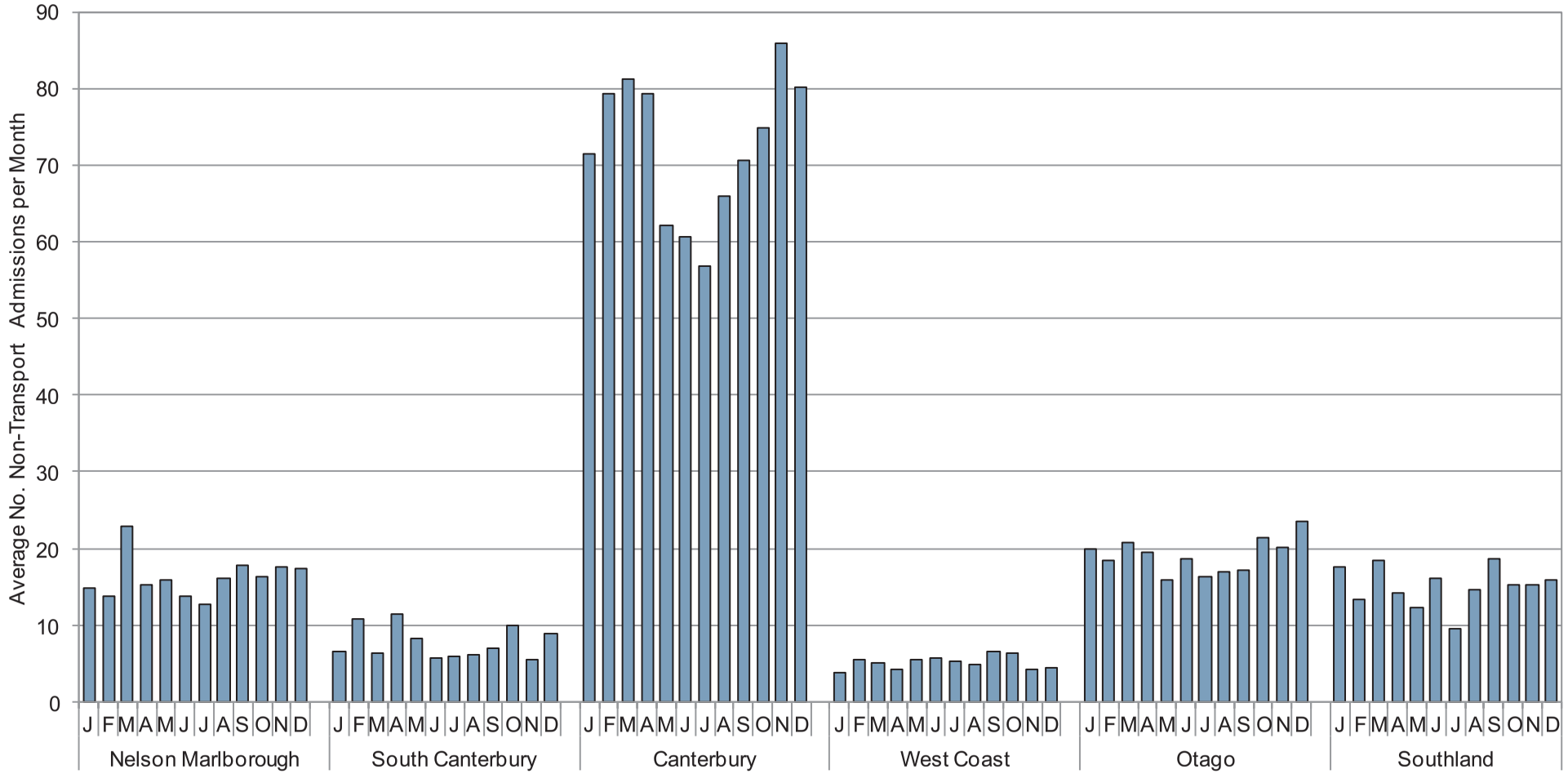
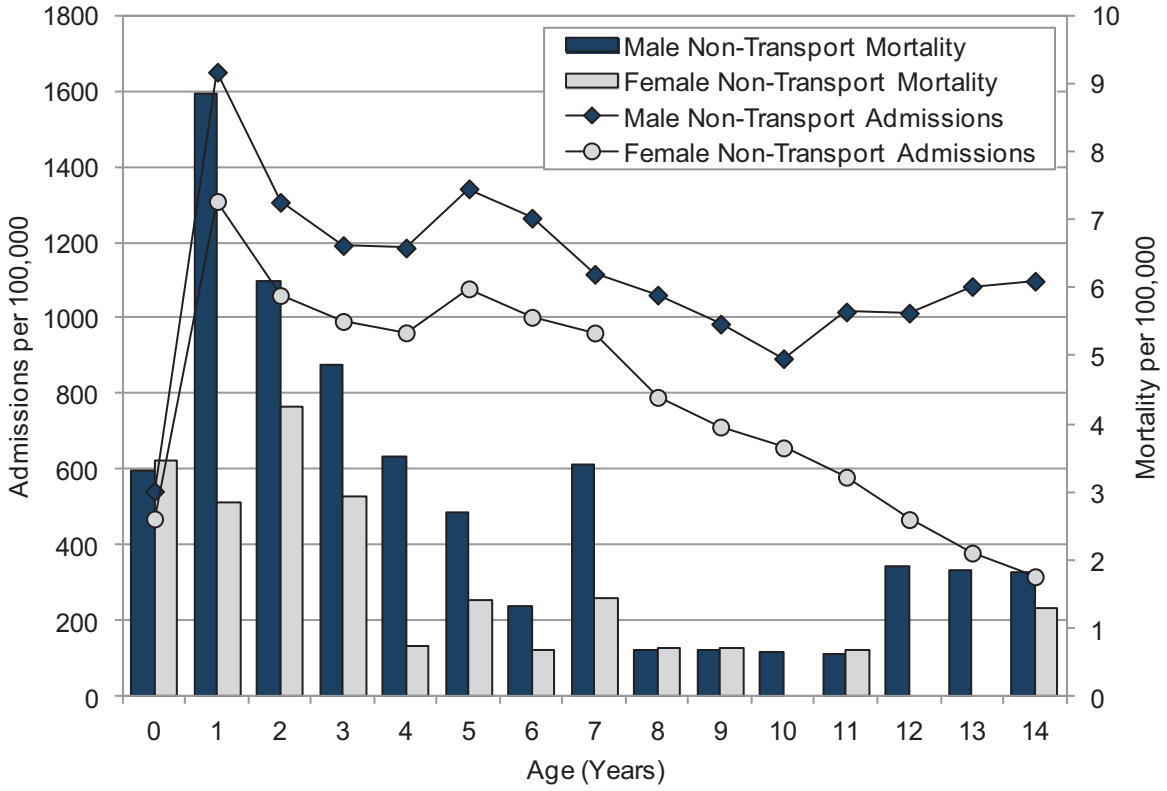


