



Child Unintentional Deaths and Injuries in New Zealand, and Prevention Strategies

This report outlines New Zealand child injury data and
effective or promising injury prevention strategies

December 2015



Executive Summary
1. Introduction
2 Child unintentional injuries in New Zealand: A snapshot of recent trends



3 Land transport injuries



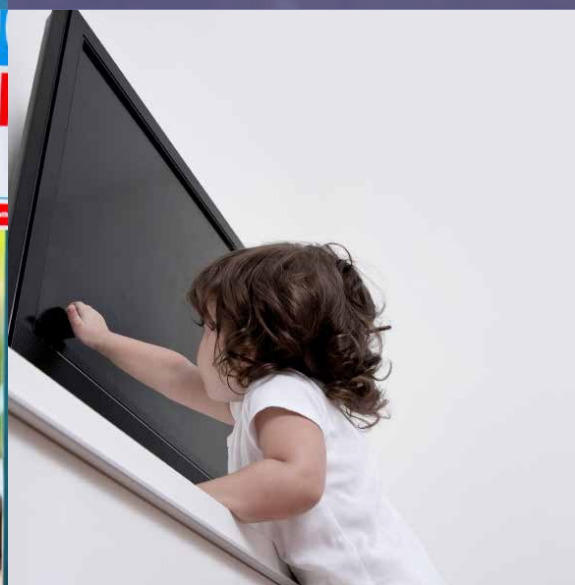
4 Choking, Suffocation and Strangulation



5 Falls



6 Drowning



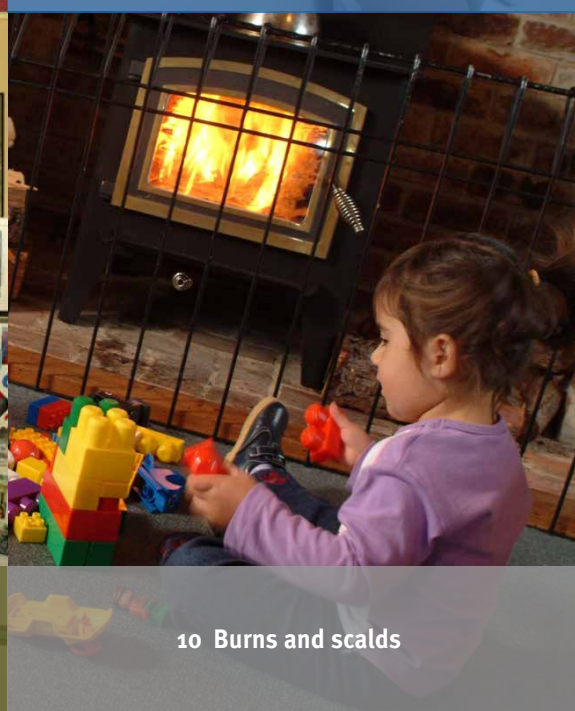
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8 Animate mechanical forces



9 Poisoning



10 Burns and scalds

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Child Unintentional Deaths and Injuries in New Zealand, and Prevention Strategies

Safekids Aotearoa

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Note:

While the University of Otago's Injury Prevention Research Unit provided a number of data tables for this report, all interpretation of the data has been undertaken by Safekids Aotearoa and Point Research.

The views expressed in this report are thus those of Safekids Aotearoa rather than those of the University of Otago's Injury Prevention Research Unit.



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Executive Summary

In New Zealand, unintentional injuries are the third-leading cause of death in children under 14.¹ These injuries not only have a high personal cost for children and families, but they have wider societal and economic impacts.² While children can never be entirely protected from injury, a significant proportion of the unintentional injuries that lead to death or hospitalisation are preventable.

The report aims to reduce the incidence and severity of unintentional injury in children. Its purpose is to examine the current data around deaths and hospitalisations from unintentional injury, identify high-risk populations and causes of injury, provide guidance and evidence for advocates and programme planners and raise public awareness.

Relevant child mortality and hospitalisation data for this report was sourced from the Injury Prevention Research Unit (IPRU) at the University of Otago, via the National Mortality Collection and National Minimum Data Set. Effective interventions and evidence of good practice were sourced from national and international injury prevention reports and scientific literature.

Analysis shows nine in every 100,000 children living in New Zealand will suffer a fatal unintentional injury and the risk of injury increases as they age³. The leading causes of fatal unintentional injuries among children are suffocation, motor vehicle crashes, drowning and non-motor vehicle traffic crashes⁴. Overall fatalities from unintentional injuries are reducing however, not all injury sub-categories follow the same pattern of decline. The majority of deaths from unintentional injury are children under four and the leading causes for this age group are suffocation and drowning. Male children are 1.5 times more likely to die from an unintentional injury than female children. Māori children are significantly more at risk of a fatal unintentional injury than other ethnicities⁵.

Focussing on non-fatal injuries, 852 in every 100,000 New Zealand children are hospitalised due to unintentional injuries. The leading causes for hospitalisation differed from fatalities, with falls, injuries from inanimate mechanical forces, non-motor vehicle traffic crashes and injuries from animate mechanical forces were identified as the main causes. Unlike fatal injuries, non-fatal injuries are evenly distributed across age groups. Apart from suffocation, young children were more likely to be injured by inanimate mechanical forces, 5-9 year olds were the most likely to experience falls and 10-14 year olds were the most likely to experience non-motor vehicle crashes. Identical to fatality rates, male children were 1.5 times more likely to be hospitalised from unintentional injuries than female children. Māori children have non-fatal injury rates twice the rate of Asian children and 1.5 times the rate of European children or other ethnicities. Pacific Island non-fatal injury rates are also relatively high⁶.

New Zealand's rate of child injuries is poor when compared to its international peers. New Zealand was ranked the lowest of 24 OECD nations in child and adolescent deaths by accidents in a 2007 UNICEF report and in 2009 scored just 33 out of 60 in terms of child injury prevention⁷. A need for greater funding for injury prevention in New Zealand has been recognised.

Broad categories of proven or promising strategies for child injury prevention include environmental modification, product modification, legislation, promoting safety devices, educational home visits, community based interventions or education and skills development⁸.

The report contains an in-depth analysis of the nine major causes of unintentional injuries in New Zealand children. It evaluates them statistically by age group, gender, ethnicity and against international peers. It also references proven good-practice prevention strategies for each cause and there is a summary of what works at the beginning of each chapter. These leading causes are land transport injuries (motor vehicle traffic crashes and non-motor vehicle traffic crashes), suffocation, falls, drowning, inanimate mechanical forces, animate mechanical forces, poisoning and burns.

¹ Injury Prevention Research Unit. National Injury Query System (NIQS). Dunedin: Injury Prevention Research Unit, University of Otago. Available online at: <http://ipru3.otago.ac.nz/niqs/>

² O'Dea D and Wren J. New Zealand Estimates of the Total Social and Economic Cost of Injuries. Wellington: Report to NZIPS Secretariat; 2012

³ Injury Prevention Research Unit. National Injury Query System (NIQS). Dunedin: Injury Prevention Research Unit, University of Otago. Available online at: <http://ipru3.otago.ac.nz/niqs/>

⁴ NZ Mortality Review Data Group. NZ Child and Youth Mortality Review Committee: 9th Data Report, 2008–2012. Dunedin: NZ Mortality Review Data Group, University of Otago; 2013. Available online at: <http://www.hqsc.govt.nz/publications-and-resources/publication/1311/>

⁵ The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

⁶ The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

⁷ United Nations International Children's Emergency Fund (UNICEF). Child Poverty in Perspective: An Overview of Child Well-being in Rich Countries. Innocenti Report Card 7. Florence (ITA): UNICEF Innocenti Research Centre; 2007

⁸ European Child Safety Alliance's guidelines "Child safety good practice guide: Good investments in unintentional child injury prevention and safety promotion" <http://www.childsafetyeurope.org/publications/>

1 Introduction

1.1 Report purpose

Unintentional injury is the third-leading cause of death for children aged 0 to 14 years in New Zealand.⁹ Every year between 2006 and 2010, around 84 children on average died as a result of unintentional injury, and a further 7,713 were hospitalised between 2008 and 2012.¹⁰ Children affected by unintentional injury are disproportionately more likely to come from socioeconomically disadvantaged households.¹¹

Along with the high personal cost for New Zealand families, the social and economic cost of unintentional child injury is huge. The social and economic cost per child fatality was estimated as \$8.05 million in 2008, which is significantly higher than the cost per fatality for the rest of the population (\$5.74 million per fatality). This is attributed to the greater number of life-years lost when a child dies.¹² In total, child fatalities were estimated to cost New Zealand \$778.8 million in 2008.¹³

Although minor child injuries happen on a regular basis and are often accepted as just a part of everyday life, many injuries that can have significant consequences are preventable.

The mission of Safekids Aotearoa is to reduce the incidence and severity of unintentional injury in children by raising public awareness about injury issues and providing evidence-based information to planners and decision-makers to improve child safety.

In this report, we specifically aim to:

- Describe relevant and recent data on child unintentional injury (deaths from 2006–2010 and non-fatal injuries from 2008–2012) in an accessible format;
- Identify high-priority populations and causes of child unintentional injury;
- Provide those working in injury prevention with information to help them advocate for child injury prevention and plan programmes; and
- Raise public awareness about how child unintentional injuries happen, and how they can be prevented.

The purpose of this document is to provide guidance on practical, effective injury prevention strategies and interventions that can be used to reduce unintentional child injuries. It is designed so that policy makers, injury prevention practitioners, community groups, whanau and family can implement and advocate for good practice. The majority of these strategies have a strong evidence base and it is likely that child injuries could be significantly reduced if these strategies were adopted.

The structure of the report is based on a World Health Organisation classification system (ICD-10) which uses national death and hospitalisation data. The indicators derived from this classification system enables trends to be tracked over time nationally, and permits comparisons to be made with other countries.

We begin by examining overall patterns of death and hospitalisation from unintentional injury among children in New Zealand, and compare our injury rates with those of other developed countries. We briefly describe the kinds of prevention activities that are currently taking place in New Zealand, and describe key recommendations from national and international research on what could be done to reduce the burden of child injury. We then focus on recent trends in some of the leading causes of injury among children: land transport injuries, suffocation, falls, drowning, and injuries from inanimate mechanical forces (jammed or crushing injuries from objects) and animate mechanical forces (bites, stings and injuries from humans, animals and insects), poisoning, and burns. For each leading cause of child injury, we make suggestions for targeted prevention activities.

⁹ Injury Prevention Research Unit. National Injury Query System (NIQS). Dunedin: Injury Prevention Research Unit, University of Otago. Available online at: <http://ipru3.otago.ac.nz/niqs/>

¹⁰ NZ Mortality Review Data Group. NZ Child and Youth Mortality Review Committee: 9th Data Report, 2008–2012. Dunedin: NZ Mortality Review Data Group, University of Otago; 2013. Available online at: <http://www.hqsc.govt.nz/publications-and-resources/publication/1311/>

¹¹ D'Souza A J, Blakely T A and Woodward A. The effect of eradicating poverty on childhood unintentional injury mortality in New Zealand: a cohort study with counterfactual modelling. *Journal of Epidemiology & Community Health*. 2008; 682: 899-904.

¹² O'Dea D and Wren J. New Zealand Estimates of the Total Social and Economic Cost of Injuries. Wellington: Report to NZIPS Secretariat; 2012.

¹³ Proffitt C and Beacham M, The New Zealand Injury Prevention Outcomes Report – June 2012. Wellington: Accident Compensation Corporation; 2012.

1.2 Data sources and methods

Data on child injuries were provided by the Injury Prevention Research Unit (IPRU) at the University of Otago. Much of the information that we report is available online via the IPRU's National Injury Query System (NIQS).¹⁴ Data that are not available on the NIQS were requested directly from the IPRU. Mortality data was obtained from the National Mortality Collection, while data on non-fatal hospitalisations are from the National Minimum Dataset (NMD). The categories used in these datasets are described in Appendix A, as are notes on the interpretation of these data. We have focussed on the five-year period between 2008 and 2012 for non-fatal injuries, and on 2006 to 2010 for fatalities. However, for looking at long-term injury trends we have used 2001 as a baseline to ensure that we have captured at least ten years of injury data (10 years for fatalities, and 12 years for non-fatal injuries). We have also looked at ten-year blocks for transport related injuries by District Health Board (DHB) (see Section 3), since the numbers included in this analysis are small. Where appropriate, we have reported confidence intervals (CI) and correlation coefficients (r) in order to assess whether trends and differences between groups are of statistical and practical significance.

We have focussed throughout this report on children aged 0 to 14, and where appropriate have examined injury trends by five-year age group (0-4, 5-9, and 10-14 years), gender (male and female), and broad ethnic group (European/Other, Asian, Pacific Island, and Māori). We have focussed on reporting injury rates (per 100,000 children) rather than raw numbers because the populations that we focus on (e.g., age and ethnic groups) differ in size.

We estimated populations using population estimates and projections from Statistics New Zealand. For the general population of children aged 0 to 14, and for age groups and genders, we have used population estimates at 30 June each year.¹⁵ Comparable population estimates are not available for ethnic groups, so for ethnic groups we have instead used population projections which use 2006 Census data as a baseline.¹⁶ For long-term injury trends (e.g., overall non-fatal injury in children between 2001 and 2012) we have used the rates reported by the IPRU on the NIQS.

Effective intervention and promising practices were identified from scientific literature and both national and international injury prevention reports based on the literature. These were considered and prioritised in light of the experiences of New Zealand, and opportunities for effective intervention.

¹⁴ Injury Prevention Research Unit. National Injury Query System (NIQS). Dunedin: Injury Prevention Research Unit, University of Otago. Available online at: <http://ipru3.otago.ac.nz/niqs/>

¹⁵ Available online at: <http://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE7502>

¹⁶ Available online at: <http://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE7502>

Unintentional

**Other
injuries**



2 Child unintentional injuries in New Zealand: A snapshot of recent trends

Summary

- Between 2006 and 2010, around 84 children aged 0 to 14 died each year of unintentional injuries. On average 7,713 children in this age group were hospitalised each year from non-fatal unintentional injuries between 2008 and 2012. This means that 7,797 die or are hospitalised from unintentional injuries each year, which is 861 in every 100,000 children.
- Male children had a higher rate of both death and hospitalisation from unintentional injuries than female children, and Māori and Pacific Island children showed disproportionately high rates of injury compared with other ethnic groups.
- Leading causes of injury deaths were suffocation (particularly among very young children), motor vehicle traffic crashes (especially as vehicle occupants), drowning (especially among young children), and non-motor vehicle traffic accidents (especially as cyclists).
- In contrast, leading causes of non-fatal hospitalisations were falls (especially from playground equipment and among children aged 5-9), injuries from inanimate mechanical forces (especially among young children aged 0 to 4), and non-motor vehicle traffic accidents (especially as cyclists and among older children).
- New Zealand compares relatively poorly to other wealthy nations on rates of childhood injury and on safety measures.

2.1 Deaths from unintentional injury

The big picture

An average of one hundred children aged 0 to 14 died of injuries each year between 2006 and 2010. Around eight out of every ten of these deaths was determined to be unintentional (84 per year).

Unintentional injury was the third-leading cause of death among children, accounting for 18 per cent of child deaths (Table 1). This means that each year, nine in every 100,000 children living in New Zealand will suffer a fatal unintentional injury.¹⁷

The risk of fatal injuries increases as children grow older. For children less than a year old, unintentional injury accounts for only 3 per cent of deaths. However, among children aged one to 14 years, unintentional injury accounts for nearly one-third of all deaths.

TABLE 1: MORTALITY (NUMBER OF DEATHS) IN CHILDREN AGED 28 DAYS TO 14 YEARS BY CAUSE OF DEATH AND AGE GROUP, 2008–2012.¹⁸

Category	<1year*	1–4 years	4–9 years	10–14 years	Total	%
Medical	340	202	88	116	746	56.0%
Unintentional injury	17	106	40	71	234	17.6%
Intentional injury	7	17	4	41	69	5.2%
SUDI/SUD**	246	16	0	0	262	19.7%
Missing data	8	3	0	1	12	0.9%
Other injury***	0	1	0	6	7	0.5%
Total	618	345	134	235	1332	100%

* This category represents infants 28 days and older, and less than one calendar year in age.

** Sudden Unexpected Death of Infant (SUDI) and Sudden Unexpected Death (SUD)

***This category includes injuries of undetermined intent and legal intervention/war.

Source: NZ Mortality Review Data Group. NZ Child and Youth Mortality Review Committee: 9th Data Report, 2008–2012. Dunedin: NZ Mortality Review Data Group, University of Otago; 2013. Available online at: <http://www.hqsc.govt.nz/publications-and-resources/publication/1311/>

¹⁷ Injury Prevention Research Unit. National Injury Query System (NIQS). Dunedin: Injury Prevention Research Unit, University of Otago. Available online at: <http://ipru3.otago.ac.nz/niqs/>

¹⁸ Note that these data represent preliminary figures on child fatality for the 2008–2012 period. Consequently, they appear lower than the figures reported elsewhere in this report for the 2006–2010 period

Leading causes

The leading causes of unintentional injury death among children aged 0 to 14 (see Table 2) are different to the leading causes of hospitalisations in this age group. The most common causes of death from unintentional injury between 2006 and 2010 were:

- Suffocation (39% of all unintentional injury deaths among children);
- Motor vehicle traffic crashes (27%, especially as vehicle occupants);
- Drowning (10%); and
- Non-motor vehicle traffic crash injuries, such as pedestrians and among older children (9%).

TABLE 2: NUMBERS, RATES (PER 100,000), AND PERCENTAGES OF DEATHS FROM UNINTENTIONAL INJURY AMONG CHILDREN AGED 0-14 YEARS BY MAIN EXTERNAL CAUSE, 2006-2010.

Main external cause of injury		No.	Rate	%
Suffocation*		164	3.7	39.1%
Motor vehicle traffic crash	Total	112	2.5	26.7%
	Occupant	79	1.8	18.8%
	Pedestrian	22	0.5	5.2%
	Cyclist	6	0.1	1.4%
	Motorbike	3	0.1	0.7%
	Other & unspecified	2	0.0	0.5%
Drowning		42	0.9	10.0%
Non-motor vehicle traffic crash	Total	37	0.8	8.8%
	Cyclist	6	0.1	1.4%
	Pedestrian	20	0.4	4.8%
	Other land transport	11	0.2	2.6%
Fire/flame		16	0.4	3.8%
Fall		10	0.2	2.4%
Poisoning		10	0.2	2.4%
Other specified and unspecified		24	0.5	5.7%
Total		420	9.4	100%

* Care must be taken when interpreting these figures as there may be some cross-over between suffocation and SUDI/ SUD, with the majority of deaths in this category occurring in infants <1 year old.

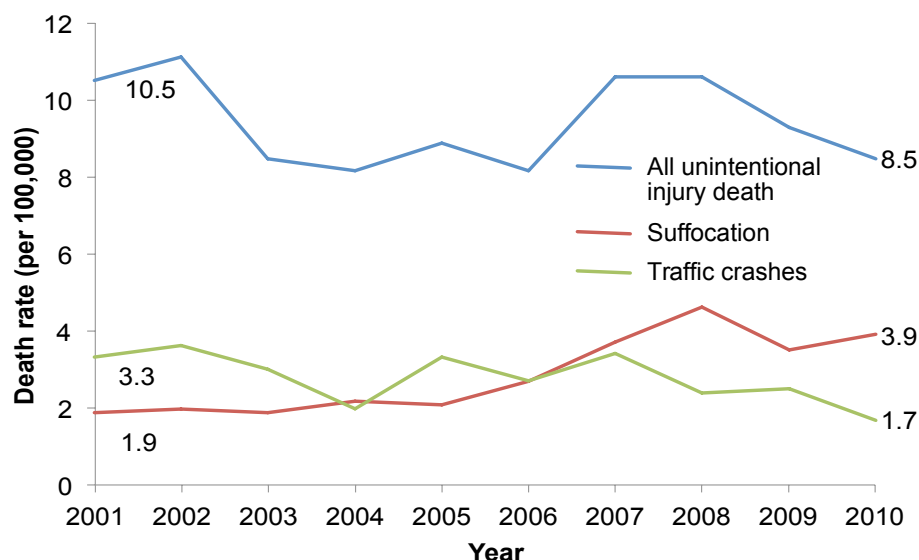
Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago,

<http://ipru3.otago.ac.nz/niqs/>.

Changes over time

There was an overall decline in deaths from unintentional injury in children aged 0 to 14 between 2001 and 2010, however it is not steady (Figure 1).¹⁹ Since 2007, suffocation has overtaken motor vehicle traffic crashes as the leading cause of unintentional injury death among children. This may be related to an increasing tendency for coroners and pathologists to recognise suffocation as a contributing factor in many cases of Sudden Infant Death in Infancy (SUDI) among children less than 12 months old.²⁰ For those aged 1 year or over the leading cause of fatalities is motor vehicle crashes.

FIGURE 1: DEATH FROM UNINTENTIONAL INJURY IN CHILDREN AGED 0–14 YEARS OVER TIME, 2001–2010.

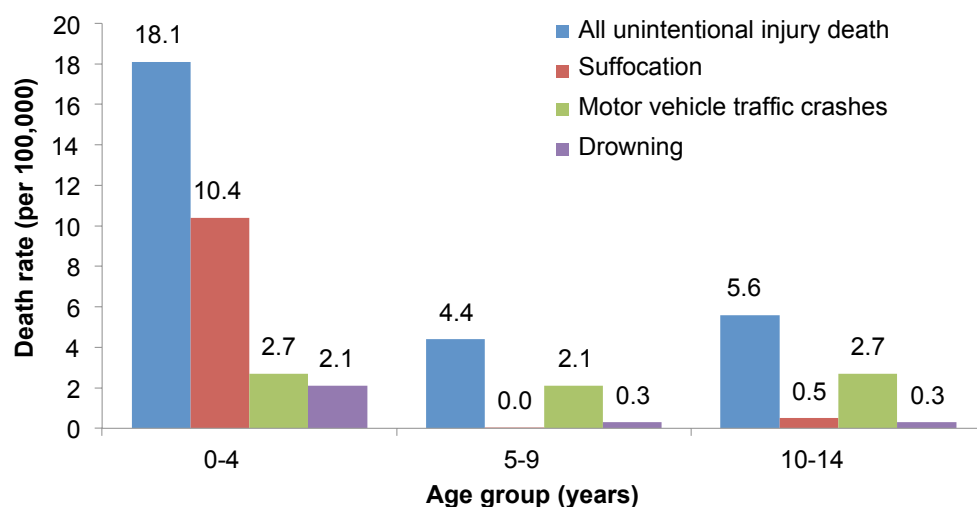


Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

Distribution by age, gender, and ethnicity

As illustrated in Figure 2, the majority of deaths from unintentional injury is among children aged four and under. Suffocation and drowning are particular concerns among these very young children, with suffocation in particular primarily affecting children under 12 months.²¹ In contrast, deaths from motor vehicle traffic crashes represent a similar threat to children in all age groups.

FIGURE 2: FATAL INJURY IN CHILDREN AGED 0–14 BY MAIN EXTERNAL CAUSE AND AGE GROUP, 2006–2010.



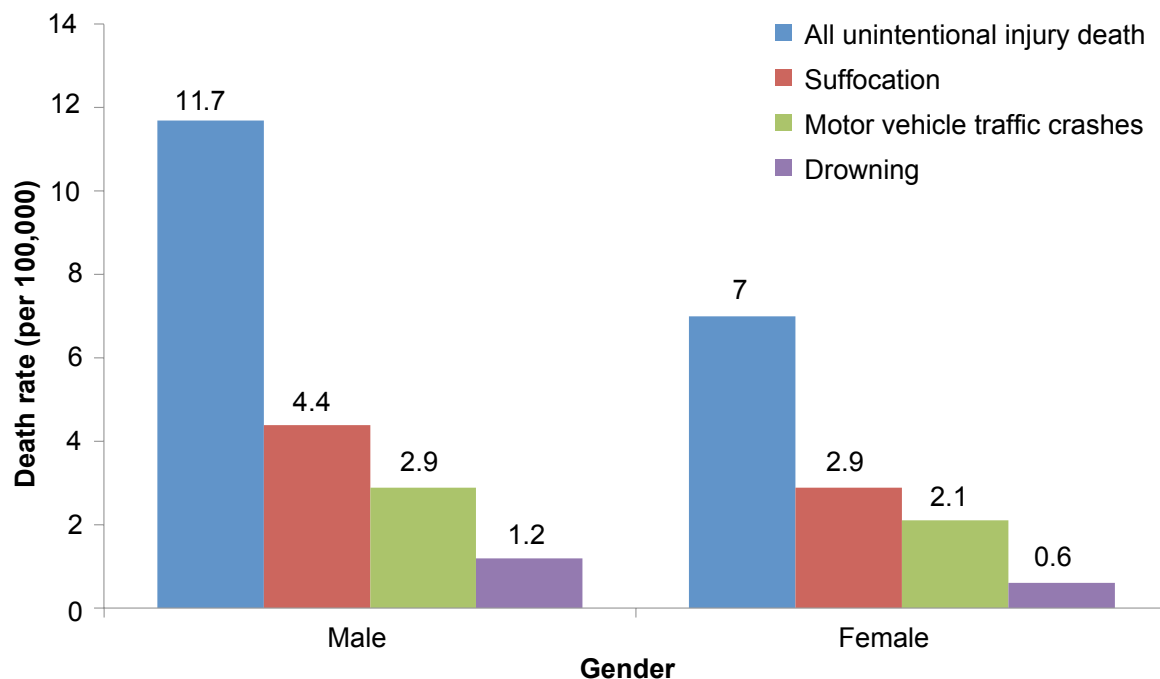
Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

¹⁹ $r = -0.22$ (a weak linear relationship). The correlation coefficient r measures the strength of a linear relationship between two variables, in this case, the decrease in unintentional deaths, over time.

^{20,21} Craig E, Reddington A, Wicken A, Oben G, and Simpson J. Child Poverty Monitor 2013 Technical Report (Updated 2014). Dunedin: NZ Child & Youth Epidemiology Service, University of Otago; 2013.

Male children face a disproportionate rate of unintentional injury death. Between 2006 and 2010 the unintentional injury death rate for male children aged 0 to 14 was over 1.5 times that of females, with 12 in every 100,000 male children dying from an unintentional injury compared with 7 in every 100,000 female children (Figure 3).²²

FIGURE 3: FATAL INJURIES IN CHILDREN AGED 0 TO 14 BY GENDER AND MAIN EXTERNAL CAUSE, 2006 TO 2010.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

Māori children aged 0-14 are significantly over-represented in unintentional injury fatalities.

FIGURE 4: DEATH FROM UNINTENTIONAL INJURY AMONG CHILDREN AGED 0 TO 14 BY ETHNIC GROUP, 2006–2010.

	European	Māori	Pacific	Asian	Other	Total
Number	146	221	38	12	3	420
Percent	34.8	52.6	9.0	2.9	0.7	100%
Rate per 100,000	5.6	20.0	6.5	2.7		

Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

²² 95% Confidence Intervals (CI): males 10.6–12.6; females 6.0–8.0 per 100,000.

2.2 Hospitalisations from unintentional injury

Around 7,713 children aged 0 to 14 were hospitalised from non-fatal, unintentional injuries each year between 2008 and 2012. This is around 852 in every 100,000 children (Table 3).

Leading causes

Leading causes of non-fatal hospitalisations from unintentional injury among children between 2008 and 2012 were different to the main causes of unintentional child injury deaths. While suffocation, motor vehicle traffic crashes, and drowning were leading causes of death between 2006 and 2010, the main causes of non-fatal injuries resulting in hospitalisation among children were:

- Falls (48%, especially among children aged 5 to 9 and involving playground equipment);
- Injuries from inanimate mechanical forces (objects); (19%, especially among young children aged four and under and from being caught or jammed between objects);
- Non-motor vehicle traffic crash injuries (9%, especially among older children and as cyclists); and
- Injuries from animate mechanical forces (5%, especially among older children and from being bitten, stung and injured by humans, animals or insects) (Table 3).

TABLE 3: NUMBERS, RATES (PER 100,000), AND PERCENTAGES OF HOSPITALISATIONS FROM NON-FATAL UNINTENTIONAL INJURY AMONG CHILDREN AGED 0–14 YEARS BY MAIN EXTERNAL CAUSE, 2008–2012.

Main external cause of injury		No.	Rate	%
Fall	Total	18636	411.8	48.3%
	Fall involving playground equipment	6186	136.7	16.0%
	Fall on same level from slipping, tripping, and stumbling	1968	43.5	5.1%
	Fall involving ice-skates, skis, roller-skates or skateboards	1705	37.7	4.4%
Inanimate mechanical forces	Total	7467	165.0	19.4%
	Struck by thrown, projected, or falling object	3337	73.7	8.7%
	Striking against or struck by sports equipment	2387	52.7	6.2%
Non-motor vehicle traffic crash	Total	3658	80.8	9.5%
	Cyclist	1877	41.5	4.9%
	Other land transport	1517	33.5	3.9%
	Pedestrian	264	5.8	0.7%
Animate mechanical forces	Total	2064	45.6	5.4%
	Hit, struck, kicked, twisted, bitten, or scratched by another person	693	15.3	1.8%
	Bitten or struck by dog	582	12.9	1.5%
	Bitten or stung by nonvenomous insect/arthropod	286	6.3	0.7%
Poisoning		1541	34.1	4.0%
Motor vehicle traffic crash	Total	1469	32.5	3.8%
	Occupant	720	15.9	1.9%
	Pedestrian	436	9.6	1.1%
	Motorcyclist	176	3.9	0.5%
	Cyclist	124	2.7	0.3%
	Other & unspecified	13	0.3	0.0%
Burns from hot object/substances*		1215	26.8	3.2%
Suffocation		298	6.6	0.8%
Drowning		141	3.1	0.4%
Other specified and unspecified		1999	44.2	5.2%
TOTAL		38563	852.2	100%

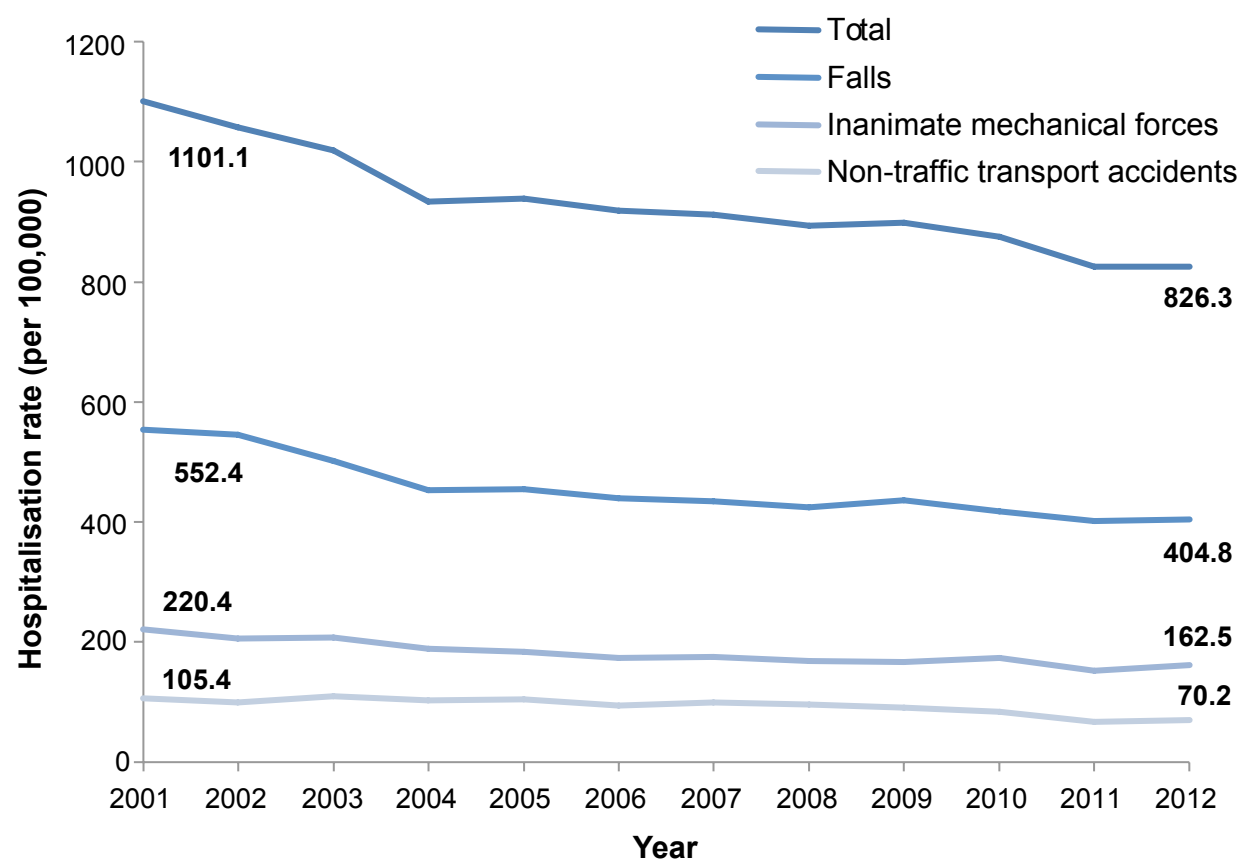
Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

* This does not include burn injuries caused by exposure to fire and flames.