Figure 110. Average Number of Hospital Admissions for Unintentional Non-Transport Injuries per Month in Children Aged 0−14 Years, South Island DHBs 2006−2010



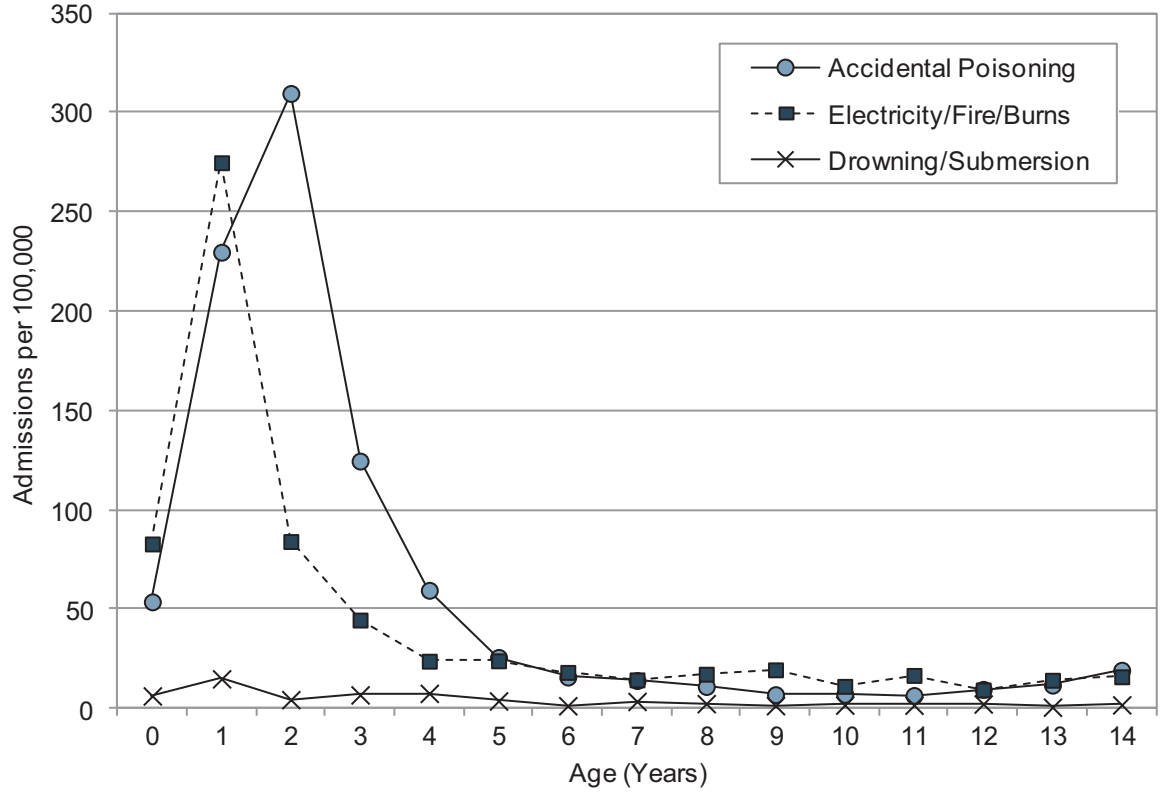
Source: National Minimum Dataset

Figure 111. Hospital Admissions (2006−2010) and Deaths (2004−2008) from Unintentional Non-Transport Injuries in New Zealand Children 0–14 Years by Age and Gender



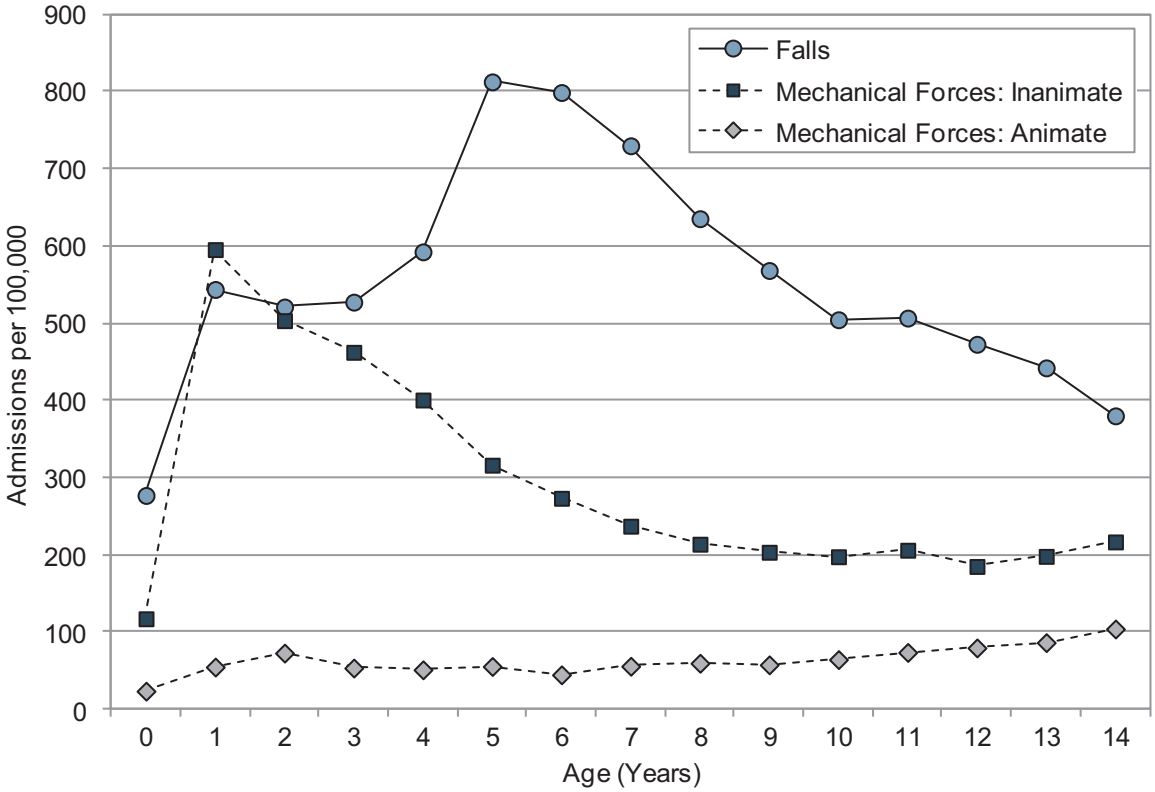
Source: Numerators: National Minimum Dataset and National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population

Figure 112. Hospital Admissions for Selected Unintentional Non-Transport Injuries in Children 0–14 Years by Age and Injury Type, New Zealand 2006−2010



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population

Figure 113. Hospital Admissions for Falls and Mechanical Force Type Injuries in Children 0–14 Years by Age and Injury Type, New Zealand 2006−2010



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population

Table 118. Hospital Admissions for Accidental Poisoning in Children Aged 0−14 Years by Gender, Ethnicity and NZ Deprivation Index Decile, New Zealand 2006−2010

Variable	Rate	Rate Ratio	95% CI	Variable	Rate	Rate Ratio	95% CI
Accidental Poisoning 0–14 Years							
NZ Deprivation Index Decile				NZ Deprivation Index Quintile			
Decile 1	41.8	1.00		Decile 1–2	37.8	1.00	
Decile 2	33.6	0.80	0.65–1.00	Decile 3–4	47.1	1.24	1.07–1.44
Decile 3	44.6	1.07	0.87–1.31	Decile 5–6	57.7	1.53	1.32–1.76
Decile 4	49.4	1.18	0.97–1.44	Decile 7–8	74.0	1.96	1.71–2.23
Decile 5	57.5	1.38	1.13–1.67	Decile 9–10	72.4	1.91	1.68–2.18
Decile 6	57.8	1.38	1.14–1.67	Prioritised Ethnicity			
Decile 7	77.6	1.85	1.55–2.22	European	66.1	1.00	
Decile 8	70.9	1.69	1.42–2.03	Māori	64.7	0.98	0.90–1.07
Decile 9	80.6	1.93	1.62–2.30	Pacific	36.1	0.55	0.46–0.64
Decile 10	65.4	1.56	1.31–1.86	Asian/Indian	21.9	0.33	0.27–0.41
Gender							
Female	51.9	1.00					
Male	65.8	1.27	1.17–1.37				

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population.
Note: Rate is per 100,000; Ethnicity is Level 1 Prioritised; Decile is NZDep2001.

Table 119. Hospital Admissions for Falls and Electricity/Fire/Burn Injuires in Children Aged 0−14 Years by Gender, Ethnicity and NZ Deprivation Index Decile, New Zealand 2006−2010