Changes over time

There has been an overall decline in the rate of unintentional injury in children aged 0 to 14 since 2001, with 1,101 out of every 100,000 children experiencing injury-related hospitalisation in 2001 and 826 in 2012 (Figure 5). This decline may be slightly underestimated, since DHBs have only been required to report short-stay emergency department events since mid-2009 (see Appendix A for more information).

FIGURE 5: NON-FATAL UNINTENTIONAL INJURY IN CHILDREN AGED 0-14 YEARS OVER TIME, 2001-2012.

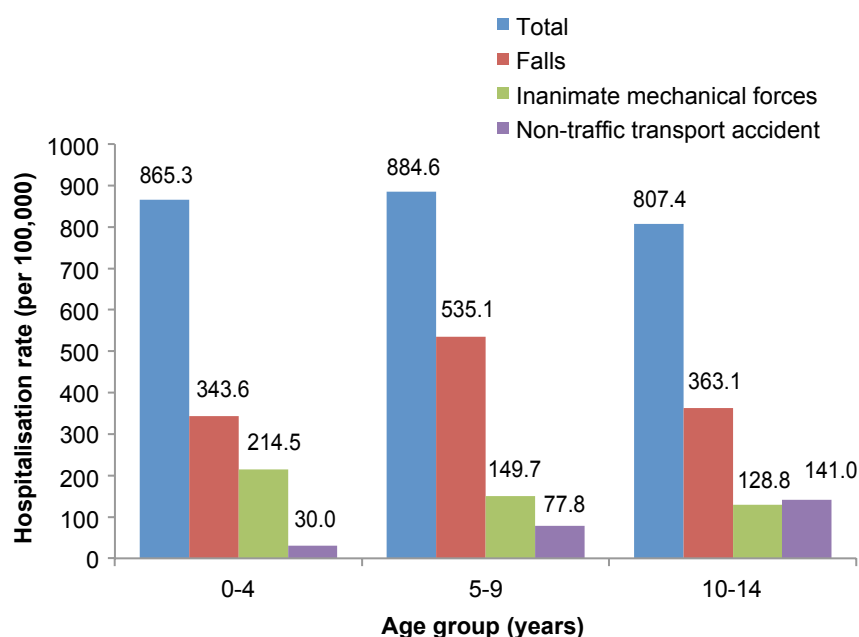


Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

Distribution by age, gender, and ethnicity

Whereas very young children (aged 0 to 4) had the highest rates of unintentional injury death (Figure 2), non-fatal injuries were more evenly distributed across children of all ages (Figure 6).²³ Falls were slightly more common among 5–9-year-olds, with half of falls in this age category being from playground equipment (51%). Non-motor vehicle traffic crash injuries (e.g. injuries from cycling which were not from crashes with motor vehicles) were most common among 10–14-year-olds, while injuries from inanimate mechanical forces were most common among very young children (aged 0–4), with nearly half of injuries of this kind resulting from young children aged 0 to 4 being caught, crushed, or jammed between objects.

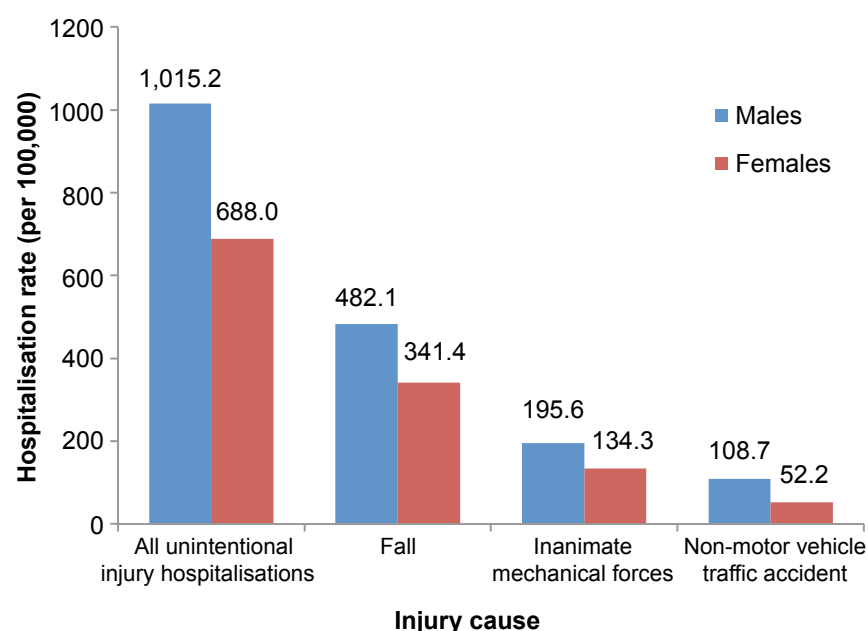
FIGURE 6: NON-FATAL UNINTENTIONAL INJURY IN CHILDREN BY AGE GROUP, 2008–2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

Between 2008 and 2012, male children aged 0 to 14 were hospitalised with non-fatal injuries at 1.5 times the rate of female children (Figure 7). One in every 100 male children was hospitalised during this time period, compared with 0.7 in every 100 female children.²⁴ There were especially large differences between genders with regard to injuries from non-motor vehicle traffic crashes, where males had over twice the rates of hospitalisation of females, and around three times the rate of cycling injuries from non-motor vehicle traffic crashes. Boys were around 1.5 times as likely than girls to be injured from inanimate mechanical forces (objects) (such as being caught between objects, struck by or against something, or coming into contact with sharp glass).

FIGURE 7: NON-FATAL UNINTENTIONAL INJURY IN CHILDREN BY GENDER, 2008–2012.



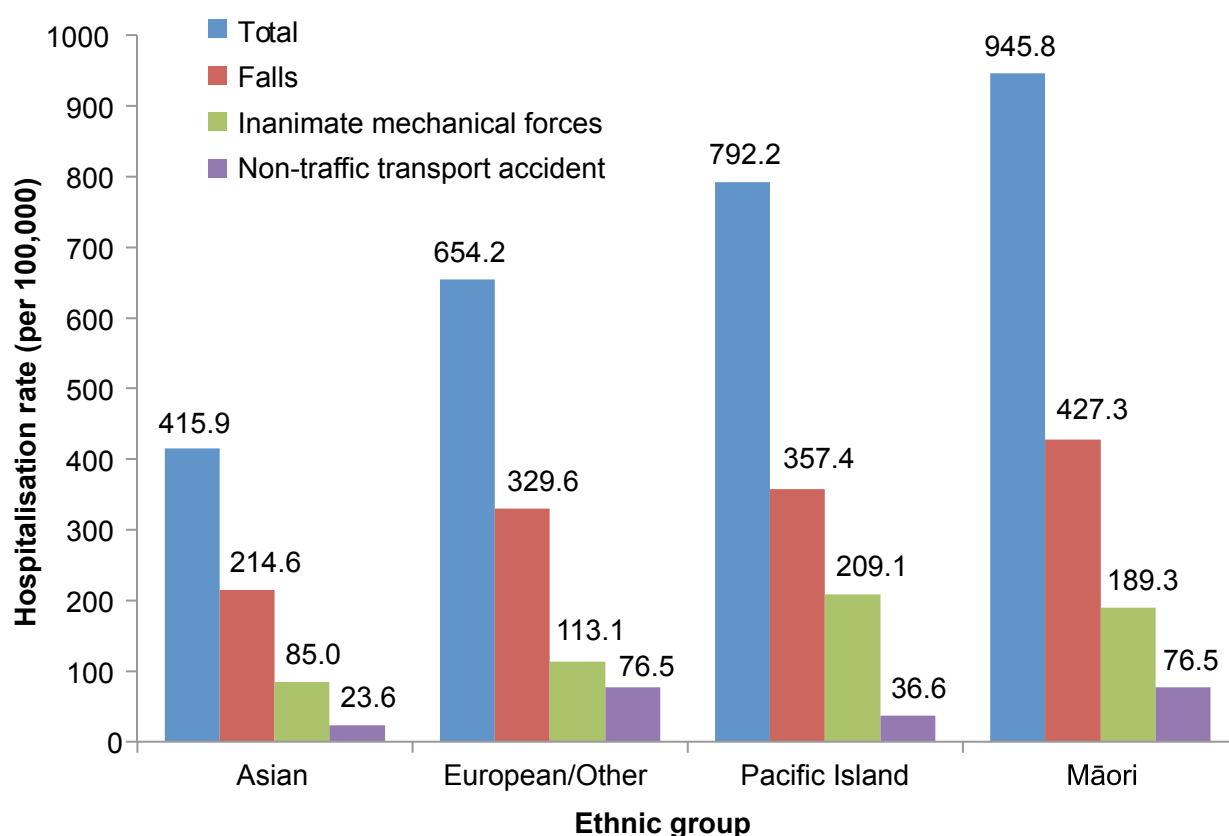
Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

²³ While 95% confidence intervals for deaths among children aged 0–4 did not overlap with CIs for older age groups (lower bound for children aged 0–4 was 15.1, while the upper bound for older children was 6.3 deaths per 100,000), all morbidity 95% CIs overlapped, meaning that non-fatal injury rates were not significantly different at a 0.05 level between age groups.

²⁴ 1014.2 out of every 100,000 male children, and 688.0 out of every 100,000 females. 95% CIs did not overlap (upper bound for females was 706.4 hospitalisations per 100,000; lower bound for males was 963.5).

Māori and Pacific Island children aged 0 to 14 had higher rates of hospitalisation from unintentional injury than other ethnic groups between 2008 and 2012 (Figure 8). Nearly one in every hundred Māori children suffered a non-fatal injury during this time period (946 in every 100,000 children), which is over twice as high as the rate among Asian children (416 per 100,000 children), and nearly 1.5 times the rate for European and other ethnicities (654 per 100,000 children). Pacific Island children also had a relatively high rate of hospitalisation, with 792 in every 100,000 Pacific Island children suffering a non-fatal injury.

FIGURE 8: NON-FATAL UNINTENTIONAL INJURY IN CHILDREN AGED 0-14 YEARS BY ETHNICITY, 2008-2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

2.3 International comparisons

In 2001, UNICEF released a report which indicated that, between 1991 and 1995, New Zealand ranked 22nd of the 26 OECD nations on child death from injuries.²⁵ New Zealand's rate of child injury death was 1.5 times that of Australia, and nearly three times that of Sweden during this period. This means that if New Zealand had achieved the same rate of child death as Sweden for the five-year period between 1991 and 1995, more than 300 children could still be alive today.

New Zealand's rate of child injury death has declined since this period, from 13.7 out of every 100,000 children between 1991 and 1995 to 11.2 between 2006 and 2010.²⁶ However, this still compares poorly to other OECD nations, whose collective average rate of injury death was 10.2 out of every 100,000 children between 1991 and 1995. More recent estimates indicate that New Zealand still compares poorly to other wealthy nations on rates of childhood and adolescent injury. For example, a 2007 UNICEF report indicated that New Zealand ranks lowest of the 24 OECD countries for which data are available on deaths from accidents among children and adolescents under the age of 19.²⁷

On this basis, a 2009 assessment of our child and adolescent injury prevention position gave New Zealand an overall score of just 33 out of 60.²⁸ This is considerably poorer than the highest-ranking European nations – which included Iceland at 44.5, and the Czech Republic, Netherlands, and Poland, which all received scores of 43.5 in 2012 – and falls slightly below the European-wide 2012 average score of 35.²⁹ The researchers concluded that if New Zealand were to be placed alongside European countries for which data are available in 2009, we would rank 15th out of 25 on injury prevention for children and adolescents. New Zealand's poor rating was based on deficiencies across many injury prevention topics,

including passenger and driver safety, pedestrian safety, water safety, falls, poisoning, burns and scalds, and choking and strangulation. The authors of the report concluded that as well as taking further steps to target child and adolescent safety in these areas, New Zealand might also benefit from increasing funding for home visiting programmes.

A 2012 outcomes report on the New Zealand Injury Prevention Strategy³⁰ (NZIPS) similarly indicated a need for further funding for injury prevention, noting that the level of government investment in injury prevention is low relative to its social and economic cost. The report also noted a need for greater collaboration and centralisation of prevention activities, and sustained prevention efforts over the long term.

²⁵ United Nations International Children's Emergency Fund (UNICEF). A League Table of Child Deaths by Injury in Rich Nations. Innocenti Report Card 2. Florence (ITA): UNICEF Innocenti Research Centre; 2001.

²⁶ The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>

²⁷ United Nations International Children's Emergency Fund (UNICEF). Child Poverty in Perspective: An Overview of Child Well-being in Rich Countries. Innocenti Report Card 7. Florence (ITA): UNICEF Innocenti Research Centre; 2007.

²⁸ Bland V, Shepherd M, and Ameratunga S, et al. Child and adolescent injury report card: New Zealand 2009. Journal of Paediatrics and Child Health. 2011; 47(11): 783-7.

²⁹ MacKay M and Vincenten J. Child Safety Report Card 2012: Europe Summary for 31 Countries. Birmingham: European Child Safety Alliance, Eurosafe; 2012.

³⁰ The nation-wide injury prevention plan that operated between 2003 and 2013, which was replaced in 2014 by a Cross-government Injury Prevention Work Plan.

2.4 Prevention approach

It is increasingly recognised that improving child safety is a more complex problem than previously recognised. Rather than an over-reliance on ‘tame’ or ‘simple’ solutions effective child injury prevention requires dynamic solutions that address the complex contexts in which children are injured.³¹ As such, multifaceted interventions are effective in reducing injury or showing promise.

Our aim is to identify and focus on evidence-informed good practice and strategies most likely to reduce childhood injuries. In general, there are seven approaches that offer proven or promising strategies to reduce unintentional child injuries. These are:

1. Environmental modification – to make the world more child or family friendly. This could include reducing the height of playground equipment, or introducing traffic calming measures;
2. Product modification – for example child resistant caps for medication or poisonous substances;
3. Legislation, regulation and enforcement. This is considered highly effective, particularly when enforced and used in combination with other strategies. This includes laws that require the mandatory use of child restraints;
4. Promoting the use of safety devices, such as bike helmets or child passenger restraints;
5. Home visits to families of young children, where the information provided is age appropriate and combined with strategies, such as the provision of free safety equipment;
6. Community based interventions – which focus on changing community values and behaviours, along with the environment. An example of this is community based bicycle helmet campaigns;
7. Education and skills development. The evidence for this approach tends to be poor, however if well designed and if it has a strong audience focus, it may be more effective particularly if used in combination with other strategies.³²

Good practice

Under each section, this guide outlines strategies that can be used to reduce child injuries ‘at a glance’. It is noted that many of the evidence informed interventions have been drawn from the European Child Safety Alliance’s publications³³ and the “Child safety good practice guide: Good investments in unintentional child injury prevention and safety promotion.”³⁴ For the purposes of this document, good practice is defined as:

- A prevention strategy that has been evaluated and found to be effective either through a robust evaluation or systematic review, or
- Expert opinion supports the practice and data suggests it is an effective strategy (e.g. life jackets and drowning prevention), or
- Expert opinion supports the practice and there is a clear link between the strategy and the reduction of risk (e.g. child-resistant packaging and medication to reduce unintentional child poisoning), and
- The strategy has been implemented and the practicalities of implementing it has been examined.

Limitations

It is noted that there are limitations in this approach, namely:

- The prevention of child injury is complex. Injury rates disproportionately affect different ages, communities and population groups. What works in one setting or with one cultural, population or age group may not work as well with another.
- Much of this evidence is international and has not been evaluated in a New Zealand context, and
- Injury prevention can benefit from an innovative, multi-pronged approach, particularly where strategies have not been effectively evaluated or do not yet exist.

³² European Child Safety Alliance’s guidelines “Child safety good practice guide: Good investments in unintentional child injury prevention and safety promotion.”

³³ <http://www.childsafetyeurope.org/publications/>

³⁴ European Child Safety Alliance’s guidelines “Child safety good practice guide: Good investments in unintentional child injury prevention and safety promotion.”



3 Land Transport Injuries

Summary

- Land transport crashes are a major cause of both fatal and non-fatal injuries among children. Motor vehicle traffic crashes (MVTs) were the second-leading cause of fatal injuries between 2006 and 2010 after suffocation, and non-motor vehicle traffic (NMVT) crashes were the third-leading cause of non-fatal injuries between 2008 and 2012. There has been a decline in non-fatal child injury rates from land transport crashes since 2001.
- Over two-thirds (71%) of child deaths in MVTs occur when children are vehicle occupants, followed by pedestrians (20%).
- Deaths from MVTs affect all ages equally, but older children (aged 10-14) are more likely to sustain non-fatal injuries. Māori children were also disproportionately likely to be injured in MVTs, especially as vehicle occupants.
- Children are most likely to suffer a non-fatal injury in NMVT crash as pedal cyclists (51%), but are most likely to die in NMVT crashes where they are pedestrians (54%). Very young children (aged 0 to 4) have a particularly high rate of death in NMVT crashes, especially as pedestrians. However, older children (aged 10 to 14) have the highest rate of non-fatal injuries in NMVT crashes, particularly when cycling and using other land transport.
- DHBs with the highest rates of injury from land transport crashes were Tairāwhiti, Northland, Bay of Plenty, and Whanganui.

We could reduce the burden of child injury from motor vehicle crashes through:

- The correct use of child restraints
- Alcohol limits for drivers
- Traffic calming techniques
- Area wide traffic calming techniques.
- Legislation for the mandatory use of child restraints until a child reaches 148cm in height.

We could improve pedestrian safety through:

- The reduction of speed limits in residential areas and school zones, and its enforcement
- Vehicle modifications such as reversing mirrors and cameras
- Separating driveways from gardens and play areas, and separate pedestrian access from the property to footpath (path separate to the driveway)
- Training children to be safe on the roads, although the evidence is mixed
- Community awareness initiatives.

We could improve cycle safety through:

- The correct use of cycle helmets
- Increased visibility through visibility aids such as bio-motion detectors
- Cycle ways and pathways
- Area wide traffic calming

We have analysed land transport crashes by motor vehicle traffic crashes (MVTs, e.g. pedal cyclist colliding with a motor vehicle on the road) versus non-motor vehicle traffic (NMVT) crashes (e.g. coming off a pedal bike at home). These two kinds of incidents show slightly different patterns of injury. Section 3.1 examines injuries from motor vehicle traffic crashes, while section 3.2 focusses on non-motor vehicle traffic crashes.

Injuries from all land transport crashes account for over one-third of child deaths from unintentional injury. However, fatalities from MVTs are more than three times as common as fatalities from NMVT crashes (Table 2).

The reverse is true of non-fatal injuries: whereas land transport crashes account for 13 per cent of all non-fatal injuries in children aged 0 to 14, injuries from NMVT crashes are over twice as common as those from MVTs (Table 3). This suggests that while MVTs tend to happen at higher speeds and cause more severe injuries, children are more frequently involved in NMVT crashes, especially as cyclists.

3.1 Motor vehicle traffic crashes (MVTs)

The big picture

Traffic crashes involving motor vehicles were, until recently, the overall leading cause of death from unintentional injury among children aged 0 to 14 (Figure 1). More recently, suffocation has become the leading cause of death from unintentional injury in children, though this primarily reflects an increase in the number of deaths attributed to suffocation in cases of Sudden Infant Death in infancy rather than a substantial decrease in fatalities from MVTs.³⁵

Between 2006 and 2010, MVTs were the main cause of over one-quarter (27%) of all child deaths from unintentional injuries (Table 2), and caused the death of around 22 children each year. MVTs accounted for 4 per cent of all non-fatal injuries in children between

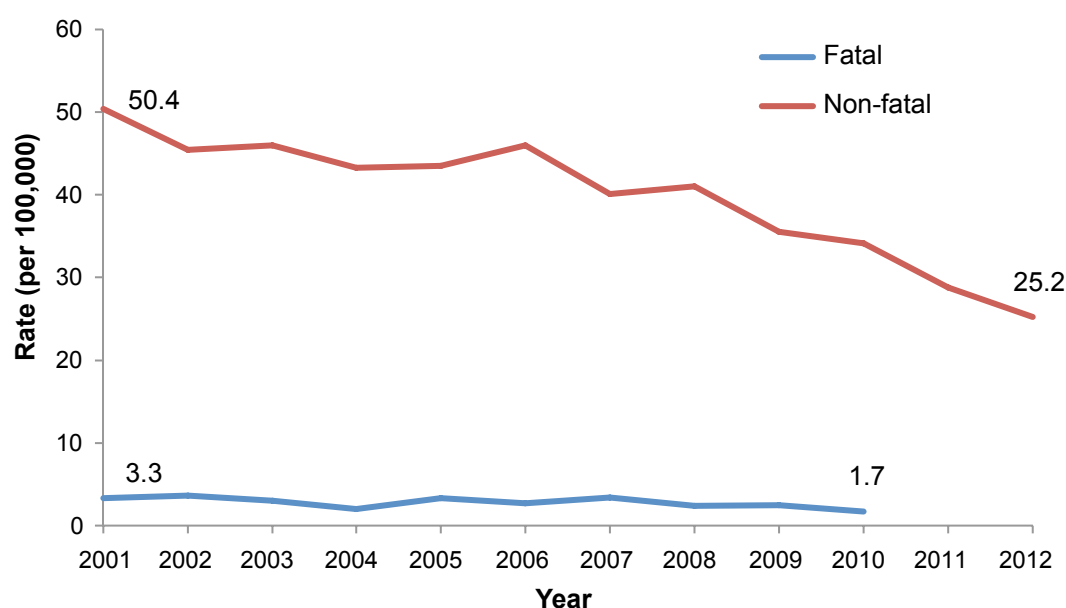
2008 and 2012, with 294 children suffering non-fatal injuries from MVTs each year (Table 3).

Taken together, this means that each year around 316 children either die or are hospitalised from traffic crashes involving motor vehicles. This is about 35 out of every 100,000 children.

Changes over time

Deaths from MVTs declined between 2001 and 2010, from 3.3 deaths per 100,000 children to 1.7 in 2010 (Figure 9).³⁶ Non-fatal injuries from MVTs have also declined, with half as many non-fatal injuries from MVTs in 2012 as in 2001 (50.4 per 100,000 children in 2001 compared with 25.2 in 2012).³⁷

FIGURE 9: FATAL AND NON-FATAL INJURIES FROM MOTOR VEHICLE TRAFFIC CRASHES IN CHILDREN AGED 0–14 OVER TIME, 2001 TO 2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

³⁵ Craig E, Reddington A, Wicken A, Oben G, & Simpson J. Child Poverty Monitor 2013 Technical Report (Updated 2014). Dunedin: NZ Child & Youth Epidemiology Service, University of Otago; 2013.

³⁶ $r = -0.62$ (a moderately strong linear relationship).

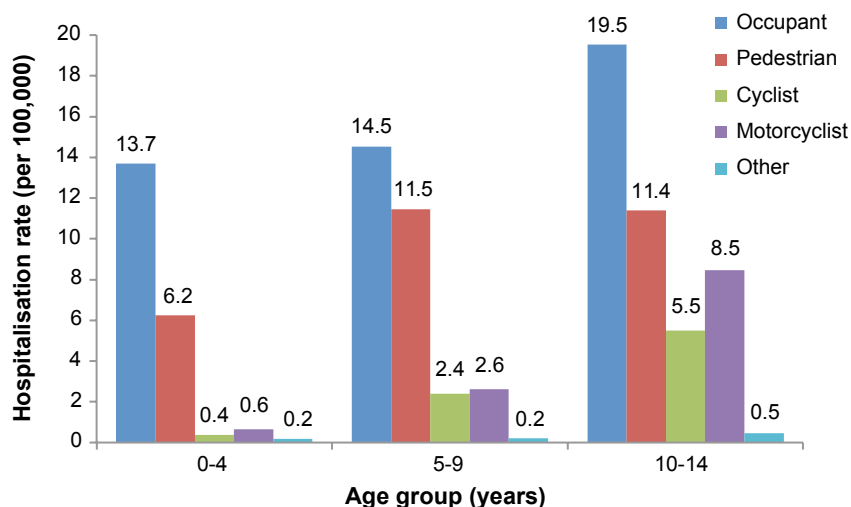
³⁷ $r = -0.93$ (a strong linear relationship).

Distribution by age, gender, and ethnicity

Around half of all non-fatal MVTC injuries among children aged 0 to 14 between 2008 and 2012 occurred when children were vehicle occupants (49%) and over one-quarter when children were pedestrians (30%). This pattern is even more pronounced for fatal injuries, with over three-quarters of child deaths from MVTCs between 2006 and 2010 occurring when children were vehicle occupants (71%).

Although fatal injuries from MVTCs affect all age groups equally (Figure 2), the risk of sustaining a non-fatal injury from a MVTC increases with age (Figure 10).³⁸

FIGURE 10: NON-FATAL INJURIES FROM MOTOR VEHICLE TRAFFIC CRASHES IN CHILDREN AGED 0 TO 14 BY AGE GROUP AND CRASH TYPE, 2008 TO 2012.

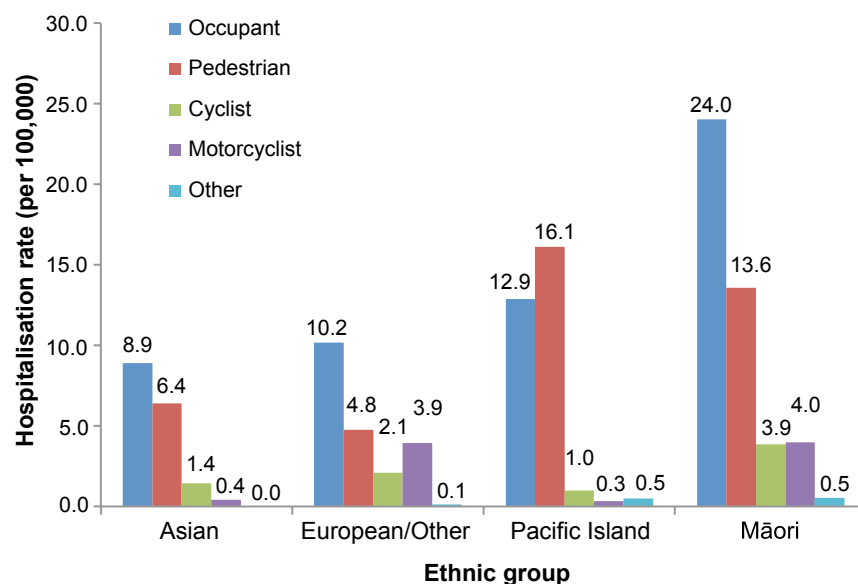


Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

Male children had over 1.5 times the rate of hospitalisation from MVTC injury as females between 2008 and 2012.³⁹

Māori children also showed a disproportionately high rate of injury from MVTCs, being more than twice as likely for Asian or European/other children to suffer a non-fatal injury from a MVTC between 2008 and 2012 (Figure 11). Pacific Island children had the highest rates of non-fatal injury as pedestrians in MVTCs, but only around half the rate of injury as vehicle occupants that Māori children had.

FIGURE 11: NON-FATAL INJURIES FROM MOTOR VEHICLE TRAFFIC CRASHES IN CHILDREN AGED 0 TO 14 BY ETHNIC GROUP AND CRASH TYPE, 2008 TO 2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

³⁸ While the differences in non-fatal MVTC injury rates were not significant at a 0.05 level between the 0-4 and 5-9 age groups, or between the 5-9 and 10-14 age groups, they were significantly different between those aged 0-4 and 10-14 (95% CI upper bound for those aged 0-4 was 24.8 per 100,000, while the lower bound for those aged 10-14 was 37.9).

³⁹ 95% confidence intervals did not overlap, meaning that rates of non-fatal injury were significantly different at a 0.05 level (upper bound for females was 27.8 hospitalisations per 100,000, while the lower bound for males was 33.1). There was not a statistically significant difference in fatality rates between genders at a 0.05 level.

Distribution by region

Overall, DHBs with the highest rates of child injury from MVTs were:

- Tairāwhiti (which sees around 71 injuries from MVTs per 100,000 children each year);
- Northland (around 59 injuries per 100,000 children);
- Bay of Plenty (around 55 injuries per 100,000 children); and
- Whanganui (around 54 injuries per 100,000 children, Table 5).

TABLE 4: DEATHS (2001-2010) AND NON-FATAL INJURIES (2003-2012) FROM MOTOR VEHICLE TRAFFIC CRASHES IN CHILDREN AGED 0-14 YEARS BY DHB, 2001-2012.

District Health Board	Deaths		Non-fatal injuries	
	Number	Rate per 100,000	Number	Rate per 100,000
Tairāwhiti	2	-	83	70.6
Northland	19	5.4	208	59.2
Bay of Plenty	17	3.8	246	55.4
Whanganui	4	-	75	54.5
Waikato	29	3.7	366	46.2
Hawkes Bay	23	6.6	151	43.7
West Coast	1	-	27	42.2
Lakes	16	6.6	100	41.6
Counties Manukau	35	3.1	448	38.1
Mid Central	13	4.1	117	37.7
Otago	4	-	121	37.5
Southland	6	2.7	81	36
Auckland	17	2.2	274	34.8
Taranaki	7	3	76	32.9
Waitemata	17	1.6	355	32.5
South Canterbury	4	-	34	32.1
Hutt	2	-	100	31.7
Canterbury	13	1.4	294	31.4
Nelson Marlborough	8	3	81	30.8
Wairarapa	1	-	22	26.7
Capital and Coast	1	-	124	23.1
Outside DHB/unknown	8	-	34	-
TOTAL	247	2.8	3,417	38.5

Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, [HYPERLINK http://ipru3.otago.ac.nz/niqs/](http://ipru3.otago.ac.nz/niqs/).

Internationally

In 2009 New Zealand was amongst the worst countries in the OECD for deaths per 100,000 population and per billion kilometres travelled. The picture improves somewhat when the rate is per 10,000 vehicles. For this measure New Zealand sits around the middle of OECD countries. New Zealand's comparable death rates are particularly poor for younger age groups. We are the third worst OECD country for deaths of those aged 0–14 years, and fifth worst for those aged 15–24 years [6]. The social cost of motor vehicle injury crashes in 2013 was estimated at \$3.14 billion, a decrease by 8.6% from 2012.⁴⁰

Prevention

Passenger (occupant) safety

There has, however, been an overall decline in road crash fatalities, which is in line with the experience of other Western countries. A combination of safer cars, safer roads and roadsides, speeds, road use, infrastructure and roadside improvements (signage, median barriers, rumble strips), more effective enforcement, the use of child restraints, targeted education campaigns, improved vehicle crash worthiness and crash avoidance technology, to some extent better trauma care are likely to have contributed to this.⁴¹

Relevant legislation and standards

Children under 7 years of age must be properly restrained by an approved child restraint that is appropriate for the age and size of the child.