Variable	Rate	Rate Ratio	95% CI	Variable	Rate	Rate Ratio	95% CI
New Zealand							
Falls 0–14 Years							
NZ Deprivation Index Decile				NZ Deprivation Index Quintile			
Decile 1	482.2	1.00		Decile 1–2	464.9	1.00	
Decile 2	446.8	0.93	0.87–0.99	Decile 3–4	468.4	1.01	0.96–1.05
Decile 3	459.5	0.95	0.90–1.01	Decile 5–6	510.4	1.10	1.05–1.15
Decile 4	476.6	0.99	0.93–1.05	Decile 7–8	565.5	1.22	1.17–1.27
Decile 5	521.6	1.08	1.02–1.15	Decile 9–10	685.7	1.47	1.42–1.53
Decile 6	500.7	1.04	0.98–1.10	Prioritised Ethnicity			
Decile 7	542.4	1.12	1.06–1.19	European	559.7	1.00	
Decile 8	585.3	1.21	1.15–1.28	Māori	593.4	1.06	1.03–1.09
Decile 9	698.9	1.45	1.37–1.53	Pacific	578.1	1.03	0.99–1.08
Decile 10	674.5	1.40	1.33–1.47	Asian/Indian	299.9	0.54	0.51–0.57
Gender							
Female	454.7	1.00					
Male	642.1	1.41	1.38–1.45				
Electricity/Fire/Burn Injuries 0–14 Years							
NZ Deprivation Index Decile				NZ Deprivation Index Quintile			
Decile 1	18.5	1.00		Decile 1–2	18.7	1.00	
Decile 2	18.9	1.02	0.75–1.39	Decile 3–4	26.7	1.43	1.16–1.74
Decile 3	25.5	1.38	1.03–1.84	Decile 5–6	36.8	1.96	1.62–2.38
Decile 4	27.8	1.50	1.13–1.98	Decile 7–8	51.0	2.72	2.28–3.25
Decile 5	37.7	2.03	1.55–2.66	Decile 9–10	77.4	4.13	3.49–4.89
Decile 6	36.1	1.94	1.49–2.54	Prioritised Ethnicity			
Decile 7	43.3	2.34	1.80–3.03	European	29.7	1.00	
Decile 8	57.6	3.10	2.43–3.97	Māori	66.0	2.23	2.01–2.47
Decile 9	74.1	4.00	3.14–5.08	Pacific	82.0	2.76	2.43–3.14
Decile 10	80.1	4.32	3.41–5.47	Asian/Indian	27.8	0.94	0.77–1.14
Gender							
Female	38.0	1.00					
Male	49.7	1.31	1.20–1.43				

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population.
Note: Rate is per 100,000; Ethnicity is Level 1 Prioritised; Decile is NZDep2001.

Inanimate Mechanical Forces: In New Zealand during 2006–2010, hospital admissions for injuries arising from inanimate mechanical forces were *significantly* higher for males, for Pacific > Māori > European > Asian/Indian children and those from average-to-more deprived (NZDep decile 4–10) areas (**Table 120**).

Animate Mechanical Forces: In New Zealand during 2006–2010, hospital admissions for injuries arising from animate mechanical forces were *significantly* higher for males, for Māori and Pacific > European > Asian/Indian children and those from more deprived (NZDep decile 6–10) areas (**Table 120**).

Table 120. Hospital Admissions for Injuries Arising from Inanimate and Animate Mechanical Forces in Children Aged 0−14 Years by Gender, Ethnicity and NZ Deprivation Index Decile, New Zealand 2006−2010

Variable	Rate	Rate Ratio	95% CI	Variable	Rate	Rate Ratio	95% CI
New Zealand							
Mechanical Forces: Inanimate Injuries 0–14 Years							
NZ Deprivation Index Decile				NZ Deprivation Index Quintile			
Decile 1	204.3	1.00		Decile 1–2	199.2	1.00	
Decile 2	193.9	0.95	0.86–1.04	Decile 3–4	221.8	1.11	1.04–1.19
Decile 3	201.8	0.99	0.90–1.09	Decile 5–6	250.7	1.26	1.18–1.34
Decile 4	240.1	1.18	1.08–1.28	Decile 7–8	292.8	1.47	1.38–1.56
Decile 5	252.2	1.23	1.13–1.35	Decile 9–10	420.9	2.11	2.00–2.23
Decile 6	249.5	1.22	1.12–1.33	Prioritised Ethnicity			
Decile 7	270.8	1.33	1.22–1.45	European	248.5	1.00	
Decile 8	311.6	1.53	1.41–1.66	Māori	313.8	1.26	1.21–1.32
Decile 9	388.8	1.90	1.76–2.06	Pacific	494.6	1.99	1.89–2.09
Decile 10	447.9	2.19	2.03–2.37	Asian/Indian	175.9	0.71	0.66–0.76
Gender							
Female	232.4	1.00					
Male	335.4	1.44	1.39–1.50				
Mechanical Forces: Animate Injuries 0–14 Years							
NZ Deprivation Index Decile				NZ Deprivation Index Quintile			
Decile 1	48.0	1.00		Decile 1–2	49.5	1.00	
Decile 2	51.1	1.07	0.88–1.29	Decile 3–4	54.4	1.10	0.96–1.25
Decile 3	59.6	1.24	1.03–1.50	Decile 5–6	57.1	1.15	1.01–1.31
Decile 4	49.6	1.03	0.86–1.25	Decile 7–8	67.5	1.36	1.20–1.54
Decile 5	50.9	1.06	0.87–1.29	Decile 9–10	80.4	1.62	1.44–1.82
Decile 6	62.4	1.30	1.09–1.56	Prioritised Ethnicity			
Decile 7	66.6	1.39	1.16–1.66	European	61.5	1.00	
Decile 8	68.2	1.42	1.20–1.69	Māori	77.3	1.26	1.15–1.37
Decile 9	78.1	1.63	1.38–1.93	Pacific	74.2	1.21	1.07–1.36
Decile 10	82.2	1.72	1.46–2.02	Asian/Indian	21.9	0.36	0.29–0.44
Gender							
Female	43.9	1.00					
Male	81.5	1.86	1.72–2.01				

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population.
Note: Rate is per 100,000; Ethnicity is Level 1 Prioritised; Decile is NZDep2001.

New Zealand Mortality Trends by Ethnicity

In New Zealand during 2000–2008, mortality arising from unintentional non-transport injuries was consistently higher for Māori children than for children of other ethnic groups, although mortality rates for Māori children declined during this period (**Figure 114**).