Change to New Zealand's Child Restraint Rule – 01 November 2013

Passenger safety and assessment of evidence at a glance

There are a number of effective practices that have been found to improve safety and prevent or reduce child passenger injuries and deaths. These include:

- The correct use of child restraints – very good evidence
- The correct use of booster seats – very good evidence
- The implementation and enforcement of alcohol limits for drivers – good evidence
- Traffic calming techniques – promising evidence.

TABLE 6: Changes to New Zealand's child restraint rules – 01 November 2013

Requirement	Pre 01 November 2013	From 01 November 2013 onwards
Child must be restrained in an appropriate approved* child restraint	Until their 5th birthday	Until their 7th birthday
Child must be restrained in an appropriate approved child restraint or seatbelt if one is available	From their 5th birthday until their 8th birthday	From their 7th birthday until their 8th birthday
Child must use any child restraint or seatbelt that is available. If not available, they must travel in the back seat	Children aged eight to 14	Children aged eight to 14 - no change
Exception from using a child restraint	If a current medical certificate is provided certifying that use of a restraint is impracticable or undesirable for medical reasons, then the child does not have to be restrained in a child restraint or seatbelt. Applies to any person from age five and over	Exemption extended to include children under the age of five (previous medical certificate exemptions only available to children aged five or over)
	If the vehicle is a goods vehicle (with an unladen weight exceeding 2000kg) in which seatbelts are not available, then a child under five years of age is not required to be restrained	This exception has been removed and so children must now be appropriately restrained if travelling in these vehicles

Source: http://www.safekids.nz/Portals/o/Documents/Resources/Passengers/Safekids%20Booster%20Seat%20Position%20Paper_finalweb11NOV2013.pdf

* Car restraint Standards - <http://www.nzta.govt.nz/resources/factsheets/07/child-restraints.html>

⁴⁰ See the <http://www.transport.govt.nz/research/roadcrashstatistics/thesocialcostofroadcrashesandinjuries/> downloaded 1/5/2015

⁴¹ Proffitt, C and Beacham, M. 2012 New Zealand Injury Prevention Strategy, The New Zealand injury prevention outcomes report. ACC: Wellington

Passenger safety good practice evidence

Effective interventions		Evidence
Engineering	The correct use and fit of child passenger restraints reduce death and injury [8-12].	<p>For children aged less than four years [19]. Rearward-facing seats are safest for children younger than two years [17,18], and are up to five times safer than forward-facing restraints</p> <p>Back seats are the safest place for child passengers – regardless of whether or not there is a side air bag [11,12,21-23]. Children in back seats are 31-64 percent less likely to be injured compared with those in front seats [22].</p> <p>To reduce the risk of injury in a motor vehicle crash, a booster seat should be used once a child has outgrown a forward-facing restraint until they reach 148cm in height [12,20].</p>
Enforcement	The correct use and fit of seatbelts reduces risk of death and injury [24-27].	<p>For children aged 8-15 years, correct use and fit of seat belts reduce the risk of death by 45 percent and hospitalisation by 32 percent [11,28].</p> <p>For children aged 5-14 years, back seat lap/shoulder belts are only 52 percent effective in reducing fatalities, and back seat lap belts are only 38 percent effective in reducing fatalities compared with no seat belt [27].</p> <p>Legislation requiring child passenger restraints increases use and reduces injury [11,29-32, 37].</p>
	Legislate and enforce the use of child restraints	<p>Legislation requiring the use of booster seats increases booster seat use and rear seating positioning, and reduces severe injury [34].</p> <p>Legislation requiring the use of booster seats until the eighth birthday reduces the risk of fatality by at least 23 percent in six year olds, and 25 percent in seven year olds [30].</p> <p>To increase compliance with legislation it is important to educate parents/caregivers on legislative changes including the principles driving recommendations, and to provide parents/caregivers with information on the process of appropriate child restraint use [35], [36].</p>
	Alcohol limits for drivers	Limiting alcohol when driving is a strategy protective for all age groups [43].
Education	Effective community based passenger safety interventions combine the involvement of the local community, multi-agency collaboration, long term strategy, effective focussed leadership, appropriate targeting, time to develop a range of local networks and initiatives and includes evaluation	<p>Effective community based passenger safety interventions combine information dissemination on child passenger restraint safety with enhanced enforcement [29,38-41].</p> <p>Community based interventions combining child passenger restraint distribution, loan programmes or incentives with education programmes lead to increased use [29,31,38,44].</p> <p>Interventions targeting child acceptance of restraints are particularly effective in increasing child restraint use [42].</p> <p>Education-only interventions increase booster seat use by 32 percent. Booster seats are twice as likely to be used when education is combined with provision of free booster seats [45].</p> <p>Community based injury prevention projects in New Zealand demonstrated increased ownership and use of child restraints. Effective projects incorporated a combination of a child restraint loan scheme, media campaign, education sessions, check points, giveaway incentives and enforcement [40,41,44].</p>

Further information and resources

For further information and resources on reducing child passenger injuries go to the Safekids website.
http://www.safekids.org.nz/index.php/pi_pageid/27

3.2 Non-motor vehicle traffic (NMVT) injuries

The big picture

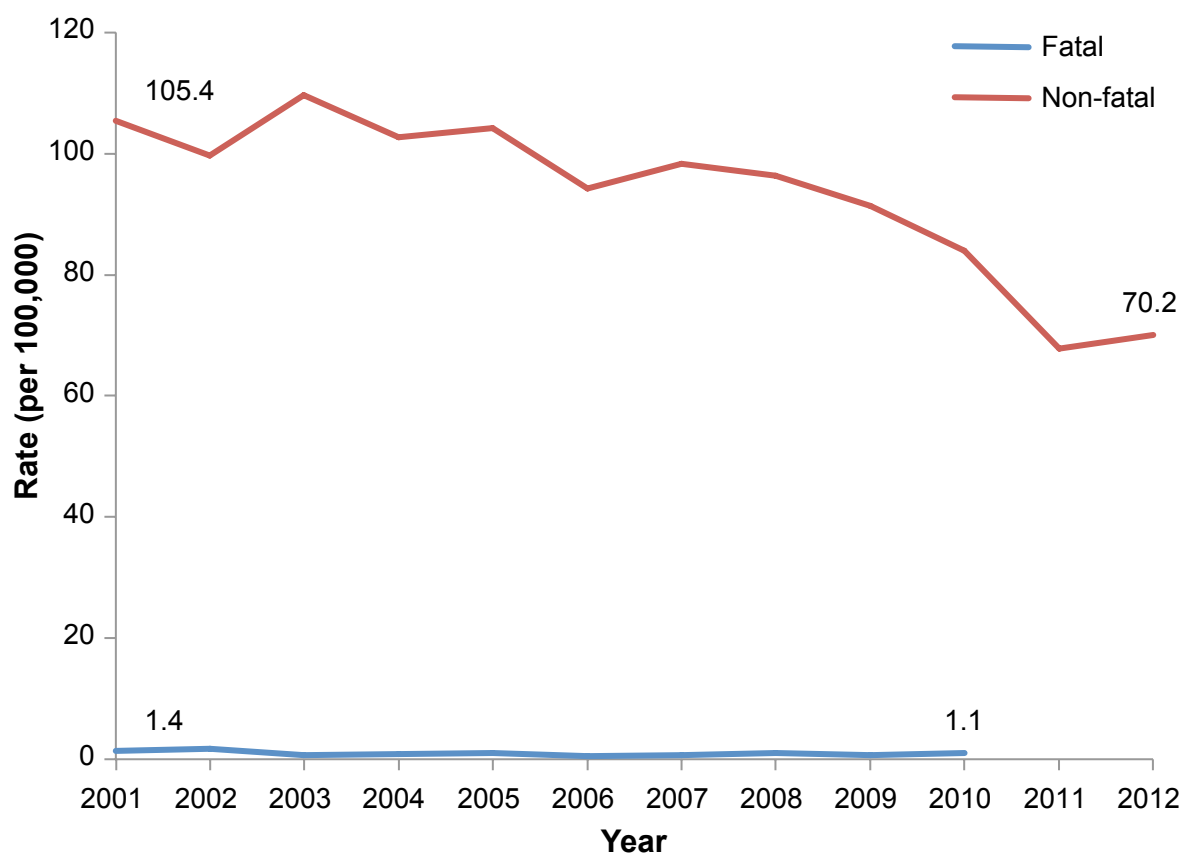
Between 2006 and 2010, land-based non-motor vehicle traffic crashes were the main cause in nearly one in ten (9%) child deaths from unintentional injury (Table 2). During this time, around 7 children were killed from NMVT crashes each year. NMVT crashes also accounted for nearly one in ten non-fatal hospitalisations from unintentional injury in children between 2008 and 2012 (10%, Table 3), which affected 732 children each year.

Taken together, this means that each year around 739 children incur injuries from NMVT crashes that result in either hospitalisation or death. This is around 82 out of every 100,000 children.

Changes over time

Death rates from NMVT crashes remained similar between 2001 and 2010 (Figure 12). As with motor vehicle traffic crashes, there has been a decline in the rate of non-fatal injuries from non-motor vehicle traffic crashes, with the 2012 rate being roughly two-thirds that of 2001.⁴²

FIGURE 12: INJURIES (FATAL AND NON-FATAL) FROM NON-MOTOR VEHICLE TRAFFIC CRASHES IN CHILDREN AGED 0–14 OVER TIME, 2001 TO 2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

⁴² $r = -0.88$ (a strong linear decline).

Leading causes by age group

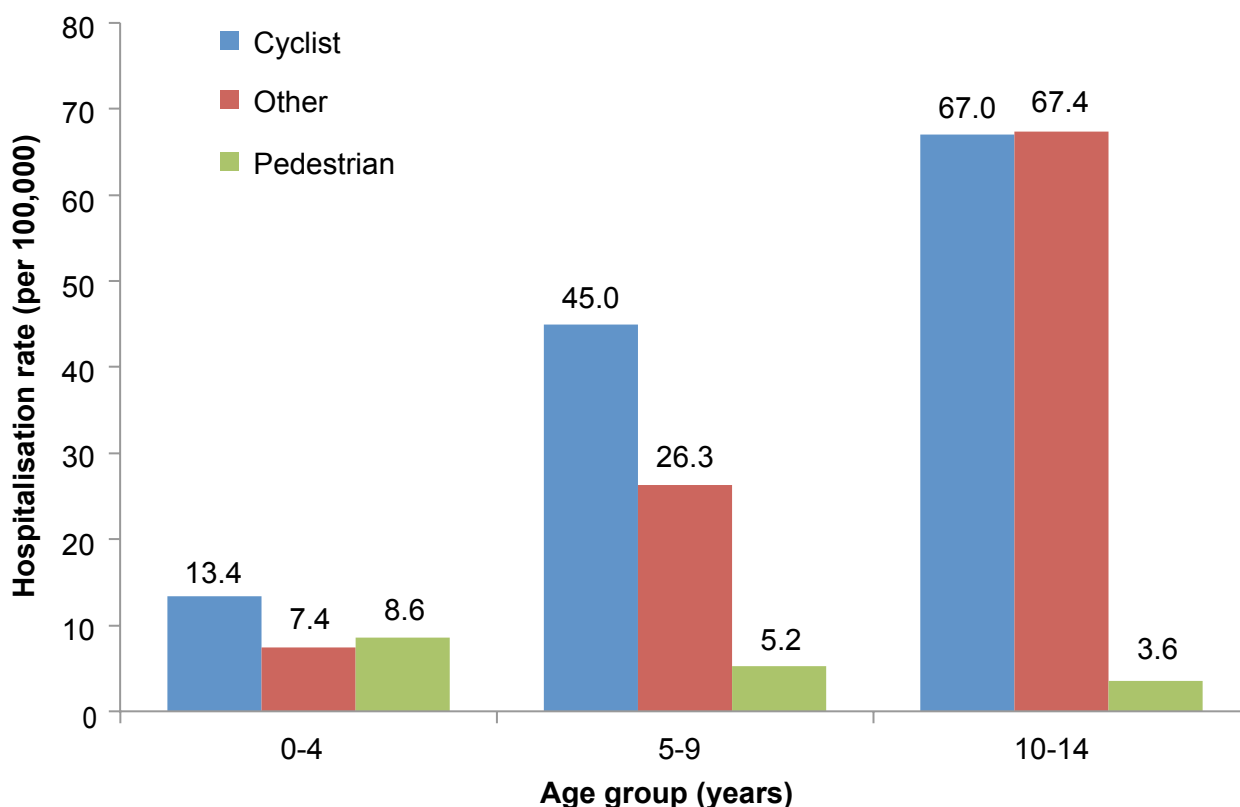
The types of non-motor vehicle traffic crash injuries that put children at greatest risk of injury differ for fatal and non-fatal injuries. While children are most likely to suffer a non-fatal injury from a NMVT injury as pedal cyclists (51% of hospitalisations of all NMVTs), they are most likely to die in crashes where they are pedestrians (54% of deaths of all NMVT deaths, Tables 2 and 3).

Very young children (aged 0 to 4) have a particularly high rate of death in NMVT crashes especially as pedestrians. Of the 37 fatal NMVT crashes between 2006 and 2010, nearly half of deaths were among children aged 0 to 4 (46%, n=17), and nearly all fatalities among very young children occurred when they were pedestrians (88% of fatalities from NMVT crashes in this age group, n=15).

However, older children (aged 10 to 14) have the highest rate of non-fatal injuries in NMVT crashes, particularly when cycling and using other land transport (Figure 13). In general, the older the child, the greater the risk of sustaining a non-fatal injury from a NMVT crash.⁴³

It should be noted that when cycling, children aged 10 to 14 are at greater risk of injury from NMVT crashes than from motor vehicle traffic crashes (see Tables 2 and 3, Figures 6 and 10). While around 3 in every 100,000 children are injured as cyclists in motor vehicle traffic crashes, around 42 are injured in NMVT crashes.

FIGURE 13: NON-FATAL INJURIES FROM NON-MOTOR VEHICLE TRAFFIC CRASHES IN CHILDREN AGED 0-14 BY AGE GROUP AND CRASH TYPE, 2008 TO 2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

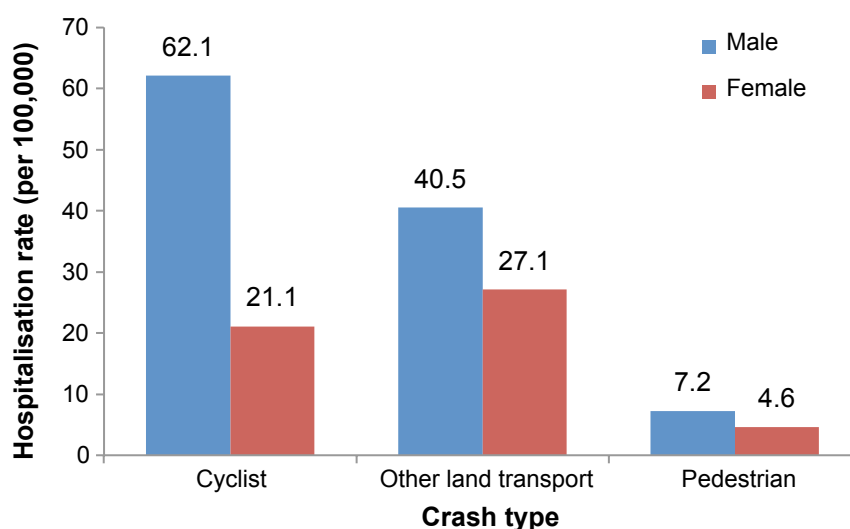
⁴³ 95% confidence intervals do not overlap for any group, meaning that non-fatal injury rates from NMVT accidents are significantly different at a 0.05 level between age groups.

⁴⁴ 95% confidence intervals do not overlap: while the upper bound for females is 55.9 hospitalisations from NMVT accidents per 100,000, the male lower bound is 88.8. Hence the difference is significant.

Distribution by gender, ethnicity, and region

Males between 0 and 14 had over twice the rate of hospitalisation from NMVT crashes of females in this age group between 2008 and 2012 (Figure 14).⁴⁴ In particular, males were injured in NMVT crashes as pedal cyclists at three times the rate of females.

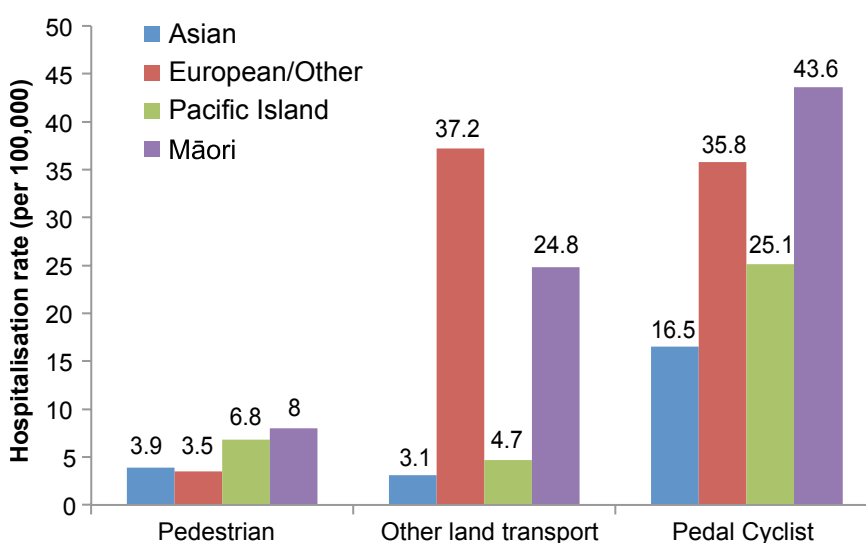
FIGURE 14: NON-FATAL INJURIES FROM NON-MOTOR VEHICLE TRAFFIC CRASHES IN CHILDREN AGED 0–14 BY GENDER AND CRASH TYPE, 2008 TO 2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

Ethnicity-based patterns of non-fatal injuries from NMVT crashes differ to those from motor vehicle traffic crashes. Whereas Māori children were the most likely to be injured in motor vehicle crashes, European/other and Māori children were equally likely to be injured in non-motor vehicle traffic incidents, though Māori were more likely to be injured when cycling and European/other children when using other land transport modes (Figure 15).

FIGURE 15: NON-FATAL INJURIES FROM NON-MOTOR VEHICLE TRAFFIC CRASHES IN CHILDREN AGED 0–14 BY ETHNIC GROUP AND CRASH TYPE, 2008 TO 2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

Rates of death and injury from NMVT crashes vary regionally, and closely resemble the regional distribution of motor vehicle traffic crashes (see section 3.1). For example, the DHBs with the top rates of non-fatal injury from NMVT crashes between 2003 and 2012 were Whanganui (178.8 children injured per 100,000), Tairāwhiti (171.1), Bay of Plenty (155.7), Lakes (131.1), Northland (126.1), and Hawke's Bay (121.1). These six DHBs also saw the highest rates of injury from motor vehicle traffic crashes, suggesting that transport safety is of significant concern in these areas.

Prevention

Countries with the best road safety outcomes tend to have national implementation plans involving political commitment, strong leadership and a multisectoral approach incorporating engineering, enforcement and awareness interventions [53, 55, 57,70]

Relevant legislation and standards

There are a number of sections in the Land Transport (Road User) Act (2004) that are relevant to child pedestrians. These include:

Use of a footpath http://www.legislation.govt.nz/regulation/public/2004/0427/latest/DLM303666.html?search=sw_096be8ed8of4ea93_pedestrian_25_se&p=1&sr=12

Passing at school crossing point http://www.legislation.govt.nz/regulation/public/2004/0427/latest/DLM303052.html?search=sw_096be8ed8of4ea93_school_25_se&p=1

Speed limit relating to stationary school bus http://www.legislation.govt.nz/regulation/public/2004/0427/latest/DLM303088.html?search=sw_096be8ed8of4ea93_school+bus_25_se&p=1&sr=5

Child pedestrian safety

Walking allows children and young people to learn about their environment, improve their fitness and explore their surroundings. Child pedestrian injuries can be severe and fatal. In general, safety can be improved by separating children from motor vehicles, using traffic calming measures to reduce the speed of motor vehicles and making children more visible to drivers.⁴⁵

Child pedestrian safety and assessment of evidence at a glance

Evidence-based good practices for the prevention and reduction of child pedestrian injuries and deaths include:

- Area wide traffic calming techniques – promising evidence
- The reduction of speed limits in residential areas and school zones, and its enforcement – good evidence
- Vehicle modifications such as reversing mirrors and cameras – good evidence
- Separating driveways from gardens and play areas – good evidence
- Training children to be safe on the roads – the evidence is mixed
- Community awareness initiatives – promising evidence

⁴⁵ NZ Transport Agency. New Zealand pedestrian profile. Available at: <http://www.nzta.govt.nz/resources/nz-pedestrian-profile/6.html>

Child pedestrian good practice evidence

Effective interventions		Evidence
Engineering	Area-wide engineering interventions reduce pedestrian risk and result in fewer injuries.	<p>Area-wide traffic calming solutions and pedestrian facilities in towns and cities reduce child pedestrian injury and fatality, and are cost effective [31,49-52].</p> <p>Interventions should reflect child developmental capabilities and limitations and be targeted to areas of high child pedestrian traffic around schools, and particularly where such areas adjoin, or are close to, main roads or rural highways [53].</p> <p>Traffic calming solutions targeted to areas of socioeconomic disadvantage may reduce inequalities in child pedestrian injury [49].</p> <p>Self-explaining roads in Point England, Auckland have reduced vehicular speed on residential and collector roads [56].</p>
	Vehicle modifications reduce child pedestrian injury and fatality.	<p>Safer car front design reduces child pedestrian injury and fatality [57].</p> <p>Bull bars increase the severity of child pedestrian injuries [58].</p>
	Property design that separates areas where vehicles are driven from child walking and play areas reduces the risk of child driveway run over injuries [59-61].	<p>Half of driveway run over injuries could be prevented if driveways were separated with fencing [61].</p> <p>Separating pedestrian pathway from driveways reduces the risk of child driveway run over injury [62].</p>
Enforcement	Legislation reducing lower speed limits reduces pedestrian injury, changes driver behaviour and is cost effective [65].	<p>A pedestrian-motor vehicle collision at a motor vehicle speed of 30 km/ph results in a 90 percent chance of pedestrian survival, whereas the same collision at a motor vehicle speed of 45 km/ph results in only a 50 percent chance of pedestrian survival [71].</p> <p>Enforcement of legislation or policy requiring lower speed limits reduces pedestrian injury and changes driver behaviour [74].</p>
	Enforcement of legislation reducing vehicle speeds in residential areas.	<p>OECD countries with the lowest rates of child pedestrian injury have legislation that assumes driver responsibility in collisions involving child pedestrians [70].</p> <p>Reduced speed zones of 20mph (32 km/ph) in the UK decreased vehicle speed by an average nine mph (14 km/ph), and reduced the number of fatal child pedestrian collisions by 70 percent [72, 73]. Various communities around New Zealand are also trialling reduced speed zones around schools and in residential neighbourhoods [66,67,68,69]. The World Health Organisation recommends 30 km/ph speed limits around schools [71].</p> <p>Legislation is most effective when well enforced and when coupled with educational interventions [36,74].</p>
Education	Pedestrian skills training improves pedestrian safety behaviour including crossing skills [75-77].	<p>Risk of child pedestrian injury is significantly reduced when children are accompanied by adults on the school-home journey [78].</p> <p>Walksafe interventions including adult accompaniment of children walking to school are an opportunity for pedestrian skills training, and have resulted in reduced pedestrian-motor vehicle collisions [80-82]. New Zealand walking school buses show promise in preventing child injury, but exhibit marked inequities in their geographical distribution [79].</p> <p>Pedestrian safety education initiatives need to be regularly repeated to retain knowledge and behaviour change [76,82].</p>
	Community interventions involving community development approaches, and including advocacy and programmes to improve awareness, reduce child pedestrian injury [77,83].	<p>Initiatives involving community coalitions which support increased community ownership of injury prevention interventions result in pedestrian-related injury reductions of 45-54 percent [83].</p> <p>Interventions which focus on raising community awareness may support to prevent low speed run over injury [64,86]. The Safekids Aotearoa driveway run over awareness campaign had significant reach into Māori and Pacific communities to increase awareness of the risk of driveway run overs. Linked community-led initiatives showed promise in raising awareness of vehicle blind zones and the need for child supervision, and reducing child driveway run over injury [84,85].</p>

Further information and resources

For further information and resources on reducing child passenger injuries go to the Safekids website www.safekids.nz

Cyclist safety

Cycling provides is an important source of exercise, transportation, recreation and independence for children. Learning to ride a bike is an important part of play, development and fitness. There is evidence that child cyclist injuries and fatalities could be reduced if the following strategies were implemented.

Relevant legislation and standards

Helmet legislation

The New Zealand helmet law came into effect from 1 January 1994 requiring all cyclists to wear a standards approved cycle helmet for all on-road cycling. The Land Transport Road User Rule (2004) established rules under which all traffic, including child cyclists, must adhere in order to use the road and footpaths (Land Transport (Road User) Rule 2004, 11.8 Safety helmets for cyclists).

http://www.legislation.govt.nz/regulation/public/2004/0427/latest/DLM303675.html?search=sw_096be8ed8of4ea93_helmet_25_se&p=1&sr=5

See the standard for buying a helmet at: <http://www.nzta.govt.nz/resources/roadcode/cyclist-code/about-equipment/cycle-helmets.html> /

Bicycle standard

This ensures that bicycles supplied in the market meet certain minimum standards by specifying requirements for the bicycle as a whole and the components and assembly which the overall safety of the bike depends. (Product Safety Standards (Pedal Bicycles) Regulations 2000 (as amended in 2003)).

<http://www.consumeraffairs.govt.nz/legislation-policy/acts-regulation/product-safety-standards/mandatory-standards/bicycles-1>

Cyclist safety and assessment of evidence at a glance

Good practice to improve cyclist safety includes:

- Cycle helmets – very good
- Increased visibility through visibility aids such as bio-motion detectors (that detect cyclists and alert cars that a cyclist is present, covering the blind spots in cars) – promising
- Cycle ways and pathways – promising
- Area wide traffic calming – promising
- Training children to be safe on the roads – precaution, mixed evidence

Cyclist safety good practice evidence

Effective interventions		Evidence
Engineering	Use of bicycle helmets reduces the incidence and severity of head injury, and is cost effective [88-90]	<p>Use of cycle helmets results in an 85 percent reduction in the risk of a head injury, an 88 percent reduction in the risk of brain injury, at least a 75 percent reduction in the risk of severe brain injury and a 65 percent reduction in risk of injury to the upper and mid facial regions [88].</p> <p>Use of cycle helmets provides a 69 percent reduction in the risk of injury in collisions with motor vehicles and a 68 percent reduction in the risk of injury regarding all other collisions [88].</p> <p>Children not wearing helmets when involved in a cycling crash were 2.7 times more likely to incur an upper head injury, and 7.3 times more likely to lose consciousness as a result of the crash compared with children who had been wearing helmets [91].</p> <p>Use of cycle helmets is cost effective - a New Zealand study estimated a cost saving of \$2.61 for every \$1 spent on helmets for children aged 5-12 years [89].</p>
	Area-wide engineering and traffic calming solutions reduce child cyclist injury,	Engineering solutions are more effective when coupled with education and enforcement activities, targeted to areas of high child traffic around schools, and particularly where such areas adjoin, or are close to, main roads or rural highways and when they reflect child developmental capabilities and limitations.
	Cycle ways and cycle paths	Separating motor vehicles and cyclists shows promise, however there is concern about the intersections. Harborview Injury Prevention and Research Center. Best Practices. 2001; Available from: http://depts.washington.edu/hiprc/practices/index.html .
Enforcement	<p>Enforcing the use of cycle helmets</p> <p>Bicycle helmet legislation increases use, and reduces injury [93,94].</p>	Mandatory bicycle helmet laws introduced in New Zealand in 1994 resulted in large increases in helmet use, and reductions in the number of head and scalp injuries [57] [95].
Education	Community-based interventions regarding helmet wearing lead to increased use of helmets [31,42,96,97].	<p>Children who received either a community-based intervention or an educational intervention including a free helmet were four times more likely to wear a helmet than children not receiving an intervention. Children who received interventions in schools were nearly twice as likely to wear helmets. Children receiving education-only interventions were 40 percent more likely to wear a helmet [96].</p> <p>Interventions provided to younger children (aged less than 9-12 years) are more effective than those provided to older children [31,96].</p> <p>Broad interventions that enhance child and parental awareness of the importance of helmets, reduce resistance to use and decrease the cost of helmet purchase may be most effective [42].</p> <p>Children are more than twice as likely to wear a helmet if accompanied by another child who is wearing a helmet. Children are four times as likely to wear a helmet if accompanied by an adult, and nine times as likely if the adult is wearing a helmet [98].</p>
	Cycling skills training shows promise but use with care. Increasing knowledge and observed riding skills, though may also encourage overconfidence, and risk taking behaviour [31, 99-101].	Comprehensive cycle skills training programmes incorporate helmet safety, knowledge about road rules and safety and include on-bike skills [102]. However, some children may become overconfident of their ability to cope in traffic following training [100]. Safekids Aotearoa recommends careful supervision of boys aged 11-14 years alongside skills training, due to the increased risk of injury in this group [103].

Further information and resources

For further information and resources on reducing child passenger injuries go to the Safekids website www.safekids.nz



Photo credit: Whakawhetu National SUDI Prevention for Maori

4 Choking, Suffocation and Strangulation

Summary

- Since 2007, suffocation has overtaken motor vehicle traffic crashes as the leading cause of fatal injury death among children. Around 92 children each year will either die or be hospitalised from unintentional suffocation, which is around 10 in every 100,000 children.
- Death rates from suffocation have increased between 2001 and 2010, which is probably related to an increasing recognition of suffocation as a contributing factor in many cases of Sudden Infant Death in Infancy (SUDI) among children under 12 months old.
- Suffocation almost exclusively affects very young children under the age of four, and particularly those under one year old. Nearly half of suffocation injuries were caused by choking on food or other objects. Inhaling gastric contents was also a leading cause of suffocation in very young children, and suffocation and strangulation in the bed is also a significant cause of injury.
- Male, Māori, and Pacific Island children had disproportionately high rates of suffocation injury.
- We could reduce the burden of child injury from suffocation in New Zealand by:
 - Designing, constructing and using materials for cots, folding cots, and high chairs that minimise entrapment – there is some evidence
 - Ensuring toys for < 3 year olds do not to have small parts that can be pulled off or break off - there is some evidence
 - Using Wahakura, Pepi pods (specially designed baby beds for safe sleeping) – the evidence may be promising
 - Health promotion messages may be promising - but the messages need further testing.

The big picture

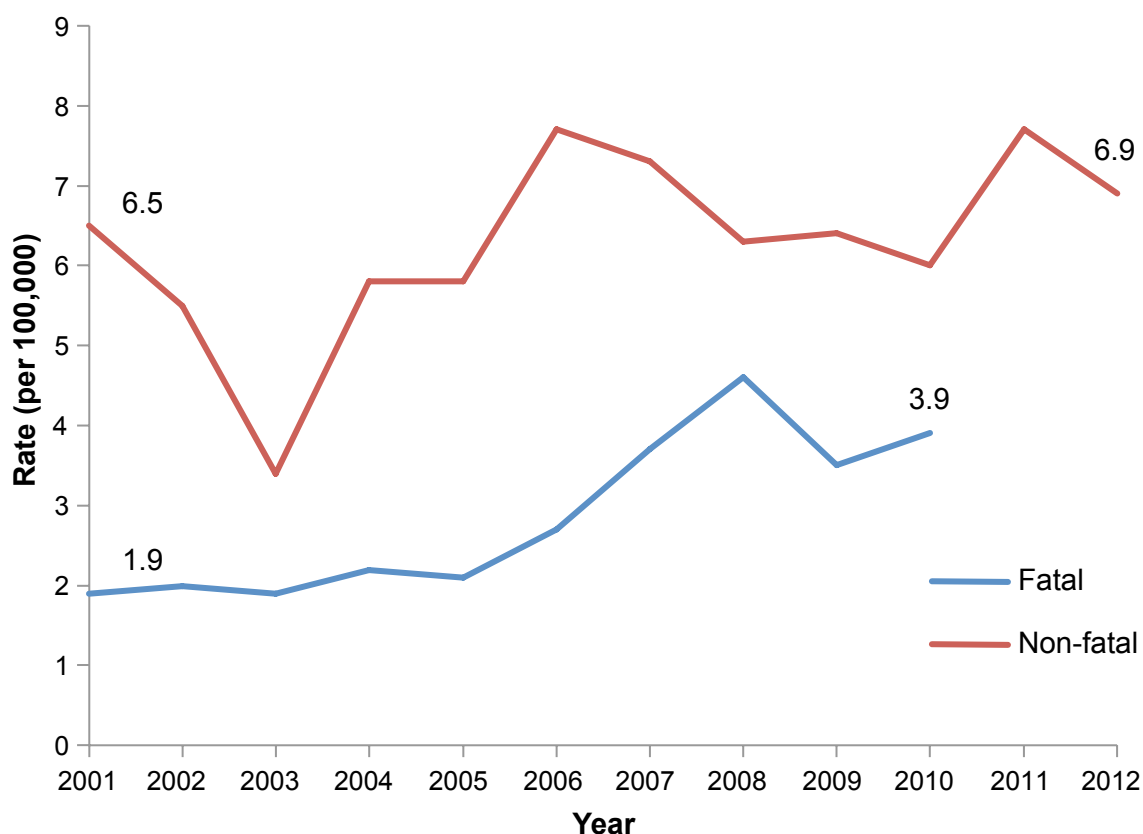
Since 2007, suffocation has overtaken motor vehicle traffic crashes as the leading cause of unintentional injury death among children aged 0 to 14. Between 2006 and 2010, suffocation was the main cause of over one-third (39%) of child deaths from unintentional injury (Table 2). During this time period, around 33 children died each year from unintentional suffocation. Although suffocation is not one of the leading causes of non-fatal injury (Table 3), around 60 children each year between 2008 and 2012 were hospitalised with non-fatal injuries from unintentional suffocation.

Taken together, this means that around 93 children each year will either die or be hospitalised from unintentional suffocation. This is around 10 in every 100,000 children.

Changes over time

Death rates from suffocation have increased between 2001 and 2010, from around 2 in every 100,000 children in 2001 to nearly 4 in 2010 (Figure 16).⁴⁶ This may be related to an increasing tendency for coroners and pathologists to recognise suffocation as a contributing factor in many cases of Sudden Infant Death in Infancy (SUDI) among children under 12 months old.⁴⁷

FIGURE 16: FATAL AND NON-FATAL INJURIES FROM SUFFOCATION IN CHILDREN AGED 0-14 OVER TIME, 2001 TO 2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

⁴⁶ $r=0.87$ (a strong increase).

⁴⁷ Craig E, Reddington A, Wicken A, Oben G, & Simpson J. Child Poverty Monitor 2013 Technical Report (Updated 2014). Dunedin: NZ Child & Youth Epidemiology Service, University of Otago; 2013.

Leading causes of suffocation, strangulation and choking

Suffocation, strangulation and choking almost exclusively affects very young children under the age of four, and particularly those under one year old. Between 2006 and 2010, 95 per cent of all fatalities from unintentional suffocation, strangulation and choking incidents affected children under the age of five, while 87 per cent of all non-fatal suffocation injuries affected children in this age group (Figure 2).

	2006 to 2010 New Zealand Fatalities, 0-14 year olds, all NZ			2008 2012 New Zealand Public Hospital Injury Discharges, 0-14 year olds, all NZ		
Age Group	Number of Deaths	%	Rate / 100,000 people	Number of Discharges	%	Rate / 100,000 people
0-4 years	155	95%	10.3	260	87%	16.7
05-09 years	2	1%	+	22	7%	1.5
10-14 years	7	4%	0.5	16	5%	1.1
TOTAL	164	100%	3.7	296	100%	6.6

For hospitalisations choking is the leading cause of these injuries in children, with nearly half (45%) of the injuries caused by choking on food, and a further quarter (25%) from choking on other objects (Table 5). The third-leading cause of these injuries is the inhalation of gastric contents, which exclusively affects children under the age of four, and accounts for 16 per cent of suffocations. Suffocation and strangulation in the bed is also a significant cause, accounting for 5 per cent of these types of injury.

TABLE 5: FATAL (2006-2010) AND NON-FATAL (2008-2012) INJURY FROM UNINTENTIONAL SUFFOCATION, STRANGULATION AND CHOKING IN CHILDREN AGED 0-14 BY LEADING CAUSE

	Deaths (2006-2010)		Hospitalisations (2008-2012)	
	Number	Percent	Number	Percent
Choking on food	8	4.9	134	45.0
Choking on other objects	2	1.2	75	25.2
Inhalation of gastric contents	2	1.2	47	15.8
Other specified and unspecified	11	6.7	15	5.0
Suffocation and strangulation in bed	2	1.2	14	4.7
Other hanging and strangulation	140	85.4	13	4.4
Total	164	100	298	100

Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

Distribution by gender and ethnicity

The differences between the rates for girls and boys is not statistically significant.⁴⁸ Māori and Pacific Island children had higher rates of non-fatal injury from suffocation than European/Other and Asian children (Figure 17). The same is true of fatal injuries.

FIGURE 17: FATAL (2006-2010) AND AND NON-FATAL (2008-2012) INJURIES FROM SUFFOCATION IN CHILDREN AGED 0 TO 14 BY ETHNIC GROUP.

	Deaths (2006-2010)		Hospitalisations (2008-2012)	
	Number	Rate per 100,000	Number	Rate per 100,000
European/ Other	46	1.4	165	5.2
Māori	100	9.1	73	6.4
Pacific Island	14	2.4	39	6.3
Asian	4	0.89	21	4.3

Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

Relevant legislation and standards

Household cots

The Product Safety Standards (Household Cots) Regulations 2005 applies to NZ cots for household use, and is designed to reduce the incidence of injuries due to hazardous design features. (AS/NZS 2172:2004 Cots for household use). http://www.legislation.govt.nz/regulation/public/2005/0212/latest/whole.html?search=qs_act%40bill%40regulation%40deemedreg_cot_resel_25_h&p=1#DLM340930

<http://www.consumeraffairs.govt.nz/legislation-policy/acts-regulation/product-safety-standards/mandatory-standards/household-cots>

Choking (toys)

The Product Safety Standards (Children's Toys) Regulations 2005 applies to children up to and including 36 months and relate to choking hazards. (AS/NZS 8124.1:2002 Safety of toys). http://www.legislation.govt.nz/regulation/public/2005/0236/latest/DLM344172.html?search=sw_096be8ed803648oc_choke_25_se&p=1&sr=04

Prevention

Choking, suffocation and strangulation injuries are often less common than other injuries but tend to be fatal. Suffocation can be caused by children being trapped in confined spaces or plastic bags. Strangulation places pressure on the trachea and can be caused by children becoming caught or entangled in window blind cords, clothing draw strings, cot bars etc. Choking is when the airway becomes blocked and can be caused by round or cylinder shaped foods such as lollies, grapes, nuts or non-food items such as coins or buttons.

Choking, suffocation and strangulation prevention and assessment of evidence at a glance

Good practices for reducing choking, suffocation and strangulation injuries and deaths include:

- Design, construction, materials for cots, folding cots, high chairs to minimise entrapment and to have baby's head in safe position for breathing – some evidence
- Toys for < 3 year olds not to have small parts that can be pulled off or break off - some evidence
- Wahakura, Pepi pods (specially designed baby beds for safe sleeping) – promising
- Health promotion messages – may be promising but the messages need testing and consistency.

Further information and resources

For further information and resources on reducing choking, suffocation and strangulation go to:

- The Safekids website – www.safekids.nz
- Whakawhetu <http://www.whakawhetu.co.nz/> – a national kaupapa Māori SUDI prevention organisation providing policy advice, information, resources, training and education to the health sector and Māori communities.

⁴⁸ The differences between the rates for boys and girls was not statistically significant.

Choking, suffocation and strangulation good practice evidence

	Effective interventions	Evidence
Enforcement	Legislation requiring product banning, regulation or modification permanently removes a large portion of the choking/strangulation/suffocation risk [197,200].	Product banning or modification is more effective in reducing risk than supervision [197]. Legislation is most effective when well enforced and when combined with educational interventions [36]. In New Zealand product banning/regulation has been implemented for small high-powered magnets [198], recommended for window blind cords in New Zealand [199], and has been recommended for drawstrings on children's clothing, latex balloons and inedible items in food products overseas [3,197].
	Legislation/standard requiring food and products to have warning labels with an explanation of the specific hazard may reduce injury [197,200].	Warning labels with a specific hazard explanation are more effective than non-specific labels [197,199].
Education	Home/community-based prevention interventions may reduce injury, however there is a lack of evidence available in this area [199,206]. Health promotion messages safe sleep, every sleep, every place. Although consistent with evidence, the efficacy of the message is not evaluated. Unintentional suffocation health promotion messages through education, professional advice and media support.	The Wahakura and Pepi-pod are baby beds that show promise in preventing cot associated entrapment and strangulation [206-208]. Based on NZ research on causes, but efficacy of message not evaluated. Report outlines safe sleep spaces [224] Based on NZ research on causes, but efficacy of message not evaluated. In Austria a free safety pack is provided to families with children under six years of age. Regional initiatives such as 'Reach Me' offer safety packs [224].



5 Falls

Summary

- Falls were the leading cause of non-fatal unintentional injuries in children aged 0 to 14 between 2008 and 2012, causing nearly half of all hospitalisations during this period. Each year, around 3,729 children are hospitalised or die from falls, which is 412 in every 100,000 children. Non-fatal injuries from falls have decreased between 2001 and 2012.
- Among children, those aged 5 to 9 are at greatest risk of fall-related injuries, though the age group most at risk depends on the main cause of the fall and the location where the fall took place. Around 40 per cent of falls where a location was specified took place at home, 29 per cent at school, and 9 per cent at a sport or athletic ground. Children aged 0 to 4 were most at risk of falls in the home, while those aged 5 to 9 were at greater risk of falls at school, and those aged 10 to 14 of falls at sport or athletic grounds.
- Falls involving playground equipment accounted for around one-third of injuries, and were most common among those children aged 5 to 9, and in a school or public playground setting. Injuries from slipping, tripping, or stumbling on the same level account for around 10 per cent of all injuries and occurred at equal rates across all age groups, while falls involving ice-skates, skis, roller-skates, and skateboards accounted for 9 per cent of injuries and were most common among older children.
- Male and Māori children were more likely to be hospitalised from falls than other groups.

We could reduce the burden of child injury from falls in New Zealand through:

- Playground equipment height and surface standards and compliance checks – very good evidence
- Reducing exposure to falls from within buildings and homes e.g. through stair guards and window latches – good evidence
- Encouraging the use of personal protective equipment such as a helmet for use with skateboards, skates, skiing or scooters – the evidence is promising
- Reducing the use of baby walkers – good evidence
- Reducing the opportunities to fall from cots, beds and bunks – some evidence supports this approach.

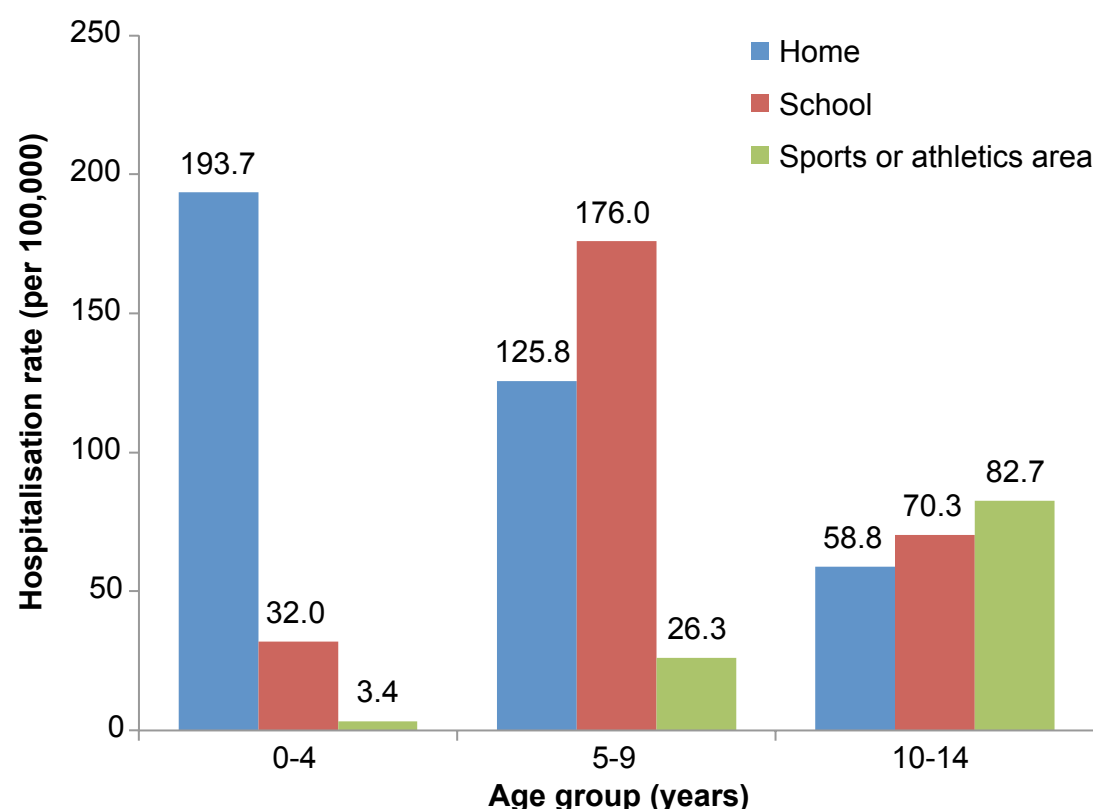
The big picture

Falls were the leading cause of non-fatal unintentional injuries in children aged 0 to 14 between 2008 and 2012, causing nearly half of all hospitalisations during this period (Table 2). Every year between 2008 and 2012, 3,729 children are hospitalised or die from falls, which is around 412 in every 100,000 children. Non-fatal injuries from falls have decreased from around 552 hospitalisations per 100,000 children in 2001 to 405 in 2012 (Figure 5).⁴⁹

Leading causes by age group

Children aged 5 to 9 had the highest rates of non-fatal injuries from falls between 2008 and 2012, with an injury rate around 1.5 times that of 0–4-year-olds and 10–14-year-olds (Figure 18).⁵⁰ However, the age group most at risk depends on the main cause of the fall (Figure 18) and the location where the fall took place (Figure 19). Of those cases where the location of the fall was specified, 40 per cent took place within the home, with around 9 per cent of all home-based falls taking place in an outdoor area such as a garden or tennis court. Falls at home were most common among children aged 0 to 4. Over one-quarter of falls (29%) took place at school, and was most common among children aged 5 to 9. More than one in ten falls occurred at sport or athletic grounds, and were most common among children aged 10 to 14 and at outdoor sporting grounds (Figure 18).

FIGURE 18: NON-FATAL INJURY FROM FALLS IN CHILDREN AGED 0–14 BY LOCATION AND AGE GROUP, 2008–2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

⁴⁹ Note that falls from cycles do not come under the falls admission data.

⁵⁰ 95% confidence intervals for children aged 5-9 did not overlap with those of other age groups: whereas the lower bound for children aged 5-9 was 510.2 hospitalisations from falls per 100,000, the highest upper bound for other ages was 378.3 per 100,000.

Around one-third of all falls among children involved playground equipment. Falls of this kind were especially common among 5–9-year-olds, who experienced non-fatal injuries from falls at three times the rate of 0–4-year-olds, and four times the rate of 10–14-year-olds. Unsurprisingly, more than half of those falls involving playground equipment where a location was specified took place at school (53%).

Incidents of slipping, tripping, or stumbling on the same level account for around 10 per cent of all fall-related non-fatal injuries, which occur at roughly equal rates across all age groups.

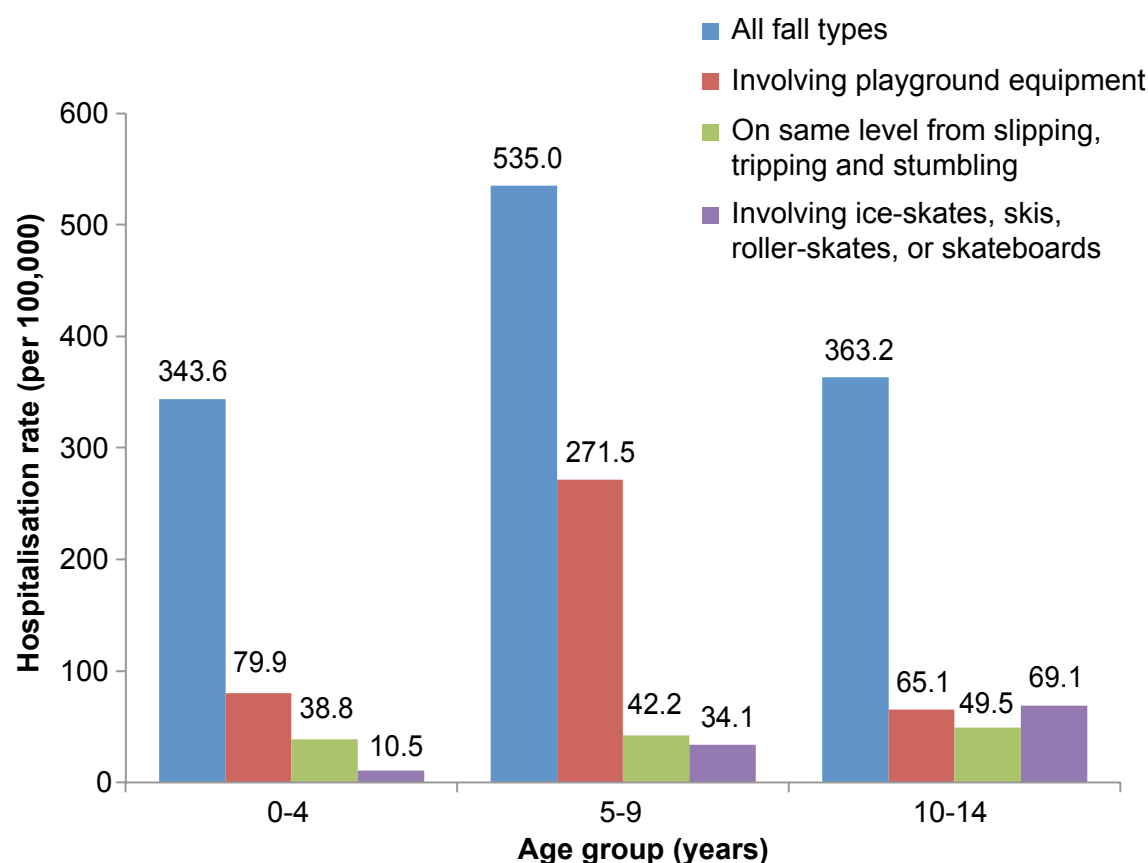
Falls involving ice-skates, skis, roller-skates, and skateboards are the third-leading cause of falls in children, and are the leading cause of falls among 10–14-year-olds. In general, the older the child, the more at risk they are of being hospitalised from a fall involving ice-skates, skis, roller-skates, and skateboards. (Figure 19, see Appendix B for further detail).

Distribution by gender and ethnicity

Male children aged 0 to 14 were hospitalised from falls at nearly 1.5 times the rate of females between 2008 and 2012, with 482 out of every 100,000 male children hospitalised compared with 341 females.⁵¹

Māori children are also disproportionately likely to be hospitalised from non-fatal fall injuries, with around twice as many Māori children as Asian hospitalised between 2008 and 2012, with 427 out of every 100,000 Māori children hospitalised compared with 215 Asian children. Rates of injury among European/other and Pacific Island children fall between those of Māori and Asian children, at 330 and 357 children per 100,000, respectively.

FIGURE 19: NON-FATAL INJURY FROM FALLS IN CHILDREN AGED 0–14 BY LEADING CAUSE AND AGE GROUP, 2008–2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

⁵¹ 95% confidence intervals did not overlap, with the upper bound for girls at 349.9 hospitalisations from falls per 100,000 and the lower bound for boys at 459.3.

Design and standards

There is currently no voluntary New Zealand Trampoline Standard. Safekids Aotearoa believes an updated mandatory standard is warranted.

Playground standards - The standard for playgrounds is NZS 5828:2004 Playground equipment and surfacing. (Voluntary)

Playground equipment is governed by the Building Act 2004 http://www.legislation.govt.nz/act/public/2004/0072/latest/DLM5770963.html?search=qs_act%40bill%40regulation%40deemedreg_playground_resel_25_h&p=1&sr=1

Bunk beds – see <http://www.consumeraffairs.govt.nz/for-consumers/goods/product-safety/keeping-kids-safe/bunk-beds>

High chairs – see <http://www.consumeraffairs.govt.nz/for-consumers/goods/product-safety/keeping-kids-safe/high-chairs>

Baby walker standard – see <http://www.consumeraffairs.govt.nz/legislation-policy/acts-regulation/product-safety-standards/mandatory-standards/baby-walkers>

Bikes, scooters and skates -

All new pedal bicycles sold in New Zealand with a wheel base of 640mm or greater must meet the safety standard AS/NZS 1927. Children's tricycles are considered toys and are not covered by the safety standard applying to bicycles. They should meet the toy safety standard AS/NZS ISO 8124.1.

There are a number of voluntary standards that the manufacturer may have followed for skateboards and scooters. Retailers should be asked if a skateboard or scooter complies with any safety standards before they are purchased. Ref: http://www.consumeraffairs.govt.nz/news/word-of-advice/2013/keeping-children-safe-on-wheels/?searchterm=skate*

Prevention

While childhood falls are often viewed as part of growing up, they can cause serious injury and in some cases are fatal.

Prevention strategies to reduce child fall related injuries and fatalities need to consider the age of the child and the setting in which they live and play.

Falls prevention and assessment of evidence at a glance

- Playground equipment height and surface standards and compliance – very good evidence
- Reducing exposure to falls from within buildings and homes e.g. through stair guards – good evidence
- Personal protective equipment such as a helmet for use with skateboards, skates, skiing or scooters – the evidence is promising
- Reduce use of baby walkers – good evidence
- Reduce the opportunity to fall from cots, beds and bunks – some evidence supports this approach.

Falls prevention evidence

	Effective interventions	Evidence
Engineering	Window guards prevent falls [55,179,180].	Window guards reduce deaths from window falls by 35-50 percent [181]. Regulations requiring window safety mechanisms on rental housing are an effective approach for areas of socio-economic deprivation [179]. Annual inspection and enforcement increases compliance with window guard legislation [181].
	Stair gates may prevent falls down stairs in young children, and are recommended [55].	Inequalities in rates of use may be partially reduced when stair gates are both supplied and installed, however further research on additional barriers is needed [171,183].
	Helmets may reduce the risk of head injury from horse riding falls [55,184,187].	In the United Kingdom, helmet use is mandated for children aged 14 years and younger when riding a horse on the road [189].
Enforcement	Legislation of playground height and surfacing materials reduces risk of injury to children.	Surfacing materials such as sand or wood chips to a depth of 300mm are recommended to prevent playground equipment-related injury. The risk of any playground-related fall injury is two times greater if falling onto a hard surface, compared with a soft surface [192]. Optimal equipment height of playground equipment to reduce risk of head injury is 1.5m [179,190,191].
	Legislation banning baby walkers removes a larger portion of existing risk than parental supervision [179,193].	Community-based initiatives to enhance awareness of baby walker hazards, and support baby walker disposal may contribute to a reduction in baby walker associated injury, and could support legislation banning baby walkers [194]. Primary care interventions to pregnant women can reduce possession and use of baby walkers [195].
Education	Initiatives encouraging fall prevention awareness may reduce fall hazards, and support actions to prevent falls but not all interventions or education are effective [31,170,179]. Initiatives encouraging the use of fall prevention safety devices increase device use.	A multi-faceted school based health promotion intervention, incorporating playground hazard assessment and remediation, was more effective in reducing playground hazards than providing information alone [196]. Home safety interventions are effective in increasing the proportion of families with appropriately fitted stair gates. Interventions that provide fitted stair gates in addition to education have a greater effect on stair gate use [170]. The Waitakere Community Injury Prevention programme resulted in significant increases in ownership of stair gates [40]. Home safety interventions providing free, low-cost or discounted safety equipment are variable in efficacy. Some are more effective in supporting injury prevention in the home than interventions not doing so [170]. For trampoline safety Safekids recommends active supervision, one child at a time, following trampoline manufacturer instructions, positioning trampolines on even ground, with minimum surrounding clearance of 2 metres and upward clearance of 7.3 metres, and regular inspection and maintenance [226].

WARNING NO LIFEGUARD ON DUTY

Children under the age of 14 should not use spa or pool without an adult in attendance



6 Drowning

Summary

- Drowning is the third-leading cause of death from unintentional injury in children aged 0 to 14. Around 37 children die or are hospitalised from drowning each year, which is around 4 in every 100,000 children. There has been a slight decline in the rate of child injury from drowning since 2001.
- Drowning fatalities and hospitalisations in children are highest among those aged 0 to 4, with the rate of injury in this age group around five times higher than in children aged 5 to 9, and more than six times higher than in children aged 10 to 14.
- Male children were nearly twice as likely to be injured from unintentional drowning than females, and rates of drowning injury among Māori children were three times as high as those of Asian children, and nearly twice as high as European/other and Pacific Island children.
- We could reduce the burden of child injury from drowning in New Zealand by
 - Personal flotation devices in boats – good evidence
 - Child-proof perimeter or isolation fencing for domestic swimming pools (including spas) – very good evidence
 - Swimming training – fair evidence
 - Supervision – quite good evidence

The big picture

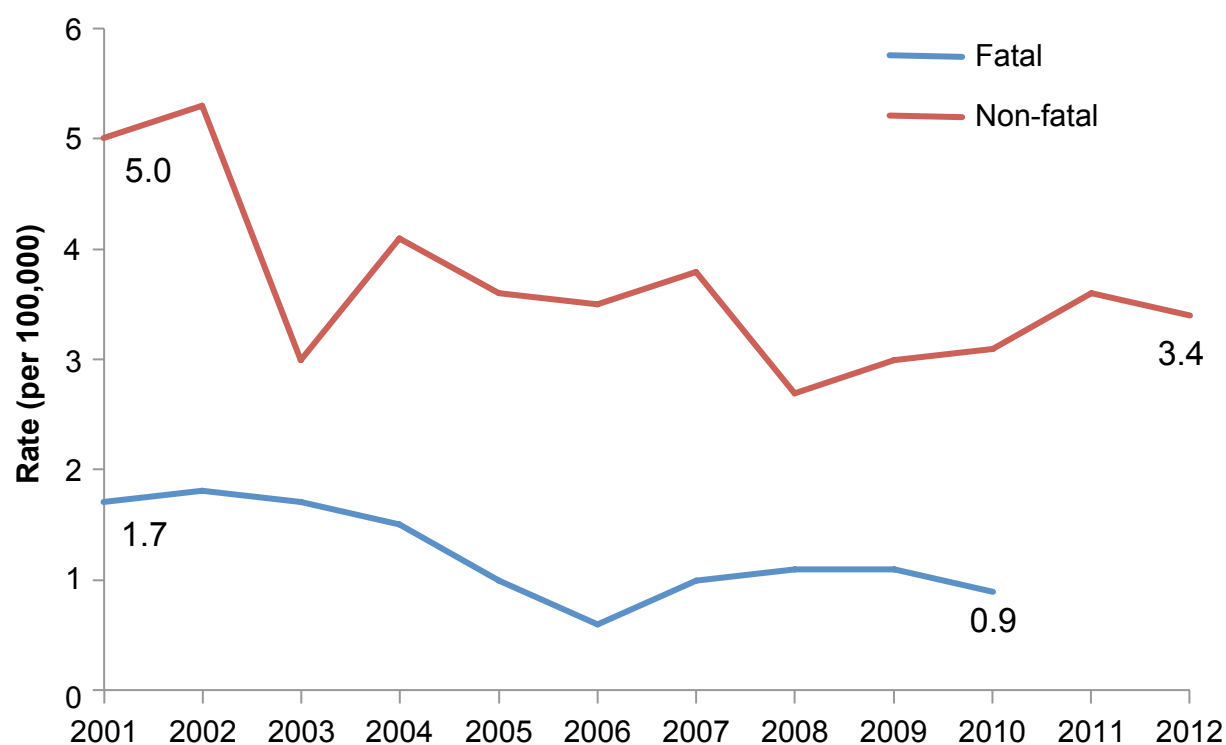
Drowning is the third-leading cause of death from unintentional injury in children aged 0 to 14, with around 8 child deaths from drowning each year between 2006 and 2010. Although drowning is not a leading cause of non-fatal unintentional injury among children, a further 28 children were hospitalised from drowning-related injuries each year between 2008 and 2012.

Taken together, this means that around 36 children die or are hospitalised from drowning each year, which is around 4 in every 100,000.

Changes over time

There has been a decline in the rate of child injury from drowning since 2001, with fatalities declining from 1.7 per 100,000 children in 2001 to 0.9 in 2010, and hospitalisations declining from 5 in every 100,000 children in 2001 to 3.4 in 2012 (Figure 20).⁵²

FIGURE 20: INJURIES (FATAL AND NON-FATAL) FROM DROWNING IN CHILDREN AGED 0-14 OVER TIME, 2001 TO 2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

⁵² $r = -0.77$ for fatalities; $r = -0.64$ for hospitalisations. (Both are strong linear relationships).