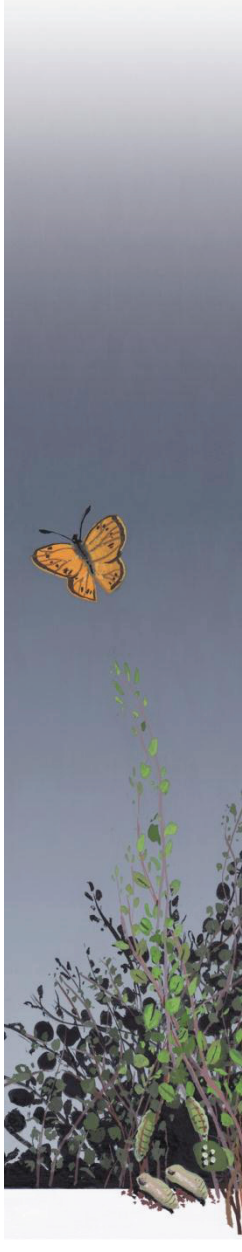
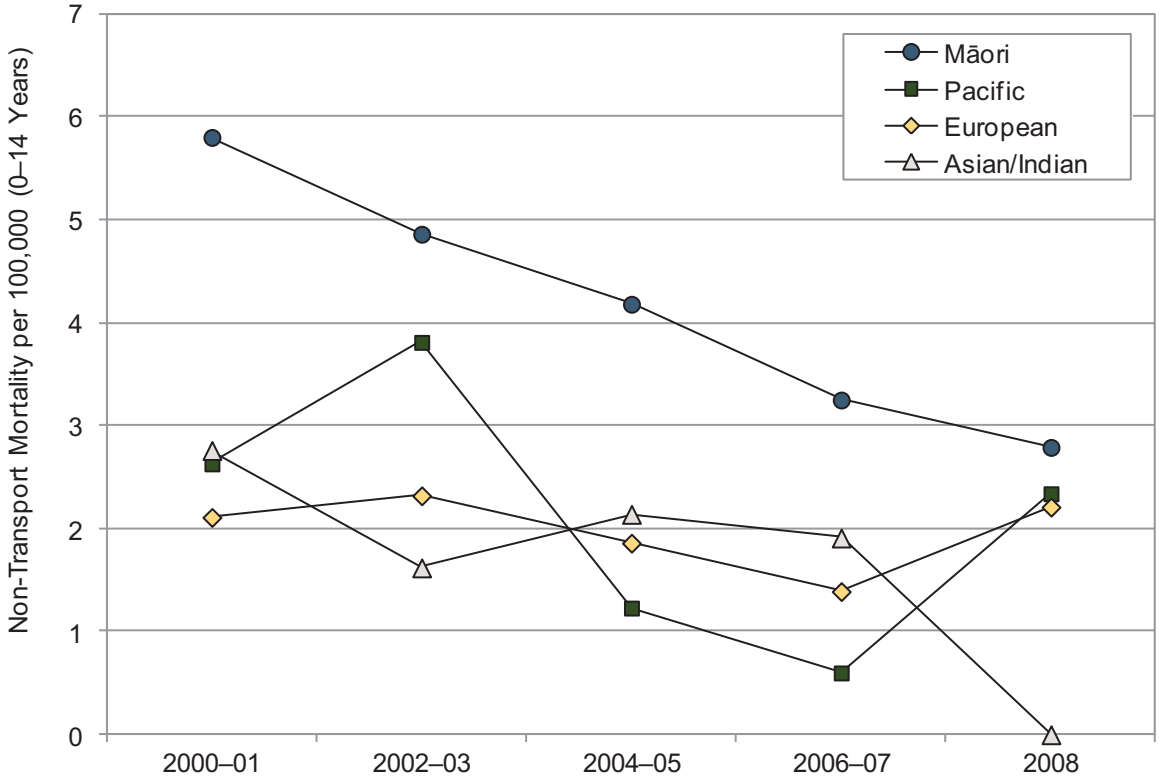


Figure 114. Mortality from Unintentional Non-Transport Injuries in Children Aged 0−14 Years by Ethnicity, New Zealand 2000−2008



Source: Numerator: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population.
Note: Ethnicity is Level 1 Prioritised.

Summary

In New Zealand during 2006–2010 falls, followed by inanimate mechanical forces were the leading causes of injury admissions in children, although transport injuries as a group also made a significant contribution. In contrast, accidental threats to breathing, followed by vehicle occupant injuries were the leading causes of childhood injury mortality during 2004–2008. During 2000–2008, mortality from land transport injuries and unintentional non-transport injuries in children both declined, while mortality from accidental threats to breathing increased. The majority of accidental threats to breathing deaths however, occurred in infants <1 year, who were coded as dying as a result of suffocation/strangulation in bed, and thus the potential exists for some of the increases seen to have arisen from a diagnostic shift in the coding of SUDI.

In the South Island during 2006–2010 falls, followed by inanimate mechanical forces, were the leading causes of injury admissions in children in all DHBs, although transport injuries as a group also made a significant contribution. During 2004–2008, accidental threats to breathing, vehicle occupant, pedestrian and other transport injuries, and assaults were among the leading causes of injury mortality in South Island children.

Local Policy Documents and Evidence-Based Reviews Relevant to Unintentional Injuries in Children

In New Zealand, the *NZ Injury Prevention Strategy* provides the broad strategic direction in the area of unintentional injury. The multi-factorial nature of unintentional injuries and the range of contexts in which they occur however, means that a range of initiatives may be required, if injury rates are to be reduced. **Table 121** provides an overview of local policy documents and evidence-based reviews which consider the most effective approaches to injury prevention in children, while **Table 165** on **Page 459** considers a range of initiatives relevant to young people.