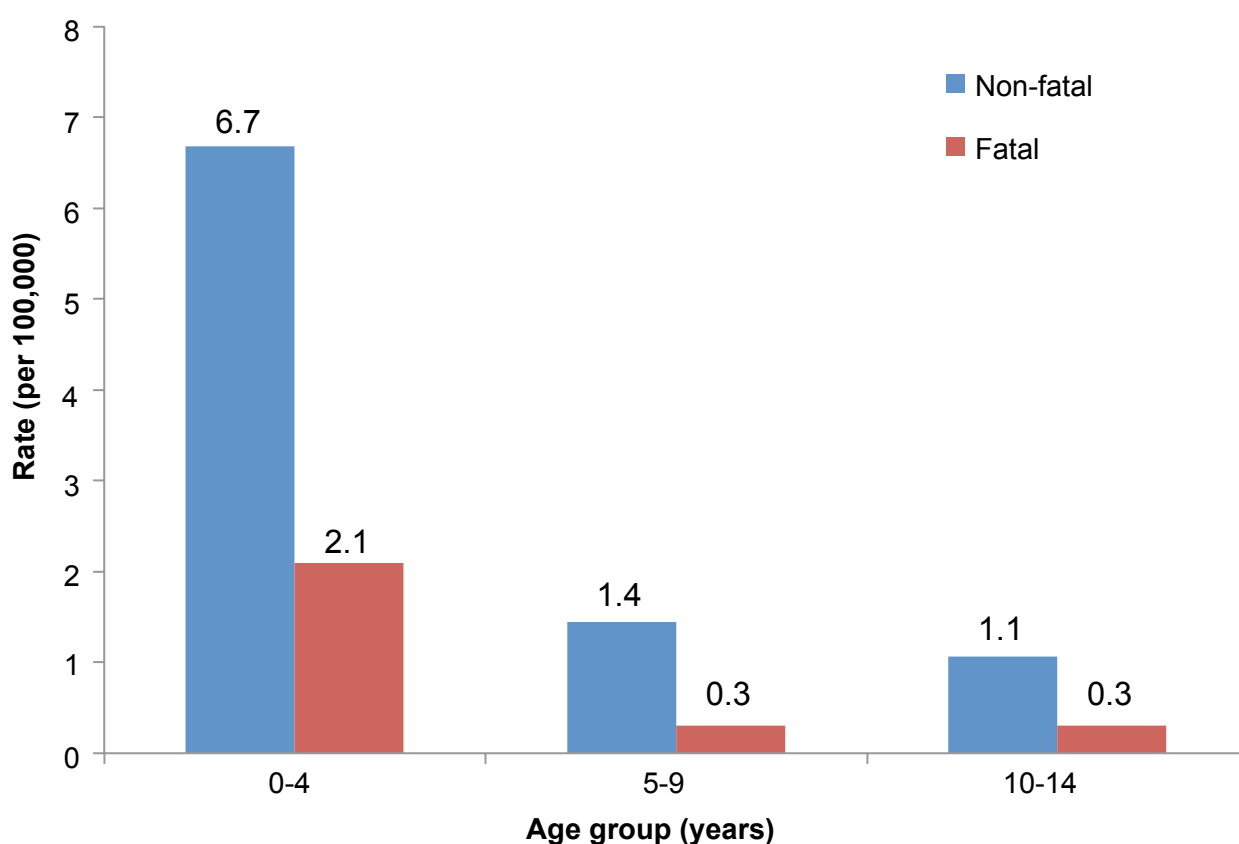
Distribution by age, gender, and ethnicity

Drowning fatalities and hospitalisations in children are highest among those aged 0 to 4, with the rate of injury in this age group around five times higher than in children aged 5 to 9, and more than six times higher than in children aged 10 to 14 (Figure 21).⁵³ Pre-schoolers are particularly at risk of drowning in “immersion incidents”, in which victims have no intention of entering the water for recreational purposes (e.g., victims are accidentally immersed in rivers, baths, or buckets). Around one-quarter of immersion fatalities involve pre-schoolers.⁵⁴

Male children aged 0 to 14 were nearly twice as likely to be injured from unintentional drowning as females. While there are around 3 deaths or hospitalisations from drowning in every 100,000 female children, there are more than 5 deaths or hospitalisations in every 100,000 male children.⁵⁵

Māori children are also over-represented in drowning injuries, with hospitalisation rates three times as high as those of Asian children, and nearly twice as high as European/other and Pacific Island children between 2008 and 2012.

FIGURE 21: FATAL (2006-2010) AND NON-FATAL (2008-2012) DROWNING IN CHILDREN AGED 0-14 BY AGE GROUP, 2008 TO 2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

⁵³ 95% confidence intervals for both fatal and non-fatal drowning injuries for children aged 0 to 4 did not overlap with the CIs of other age groups, and were therefore significantly higher at a 0.05 level.

⁵⁴ Proffitt C, Beacham M. The New Zealand Injury Prevention Outcomes Report – June 2012. Wellington: Accident Compensation Corporation; 2012.

⁵⁵ 95% confidence intervals for both fatal and non-fatal drowning injuries for male children did not overlap with the CIs of females, and were therefore significantly higher at a 0.05 level.

Relevant legislation and standards

The Fencing of Swimming Pool Act

The act promotes the safety of young children by requiring the fencing of certain swimming pools. (Fencing of Swimming Pools Act 1997)

<http://www.legislation.govt.nz/act/public/1987/0178/latest/DLM124442.html?src=qs>

Life jacket standard

Boat operators must carry a correctly sized, serviceable lifejacket for each person on board a pleasure boat in New Zealand. This is a legal requirement and applies to all boats. Children should wear lifejackets at all time in boats under 6 metres. Lifejackets must meet the New Zealand Standard (NZS 5823:1999, 2001 or 2005). Also check council by laws.

<http://www.maritimenz.govt.nz/recreational-boating/Lifejackets/Lifejackets.asp>

Prevention

Childhood drowning tends to be silent and fast.

The locations in which children drown reflect their developmental activity and the environments in which they spend time. The speed at which children drown suggests that the active supervision of children around water is an important strategy.

Isolation fencing reduces the risk of young children drowning in domestic swimming pools and spa pools [12].

At-risk groups, include Māori, pre-schoolers, and males participating in recreational activities.

Drowning prevention and assessment of evidence at a glance

- Personal flotation devices in boats - good
- Child-proof perimeter or isolation fencing for domestic swimming pools (including spas) – very good
- Swimming training - fair
- Supervision – quite good

Drowning prevention evidence

	Effective interventions	Evidence
Engineering	Use of personal flotation devices (PFD) may prevent drowning [104,105]	Use of a PFD doubles the chance of surviving a boating incident [105]. Use of a PFD may prevent half of all boating related deaths that would otherwise occur [104].
	Provision of safe swimming places and elimination of common hazards prevent injury [55,107,108].	Actions recommended to prevent drowning include: installing four-sided isolation fencing around paddling and permanent pools, always latching pool gates, safely storing buckets, drums and other containers to prevent rainwater collection, emptying baths, paddling pools and buckets when not in use, shutting bathroom and toilet doors and covering septic and water tank openings [55,110,111]. Effective signage about safe swimming should reinforce previous awareness and education action [106,107]. Drain covers and special filter equipment can prevent entrapment and hair entanglement in pools [110].
Enforcement	Legislation requiring fencing with secure, self-latching gates for all pools (old and new public, semi-public and private) prevents drowning when well enforced [55,112,113].	Four-sided fencing that completely isolates a pool can prevent more than 50 percent of pool-related drowning in young children [110]. The New Zealand Fencing of Swimming Pools Act (1987) [114] reduced annual drowning among children aged less than five years in home swimming pools from from 12 to two per year [111]. Australian research shows that enforcement is essential for legislation to be effective [116,117]. Government inspections increased compliance with pool fencing laws from approximately 50 percent to 97 percent [118]. A 2006 New Zealand survey of enforcement of the Fencing of Swimming Pools Act (1987) found that 63 percent of 49 responding local authorities had a re-inspection programme for domestic pools - an increase from 28 percent in 1997. The Building Act 2004 requires local authorities to undertake regulatory building control work, and may have supported an increase in enforcement and compliance with the Fencing of Swimming Pools Act (1987) [115].

	<p>Legislation requiring child PFD use is recommended [55] and may increase use [119].</p>	<p>Use of PFD by children increased from 52 percent to 83 percent 13-16 months after a regulation requiring all persons on board small powered recreational vessels to wear a PFD was enacted in Victoria, Australia [120].</p> <p>Even with varying enforcement, child PFD use prevalence is 89-95 percent in the United States, which has 48 states with PFD legislation for children [119].</p>
	<p>Appropriately staffed, qualified, trained and equipped lifeguards appear to be part of an effective prevention strategy [55,108,121,122].</p>	<p>Lifeguards offer multiple layers of prevention that appear to be effective in water safety and drowning prevention including: role modeling, water safety awareness and education, monitoring of the aquatic environment for hazard identification and avoidance, enforcement of water safety rules and regulations, rescue and resuscitation [121].</p>
Education	<p>Community-based interventions regarding water safety, including the need for supervision and use of PFD, may increase water safety practices [113,121,123].</p>	<p>A water safety awareness and education campaign in Victoria, Australia may have contributed to a 56 percent reduction in the drowning rate since 1998 [123].</p> <p>Community interventions including PFD loan schemes may increase child PFD use, and reduce drowning [113, 124,125].</p> <p>Supervision is an important component of water safety. Supervision is lacking in the majority of child drownings under the age of five years [126,127]. Observational research at 18 New Zealand beaches found that more than a quarter of caregivers failed to provide adequate supervision for children aged less than five years at the beach, and nearly half of caregivers failed to provide adequate supervision for children aged five-nine years, highlighting the need for actions.</p>
	<p>Water safety and skills training improve swimming performance [113], and may prevent drowning in young children [106,121].</p>	<p>Swimming lessons for toddlers are an opportunity to reiterate to adult caregivers the importance of supervision, and address misconceptions, such as overestimating the protective role of lessons [129,130].</p> <p>Swimming instruction for children aged one to four years may reduce drowning [106,121].</p> <p>Swimming instruction must be considered as only one aspect of a multilayered approach to drowning prevention that also includes effective barriers, appropriate adult supervision and resuscitation training [110,121,126].</p> <p>Swimming skills and water safety programmes have positive impacts for vulnerable population groups. WaterSafe Auckland's Pools2Schools initiative provides schools in areas of high socioeconomic deprivation with a portable pool, and instructor training to teach children aquatic confidence, how to swim, survival skills and critical thinking. Children involved in this initiative have learnt water safety and survival skills, and have an increased awareness of decision making in aquatic environments [132]. Evaluation of an Auckland water safety education programme for refugees and new settlers aged 5-18 years showed an improvement in swimming skills, and understanding of key water safety messages compared with skills and understanding prior to the programme, although it is unclear if this has an impact on drowning prevention [133].</p>



7 Inanimate mechanical forces (crushing, cutting, piercing, jamming injuries from objects)

Summary

- Inanimate mechanical force (e.g., being struck by, cut, or otherwise injured by an object) is the second-leading cause of non-fatal unintentional injury among children. Each year between 2008 and 2012, around 1,493 children were hospitalised with non-fatal inanimate mechanical force injuries, which is 165 in every 100,000 children. The rate of child hospitalisation from non-fatal inanimate mechanical forces has declined since 2001.
- Preschool-aged children have the highest rates of inanimate mechanical force injury, and are especially prone to being caught, crushed, jammed, or pinched between objects. Older children were more often injured from contact with sharp glass or being struck by or against objects (e.g. sports equipment).
- Boys were hospitalised from inanimate mechanical force injuries at nearly 1.5 times the rate of females.
- Pacific Island and Māori children were hospitalised from inanimate mechanical force injuries at around twice the rate of other ethnic groups. Pacific Island children had especially high rates of injury from being caught, crushed, jammed, or pinched between objects.
- To help prevent inanimate mechanical force injuries in children:
 - Safety glass – good evidence
 - Home visiting programmes – promising evidence

The big picture

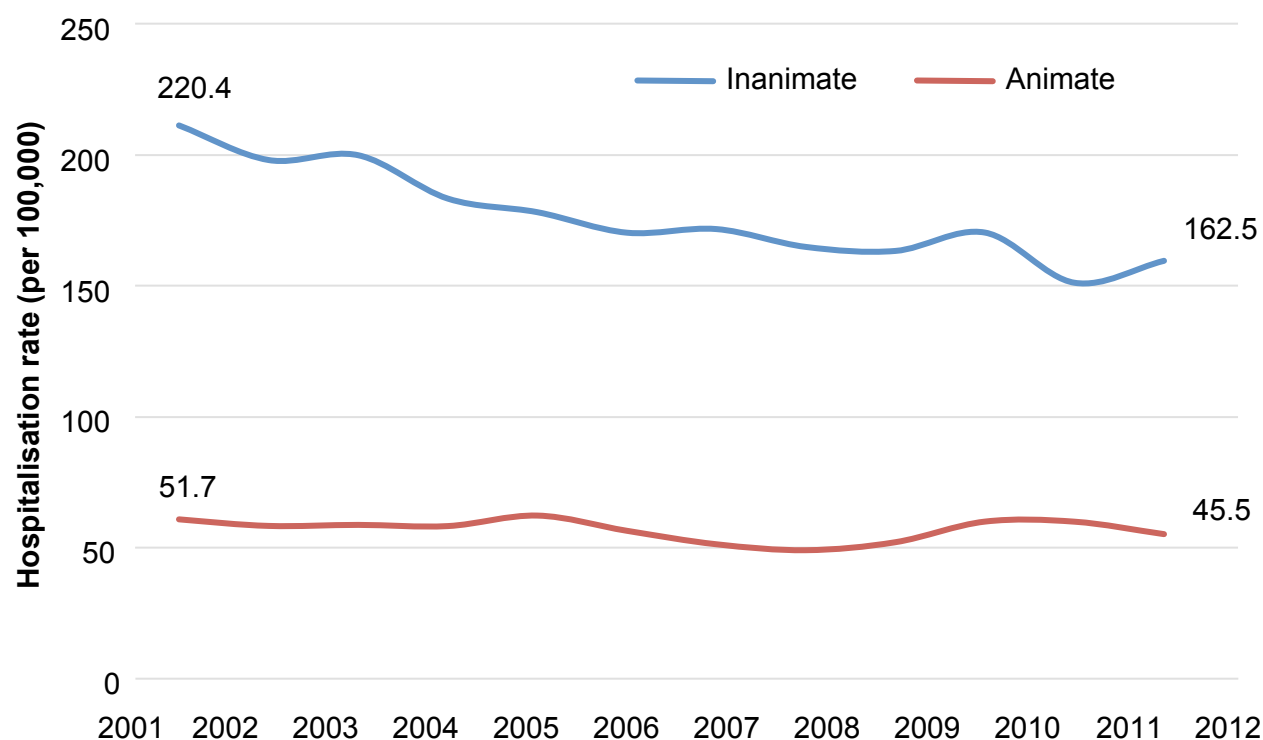
Inanimate mechanical force injuries are those incurred through being struck by, cut, or otherwise injured by an object. This includes being caught, crushed, jammed, or pinched between objects. It can include sports injuries, jammed fingers, and injuries from sharp objects such as knives, scissors, or glass.

Inanimate mechanical force is the second-leading cause of non-fatal unintentional injury among children, causing around 1,493 child hospitalisations each year between 2008 and 2012. This is around 165 in every 100,000 children.

Changes over time

There has been a decline in the rate of non-fatal injury from inanimate mechanical forces among children between 2001 and 2012, with around 220 in every 100,000 children hospitalised in 2001 and 162 in 2012 (Figure 22)⁵⁶.

FIGURE 22: NON-FATAL INJURIES FROM INANIMATE AND ANIMATE MECHANICAL FORCES IN CHILDREN AGED 0-14 OVER TIME, 2001 TO 2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

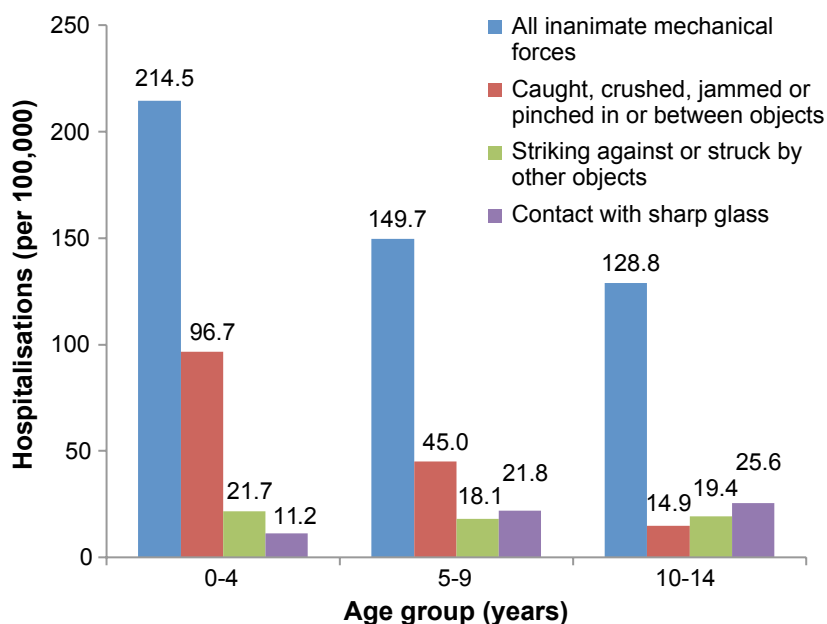
⁵⁶ $r = -0.93$ (a strong linear relationship).

Leading cause by age group

Children aged four years and under were hospitalised with mechanical force injuries at around 1.5 times the rate of older children between 2008 and 2012 (Figure 23).

Nearly half (45%) of injuries in children aged four and under were caused by being caught, crushed, jammed, or pinched between objects. This was also the leading cause of inanimate mechanical force injury in 5–9-year-olds, causing around one-third of inanimate mechanical force injuries in this age group. In contrast, the leading cause of inanimate mechanical force injury in 10–14-year-olds was contact with sharp glass, followed by being struck against objects, especially sports equipment (Figure 23, see also Appendix B).

FIGURE 23: NON-FATAL INJURY FROM INANIMATE MECHANICAL FORCES IN CHILDREN AGED 0–14 BY LEADING CAUSE AND AGE GROUP, 2008–2012.

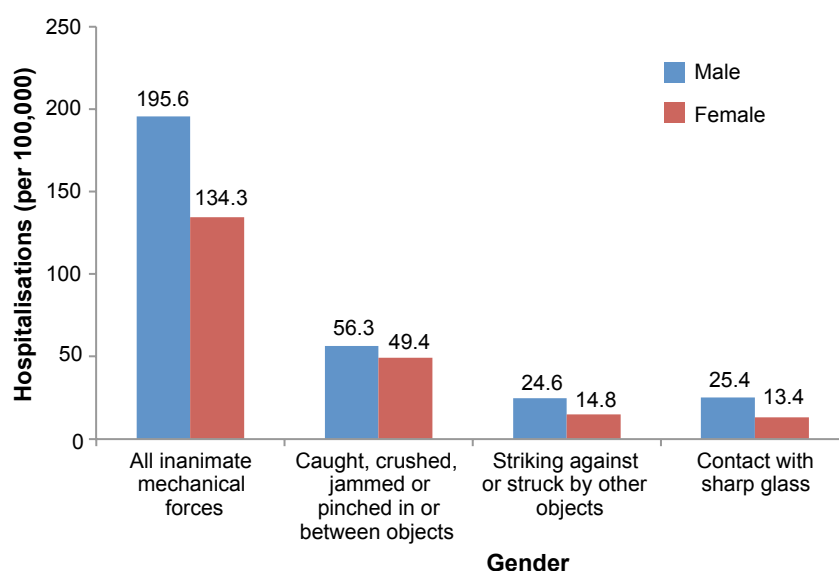


Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

Distribution by gender and ethnicity

Male children were hospitalised from inanimate mechanical force injuries at nearly 1.5 times the rate of females between 2008 and 2012, with around 196 in every 100,000 boys hospitalised and 134 in every 100,000 girls (Figure 24).

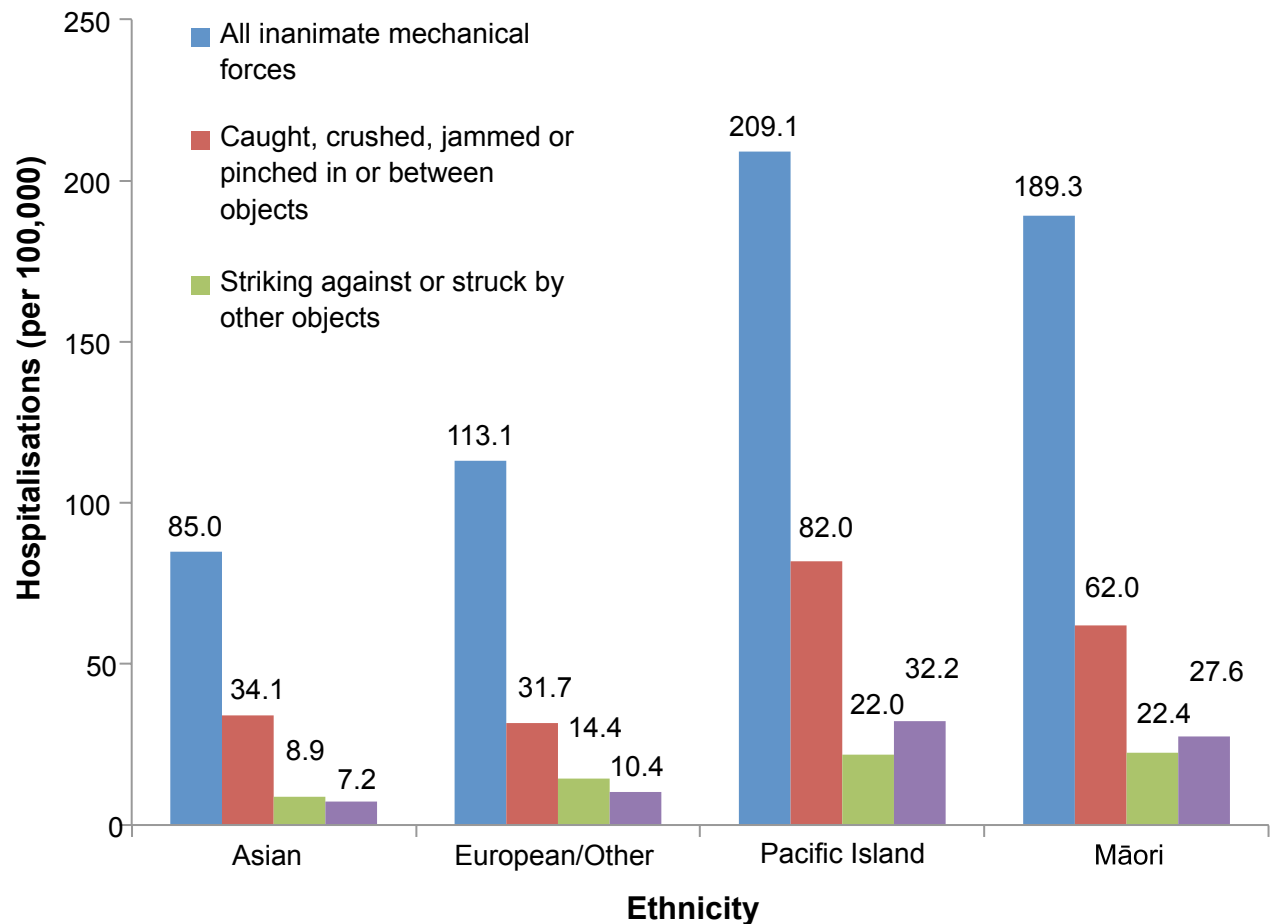
FIGURE 24: NON-FATAL INJURY FROM INANIMATE MECHANICAL FORCES IN CHILDREN AGED 0–14 BY LEADING CAUSE AND GENDER, 2008–2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>

Pacific island and Māori children were hospitalised from inanimate mechanical force injuries at around twice the rate of Asian and European/other children (Figure 25). Pacific island children had especially high rates of injury from being caught, crushed, jammed, or pinched between objects.

FIGURE 25: NON-FATAL INJURY FROM INANIMATE MECHANICAL FORCES IN CHILDREN AGED 0–14 BY LEADING CAUSE AND ETHNICITY, 2008-2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

Design and standards

The Building Code has a clause (Clause F2 Hazardous Building Materials) that outlines where and how safety glass must be used in new buildings. The New Zealand Standard 4223:1999 also gives guidance about minimum requirements for glazing in buildings where people risk injury by falling onto glass.

Prevention

Severe and fatal injuries happen when children fall through glass windows or doors that are not fitted with safety glass. Children also receive severe foot or leg injuries after being run over by lawn mowers. Injury prevention opportunities include ensuring the effective removal of broken glass from public spaces; encouraging children to wear footwear; the increased use of safety glass in windows and doors; increased awareness of the dangers of equipment such as lawn mowers and kitchen equipment; and keeping fences and playgrounds in good repair.

Inanimate forces evidence at a glance

- Safety glass – good
- Home visiting programmes - promising

Inanimate mechanical forces evidence

	Effective interventions	Evidence
Engineering	Safety glass	<p>Safety glass is glass that has been treated so that it will be unlikely to cause harm when it is cracked or broken. Safety glass can be used in areas where falls are possible, for example, ranch sliders, shower enclosures, or around stairs.</p> <p>Government building rules require safety glass is used in places where an injury might occur should the glass be broken [248].</p>
Education	Home visiting programmes	<p>Injuries are most likely to occur when parents are unable to predict a child's ability to perform tasks such as climbing furniture. Parenting programmes are effective in improving home safety, particularly amongst families considered at risk [249-251].</p>



8 Animate mechanical forces (bites, stings, injuries from humans, animals, insects etc.)

Summary

- Animate mechanical force (e.g., being bitten, struck, or otherwise injured by another person or an animal) is the third-leading cause of non-fatal unintentional injury among children. Each year between 2008 and 2012, around 413 children were hospitalised with non-fatal animate mechanical force injuries, which is 46 in every 100,000 children.
- Children aged 10 to 14 had higher rates of hospitalisation from animate mechanical force injury than younger children between 2008 and 2012. In particular, older children were more prone to injury from accidental contact (e.g. bumping into or being hit, struck, twisted, or bitten) with another person, which perhaps reflects older children's higher participation in contact sports. In contrast, the leading cause of injury from animate mechanical forces in children aged 9 and below was contact with a dog.
- Boys were hospitalised from inanimate mechanical force injuries at nearly twice the rate of females, and were especially prone to injury from contact with another person.
- Māori children had the highest rates of non-fatal injury from animate mechanical forces, followed by Pacific Island children. Māori children were especially prone to being injured from contact with a dog.
- To help prevent animate mechanical force injuries in children:
 - Educate families on neutering male dogs and avoiding choosing unsafe breeds as pets – promising
 - Educate children on how to interact with unfamiliar and pet dogs (although the evidence is mixed)

The big picture

Animate mechanical force injuries are those incurred through being struck, bitten, or otherwise injured by an animal, such as a human, dog, or insect. Animate mechanical force is the fourth-leading cause of non-fatal unintentional injury among children, causing around 413 child hospitalisations each year between 2008 and 2012. This is about 46 in every 100,000 children.

Changes over time

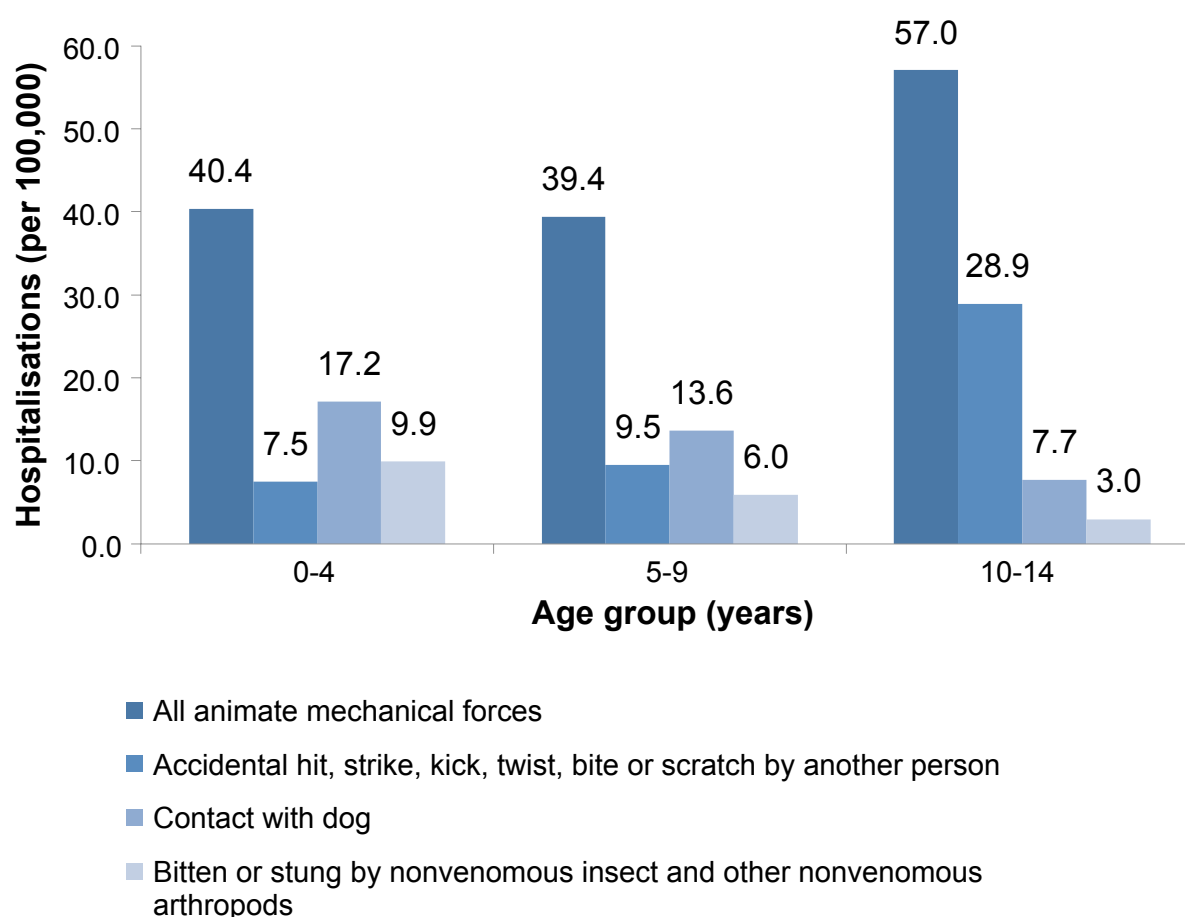
There has not been a steady decline in injuries from animate mechanical forces between 2001 and 2012, with around 52 children out of every 100,000 hospitalised from animate mechanical force injuries in 2001, and 46 in 2012 (Figure 22).⁵⁷

Leading cause by age group

Hospitalisation from animate mechanical forces among children aged 10 to 14 years was around 1.5 times the rate for children aged 9 and under. Most of these injuries in this older age group were from being unintentionally hit, struck, kicked, twisted, bitten, scratched or bumped by another person. This may be related to greater participation in contact sports in this age group.

In contrast, the leading cause of injury from animate mechanical forces in children aged 9 and under was contact with a dog, which accounted for 43 per cent of hospitalisations from animate mechanical forces in children aged 0 to 4, and 35 per cent in children aged 5 to 9. Younger children were also at greater risk of being bitten or stung by a nonvenomous insect than children aged 10 and over (Figure 26)

FIGURE 26: NON-FATAL INJURY FROM ANIMATE MECHANICAL FORCES IN CHILDREN AGED 0-14 BY LEADING CAUSE AND AGE GROUP, 2008-2012.



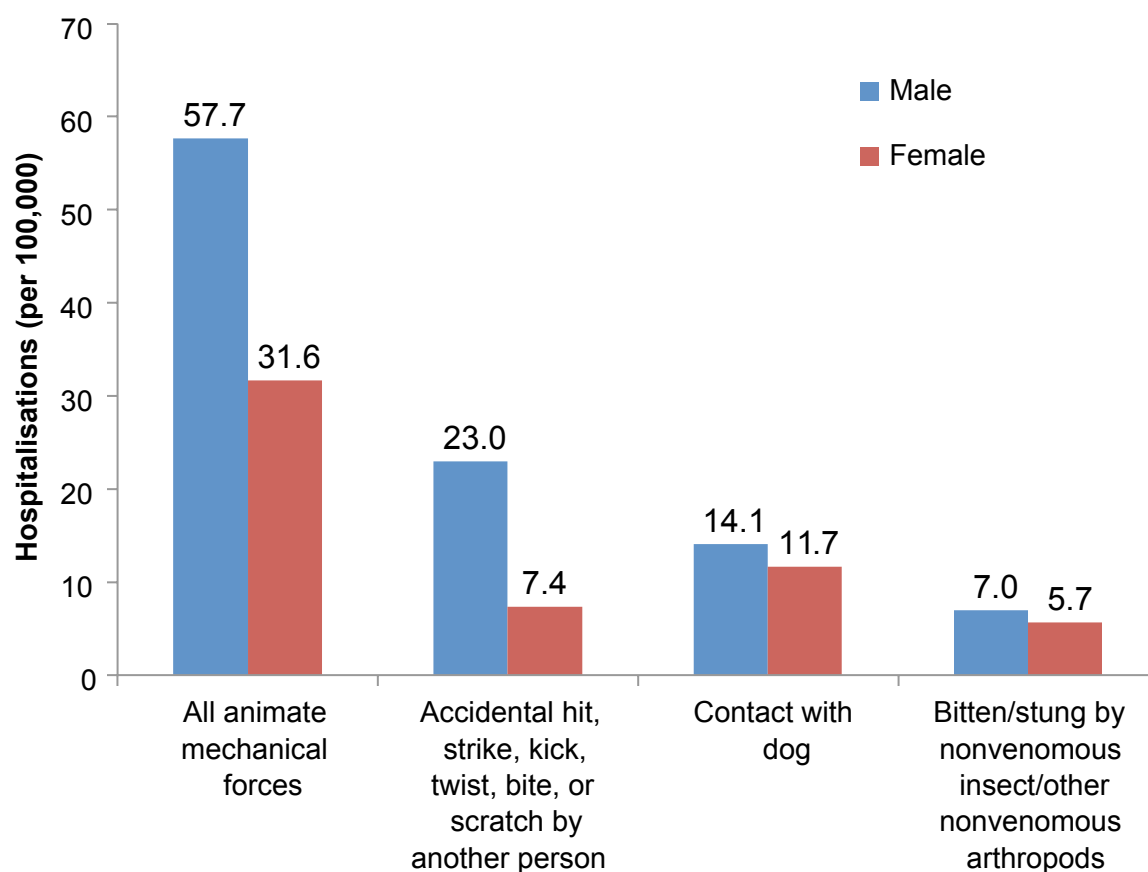
Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

⁵⁷ $r = -0.34$ (a weak linear relationship).

Distribution by gender and ethnicity

Boys were nearly twice as likely to be hospitalised from non-fatal animate mechanical force injuries as girls between 2008 and 2012 (Figure 27). In particular, boys were hospitalised from being accidentally hit, kicked, twisted, bit, or scratched by another person at three times the rate of girls.

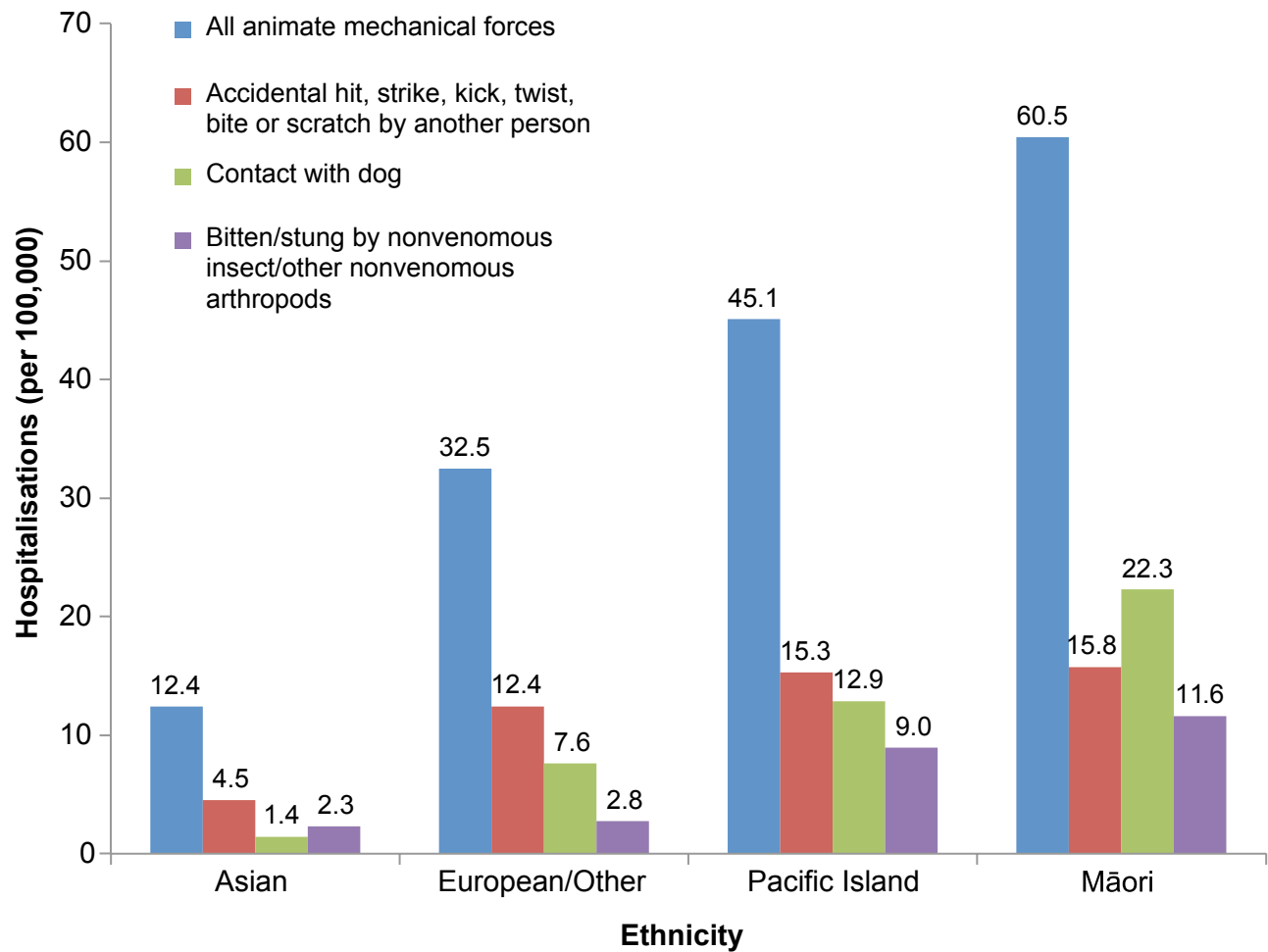
FIGURE 27: NON-FATAL INJURY FROM ANIMATE MECHANICAL FORCES IN CHILDREN AGED 0–14 BY LEADING CAUSE AND GENDER, 2008-2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

Māori children had the highest rate of hospitalisation from animate mechanical force injury, with nearly five times the rate of hospitalisation than Asian children, and twice the rate of European/other children. Pacific Island children had the second-highest hospitalisation rate. In particular, Māori children had the highest rate of injury from contact with dogs, with around 22 in every 100,000 Māori children hospitalised with non-fatal injuries from contact with dogs between 2008 and 2012 (Figure 28).

FIGURE 28: NON-FATAL INJURY FROM ANIMATE MECHANICAL FORCES IN CHILDREN AGED 0–14 BY LEADING CAUSE AND ETHNICITY, 2008-2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

Relevant legislation and standards

Dog Control Act 1996

http://www.legislation.govt.nz/act/public/1996/0013/latest/DLM374486.html?search=ts_act%40bill%40regulation%40deemedreg_dog_resel_25_a&p=1

Banned breeds

http://www.legislation.govt.nz/act/public/1996/0013/latest/DLM375498.html?search=sw_096be8ed80eadfae_ban_25_se&p=1

Dog control bylaws

http://www.legislation.govt.nz/act/public/1996/0013/latest/DLM374833.html?search=sw_096be8ed80eadfae_muzzled_25_se&p=1

Prevention

Responsible dog ownership, including separating young children from dogs, avoiding high risk dogs, neutering, regulatory enforcement, and standardised monitoring of bites have been suggested as prevention strategies, along with teaching children how to approach a dog safely. The efficacy of these approaches is uncertain but promising.

Animate forces evidence at a glance

- Educating families on neutering male dogs and avoiding choosing unsafe breeds as pets – uncertain
- Educating children on how to interact with pet dogs - uncertain

Animate forces evidence

	Effective interventions	Evidence
Enforcement	Dog management programmes on responsible dog ownership.	Limiting dog ownership such as restricting the number of dogs per household, placing the onus of responsibility on the dog owner [245]. It is unclear if dog control policies are having the intended effect [246].
Education	Educational and home-based interventions increase child and parent/caregiver knowledge of on the safe interaction between children and pet dogs	Educating parents about unsafe breeds e.g. some breeds are more likely to bite nonmembers of the household. [247]. The identification of valid and reliable guidelines for safe interaction between children and pet dogs in their homes or known to them and their incorporation in a range of age-appropriate educational resources [246]. It is unclear whether educating children can reduce dog bite injuries in children and adolescents [247].



9 Poisoning

Summary

- Poisoning is the fifth-leading cause of non-fatal unintentional injury in children aged 0 to 14. Around 310 children die or are hospitalised from unintentional poisoning each year, which is around 34 in every 100,000 children. There has been a slight decline in hospitalisations from unintentional poisoning in children since 2001.
- Poisoning disproportionately affects younger children, with around four in every five hospitalisations from unintentional poisoning between 2008 and 2012 in children aged four years and under. Poisoning is most frequently caused by the ingestion of various drugs, medicaments, and biological substances.
- Male and female children were hospitalised with unintentional poisoning injuries at similar rates, though Māori children were disproportionately likely to be hospitalised from poisoning.
- We could reduce the burden of child injury from poisoning in New Zealand through:
 - Use of child resistant packaging, locked cupboards and child resistant door catches – good evidence.
 - Protection from toxic substances through storage i.e. out of the reach and sight of children, in a locked high cupboard – good evidence.
 - Storing toxic substances in original packaging – some evidence.
 - Contacting the National Poisons Centre for expert information – good evidence.

The big picture

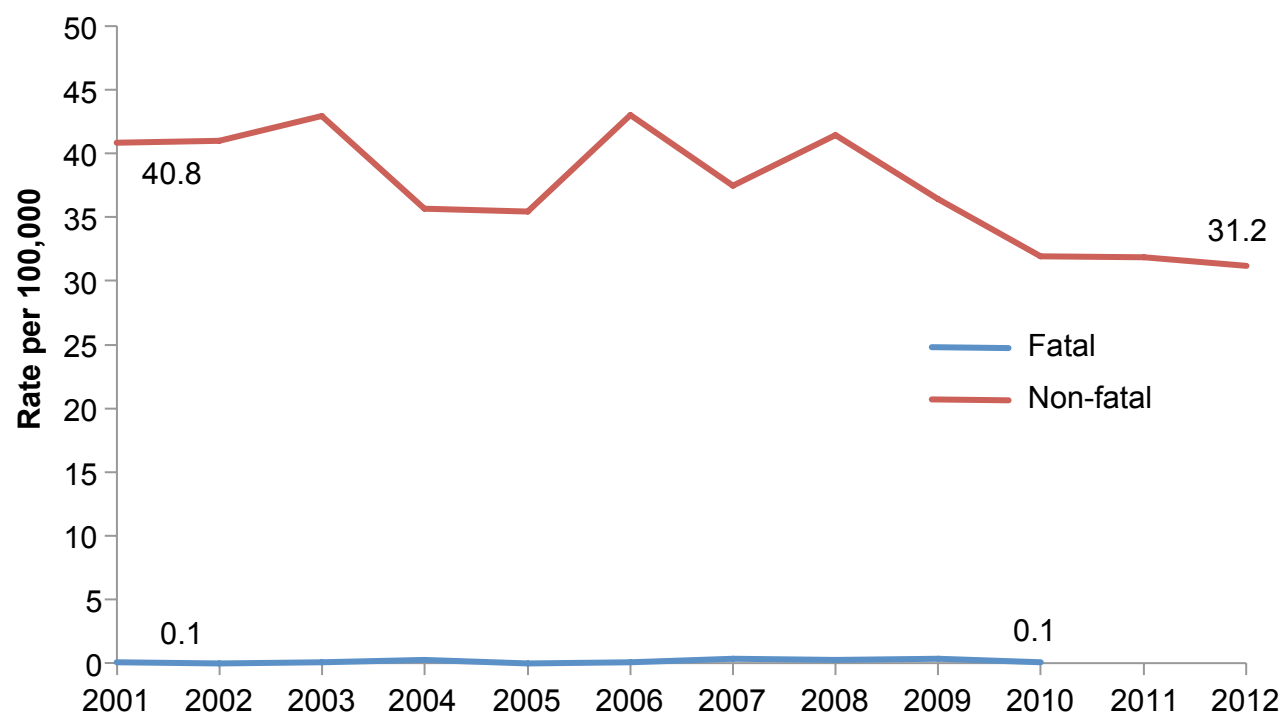
Poisoning is the fifth-leading cause of non-fatal unintentional injury in children aged 0 to 14. Between 2008 and 2012, 1,541 children were hospitalised with non-fatal poisoning injuries, and a further ten died from unintentional poisoning.

Taken together, this means that around 310 children die or are hospitalised from unintentional poisoning each year, which is around 34 in every 100,000 children.

Changes over time

There has been a slight decline in non-fatal poisoning injuries since 2001, with 40.8 in every 100,000 children hospitalised in 2001 and 31.2 in 2012 (Figure 30)⁵⁸.

FIGURE 30: INJURIES (FATAL AND NON-FATAL) FROM POISONING IN CHILDREN AGED 0-14 OVER TIME, 2001 TO 2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

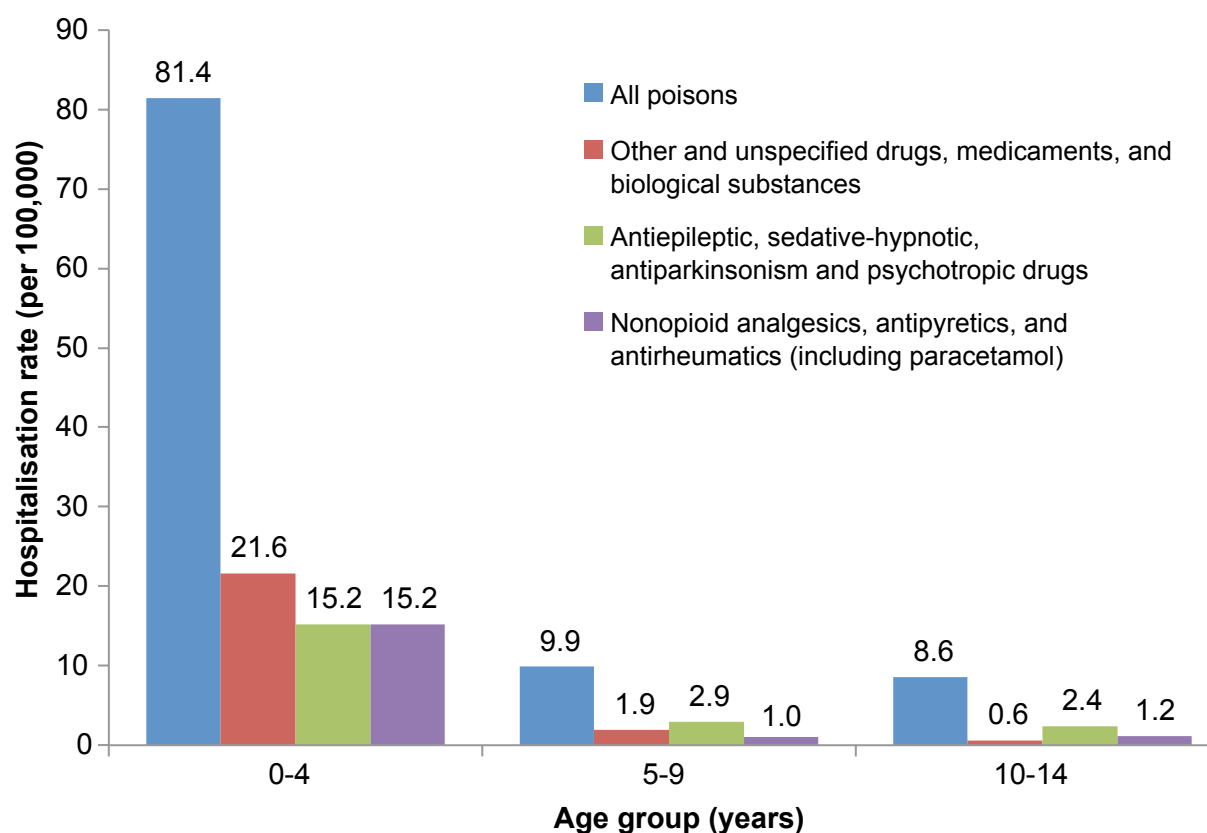
⁵⁸ $r = -0.72$ (a strong linear relationship).

Leading cause by age group

Unintentional poisoning disproportionately affects younger children, with around four in every five hospitalisations from unintentional poisoning between 2008 and 2012 in children aged four years and under (Figure 31).

Poisoning in the 0 to 4 age group was most frequently caused by the ingestion of various drugs, medicaments, and biological substances, as outlined in Appendix B, Table B 4. Unintentional poisoning from alcohol was more common in children aged 10 to 14 than in other age groups.

FIGURE 31: NON-FATAL INJURY FROM POISONING IN CHILDREN AGED 0–14 BY LEADING CAUSE AND AGE GROUP, 2008–2012.



Source: The National Injury Query System (NIQS); Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

Distribution by gender and ethnicity

Male and female children were hospitalised with unintentional poisoning injuries at similar rates between 2008 and 2012, with around 32 in every 100,000 female children hospitalised and 36 in every 100,000 males.

Māori children were disproportionately likely to suffer a non-fatal injury from unintentional poisoning between 2008 and 2012, with a rate of hospitalisation 1.5 times that of European/other children, twice that of Pacific Island children, and nearly four times that of Asian children. During this time period, around 49 Māori children in every 100,000 were hospitalised from non-fatal unintentional poisoning injuries, compared with 27 European/other, 20 Pacific Island, and 12 Asian.

Relevant legislation and standards

There is no one law or standard covering hazardous substances and packaging requirements. The laws and standards are currently difficult to navigate.

It is noted that there is no current New Zealand standard to guide child resistant packaging. The standard (NZS 5825:1991) Child Resistant Packages, was withdrawn in September 2014. The requirements for pharmacists to use child resistant caps are detailed in the Pharmacy Practice Handbook. Contact the Pharmaceutical Society of New Zealand for details. The required use of safety caps on oral liquid formulations, however, is mandated and listed in Section G of Pharmaceutical Schedule supporting the Medicines Regulations and is determined by the Ministry of Health.

The packaging requirements for toxic substances (Hazardous Substances Packaging Regulations 2001) outline the packaging requirements for hazardous substances. http://www.legislation.govt.nz/regulation/public/2001/0118/latest/DLM41641.html?search=sw_096be8ed804bb4ad_child_25_se&p=1&sr=1

Hazardous substances are allocated to different group standards which guide requirements for safe use and the use of child resistant packaging requirements for individual products and substances.

Prevention

Prevention strategies tend to focus on effective barriers between children and poisonous substances, in particular through the use of safe storage such as high and locked cupboards, and through child resistant packaging and child resistant closures on bottles of medicine, cleaners and chemicals. Child resistant closures, however, are not child-proof. It is also recommended that poisons, cleaning products and medications are stored in their original packaging, and never placed in food or drink containers. They should be safely disposed of after use.

Further information and resources

For further information and resources on reducing poisonings see: Safekids Aotearoa, *Position Paper: Child Poisoning Prevention*. Auckland, Safekids Aotearoa, 2015.

Poisoning prevention and assessment of evidence at a glance

- Use of child resistant packaging – good
- Protection from toxic substances through storage, transport etc. – good
- National Poisons Centre for expert information – good.
- Storing toxic substances in original packaging – some evidence.

Poisoning prevention evidence

	Effective interventions	Evidence
Engineering	Secure storage of medications and poisons removes a larger portion of poisoning risk than parental supervision, and may be an effective means of poisoning prevention [48,55].	<p>Parent/caregiver perceptions of the toxicity of a substance may influence the immediacy and safety of storage – substances that are perceived to be less toxic are less likely to be securely stored [214].</p> <p>Design improvements to packaging and the home environment should be supported by: regulation and education of industry (including clear packaging warning labels), community education regarding supervision and storage and actions to increase accessibility and affordability [215,216].</p>
Enforcement	Legislation requiring child resistant packaging (CRP) reduces the incidence of poisoning [48,217].	International evidence suggests that child-resistant packaging legislation should include all prescription and over-the-counter medications and other hazardous substances [172]. New Zealand legislation requires CRP for specific medicines and chemicals [218,219].
Education	Poison control centres are effective if the public is well informed on how to utilise them [217,220-222].	<p>Poison control centres are cost effective, evidence estimates cost savings of \$13.39 for every \$1 spent on poison control centres, as a large number of poisoning cases can be resolved via expert phone consultation [222].</p> <p>Eighty percent of calls received by New Zealand's National Poisons Centre (NPC) are managed solely by the Centre, preventing the need for further treatment. A recent survey found that 92 percent of callers would seek health care alternatives (ambulance, general practitioners and emergency departments) if there was no NPC [223].</p>
	Educational and home-based interventions increase child and parent/caregiver knowledge of poisons [31], and are effective in increasing safe storage behaviour [170][215]	Home based educational interventions to increase safe storage of medication and cleaning products are effective in increasing safe storage behaviour. Providing safety locks may increase the effectiveness of interventions to increase safe storage of cleaning products, however, more research is needed in this area [215].



10 Burns

Summary

- Burns are the fourth-leading cause of death from unintentional injury in children, and the sixth-leading cause of non-fatal injury. Around 284 children are hospitalised or die from burns each year, which is about 31 in every 100,000. Most non-fatal burn injuries in children are caused by contact with a hot substance or object, while most fatal injuries are caused by exposure to fire or flames.
- Nearly all burn injuries took place within the home, especially the kitchen, and affected children under the age of four. Non-fatal burns were most commonly caused by contact with hot fluids, particularly drinks, food, and fats.
- Pacific Island and Māori children had hospitalisation rates from burns roughly twice those of Asian and European/other children between 2008 and 2012. Male children were also disproportionately affected by burns; with a hospitalisation rate about 1.5 times that of females.
- We could reduce the burden of child injury from burns in New Zealand by
 - Reducing the ignition and burning behaviour of dwellings – good evidence.
 - Installing potentially hazardous equipment such as gas or solid fuel heaters safely – good evidence.
 - Use of working smoke detectors – good evidence.
 - Fire resistant composition of upholstered furniture – good evidence.
 - Child resistant cigarettelighters – good evidence.
 - Fire resistant fabric for children's nightwear – very good evidence.
 - Firefighter interventions and education campaigns such as Firewise and No Cooking when Drunk – promising.
 - Reducing hot water temperatures to 50 degrees Celsius – good evidence.

The big picture

Burns were the fifth-leading cause of death from unintentional injury in children, and the seventh-leading cause of non-fatal injury. Between 2008 and 2012, each year around 281 children were hospitalised from burns, and more than 3 died from burns between 2006 and 2010.

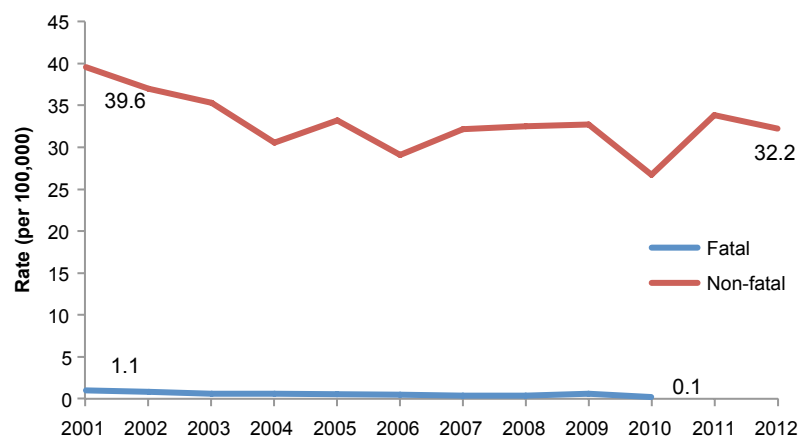
Taken together, this means that around 284 children are hospitalised or die from unintentional burns each year, which is about 31 in every 100,000.

While the majority of most non-fatal burns in children between 2008 and 2012 resulted from contact with a hot object or substance (86%), all fatal burns between 2006 and 2010 were caused by exposure to fire or flames.

Changes over time

There has been a slight decline⁵⁹ in the rate of burn fatalities in children since 2001, though because fatality numbers are small this should be interpreted with caution. Non-fatal injuries have not shown a steady decline, though injury rates in 2012 were slightly lower than in 2001 (32.2 children per 100,000 compared with 39.6).⁶⁰

FIGURE 32: INJURIES (FATAL AND NON-FATAL) FROM BURNS IN CHILDREN AGED 0–14 OVER TIME, 2001 TO 2012.



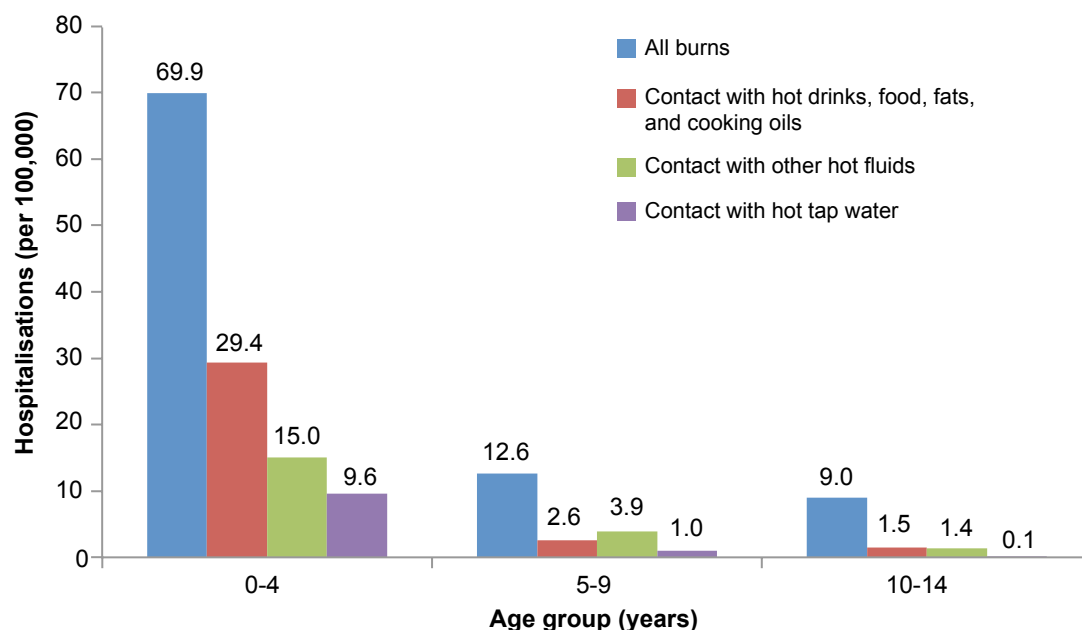
Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

Leading cause by age group

Of those non-fatal burns where a location was specified, nearly all (94%) took place within the home, especially the kitchen.

Over three-quarters (77%) of hospitalisations from burns among children between 2008 and 2012 affected those aged four years and under. Non-fatal burns were most commonly caused by contact with hot fluids, particularly hot drinks, food, and fats (Figure 33).

FIGURE 33: NON-FATAL INJURY FROM BURNS IN CHILDREN AGED 0–14 BY LEADING CAUSE AND AGE GROUP, 2008-2012.



Source: The National Injury Query System (NIQS): Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/niqs/>.

⁵⁹ $r = -0.85$ (a strong linear relationship).

⁶⁰ $r = -0.58$ (a moderately strong linear relationship).

Distribution by gender and ethnicity

Male children aged 0 to 14 were hospitalised from burns at around 1.5 times the rate of females between 2008 and 2012.⁶¹ During this period, around 37 in every 100,000 male children were hospitalised from non-fatal burns, compared with 26 in every 100,000 female children.

Pacific Island and Māori children were hospitalised from burns at roughly twice the rate of Asian and European/other children between 2008 and 2012. During this period, around 45 in every 100,000 Pacific Island children and 44 Māori were hospitalised with non-fatal burn injuries, compared with 25 Asian and 16 European/other children.

Relevant legislation and standards

Cigarette lighter standard

This requires disposable lighters and cheap refillable ones to be child resistant. (The regulations are based on ISO 9994 1995E and 16 CRF 121.4)

<http://www.consumeraffairs.govt.nz/legislation-policy/acts-regulation/product-safety-standards/mandatory-standards/cigarette-lighters>

Children's nightwear standard

This standard applies to all children's nightwear (size 00 to 14) and some daywear (knitted all in one garments from sizes 00-2) and declares that these should have reduced fire hazard. (AS/NZS 1249:2003)

<http://www.consumeraffairs.govt.nz/legislation-policy/acts-regulation/product-safety-standards/mandatory-standards/childrens-nightwear>

Water temperature

The NZ Building Code, Clause G12 requires the use of a tempering valve to permit the storage to be above 60 degrees Celsius and delivery to be below 55 degrees Celsius in new buildings and installations.

http://www.branz.co.nz/cms_show_download.php?id=2c46cd486e0eee3acee9988f06c1507e1626e8af (p.9)

Prevention

Prevention measures focusing on reducing the burning behaviour of dwellings, smoke detectors, child resistant lighters and fire resistant nightwear help to prevent injuries from burns. Prevention measures such as reducing hot water tap temperatures have been shown to be effective in reducing burns.

Burns prevention at a glance

- Reducing the ignition and burning behaviour of dwellings, installing potentially hazardous equipment such as gas or solid fuel heaters safely – good evidence
- Use of working smoke detectors – good evidence
- Fire resistant composition of upholstered furniture – good evidence
- Child resistant cigarette lighters – good evidence
- Fire resistant fabric for children's nightwear – very good evidence
- Firelighter interventions and education campaigns such as Firewise and not cooking drunk – promising.
- Turning down hot water tap temperatures – good evidence

⁶¹ 95% confidence intervals did not overlap, with the lower bound for male children at 31.4 hospitalisations from burns per 100,000, and the upper bound for females at 28.8 per 100,000.

Burns prevention evidence

	Effective interventions	Evidence
Engineering	Product modifications can be a primary prevention strategy to reduce the risk of injuries to children [138-141].	<p>The New Zealand mandatory Product Safety Standards (Cigarette Lighters) Regulations 1998 provides tests to ensure that cigarette lighters cannot be easily operated by children aged less than five years (to be updated in late 2015) [142].</p> <p>Product safety standards and modifications, such as wide based ‘no spill’ cups and stove guards, are effective means to prevent injuries [138].</p> <p>Fire resistant composition of upholstered materials.</p>
	Correctly installed and charged smoke alarms with working batteries are effective early warning devices that reduce injury [138,141].	Use of smoke alarms is recommended by the American Academy of Pediatrics to prevent fatality and injury from residential fires [145].
Enforcement	Legislation and effective enforcement can reduce the risk of burns and scalds from fire, hot water injuries from fireworks and flammable clothing.	<p>Legislation to reduce thermostat settings, coupled with annual educational notices to households would generate significant cost savings and reduce tap water burns [154].</p> <p>Legislation regulating the temperature of household hot water from taps by requiring a safe pre-set temperature for all hot water cylinders is effective in reducing burns, and more effective than educational interventions alone [55,138,147,148].</p> <p>Legislation requiring installation of smoke detectors in new and existing housing is an effective way to increase smoke detector use when combined with multi-factorial community campaigns and reduced price smoke alarms [138].</p> <p>Introduction and enforcement of a smoke alarm mandatory standard for all New Zealand buildings and dwellings would save an estimated nine lives annually; addition of a mandatory standard for ignition resistance of upholstered furniture and mattresses would increase the estimated number of lives saved annually to 13 [157].</p> <p>Legislation regulating flammability of sleepwear is effective in reducing burn injuries when enforced [138,158].</p> <p>Legislation banning the manufacture and sale of fireworks combined with enforcement is the most effective way to restrict supply and prevent fireworks-associated injury [138,161-163].</p> <p>In New Zealand legislation was tightened in 2008, and limits the types of fireworks available, requires testing certificates for available fireworks, limits sparkler sales to fireworks packages of a limited number, and prohibits the sale of fireworks outside a yearly four day period, and to minors (less than 18 years) [164].</p> <p>ACC claims for fireworks-related injuries for children aged 0-14 years have decreased by 41 percent since legislation changes to restrict access to fireworks [165].</p> <p>Countries with legislation restricting or banning the sale of fireworks show an 87 percent post-legislation reduction in the incidence rate of firework-related ophthalmic trauma [166].</p> <p>Education and advocacy campaigns around fireworks are useful as supplemental efforts to support legislation [138,141].</p>
	<p>Reducing ignition and burning behaviour of dwellings.</p> <p>Safe installation of potential hazards: solid fuel heaters.</p> <p>Safe installation of gas / electricity.</p>	These legal regulations address risks identified from analyses of fires. Enforcement is through the NZ Building Act (2004) and associated Compliance Documents and Standards, and the Electricity Act (1992) and Gas Act (1992) which detail certification requirements and licensing of trade personnel.