Table 121. Local Policy Documents and Evidence-Based Reviews Relevant to the Prevention of Unintentional Injuries in Children

New Zealand Policy Documents
New Zealand Injury Prevention Strategy. Minister for Accident Compensation Corporation, Wellington, 2003. http://www.nzips.govt.nz/documents/strategycolour.pdf New Zealand's first national injury prevention strategy was published in 2003. It sets out goals and objectives for achieving a positive safety culture and creating safe environments and defines principles by which the process would operate. Children are not identified as a specific priority in the original document. However, injury to those under 25 years is included in all of the priority areas: road safety, falls, drowning, assault, suicide and work related injury.
Accident Compensation Corporation. **New Zealand Injury Prevention Strategy Outcomes Report June 2011** www.nzips.govt.nz This progress report for the New Zealand Strategy for Injury Prevention (NZIPS) recommends that unintentional child injury be prioritised as a focus area.
Drowning Prevention Strategy: Towards a Water Safe New Zealand 2005-2015. Accident Compensation Corporation, Wellington, 2005. http://www.acc.co.nz/PRD_EXT_CSMP/groups/external_ip/documents/guide/wcm2_020949.pdf The Drowning Prevention Strategy provides a framework for people, groups, organisations and communities to work coherently to prevent drowning and improve water safety. The focus in this document is on identified priority population groups: males 15-24 years and children aged 0-4 years.
Systematic Reviews of Childhood Injury Prevention
Turner S, et al., **Modification of the home environment for the reduction of injuries**. Cochrane Database of Systematic Reviews 2011; 2(online): CD003600. Evidence is inconclusive on the effect of interventions to modify environmental home hazards, on the reduction of injuries due to environmental hazards. While multi-factorial injury prevention interventions have been shown to reduce injuries in the home, few studies have examined the impact of physical adaptations to the home environment and their effectiveness. The 29 RCTs identified were categorised into child, older people and general/mixed age. None of the child trials indicated a reduction in injuries that might have been due to environmental adaptation in the home, a similar conclusion was drawn for all age groups.
Kendrick, D., et al., **Parenting interventions for the prevention of unintentional injuries in childhood.** Cochrane Database of Systematic Reviews, 2009 (2). This review assessed the effects of parenting interventions for preventing unintentional injury, as well as increasing possession and use of safety equipment and parental safety practices. The 15 studies included (11RCTs, 1 non-RCT, 1 with RCT and non-RCT, and 2 CBAs) were evaluations of parenting interventions with protocols, a manual or a curriculum, administered to parents of children ≤18 years, which reported outcome data on injury (unintentional or unspecified) and possession and use of safety equipment or safety practices. Most studies involved families at risk of adverse child health outcomes. The authors concluded that parenting interventions (which are commonly provided within the home using multi-faceted interventions) may be effective in reducing child injury.
Kendrick. D., et al. **Home safety education and provision of safety equipment for injury prevention**. *Cochrane* Database of Systematic Reviews 2007, Issue 1. Art. No.: CD005014.DOI: 10.1002/14651858.CD005014.pub2. Numerous studies have evaluated the effectiveness of home safety interventions. This review examined the effectiveness of those related to education, with or without the provision of low cost, discounted or free equipment in increasing home safety practices or reducing child (0-19 years) injury rates. Of the 80 studies included, 37 included at least one meta-analysis, of which 62% were RCTs. The authors concluded that home safety education (mainly one-to-one, face-to-face education, either in a clinical setting or at home) was effective in increasing a range of safety practices, especially if it provided safety equipment. There was a lack of evidence of the impact of home safety education on child injury rates and no consistent evidence that home safety education, with or without the provision of safety equipment, was less effective in those at greater risk of injury.
Towner, E., et al., **What Works in Preventing Unintentional Injuries in Children and Young Adolescents**. 2001, United Kingdom. Health Development Agency. www.nice.org.uk/niceMedia/documents/prevent_injuries.pdf This systematic review was published a decade ago, but its analysis provides a valuable critique of the effectiveness of interventions for unintentional childhood injury prevention among children under 15 years. Interventions are assessed by outcome measure, whether they reduced injury, behaviour change or hazard reduction. Areas covered include road safety (ranging from the personal to the community or policy strategies, for example, from promoting helmet use to traffic calming), interventions for injuries commonly occurring in the home environment, and both generic and specific cause interventions. The authors also assessed the value of educational interventions and those related to the media.

Systematic Reviews of the Prevention of Specific Childhood Injuries
Turner, C., et al., **Community-based interventions for the prevention of burns and scalds in children**. Cochrane Database of Systematic Reviews, 2004(2): CD004335.
The small number of eligible studies in this review made it difficult to draw conclusions as to the effectiveness of community-based interventions (coordinated, multi-strategy initiatives) for reducing burns and scalds in children aged 0-14 years. One of the four studies included showed a significant decrease in paediatric burn and scald injury in an intervention community. The authors noted time-frames or failure to implement the components of the interventions in the community as limitations of the studies in general.
DiGuiseppi, C., C. Goss, and J. Higgins, **Interventions for promoting smoke alarm ownership and function**. Cochrane Database of Systematic Reviews, 2001(2); CD002246.
Based on a review of 26 trials, half of which were RCTs, the authors of this review concluded that "Counselling as part of child health surveillance may increase smoke alarm ownership and function but its effects on injuries are unevaluated." The lack of randomisation in community based smoke alarm give-away programmes means the reductions in fire-related injuries needs to be viewed with caution.
Thompson, D. & Rivara, F. **Pool fencing for preventing drowning in children**. Cochrane Database of Systematic Reviews, 1998 (1): CD001047
Medical care offers little help to drowning victims, therefore preventing the event is critical. Results from the three case control studies in this review indicate that domestic swimming pool fencing, compared to no fencing, significantly reduces the risk of drowning. Isolation fencing (enclosing the pool only), is superior to perimeter fencing (enclosing the property and pool), a situation in which a child can access the pool through the house.
Nixon, J., Spinks, A. and Turner, C. **Community based programs to prevent poisoning in children 0-15 years**. Injury Prevention, 2004. **10**: p. 43-46.
Four studies were eligible for this review of community based poisoning prevention programmes that used poisoning rates as an evaluative component. The design for two involved a comparison community as control, while the other two used a before and after design. One study showed a statistically significant reduction in child poisoning, but the topic has of little relevance to New Zealand child poisoning priorities (child resistant containers for paraffin). Proving community implementation of interventions to be efficacious in research settings is difficult, and few high quality evaluations are conducted which can assess outcomes at the population level.
Systematic Reviews: Road Safety
Ehiri JE, et al. **Interventions for promoting booster seat use in four to eight year olds travelling in motor vehicles**. Cochrane Database of Systematic Reviews 2006, Issue 1. Art. No.: CD004334. DOI:10.1002/14651858.CD004334.pub2.
This review assessed the effectiveness of interventions to increase acquisition and use of booster seats in motor vehicles among four to eight year olds. Five studies (3,070 individuals) met the criteria for inclusion in the meta-analysis. Interventions that combined education with incentives (booster seat discount coupons or gift certificates) or the distribution of free booster seats demonstrated marked beneficial outcomes in terms of acquiring and using booster seats. There was some evidence from before-and-after studies, that legislation had a beneficial effect on booster seat acquisition and use.
Duperrex, O.J.M., et al. **Safety education of pedestrians for injury prevention.** Cochrane Database of Systematic Reviews 2002, Issue 2. Art. No.: CD001531. DOI: 10.1002/14651858.CD001531
The aim of this review was 'to quantify the effectiveness of pedestrian safety education programmes in preventing pedestrian-motor vehicle collisions'. Children are at considerable risk of pedestrian injury and almost all studies included were child focused. There was some evidence that behaviour changed with the improvement in children's knowledge, but there was no information on whether this reduced the risk of pedestrian motor vehicle collision or injury occurrence. There is evidence that safety knowledge and behaviour decline with time.
Thompson DC, Rivara F, Thompson R. **Helmets for preventing head and facial injuries in bicyclists**. Cochrane Database of Systematic Reviews 1999, Issue 4. Art. No.: CD001855. DOI: 10.1002/14651858.CD001855.
From the five case control studies the authors considered well designed in this systematic review, they concluded that 'wearing a helmet dramatically reduces the risk of head and facial injuries for bicyclists involved in a crash, even if it involves a motor vehicle'. The use of helmets generates reductions of the risk of head injury, brain injury, severe brain injury, and injuries to the upper and mid facial areas. No protection was offered to the lower face and jaw.
Macpherson A, Spinks A. **Bicycle helmet legislation for the uptake of helmet use and prevention of head injuries**. Cochrane Database of Systematic Reviews 2008, Issue 3. Art. No.: CD005401. DOI: 10.1002/14651858.CD005401.pub3
The promotion of helmet wearing is not universally accepted, despite the conclusions from Cochrane Reviews such as the one above. The concern includes questions around the mandatory use of helmets. Macpherson and Spinks undertook 'to assess the effects of bicycle helmet legislation on bicycle-related head injuries and helmet use, and the occurrence of unintended adverse consequences'. The six studies eligible for inclusion were focused on child helmet wearing. They concluded that helmet use appeared to increase and head injury rates decrease in populations where compulsory helmet legislation was enacted. These authors noted the lack of high quality evaluative studies in this area. No eligible study reported on reputed declines in bicycle use as a result of legislation.

Kwan I, Mapstone J. **Interventions for increasing pedestrian and cyclist visibility for the prevention of death and injuries.** Cochrane Database of Systematic Reviews 2006, Issue 4. Art. No.: CD003438. DOI: 10.1002/14651858.CD003438.pub2

No studies were found that compared crash outcomes in relation to the use of visibility aids, but 42 studies had compared driver detection of riders with or without these aids. Daytime detection was improved by fluorescent materials in yellow, red and orange. Night time detection was assisted by lamps, flashing lights, reflective materials in red and yellow. Further research is required to establish whether the visibility results in a decrease in crashes.

Royal, S., D. Kendrick, et al. (2009). **Non-legislative interventions for the promotion of cycle helmet wearing by children.** Cochrane Database of Systematic Reviews (1).

Legislative interventions are often promoted to increase cycle helmet use, but this systematic review concluded that non-legislative community based programmes that include free helmets are effective in increasing helmet use by children. The 22 studies eligible were heterogeneous, which made drawing further conclusions difficult.

Systematic Reviews: Other Topics

Parkin P, Howard, A. **Advances in the prevention of children's injuries: an examination of four common outdoor activities.** Current Opinion Pediatrics, 2008; 20(6): 719-723.

The authors examined systematic reviews of interventions to reduce bicycle related injury, playground injury, helmets for skiing and snowboarding, and modifying the physical pedestrian environment. They found that systematic reviews provided good evidence for interventions in all these areas. The reviews for bicycles have been included in the systematic reviews noted above. The use of helmets in skiing and snowboarding was clearly associated with reduced head injury, but wrist guards, while reducing wrist injury may have a negative effect on other upper body joints. Traffic calming, the focus of the studies in which the physical environment was modified, was shown to reduce child injury.