Education	<p>Community, school and home-based interventions and campaigns may increase burn and scald prevention knowledge and reduce injury, however further research is needed [55,138,173].</p>	<p>Community and home based smoke alarm interventions increase the proportion of households with functional smoke alarms [141,170,171].</p> <p>Smoke alarm installation interventions are more successful when they originate from a community identifying burns prevention as an area of community interest, support a trust relationship with householders from high risk communities, involve an education component and are embedded into wider health programmes [171].</p> <p>A New Zealand community injury prevention intervention including a media campaign and home based educational programme on hot tap water temperature led to significant reductions in hot tap water temperatures [150].</p> <p>Educational interventions that provide a tangible object, such a thermometer to enable measurement of hot tap water temperature, are more effective in reducing hot tap water temperature than education alone [138].</p>
	<p>Fire safety skills training increases child and parent knowledge, and fire safety behaviour [138,175].</p>	<p>Evaluation of the New Zealand Fire Service Firewise school education programme found the programme increased children's knowledge of the dangers of smoke and fire, and of safety behaviours compared with children's knowledge from schools that had not run the programme [176].</p> <p>A three-year evaluation of a New Zealand primary school-based educational intervention run by fire fighters, which introduced children to a new information module each year, found that children's skills improved in some areas of fire safety compared with baseline results [177].</p> <p>Programmes involving authority figures (fire fighters), and using active participation, fear reduction techniques and teaching the rationale for fire safety behaviours improve knowledge and skill retention, particularly if programmes are periodically repeated [175].</p>





Prevention References

- Bland V, Shepherd M, Ameratunga S, et al. "Child and adolescent injury report card: New Zealand 2009". *Journal of Paediatrics and Child Health*. 2011; 47(11): 783-7.
- Craig E, Reddington A, Wicken A, Oben G, & Simpson J. *Child Poverty Monitor 2013 Technical Report (Updated 2014)*. Dunedin: NZ Child & Youth Epidemiology Service, University of Otago; 2013.
- D'Souza A J, Blakely T A, Woodward A. "The effect of eradicating poverty on childhood unintentional injury mortality in New Zealand: a cohort study with counterfactual modelling". *Journal of Epidemiology & Community Health*. 2008; 682: 899-904.
- Injury Prevention Research Unit. National Injury Query System (NIQS). Dunedin: Injury Prevention Research Unit, University of Otago. Available online at: <http://ipru3.otago.ac.nz/niqs/>.
- Safe Kids Canada. *European Child Safety Child safety good practice guide: Good investments in unintentional child injury prevention and safety promotion*. Toronto, 2011. Available online at: <http://www.parachutecanada.org/downloads/research/reports/ChildSafetyGoodPracticeGuide-CanadianEdition.pdf>
- United Nations International Children's Emergency Fund (UNICEF). *A League Table of Child Deaths by Injury in Rich Nations. Innocenti Report Card 2*. Florence (ITA): UNICEF Innocenti Research Centre; 2001.
- Injury Prevention Research Unit. National Injury Query System (NIQS). Dunedin: Injury Prevention Research Unit, University of Otago. Available online at: <http://ipru3.otago.ac.nz/niqs/>
- MacKay M and Vincenten J. *Child Safety Report Card 2012: Europe Summary for 31 Countries*. Birmingham: European Child Safety Alliance, Eurosafe; 2012.
- NZ Mortality Review Data Group. *NZ Child and Youth Mortality Review Committee: 9th Data Report, 2008–2012*. Dunedin: NZ Mortality Review Data Group, University of Otago; 2013. Available online at: <http://www.hqsc.govt.nz/publications-and-resources/publication/1311/>
- NZ Transport Agency. *New Zealand pedestrian profile*. Available online at: <http://www.nzta.govt.nz/resources/nz-pedestrian-profile/6.html>
- O'Dea D. and Wren J. *New Zealand Estimates of the Total Social and Economic Cost of Injuries. For All Injuries, and the Six Injury priority areas. For Each of Years 2007 to 2010. In June 2010 dollars. Report to New Zealand Injury Prevention Strategy*. Wellington, New Zealand. 2012
- Proffitt C, Beacham M. *The New Zealand Injury Prevention Outcomes Report – June 2012*. Wellington: Accident Compensation Corporation; 2012.
- Safekids Aotearoa, *Position Paper: Child Poisoning Prevention*. Auckland, Safekids Aotearoa, 2015.
- Simpson, J, Fougere, G, and McGee, R. "A wicked problem: Early childhood safety in the dynamic, interactive environment of home". *International Journal of Environmental Research and Public Health*. 2013, 10: 1647-1664.
- United Nations International Children's Emergency Fund (UNICEF). *A League Table of Child Deaths by Injury in Rich Nations. Innocenti Report Card 2*. Florence (ITA): UNICEF Innocenti Research Centre; 2001.
- United Nations International Children's Emergency Fund (UNICEF). *Child Poverty in Perspective: An Overview of Child Well-being in Rich Countries. Innocenti Report Card 7*. Florence (ITA): UNICEF Innocenti Research Centre; 2007.

Appendix A: Further information on data and methods

As outlined in section 1.2, mortality data are from the National Mortality Collection, and include deaths among children aged 0–14 years between 2006 and 2010 whose main underlying cause of death was an unintentional injury (V01–Y36).

Non-fatal unintentional injury data are from the National Minimum Data Set (NMDS), and focus on non-fatal hospitalisations among children aged 0–14 between 2008 and 2012. The following were excluded from our data: 1) discharge records with an Emergency Medicine Specialty code (M05–M08) on discharge; and 2) discharge records with the following E code ranges: Y40–Y89 (complications of drugs/medical/surgical care and late sequelae of injury), X60–Y09 (intentional self-harm or assault) and Y10–Y34 (undetermined intent).

Note that hospitalisation data exclude day patients (those who do not stay in the hospital past midnight) and all cases of re-admission for the same injury. Since July 2009 it has been compulsory for DHBs to also report any short stays in the emergency department (ED), in which the patient is seen for at least three hours but is not admitted as an inpatient. Prior to 2009 some DHBs reported short-stay ED events but others did not, which means that the decline in hospitalisations of non-fatal injuries between 2001 and 2012 may be underestimated.

Injury codes

Causes of injury were assigned using the hospitalisation primary ICD 10 AM version 1 codes.

Detailed analyses on injury due to falls, inanimate 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), inanimate mechanical forces (W20–W49), animate mechanical forces (W50–64), drowning or submersion (W65–74), suffocation (W75–W84), thermal injury (W85–X19), and poisoning (X40–X49). Land transport injuries (V01–V89) are further categorised into traffic crash and non-traffic using the fourth digit of the primary E code. or animate mechanical forces, suffocation, and poisoning use the primary E code as submitted to the NMDS, while the remainder of the report uses the primary E code as mapped to ICD-10-AM version 1. Place or location of injury is assigned using the Y92 code associated with the primary E code (as submitted to the NMDS) or the fourth digit of the primary E code for codes submitted in ICD-10-AM version 1.

Appendix B: Additional tables

TABLE B 1: NUMERS, RATES (PER 100,000), AND PERCENTAGES OF LEADING CAUSES FROM NON-FATAL FALL INJURY IN CHILDREN AGED 0–14, 2008-2012.

	0-4			5-9			10-14			Total		
	No.	Rate	%	No.	Rate	%	No.	Rate	%	No.	Rate	%
Fall involving playground equipment	1243	79.9	23.3%	3960	271.5	50.7%	983	65.1	17.9%	6186	136.7	33.2%
Fall on same level from slipping, tripping and stumbling	604	38.8	11.3%	616	42.2	7.9%	748	49.5	13.6%	1968	43.5	10.6%
Fall involving ice-skates, skis, roller-skates or skateboards	164	10.5	3.1%	497	34.1	6.4%	1044	69.1	19.0%	1705	37.7	9.1%
Other fall on same level	300	19.3	5.6%	364	25.0	4.7%	553	36.6	10.1%	1217	26.9	6.5%
Other fall from one level to another	446	28.7	8.3%	369	25.3	4.7%	311	20.6	5.7%	1126	24.9	6.0%
Fall from, out of or through building or structure	385	24.7	7.2%	427	29.3	5.5%	285	18.9	5.2%	1097	24.2	5.9%
Other fall on same level due to collision with, or pushing by, another person	51	3.3	1.0%	207	14.2	2.7%	703	46.5	12.8%	961	21.2	5.2%
Fall from tree	57	3.7	1.1%	526	36.1	6.7%	255	16.9	4.6%	838	18.5	4.5%
Fall involving chair	604	38.8	11.3%	180	12.3	2.3%	53	3.5	1.0%	837	18.5	4.5%
Fall involving bed	482	31.0	9.0%	148	10.1	1.9%	42	2.8	0.8%	672	14.9	3.6%
Unspecified fall	221	14.2	4.1%	193	13.2	2.5%	180	11.9	3.3%	594	13.1	3.2%
Fall on and from stairs and steps	283	18.2	5.3%	145	9.9	1.9%	120	7.9	2.2%	548	12.1	2.9%
Fall while being carried or supported by other persons	269	17.3	5.0%	28	1.9	0.4%	20	1.3	0.4%	317	7.0	1.7%
Fall involving other furniture	182	11.7	3.4%	42	2.9	0.5%	11	0.7	0.2%	235	5.2	1.3%
Fall from cliff	16	1.0	0.3%	28	1.9	0.4%	75	5.0	1.4%	119	2.6	0.6%
Diving or jumping into water causing injury other than drowning or submersion	2	0.1	0.0%	20	1.4	0.3%	72	4.8	1.3%	94	2.1	0.5%
Fall on and from ladder	33	2.1	0.6%	41	2.8	0.5%	14	0.9	0.3%	88	1.9	0.5%
Fall involving wheelchair	3	0.2	0.1%	4	0.3	0.1%	9	0.6	0.2%	16	0.4	0.1%
Fall on same level involving ice and snow	0	0.0	0.0%	2	0.1	0.0%	9	0.6	0.2%	11	0.2	0.1%
Fall on and from scaffolding	0	0.0	0.0%	6	0.4	0.1%	1	0.1	0.0%	7	0.2	0.0%
Total	5345	343.6	100.0%	7803	535.0	100.0%	5488	363.2	100.0%	18636	411.8	100.0%

Source: Injury Prevention Unit, University of Otago. “<http://ipru3.otago.ac.nz/niqs/>”<http://ipru3.otago.ac.nz/niqs/>.

TABLE B 2: NUMBERS, RATES (PER 100,000), AND PERCENTAGES OF LEADING CAUSES FROM NON-FATAL INANIMATE MECHANICAL FORCE INJURY IN CHILDREN AGED 0–14, 2008–2012.

External cause	0-4			5-9			10-14			Total		
	No.	Rate	%	No.	Rate	%	No.	Rate	%	No.	Rate	%
Caught, crushed, jammed or pinched in or between objects	1505	96.7	45.1%	657	45.0	30.1%	225	14.9	11.6%	2387	52.7	32.0%
Striking against or struck by other objects	337	21.7	10.1%	264	18.1	12.1%	293	19.4	15.1%	894	19.8	12.0%
Contact with sharp glass	175	11.2	5.2%	318	21.8	14.6%	387	25.6	19.9%	880	19.4	11.8%
Foreign body entering into or through eye or natural orifice	583	37.5	17.5%	157	10.8	7.2%	96	6.4	4.9%	836	18.5	11.2%
Struck by thrown, projected or falling object	294	18.9	8.8%	164	11.2	7.5%	109	7.2	5.6%	567	12.5	7.6%
Foreign body or object entering through skin	105	6.7	3.1%	215	14.7	9.8%	168	11.1	8.6%	488	10.8	6.5%
Striking against or struck by sports equipment	27	1.7	0.8%	91	6.2	4.2%	231	15.3	11.9%	349	7.7	4.7%
Exposure to other inanimate mechanical forces	86	5.5	2.6%	118	8.1	5.4%	121	8.0	6.2%	325	7.2	4.4%
Contact with nonpowered hand tool	76	4.9	2.3%	59	4.0	2.7%	89	5.9	4.6%	224	5.0	3.0%
Contact with knife, sword or dagger	51	3.3	1.5%	52	3.6	2.4%	84	5.6	4.3%	187	4.1	2.5%
Contact with other and unspecified machinery	39	2.5	1.2%	20	1.4	0.9%	39	2.6	2.0%	98	2.2	1.3%
Contact with other powered hand tools and household machinery	26	1.7	0.8%	22	1.5	1.0%	25	1.7	1.3%	73	1.6	1.0%
Contact with powered lawn mower	11	0.7	0.3%	19	1.3	0.9%	29	1.9	1.5%	59	1.3	0.8%
Accidental discharge and malfunction from other and unspecified firearms and guns	1	0.1	0.0%	7	0.5	0.3%	20	1.3	1.0%	28	0.6	0.4%
Contact with lifting and transmission devices, not elsewhere classified	11	0.7	0.3%	2	0.1	0.1%	7	0.5	0.4%	20	0.4	0.3%
Discharge of firework	2	0.1	0.1%	7	0.5	0.3%	9	0.6	0.5%	18	0.4	0.2%
Contact with agricultural machinery	3	0.2	0.1%	7	0.5	0.3%	2	0.1	0.1%	12	0.3	0.2%
Explosion of other materials	0	0.0	0.0%	1	0.1	0.0%	8	0.5	0.4%	9	0.2	0.1%
Explosion and rupture of gas cylinder	3	0.2	0.1%	3	0.2	0.1%	2	0.1	0.1%	8	0.2	0.1%
Accidental handgun discharge and malfunction	0	0.0	0.0%	0	0.0	0.0%	2	0.1	0.1%	2	0.0	0.0%
Explosion and rupture of pressurized tire, pipe or hose	1	0.1	0.0%	0	0.0	0.0%	0	0.0	0.0%	1	0.0	0.0%
Explosion and rupture of other specified pressurized devices	0	0.0	0.0%	1	0.1	0.0%	0	0.0	0.0%	1	0.0	0.0%
Contact with hypodermic needle	1	0.1	0.0%	0	0.0	0.0%	0	0.0	0.0%	1	0.0	0.0%
Total	3337	214.5	100.0%	2184	149.7	100.0%	1946	128.8	100.0%	7467	165.0	100.0%

TABLE B 3: NUMBERS, RATES (PER 100,000), AND PERCENTAGES OF LEADING CAUSES FROM NON-FATAL ANIMATE MECHANICAL FORCE INJURY IN CHILDREN AGED 0–14, 2008-2012.

	0-4			5-9			10-14			Total		
	No.	Rate	%	No.	Rate	%	No.	Rate	%	No.	Rate	%
Accidental hit, strike, kick, twist, bite or scratch by another person	117	7.5	18.6%	139	9.5	24.2%	437	28.9	50.7%	693	15.3	33.6%
Contact with dog	267	17.2	42.5%	199	13.6	34.7%	116	7.7	13.5%	582	12.9	28.2%
Bitten or stung by nonvenomous insect and other nonvenomous arthropods	154	9.9	24.5%	87	6.0	15.2%	45	3.0	5.2%	286	6.3	13.9%
Accidental striking against or bumped into by another person	43	2.8	6.8%	82	5.6	14.3%	154	10.2	17.9%	279	6.2	13.5%
Contact with other mammals	36	2.3	5.7%	33	2.3	5.7%	56	3.7	6.5%	125	2.8	6.1%
Contact with nonvenomous plant thorns and spines and sharp leaves	3	0.2	0.5%	24	1.6	4.2%	22	1.5	2.6%	49	1.1	2.4%
Crushed, pushed or stepped on by crowd or human stampede	3	0.2	0.5%	5	0.3	0.9%	28	1.9	3.2%	36	0.8	1.7%
Exposure to other animate mechanical forces	3	0.2	0.5%	5	0.3	0.9%	2	0.1	0.2%	10	0.2	0.5%
Contact with rodent	2	0.1	0.3%	0	0.0	0.0%	0	0.0	0.0%	2	0.0	0.1%
Contact with nonvenomous marine animal	0	0.0	0.0%	0	0.0	0.0%	2	0.1	0.2%	2	0.0	0.1%
Total	628	40.4	100.0%	574	39.4	100.0%	862	57.0	100.0%	2064	45.6	100.0%

TABLE B 4: NUMBERS, RATES (PER 100,000), AND PERCENTAGES OF LEADING CAUSES FROM NON-FATAL POISONING INJURY IN CHILDREN AGED 0–14, 2008–2012.

	0-4			5-9			10-14			Total		
	No.	Rate	%	No.	Rate	%	No.	Rate	%	No.	Rate	%
Other and unspecified drugs, medicaments, and biological substances	336	21.6	26.5%	28	1.9	19.4%	9	0.6	6.9%	373	8.2	24.2%
Antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs	237	15.2	18.7%	43	2.9	29.9%	36	2.4	27.7%	316	7.0	20.5%
Nonopioid analgesics, antipyretics, and antirheumatics (including paracetamol)	236	15.2	18.6%	15	1.0	10.4%	18	1.2	13.8%	269	5.9	17.5%
Exposure to other and unspecified chemicals and noxious substances	193	12.4	15.2%	36	2.5	25.0%	27	1.8	20.8%	256	5.7	16.6%
Narcotics and (hallucinogens), not elsewhere classified	111	7.1	8.8%	7	0.5	4.9%	10	0.7	7.7%	128	2.8	8.3%
Organic solvents and halogenated hydrocarbons and their vapours	50	3.2	3.9%	0	0.0	0.0%	7	0.5	5.4%	57	1.3	3.7%
Other drugs acting on the autonomic nervous system	51	3.3	4.0%	3	0.2	2.1%	0	0.0	0.0%	54	1.2	3.5%
Pesticides	35	2.2	2.8%	7	0.5	4.9%	5	0.3	3.8%	47	1.0	3.0%
Alcohol	10	0.6	0.8%	4	0.3	2.8%	14	0.9	10.8%	28	0.6	1.8%
Other gases and vapours	8	0.5	0.6%	1	0.1	0.7%	4	0.3	3.1%	13	0.3	0.8%
Total	1267	81.4	100.0%	144	9.9	100.0%	130	8.6	100.0%	1541	34.1	100.0%

Source: Injury Prevention Unit, University of Otago, <http://ipru3.otago.ac.nz/nigs/>.

Glossary

External Injury Causes (unintentional unless otherwise indicated):

- Animate Mechanical Forces - Injury to a person struck, bitten, or otherwise injured by a human or animal, such as a dog, or insect.
- Assault - Injury purposely inflicted by other persons
- Cut/Pierce - Injuries caused by cutting and piercing instruments or objects
- Pedal Cyclist Other - Rider or passenger on a pedal cycle involved in a crash off a public road
- Drowning - Injury from submersion while engaged in sport or recreational activities, while swimming, in bathtub, or following a water transport crash
- Fall - Injury resulting from a fall, e.g. from stairs, tripping, slipping, or from playground equipment
- Firearm – Injury caused from the discharge of a firearm
- Fire/Flame - Injury caused by fire and flames e.g. conflagration in private dwelling, conflagration in other building or structure, ignition of clothing, ignition of highly flammable material
- Hot object/Substance - Injuries caused by hot substance or object, caustic or corrosive material and steam
- Inanimate Mechanical Forces – Injury to a person struck by, cut, or otherwise injured by an object. This includes being caught, crushed, jammed, or pinched between objects. It can include sports injuries, jammed fingers, and injuries from sharp objects such as knives, scissors, or glass.
- Intentional injuries - Injuries caused by intended events e.g. injuries inflicted upon a person through suicide / self-inflicted or homicide / assault.
- Machinery - Injury caused by machinery
- MVT Occupant - Driver or passenger of a motorised transport vehicle, including car, van, truck, bus etc. involved in a crash on a public road
- MVT Pedal Cyclist - Rider or passenger on a pedal cycle involved in a crash on a public road
- MVT Pedestrian - Any person involved in a crash on a public road who was not at the time of the accident riding in or on a motor vehicle, railway train, tram, animal-drawn or other vehicle, or on a pedal cycle or animal
- MVT Motorcyclist - Rider or passenger on a motorcycle involved in a crash on a public road
- Natural/Environmental - Injuries from natural and environmental factors, e.g. excessive heat, excessive cold, hunger, neglect, venomous animals and plants, other injury caused by animals, lightning, cataclysmic storms, floods, earth surface movements, or other and unspecified environmental cause
- Other Land Transport – Injury from a non-transport crash excluding a motor vehicle on a public road e.g. special terrain vehicles designed for off road use, special vehicle mainly used in agriculture injured in non-transport, motorcycle motor vehicles not on a public road, animals being ridden
- Other specified - All other specified causes of unintentional injury e.g. Caught, crushed, jammed or pinched in or between objects; Explosion and rupture of boiler; Foreign body entering into or through eye or natural orifice; Exposure to other and unspecified inanimate mechanical forces; Exposure to electric transmission lines; Contact with explosive material, undetermined intent; Falling, lying or running before or into moving object, undetermined intent etc.
- Other Transport - Injury from a transport crash excluding a motor vehicle on a public road, e.g. water transport, air and space transport.
- Overexertion - Injury from overexertion and strenuous movement e.g. lifting, pulling, pushing, excessive physical exercise
- Pedestrian Other - Any person injured in a collision with motor vehicle off a public road who was not at the time of the accident riding in or on a motor vehicle, railway train, tram, animal-drawn or other vehicle, or on a pedal cycle or animal
- Poisoning - Poisoning by drugs, medicinal substances, biological, other solid and liquid substances, gases or vapours
- Self-Inflicted - Injury resulting from intentional self-harm
- Struck by or against - Injury from being struck by a falling object, or striking against, or being struck by objects or persons
- Suffocation – Injury caused by accidental threats to breathing e.g. accidental suffocation and strangulation in bed, inhalation of gastric contents or inhalation and ingestion of food causing obstruction of respiratory tract, other accidental hanging and strangulation
- Unintentional injuries - Injuries caused by unintended events e.g. injuries from falls, motor vehicle crashes, drowning, burns, poisonings etc.
- Unspecified - Where the cause of unintentional injury has not been specified in the coding
- Undetermined Intent – Where the intent of the injury has not been determined
- Suffocation – Injury caused by accidental threats to breathing e.g. accidental suffocation and strangulation in bed, inhalation of gastric contents or inhalation and ingestion of food causing obstruction of respiratory tract, other accidental hanging and strangulation

Section References

Note: Those bolded are recommended reading.

Motor vehicle

- [8] **Rice, T.M. and Anderson, C.L., "The effectiveness of child restraint systems for children aged 3 years or younger during motor vehicle collisions: 1996 to 2005" *Journal Information*, 2009, 99(2): 252-257.**
- [9] **Sivinski R, *Booster seat effectiveness estimates based on CDS and state data*, Washington DC, USA, National Highway Traffic Safety Administration, United States Department of Transportation: 2010.**
- [10] Weber, K., *Crash protection for child passengers: A review of best practice*, UMTRI Research Review, Michigan, USA, University of Michigan Transportation Research Institute: 2000.
- [11] Durbin, D.R., "Child passenger safety" *Paediatrics*, 2011, 127(4): e1050-e1066.
- [12] Neuroscience Research Australia and Kidsafe Australia, *Best practice guidelines for the safe restraint of children travelling in cars*, Sydney, Australia, Neuroscience Research Australia, Kidsafe Australia: 2012.
- [17] Watson, E.A. and Monteiro, M.J., "Advise use of rear facing child car seats for children under 4 years old" *British Medical Journal*, 2009, 338(b1994): 1496-1497.
- [18] **Henary, B., Sherwood, CP, Crandall, JR, Kent, RW, Vaca, FE, Arbogast, KB and Bull, MJ, "Car safety seats for children: rear facing for best protection" *Injury Prevention*, 2007, 13(6): 398-402.**
- [19] Gloyns, P., Roberts, J. and Vehicle Safety Consultancy Ltd, *An accident study of the performance of restraints used by children aged three years and under*, Brussels, Belgium, ANEC: 2008.
- [20] Klinich, K.D., Pritz, H.B., Beebe, M.S., Welty, K. and Burton, R.W., *Study of older child restraint/booster seat fit and NASS injury analysis. Final report*, Virginia, USA, U.S. Department of Transportation. National Highway Traffic Safety Administration: 1994.
- [21] Durbin, D.R., Chen, I., Smith, R., Elliott, M.R. and Winston, F.K., "Effects of seating position and appropriate restraint use on the risk of injury to children in motor vehicle crashes" *Pediatrics*, 2005, 115(3): e305-309
- [22] Arbogast K, Kallan M, Durbin D. Front versus rear seat injury risk for child passengers: evaluation of newer model year vehicles. *Traffic injury prevention* 2009; 10(3):297-301.
- [23] Berg, M.D., Cook, L., Corneli, H.M., Vernon, D.D. and Dean, J.M., "Effect of seating position and restraint use on injuries to children in motor vehicle crashes" *Pediatrics*, 2000, 105(4): 831-835.
- [24] Evans, L., "The effectiveness of safety belts in preventing fatalities" *Accident Analysis & Prevention*, 1986, 18(3): 229-241.
- [25] Kahane, C.J., *Fatality and injury reducing effectiveness of lap belts for back seat occupants*, Society of Automotive Engineers Technical Paper 870486, Warrendale, PA, USA, National Highway Traffic Safety Administration: 1987.
- [26] National Highway Traffic Safety Administration, *Final regulatory impact analysis amendment to federal motor vehicle safety standard 208 passenger car front seat occupant protection*, Department of Transportation, National Highway Traffic Safety Administration: 1984.
- [27] **Morgan, C., *Effectiveness of lap/shoulder belts in the back outboard seating positions. NHTSA technical report. DOT HS 808 945*, Washington, DC, U.S. Department of Transportation. National Highway Traffic Safety Administration, Evaluation Division, Plans and Policy: 1999.**
- [28] Corden, T.E., "Analysis of booster seat and seat belt use: how many Wisconsin childhood deaths and hospitalizations could have been prevented in 1998–2002" *Wisconsin Medical Journal*, 2005, 104(1): 42-45.
- [29] Zaza, S., Sleet, D.A., Thompson, R.S., Sosin, D.M. and Bolen, J.C., "Reviews of evidence regarding interventions to increase use of child safety seats" *American Journal of Preventive Medicine*, 2001, 21(4): 31-47
- [30] **Mannix, R., Fleegler, E., Meehan, W.P., Schutzman, S.A., Hennelly, K., Nigrovic, L. and Lee, L.K., "Booster Seat Laws and Fatalities in Children 4 to 7 Years of Age" *Pediatrics*, 2012**
- [31] Towner, E., Dowswell, T., Mackereth, C. and Jarvis, S., *What works in preventing unintentional injuries in children and young adolescents? An updated systematic review*, Newcastle, Australia, National Health Service: 2006.
- [32] Lennon, A., Johns, M. and Haworth, N., Effects of changes to child car restraint legislation in Australia on seating position and restraint use, Transportation Research Board 91st Annual Meeting, 2012.
- [34] Eichelberger, A.H., Chouinard, A.O. and Jermakian, J.S., "Effects of booster seat laws on injury risk among children in crashes" *Traffic Injury Prevention*, 2012, 13(6): 631-639.
- [35] Koppel, S., Charlton, J.L. and Rudin-Brown, C.M., "The impact of new legislation on child restraint system (CRS) misuse and inappropriate use in Australia" *Traffic Injury Prevention*, 2013.
- [36] Christoffel, T. and Gallagher, S.S., *Injury prevention and public health: practical knowledge, skills, and strategies*, 2nd edition, Maryland, USA, Jones & Bartlett Publishers: 2006.
- [37] Dinh-Zarr, T.B., Sleet, D.A., Shults, R.A., Zaza, S., Elder, R.W., Nichols, J.L., Thompson, R.S. and Sosin, D.M., "Reviews of evidence regarding interventions to increase the use of safety belts" *American Journal of Preventive Medicine*, 2001, 21(4): 48-65.

- [38] Turner, C., McClure, R., Nixon, J. and Spinks, A., "Community-based programs to promote car seat restraints in children 0-16 years-a systematic review" *Accident Analysis & Prevention*, 2005, 37(1): 77-83.
- [39] Schaechter, J. and Uhlhorn, S.B., "Restraint use law enforcement intervention in latino communities" *The Journal of Trauma*, 2011, 71(5): S517-S521
- [40] **Coggan, C., Patterson, P., Brewin, M., Hooper, R. and Robinson, E., "Evaluation of the Waitakere community injury prevention project" *Injury Prevention*, 2000, 6(2): 130-134.**
- [41] Brewin, M. and Coggan, C., "Evaluation of the Ngati Porou community injury prevention project" *Ethnicity & Health*, 2004, 9(1): 5-15.
- [42] Klassen, T.P., MacKay, J.M., Moher, D., Walker, A. and Jones, A.L., "Community-based injury prevention interventions" *The Future of Children*, 2000, 10(1) 83-110.
- [43] Shults, R.A., "Child passenger deaths involving drinking drivers." *Morbidity and Mortality Weekly Report*, 2004. 53(4): p. 77-79.
- [44] Brewin, M. and Coggan, C., "Evaluation of a New Zealand indigenous community injury prevention project" *Injury Control and Safety Promotion*, 2002, 9(2): 83-88.
- [45] Ehiri, JE, Ejere, HOD, Magnussen, L., Emusu, D., King, W. and Osberg, JS, *Interventions for promoting booster seat use in four to eight year olds traveling in motor vehicles*, *Cochrane Database of Systematic Reviews*, Cochrane Database of Systematic Reviews: 2006.
- [55] Peden M, Oyegbite K, Ozanne-Smith J, Hyder AA, Branche C, Rahman AF, et al. *World report on child injury prevention*. Geneva: World Health Organization, UNICEF; 2008.
- [56] Charlton, S.G., Mackie, H.W., Baas, P.H., Hay, K., Menezes, M. and Dixon, C., "Using endemic road features to create self-explaining roads and reduce vehicle speeds" *Accident Analysis & Prevention*, 2010, 42(6): 1989-1998.
- [57] Peden, M., Scurfield, R., Sleet, D., Mohan, D., Hyder, A.A., Jarawan, E. & Mathers, C., *World report on road traffic injury prevention*, Geneva, Switzerland, World Health Organization Geneva: 2004.
- [58] **Desapriya, E., Kerr, J.M., Hewapathirane, D.S., Peiris, D., Mann, B., Gomes, N., Peiris, K., Scime, G. and Jones, J., "Bull bars and vulnerable road users" *Traffic Injury Prevention*, 2012, 13(1): 86-92.**
- [59] Committee on Injury Violence and Poison Prevention, "Policy statement - pedestrian safety" *Pediatrics*, 2009, 124(2): 802-812. [*n.b. only cite for policy recommendations*]
- [60] Murphy, F., White, S. and Morreau, P., "Driveway-related motor vehicle injuries in the paediatric population: a preventable tragedy" *Journal of the New Zealand Medical Association*, 2002, 115(1160): e1-e7.
- [61] **Roberts, I., Norton, R. and Jackson, R., "Driveway-related child pedestrian injuries: a case-control study" *Pediatrics*, 1995, 95(3): 405-408**
- [62] **Shepherd, M., Austin, P. and Chambers, J., "Driveway runover, the influence of the built environment: A case control study" *Journal of Paediatrics and Child Health*, 2010, 46(12): 760-767.**

Non Motor Vehicle References

Child Pedestrian Safety References

- [31] Towner, E., Dowswell, T., Mackereth, C. and Jarvis, S., *What works in preventing unintentional injuries in children and young adolescents? An updated systematic review*, Newcastle, Australia, National Health Service: 2006.
- [49] **Jones, S.J., Lyons, R.A., John, A. and Palmer, S.R., "Traffic calming policy can reduce inequalities in child pedestrian injuries: database study" *Injury Prevention*, 2005, 11(3): 152-156.**
- [50] **Bunn, F., Collier, T., Frost, C., Ker, K., Roberts, I. and Wentz, R., *Area-wide traffic calming for preventing traffic related injuries*, *Cochrane Database of Systematic Reviews* 2009.**
- [51] **Tester, J.M., Rutherford, G.W., Wald, Z. and Rutherford, M.W., "A matched case-control study evaluating the effectiveness of speed humps in reducing child pedestrian injuries" *Journal Information*, 2004, 94(4): 646-650.**
- [52] Petch, RO and Henson, RR, "Child road safety in the urban environment" *Journal of Transport Geography*, 2000, 8(3): 197-211.
- [53] Wigmore, B., Baas, C., Wade, W. and Baas, P., *School journey safety: a comparative study of engineering devices. Research Report 271*, Wellington, New Zealand, Land Transport New Zealand 2006.
- [64] Child and Youth Mortality Review Committee Te Rōpū Arotake Auau Mate o te Hunga Tamariki Taiohi, *Low speed run over mortality*, Wellington, New Zealand, Child and Youth Mortality Review Committee: 2011.
- [65] Steinbach, R., Cairns, J., Grundy, C. and Edwards, P., "Cost benefit analysis of 20 mph zones in London" *Injury Prevention*, 2012, August 30: 31-33.
- [66] New Zealand Transport Agency, *Rural school speed management trial. Information sheet*, Wellington, New Zealand, New Zealand Transport Agency: 2012.
- [67] Strategy & Policy Committee, *Proposed Hamilton city speed limit bylaw 2013 - hearing and adoption report*, Hamilton, New Zealand, Hamilton City Council: 2012.
- [68] *NZ strategy*: <http://saferspeedarea.org.nz/>
- [69] New Zealand Transport Agency, *Rural schools safety programme. Questions and answers*, Wellington, New Zealand, New Zealand Transport Agency: 2013
- [70] Christie, N., Towner, E., Cairns, S. and Ward, H., *Children's road traffic safety: an international survey of policy and practice*, *Road safety research report 47*, London, UK, Department for Transport: 2004.
- [71] World Health Organization, *Road traffic injuries. Fact sheet No 358*, Geneva, Switzerland, World Health Organization: March 2013.