International Guidelines

MacKay M, et al., **Child Safety, Good Practice Guide: Good investments in unintentional child injury prevention and safety promotion**. Amsterdam: European Child Safety Alliance, Eurosafe; 2006. http://www.childsafetyeurope.org/publications/goodpracticeguide/info/good-practice-guide.pdf

The European Child Safety Alliance presents 'good practice' for child injury prevention, which is a combination of best available research evidence and its practical application. In these guidelines, good practice is generally defined as an evaluated prevention strategy found to be effective through a systematic review or the minimum of one rigorous evaluation. The guidelines note that rigorous evaluation can be difficult, with their criteria for inclusion being a combination of expert opinion supporting the practice and data supporting it as an effective strategy, and/or a clear link between the strategy and reduced risk (although not necessarily reduced injury). For these criteria to hold the strategy in question must have been implemented in a real world setting so that the practicality of the intervention has also been examined. The areas of child injury included are: motor vehicle traffic related, pedestrian and cycle safety, water safety, poisoning, falls, burns and scalds, choking/strangulation, as well as home and community based interventions.

World Health Organization Documents

Peden, M., et al., (Editors) **World report on child injury prevention**. World Health Organization, 2008 http://www.who.int/violence_injury_prevention/child/injury/world_report/en/

This publication provides a valuable global perspective on the epidemiology of child injury, including causes of injury such as road traffic crashes, pedestrian and cycle injuries, drowning, poisoning, and falls. It also details preventive measures of particular interest to low and middle income countries, but which may offer guidance for populations whose rate of injury is influenced by the social determinants of health.

Relevant Publications from New Zealand

Tin S, Woodward A, Ameratunga S. **Injuries to pedal cyclists on New Zealand Roads, 1988-2007** Injury Prevention. 2010 16: A183.

Injury among cyclists has been increasing over the last decade in New Zealand. This study found that cyclists under 15 years were at the highest risk for non-collision crashes which constitute 40% of crashes. Collision crashes were more likely to result in traumatic head injury than non-collision events. Cycle safety is an urgent issue with the increasing of promotion of cycling for health and environmental reasons.

Shaw C, Blakely T, Crampton P, Atkinson J: **The contribution of causes of death to socioeconomic inequalities in child mortality: New Zealand 1981-1999**. NZ Med J 2005, 118(1227)

This paper examines child mortality inequality by household income in New Zealand over two decades to 1999. Focusing on children aged 1-14 years, the authors found socioeconomic differences in child mortality for road traffic injury, non-road traffic injury, and other causes of death. They concluded that there were socioeconomic differences across most broad causes of childhood death, and that while there is a range of contributing influences, there are similar causes of inequality such as poverty that underlie the immediate causes.

Duncanson M, Woodward A, Reid P. **Social and economic deprivation and fatal unintentional domestic fire incidents in New Zealand 1988 – 1998.** 2000. New Zealand Fire Service Commission Research Report No 5.

The authors reviewed the international literature on the relationship between socioeconomic circumstances and risk of death or injury in fire events and analysed New Zealand fire fatality data from July 1988 to June 1998. Internationally, socioeconomically deprived households experience higher rates of fatal fire incidents and in New Zealand, the rate for fatal fires in the most deprived areas was 4.5 times that of the least deprived areas. The authors concluded that in the short term, strategies were needed to address this differential risk and barriers to household fire safety in high risk populations. Longer term, strategic policy development was needed to address underlying socio-economic determinants.

Duncanson M, Ormsby C, Reid P, Langley J, Woodward A. **Fire Incidents Resulting in Deaths of New Zealand Children aged Under 15 Years 1991-1997**. New Zealand Fire Service Commission Research Report Number 30.

This study collated fire fatality data from the Fire Incident Recording System and the NZ Health Information Service and linked it with coroners files to provide an overview of fire related deaths in children <15 years. The study found higher risk for males, particularly Māori, with the most common heat sources in fatalities among children being lighters and matches. A significant risk factor identified was children visiting an unfamiliar house or where there were visitors to the family home. Operating smoke detectors were not present in nearly every incident involving fatalities.

Gulliver P, Cousins K, and Chalmers D. **Achieving compliance with pool fencing legislation in New Zealand: how much progress has been made in ten years?** International Journal of Injury Control & Safety Promotion, 2009; 16(3), 127-132.

A previous study identified that the Fencing of Swimming Pools Act 1987 was poorly implemented and enforced in New Zealand. This study showed a considerable improvement in the enforcement and monitoring activities of territorial authorities. A 65% increase in compliance with the Act was noted. Local authorities were more active in re-inspecting pools, and also recorded a greater number of pools complying.

Langley J & Simpson J. **Injury Surveillance: unrealistic expectations of safe communities.** Injury Prevention, 2009;15;146-149

Community injury prevention programmes established using a WHO Safe Communities model have requirements to record injury data for use in their evaluation. This paper questions the ability of that data to provide stable statistical information from which to assess success. It suggests alternatives that would be more appropriate for community programmes to use to measure their progress and ability to create a safer environment.

Other Relevant Links – New Zealand Websites

Statistics New Zealand**. Injury Information Portal**

http://search.stats.govt.nz/browse_for_stats/health/injuries.aspx

This website provides links to various websites that provide data on New Zealand injury.

NIQS (National Injury Query System) http://ipru3.otago.ac.nz/niqs/index.php

This website has a search engine for basic queries for New Zealand injury based on national data sets. This site and the associated personalised query system that operates through StatsEnquiry@ipru.otago.ac.nz are provided by the Injury Prevention Research Unit, University of Otago, funded by the Ministry of Health.

New Zealand National Poisons Centre http://www.poisons.co.nz

Provided by the Ministry of Health and ACC, the NPC maintains an accurate and up-to-date database of almost all poisonous substances in NZ and Australia, and provides professional and timely advice during poisoning incidents.

SafeKids New Zealand http://www.safekids.org.nz/

Safekids New Zealand is an advocate for child injury prevention. It seeks the reduction of the incidence and severity of unintentional injuries to children in New Zealand aged 0–14 years. A range of information on child injury prevention relevant to the New Zealand context is found on its website.