- [72] Webster, D.C. and Mackie, A.M., *Review of traffic calming schemes in 20 mph zones*, TRL Report 215, Berkshire, UK, Transport Research Laboratory: 1996.
- [73] Steinbach, R., Grundy, C., Edwards, P., Wilkinson, P. and Green, J., "The impact of 20 mph traffic speed zones on inequalities in road casualties in London" *Journal of Epidemiology and Community Health*, 2011, 65(10): 921-926.
- [74] Retting, R.A., Farmer, C.M. and McCartt, A.T., "Evaluation of automated speed enforcement in Montgomery County, Maryland" *Traffic Injury Prevention*, 2008, 9(5): 440-445.
- [75] Hotz, G., Cohn, S., Castelblanco, A., Colston, S., Thomas, M., Weiss, A., Nelson, J., Duncan, R. and Pediatric, P.I.T.F., "WalkSafe: a school-based pedestrian safety intervention program" *Traffic Injury Prevention*, 2004, 5(4): 382-389.
- [76] Duperrex, O., Roberts, I. and Bunn, F., *Safety education of pedestrians for injury prevention*, Cochrane Database of Systematic Reviews: 2003.
- [77] Harborview Injury Prevention and Research Center, *Best practices. Child pedestrians*, Washington, USA, Harborview Injury Prevention and Research Center: 2001.
- [78] Roberts, I., "Adult accompaniment and the risk of pedestrian injury on the school-home journey" *Injury Prevention*, 1995, 1(4): 242-244.
- [79] Collins, D.C.A. and Kearns, R.A., "Geographies of inequality: Child pedestrian injury and walking school buses in Auckland, New Zealand" *Social Science & Medicine*, 2005, 60(1): 61-69.
- [80] A letter of support for article, see [82] below.
- [81] Hotz, G., Kennedy, A., Lutfi, K. and Cohn, S.M., "Preventing pediatric pedestrian injuries" *The Journal of Trauma and Acute Care Surgery*, 2009, 66(5): 1492-1499
- [82] Livingston, D.H., Suber, I., Snyder, D., Clancy, S.F., Passannante, M.R. and Lavery, R.F., "Annual pediatric pedestrian education does not improve pedestrian behavior" *The Journal of Trauma*, 2011, 71(5): 1120-1125.
- [83] Turner, C., McClure, R., Nixon, J. and Spinks, A., "Community-based programmes to prevent pedestrian injuries in children 0-14 years: a systematic review" *Injury Control and Safety Promotion*, 2004, 11(4): 231-237.
- [84] Safekids New Zealand, *Safekids campaign 2011/2012: Final evaluation report*, Auckland, New Zealand, Safekids New Zealand: 2012.
- [85] Safekids New Zealand, *Driveway run over kit. Outcome evaluation findings*, Auckland, Safekids New Zealand: 2012.
- [86] Barker, R., *Putting the brakes on low speed vehicle run over - an opportunity to act. Forum report June 2012*, Queensland, Australia, Queensland Injury Prevention Council: 2012. (note this is a summary of forum content not an evaluation.)

Cycle safety

- [31] Towner, E., Dowswell, T., Mackereth, C. and Jarvis, S., *What works in preventing unintentional injuries in children and young adolescents? An updated systematic review*, Newcastle, Australia, National Health Service: 2006.
- [36] Christoffel, T. and Gallagher, S.S., *Injury prevention and public health: practical knowledge, skills, and strategies*, 2nd edition, Maryland, USA, Jones & Bartlett Publishers: 2006.
- [42] Klassen, T.P., MacKay, J.M., Moher, D., Walker, A. and Jones, A.L., "Community-based injury prevention interventions" *The Future of Children*, 2000, 10(1) 83-110.
- [53] Wigmore, B., Baas, C., Wade, W. and Baas, P., *School journey safety: a comparative study of engineering devices. Research Report 271*, Wellington, New Zealand, Land Transport New Zealand 2006.
- [50] Bunn, F., Collier, T., Frost, C., Ker, K., Roberts, I. and Wentz, R., *Area-wide traffic calming for preventing traffic related injuries*, Cochrane Database of Systematic Reviews 2009. [n.b. tentative effect but robust review]
- [56] Charlton, S.G., Mackie, H.W., Baas, P.H., Hay, K., Menezes, M. and Dixon, C., "Using endemic road features to create self-explaining roads and reduce vehicle speeds" *Accident Analysis & Prevention*, 2010, 42(6): 1989-1998.
- [57] Peden, M., Scurfield, R., Sleet, D., Mohan, D., Hyder, A.A., Jarawan, E. & Mathers, C., *World report on road traffic injury prevention*, Geneva, Switzerland, World Health Organization Geneva: 2004.
- [88] Thompson, D.C., Rivara, F.P. and Thompson, R., *Helmets for preventing head and facial injuries in bicyclists*, Cochrane Database of Systematic Reviews: 2009
- [89] Taylor, M. and Scuffham, P., "New Zealand bicycle helmet law—do the costs outweigh the benefits?" *Injury Prevention*, 2002, 8(4): 317-320.
- [90] Hynd, D., Cuerden, R., Reid, S. and Adams, S., *The potential for cycle helmets to prevent injury-a review of the evidence* Berkshire, UK, Transport Research Laboratory: 2011
- [91] Thomas, S., Acton, C., Nixon, J., Battistutta, D., Pitt, W.R. and Clark, R., "Effectiveness of bicycle helmets in preventing head injury in children: case-control study" *British Medical Journal*, 1994, 308(6922): 173-176.
- [92] Reynolds, C.C.O., Harris, M.A., Teschke, K., Crompton, P.A. and Winters, M., "The impact of transportation infrastructure on bicycling injuries and crashes: a review of the literature" *Environmental Health*, 2009, 8(47): 1-19.
- [93] Macpherson, A. and Spinks, A., "Cochrane review: Bicycle helmet legislation for the uptake of helmet use and prevention of head injuries" *Evidence-Based Child Health: A Cochrane Review Journal*, 2008, 3(1): 16-32.
- [94] Karkhanav, M., Kalenga, J.C., Hagel, B.E. and Rowe, B.H., "Effectiveness of bicycle helmet legislation to increase helmet use: a systematic review" *Injury Prevention*, 2006, 12(2): 76-82
- [95] Scuffham, P., Alsop, J., Cryer, C. and Langley, J.D., "Head injuries to bicyclists and the New Zealand bicycle helmet law" *Accident Analysis and Prevention*, 2000, 32(4): 565-574

[96] Owen, R., Kendrick, D., Mulvaney, C., Coleman, T. and Royal, S., *Non-legislative interventions for the promotion of cycle helmet wearing by children*, Cochrane Database of Systematic Reviews, Cochrane Database of Systematic Reviews: 2011.

[97] Royal, ST, Kendrick, D. and Coleman, T., *Non-legislative interventions for the promotion of cycle helmet wearing by children*, Cochrane Database of Systematic Reviews: 2012.

[98] Khambalia, A., MacArthur, C. and Parkin, P.C., "Peer and adult companion helmet use is associated with bicycle helmet use by children" *Pediatrics*, 2005, 116(4): 939-942.

[99] Plumert, J.M., Kearney, J.K., Cremer, J.F., Recker, K.M. and Strutt, J., "Changes in children's perception-action tuning over short time scales: Bicycling across traffic-filled intersections in a virtual environment" *Journal of Experimental Child Psychology*, 2011, 108(2): 322-337.

[100] Imberger, K., Styles, T., Hughes, I. and Di Petro, G., *Evaluation of Bike Ed and the Traffic Centre Road Safety Package*, Victoria, Australia, NRMA-ACT Road Safety Trust, ARRB Group Limited: 2006.

[101] Babu, S.V., Grechkin, T.Y., Chihak, B., Ziemer, C., Kearney, J.K., Cremer, J.F. and Plumert, J.M., "An immersive virtual peer for studying social influences on child cyclists' road-crossing behavior" *Visualization and Computer Graphics, IEEE Transactions on*, 2011, 17(1): 14-25.

[102] New Zealand Transport Agency, *Cyclist Skills Training: Summary of the Guide*, Wellington, New Zealand Transport Agency: 2010. [n.b. cite as example of NZ practice]

[103] Safekids New Zealand, *Safekids New Zealand position paper: Child cycling injury prevention*, Auckland, Safekids New Zealand: 2012.

Choking/Strangulation Prevention References

[3] Bland, V., Shepherd, M., Ameratunga, S., Carter, W., Chambers, J., Hassall, I., Kool, B., Richards, G., Sapolu-Reweti, P. and Dalziel, S., "Child and adolescent injury report card: New Zealand 2009" *Journal of Paediatrics and Child Health*, 2011, 47(11): 783-787.

[36] Christoffel, T. and Gallagher, S.S., *Injury prevention and public health: practical knowledge, skills, and strategies*, 2nd edition, Maryland, USA, Jones & Bartlett Publishers: 2006.

[197] Harborview Injury Prevention and Research Center, *Best practices. Childhood injury prevention interventions. Choking, aspiration and suffocation*, Washington, USA, Harborview Injury Prevention and Research Center: 2001.

[198] New Zealand Government, *Consumer affairs. Fair trading Act 1986. Unsafe goods (small high powered magnets). Notice 2013*, Wellington, New Zealand, Ministry of Business, Innovation and Employment: 2013.

[199] Child and Youth Mortality Review Committee Te Ropu Arotake Auau Mate o te Hunga Tamariki Taiohi, *Special report: Unintentional suffocation, foreign body inhalation and strangulation*, Wellington, New Zealand, Child and Youth Mortality Review Committee: 2013.

[200] Committee on Injury Violence and Poison Prevention, "Prevention of choking among children" *Pediatrics*, 2010, 125(3): 601-607.

[206] Mitchell, E.A. and Blair, P.S., "SIDS prevention: 3000 lives saved but we can do better" *The New Zealand Medical Journal*, 2012, 125(1359): 50-57.

[207] Cowan, S., Clarke, J. and Bennett, S., *Using pepi-pods. Report on feedback from families who used protected sleeping spaces for babies following the Christchurch earthquake of February 2011*, Christchurch, Change for our Children Limited: 2012.

[208] Tipene-Leach, D. and Abel, S., "The wahakura and the safe sleeping environment" *Journal of Primary Health Care*, 2010, 2(1): 81.

[224] Baker, Nick, *Child and Youth Mortality Review Committee (CYMRC) - Te Roopu Arotake Auau Mate o te Hunga Tamariki, Taiohi*. Wellington, Child and Youth Mortality Review Committee: 2013.

Falls Prevention References

[55] Peden M, Oyegbite K, Ozanne-Smith J, Hyder AA, Branche C, Rahman AF, et al. *World report on child injury prevention*. Geneva: World Health Organization, UNICEF; 2008.

[170] Kendrick, D., Young, B., Mason-Jones, A.J., Ilyas, N., Achana, F.A., Cooper, N.J., Hubbard, S.J., Sutton, A.J., Smith, S. and Wynn, P., "Home safety education and provision of safety equipment for injury prevention" *The Cochrane Library*, 2012.

[171] Pearson, M., Garside, R., Moxham, T. and Anderson, R., "Preventing unintentional injuries to children in the home: a systematic review of the effectiveness of programmes supplying and/or installing home safety equipment" *Health Promotion International*, 2011, 26(3): 376-392.

[179] Harborview Injury Prevention and Research Center. *Best Practices*. Seattle: University of Washington; 2001.

[180] Spiegel, C.N. and Lindaman, F.C., "Children can't fly: a program to prevent childhood morbidity and mortality from window falls" *Injury Prevention*, 1995, 1(3): 194-198

[181] Pressley, JC and Barlow, B., "Child and adolescent injury as a result of falls from buildings and structures" *Injury Prevention*, 2005, 11(5): 267-273.

[183] Kendrick, D., Mulvaney, C. and Watson, M., "Does targeting injury prevention towards families in disadvantaged areas reduce inequalities in safety practices?" *Health Education Research*, 2009, 24(1): 32-41.

[184] Bond, G Randall, Christoph, Richard A and Rodgers, Bradley M, "Pediatric equestrian injuries: assessing the impact of helmet use" *Pediatrics*, 1995, 95(4): 487-489

[187] Cuenca, A.G., Wiggins, A., Chen, M.K., Kays, D.W., Islam, S. and Beierle, E.A., "Equestrian injuries in children" *Journal of Pediatric Surgery*, 2009, 44(1): 148-150.

[189] Parliament of the United Kingdom, *Horses (protective headgear for young riders) Act 1990 (c.25)*, Westminster, UK, Parliament of the United Kingdom: 1990. (Note: legislation).

[190] Khambalia, A., Joshi, P., Brussoni, M., Raina, P., Morrongiello, B. and Macarthur, C., "Risk factors for unintentional injuries due to falls in children aged 0–6 years: a systematic review" *Injury Prevention*, 2006, 12(6): 378-381

[191] Standards New Zealand, *New Zealand Standard. Playground equipment and surfacing. NZS 5828:2004*, 2004. (Note a standard).

[192] Chalmers, D.J., Marshall, S.W., Langley, J.D., Evans, M.J., Brunton, C.R., Kelly, A.M. and Pickering, A.F., "Height and surfacing as risk factors for injury in falls from playground equipment: a case-control study" *Injury Prevention*, 1996, 2(2): 98-104

[193] American Academy of Pediatrics Committee on Injury and Poison Prevention, "Injuries associated with infant walkers" *Pediatrics*, 2001, 108(3): 790-792.

[194] Conners, G.P., Veenema, T.G., Kavanagh, C.A., Ricci, J. and Callahan, C.M., "Still falling: a community-wide infant walker injury prevention initiative" *Patient Education and Counseling*, 2002, 46(3): 169-173

[195] Kendrick, D., Illingworth, R., Woods, A., Watts, K., Collier, J., Dewey, M., Hapgood, R. and Chen, C., "Promoting child safety in primary care: a cluster randomised controlled trial to reduce baby walker use" *The British Journal of General Practice*, 2005, 55(517): 582-588.

[226] Safekids Aotearoa: Safekids Aotearoa Position Paper: Child trampoline injury prevention. Safekids Aotearoa: 2014.

Water Safety References

[55] Peden M, Oyegbite K, Ozanne-Smith J, Hyder AA, Branche C, Rahman AF, et al. *World report on child injury prevention*. Geneva: World Health Organization, UNICEF; 2008.

[104] Cummings, P., Mueller, BA and Quan, L., "Association between wearing a personal floatation device and death by drowning among recreational boaters: a matched cohort analysis of United States Coast Guard data" *Injury Prevention*, 2011, 17(3): 156-159.

[105] O'Connor, P., *National assessment of boating fatalities in Australia 1999-2004*, New South Wales, Australia, National Marine Safety Committee: 2001

[106] Moran, K., Quan, L., Franklin, R.C. and Bennett, E., "Where the evidence and expert opinion meet: a review of open-water recreational safety messages" *International Journal of Aquatic Research and Education*, 2011, 5(3): 251-270.

[107] World Health Organization, *Guidelines for safe recreational water environments. Volume 2 swimming pools and similar environments*, Geneva, Switzerland, World Health Organization: 2006.

[108] World Health Organization, *Guidelines for safe recreational water environments. Volume 1 coastal and fresh water*, Geneva, Switzerland, World Health Organization: 2003.

[110] American Academy of Pediatrics Committee on Injury and Poison Prevention. Policy statement - Prevention of Drowning. *Pediatrics* 2010;126:178-85.

[111] Child and Youth Mortality Review Committee Te Rōpū Arotake Auau Mate o te Hunga Tamariki Taiohi, *Fifth report to the minister of health: Reporting mortality 2002–2008* Wellington, New Zealand, Child and Youth Mortality Review Committee: 2009.

[112] Thompson DC, Rivara FP. *Pool fencing for preventing drowning in children*. Cochrane database of systematic reviews 2005(3).

[113] Harborview Injury Prevention and Research Center. *Best Practices*. Seattle: University of Washington; 2001.

[114] New Zealand Government, *Fencing of swimming pools Act 1987* Wellington, New Zealand, New Zealand Government: 2008.

[115] Gulliver, P., Chalmers, D. and Cousins, K., "Achieving compliance with pool fencing legislation in New Zealand: how much progress has been made in 10 years?" *International Journal of Injury Control and Safety Promotion*, 2009, 16(3): 127-132.

[117] Mitchell, R. and Haddrill, K., "Swimming pool fencing in New South Wales: who is checking compliance?" *Health Promotion Journal of Australia*, 2004, 15(1): 68-72.

[118] van Weerdenburg, K., Mitchell, R. and Wallner, F., "Backyard swimming pool safety inspections: a comparison of management approaches and compliance levels in three local government areas in NSW" *Health Promotion Journal of Australia*, 2006, 17(1): 37-42.

[119] Mangione, T.W., Imre, M., Lisinski, H.E. and Higgins-Biddle, M., *2010 life jacket wear rate observation study*, Boston, USA, United States Coast Guard: 2010.

[120] Monash University Accident Research Centre, *Annual report 2007*, Melbourne, Australia, Monash University Accident Research Centre: 2007

[121] American Academy of Pediatrics Committee on Injury Violence and Poison Prevention and Weiss, J., Technical Report: Prevention of drowning. *Pediatrics*, 2010, 126(1): e253-e262

[122] Quan, L., Bennett, E. and Branche, C.M., "Interventions to prevent drowning", 81-96, Doll, L.S., Bonzo, S.E., Mercy, J.A. and Sleet, D.A., *Handbook of injury and violence prevention*, Atlanta, Georgia, USA, Springer: 2007

[123] Life Saving Victoria, *Victorian drowning report 2010/2011*, Melbourne, Australia, Life Saving Victoria: 2011.

[124] Seattle Children's Hospital, *Life jacket loaner guide*, Seattle, Washington, Seattle Children's Hospital: 2011

[125] referencing the CSGPG: MacKay, M., Vincenten, J., Brussoni, M., Towner, E. and Fuselli, P., "Good practice case studies from Canada", 34-69, *Child safety good practice guide: good investments in child injury prevention and safety promotion - Canadian edition*, Toronto, Canada, The Hospital for Sick Children: 2011.

[126] Bugeja, L. and Franklin, R.C., "An analysis of stratagems to reduce drowning deaths of young children in private swimming pools and spas in Victoria, Australia" *International Journal of Injury Control and Safety Promotion*, 2012, September 6.

[127] New South Wales Water Safety Taskforce, *Analysis of drownings involving children aged five years and under in NSW*, New South Wales, Australia, New South Wales Water Safety Taskforce: 2002.

[128] Moran, K., "Parent/caregiver perceptions and practice of child water safety at the beach" *International Journal of Injury Control and Safety Promotion*, 2009, 16(4): 215-221.

[109] Gipson, K., *Submersions related to non-pool and non-spa products, 2012 report*, Bethesda, USA, United States Consumer Product Safety Commission: 2012.

Mangione, T.W., Imre, M., Lisinski, H.E. and Higgins-Biddle, M., 2010 life jacket wear rate observation study, Boston, USA, United States Coast Guard: 2010.

[129] Moran, K. and Stanley, T., "Parental perceptions of toddler water safety, swimming ability and swimming lessons" *International Journal of Injury Control and Safety Promotion*, 2006, 13(3): 139-143.

[130] Moran, K. and Stanley, T., "Toddler drowning prevention: teaching parents about water safety in conjunction with their child's in-water lessons" *International Journal of Injury Control and Safety Promotion*, 2006, 13(4): 254-256.

[132] WaterSafe Auckland Incorporated, *Pools2Schools 24 month report*, Auckland, New Zealand, WaterSafe Auckland Incorporated: 2012.

[133] Mills, C., *Rebuilding refugee's lives: An olympic movement sport for life swimming and water safety programme, Evaluation May 2008*, Auckland, New Zealand, WaterSafe Auckland Inc.: 2008.

Animate and inanimate mechanical injuries

[245] Royal Australasian College of Surgeons. *Position paper - Royal Australasian College of Surgeons - Dog bites*. Melbourne, Victoria; Royal Australasian College of Surgeons: 2012.

[246] Marsh, Louise; Langley, John; Gauld, Robin. "Dog bite injuries." *The New Zealand Medical Journal*, 117(1201) 04, 2004.

[247] Gershman, Kenneth A. "Which dogs bite? A case-control study of risk factors". *Pediatrics*, 93(6) Jun94, 1994. pp913-917.

[248] Standards New Zealand. *Glazing in buildings - Part 3: Human impact safety requirements*. NZS 4223.3:1999.

[249] King, WJ, LeBlanc, JC, Barrowman, NJ, Klassen, TP, Bernard-Bonnin, AC, Robitaille, Y., Tenenbein, M. and Pless, IB, "Long term effects of a home visit to prevent childhood injury: three year follow up of a randomized trial" *Injury prevention*, 2005, 11(2): 106-109.

[250] Fergusson, David M, Boden, Joseph M and Horwood, L John, "Nine-year follow-up of a home-visitation program: a randomized trial" *Pediatrics*, 2013, 131(2): 297-303.

[251] Ingram, J.C., Deave, T., Towner, E., Errington, G., Kay, B. and Kendrick, D., "Identifying facilitators and barriers for home injury prevention interventions for pre-school children: A systematic review of the quantitative literature" *Health Education Research*, 2012, 27(2): 258-268.

Poisoning Prevention References

[31] Towner, E., Dowswell, T., Mackereth, C. and Jarvis, S., *What works in preventing unintentional injuries in children and young adolescents? An updated systematic review*, Newcastle, Australia, National Health Service: 2006.

[48] Towner, E., Dowswell, T., Mackereth, C. and Jarvis, S., *What works in preventing unintentional injuries in children and young adolescents? An updated systematic review*, Newcastle, Australia, National Health Service: 2001.

[55] Peden M, Oyegbite K, Ozanne-Smith J, Hyder AA, Branche C, Rahman AF, et al. *World report on child injury prevention*. Geneva: World Health Organization, UNICEF; 2008.

[170] Kendrick, D., Young, B., Mason-Jones, A.J., Ilyas, N., Achana, F.A., Cooper, N.J., Hubbard, S.J., Sutton, A.J., Smith, S. and Wynn, P., "Home safety education and provision of safety equipment for injury prevention" The Cochrane Library, 2012.

[172] Child and Youth Mortality Review Committee, Te Ropu Aotake Auau Mate o te Hunga, Taiohi. *Special report: Unintentional deaths from poisoning in young people*. Wellington, New Zealand. Child and Youth Mortality Review Committee: 2013.

[214] Lee, L.K., Walia, T., Forbes, P.W., Osganian, S.K., Samuels, R., Cox, J.E. and Mooney, D.P., "Home safety practices in an urban low-income population: Level of agreement between parental self-report and observed behaviors" *Clinical Pediatrics*, 2012, 51(12): 1119-1124.

[215] Ozanne-Smith, J., Day, L., Parsons, B., Tibballs, J. and Dobbin, M., "Childhood poisoning: access and prevention" *Journal of Paediatrics and Child Health*, 2001, 37(3): 262-265.

[216] Gibbs, L., Waters, E., Sherrard, J., Ozanne-Smith, J., Robinson, J., Young, S. and Hutchinson, A., "Understanding parental motivators and barriers to uptake of child poison safety strategies: a qualitative study" *Injury Prevention*, 2005, 11(6): 373-377.

[218] Ministry of Health, *Code of practice for child-resistant packaging of toxic substances. For importers, manufacturers, packers and retailers of toxic and corrosive substances*, Wellington, New Zealand, Ministry of Health: 1998.

[219] "Pharmacy Contractors Section 51 Advice Notice" 1997

[220] Zaloshnja, E., Miller, T., Jones, P., Litovitz, T., Coben, J., Steiner, C. and Sheppard, M., "The impact of poison control centers on poisoning-related visits to EDs-United States, 2003" *The American Journal of Emergency Medicine*, 2008, 26(3): 310-315.

[221] Miller, T.R. and Lestina, D.C., "Costs of poisoning in the United States and savings from poison control centers: a benefit-cost analysis" *Annals of Emergency Medicine*, 1997, 29(2): 239-245.

[222] **The Lewin Group, *Final report on the value of the poison center system, Virginia, USA, American Association of Poison Control Centers: 2012.***

[223] *Personal communication of report author.*

Burns Prevention References

[55] Peden M, Oyegbite K, Ozanne-Smith J, Hyder AA, Branche C, Rahman AF, et al. *World report on child injury prevention.* Geneva: World Health Organization, UNICEF; 2008.

[138] Harborview Injury Prevention and Research Center. *Best Practices.* Seattle: University of Washington; 2001.

[139] Viscusi, W.K. and Cavallo, G.O., "The effect of product safety regulation on safety precautions" *Risk Analysis*, 2006, 14(6): 917-930.

[140] Smith, L.E., Greene, MA and Singh, HA, "Study of the effectiveness of the US safety standard for child resistant cigarette lighters" *Injury Prevention*, 2002, 8(3): 192-196

[141] Warda, L.J. and Ballesteros, M.F., "Interventions to prevent residential fire injury", 97-116, Doll, L.S., Bonzo, S.E., Mercy, J.A. and Sleet, D.A., *Handbook of Injury and Violence Prevention*, Atlanta, Georgia, USA, Springer: 2007.

[142] Ministry of Consumer Affairs, *Product safety standards (cigarette lighters) regulations 1998. (SR 1998/451)*, Wellington, New Zealand, New Zealand Government: 1998.

[145] American Academy of Pediatrics Committee on Injury and Poison Prevention, "Reducing the number of deaths and injuries from residential fires" *Paediatrics*, 2000, 105(6): 1355-1357.

[154] Han, R.K., Ungar, W.J. and Macarthur, C., "Cost-effectiveness analysis of a proposed public health legislative/educational strategy to reduce tap water scald injuries in children" *Injury Prevention*, 2007, 13(4): 248-253.

[147] Cloutre, E., Pinto, R., Banfield, J. and Jeschke, M.G., "Incidence of hot tap water scalds after the introduction of regulations in Ontario" *Journal of Burn Care & Research*, 2013, 34(2): 243-248.

[148] Harvey, L.A., Poulos, R.G., Finch, C.F., Olivier, J. and Harvey, J.G., "Hospitalised hot tap water scald patients following the introduction of regulations in NSW, Australia: Who have we missed?" *Burns*, 2010, 36(6): 912-919

[157] Wade, C.A., Duncanson, M., O'Dea, D. and Duncan, C.R., *Costs and benefits of regulating fire safety performance of upholstered furniture in New Zealand. New Zealand Fire Service Commission Research Report Number 35*, Porirua, Building Research Association of New Zealand, New Zealand Fire Service Commission 2003.

[158] Laing, RM and Bryant, V., "Prevention of burn injuries to children involving nightwear" *New Zealand Medical Journal*, 1991, 104(918): 363-365

[161] Abdulwadud, O. and Ozanne-Smith, J., "Injuries associated with fireworks in Victoria: an epidemiological overview" *Injury Prevention*, 1998, 4(4): 272-274.

[162] Bull, N., "Legislation as a tool to prevent firework-related eye injuries" *Acta Ophthalmologica*, 2011, 89(8): e654-e655.

[163] Espitia-Hardeman, V., Borse, N.N., Dellinger, A.M., Betancourt, C.E., Villareal, A.N., Caicedo, L.D. and Portillo, C., "The burden of childhood injuries and evidence based strategies developed using the injury surveillance system in Pasto, Colombia" *Injury Prevention*, 2011, 17(Suppl I): i38-i44.

[165]: *ACC unpublished data*

[166] Wisse, R.P.L., Bijlsma, W.R. and Stilma, J.S., "Ocular firework trauma: a systematic review on incidence, severity, outcome and prevention" *British Journal of Ophthalmology*, 2010, 94(12): 1586-1591

[170] Kendrick, D., Young, B., Mason-Jones, A.J., Ilyas, N., Achana, F.A., Cooper, N.J., Hubbard, S.J., Sutton, A.J., Smith, S. and Wynn, P., "Home safety education and provision of safety equipment for injury prevention" *The Cochrane Library*, 2012.

[171] Pearson, M., Garside, R., Moxham, T. and Anderson, R., "Preventing unintentional injuries to children in the home: a systematic review of the effectiveness of programmes supplying and/or installing home safety equipment" *Health Promotion International*, 2011, 26(3): 376-392.

[150] Waller, A.E., Clarke, J.A. and Langley, J.D., "An evaluation of a program to reduce home hot tap water temperatures" *Australian Journal of Public Health*, 1993, 17(2): 116-123.

[173] Turner, C., Spinks, A., McClure, R. and Nixon, J., *Community-based interventions for the prevention of burns and scalds in children*, Cochrane Database of Systematic Reviews: 2012.

[175] Warda, L., Tenenbein, M. and Moffatt, M.E.K., "House fire injury prevention update. Part II. A review of the effectiveness of preventive interventions" *Injury Prevention*, 1999, 5(3): 217-225.

[176] **Ogier, S., *Evaluation of the firewise programme for year one and two students. New Zealand fire service commission research report number 81*, Martin, Jenkins & Associates Limited, New Zealand Fire Service Commission: 2008**

[177] **Dunn, K. and Renwick, M., *Children's knowledge of fire safety stage 2: what standard 2 children know about fire safety and where they got that information from*, Wellington, New Zealand, New Zealand Council for Educational Research: 1995.**

