



## Self-reported injury rates in New Zealand

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### Abstract

**Aim** The study aimed to obtain baseline information on the incidence and nature of self-reported injuries in New Zealand.

**Methods** A cross-sectional survey was conducted of approximately 400 randomly-selected households from each of 13 Territorial Local Authorities across New Zealand, giving a total sample size of 5282. Respondents were asked if anyone in their household had been treated by a medical doctor in the previous twelve months for any injuries and, if so, details of the injury event were recorded.

**Results** Forty one per cent of households reported that someone in the household had sustained an injury. The most common types of injuries were falls (33%), sports-related injuries (28%) and injuries caused by lifting an object (16%). Only eight per cent of the injuries required overnight hospitalisation.

**Conclusion** The findings from this study indicate that the total burden of injury in New Zealand is much larger than estimated by routinely-collected injury hospitalisation data.

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Injury is a major public health problem in New Zealand. In 1998/99 injury was the third leading cause of hospitalisation, resulting in 68 472 public hospital discharges.<sup>1</sup> However, injury hospitalisations represent just a small fraction of the injury problem. In 2000/01 the Accident Compensation Corporation (ACC) paid compensation for 1.4 million new claims, at a cost of \$1.2 billion.<sup>2</sup> This figure includes payments for 2.3 million GP visits and 2.2 million physiotherapist visits. As well as the financial cost of injury, and the resulting burden on the health system, there is also a huge social cost of injury in terms of pain and suffering.<sup>3</sup> Serious injury can also result in long-term disability. The 2001 Household Disability Survey estimated that 30% of all disabilities are caused by injury.<sup>4</sup>

Few studies have reported on the epidemiology of non-hospitalised injuries in New Zealand. A 1996/97 New Zealand Health Survey found that 26.8% of adult respondents had sought medical treatment for an injury in the previous twelve months.<sup>5</sup> However, this survey asked only whether the respondent had been treated for *any* injury, and not the total number of injuries occurring during the reference period. Although ACC data are another potential source of information on non-hospitalised injury, detailed information on the circumstances of the injury event is only available for entitlement claims (14% of paid claims in 2001).<sup>2</sup> In addition, ACC data are not collected in a consistent manner across years. For example, in 1999/2000 ACC did not provide cover for all workplace injuries,<sup>2</sup> resulting in an underestimate of workplace and total injury for that period.

Consequently, unlike information on injury deaths and hospitalisations, little is known about the nature and incidence of other injuries. The current study aimed to obtain baseline information on the incidence and nature of self-reported injuries in New Zealand.

## Methods

The survey was conducted between the months of September and November 2001 as part of an ongoing evaluation of a national injury prevention programme. A computer-assisted telephone interviewing system (CATI) was used to randomly select approximately 400 households from each of 13 Territorial Local Authorities across New Zealand, giving a total sample size of 5282 households. The adult (18+ years) in the household with the next birthday was asked to complete a phone interview of 10–15 minutes in length. Up to eight call-backs were made to each household. The response rate for the survey was 65%.

The interviewers asked respondents: “Has anyone living in your household required medical treatment by a doctor in the previous twelve months for any of these injuries:

- an injury caused by a fall;
- an injury caused by lifting an object;
- an injury after being physically hurt by someone else;
- an injury caused by poisoning (excluding food poisoning);
- an injury caused by a motor vehicle crash;
- an injury sustained while playing sport (other than a fall);
- any other injuries (specify cause).”

These injury categories were based on the leading causes of injury as identified from hospitalisation data and ACC claims data. Free text information on the mechanism of ‘other’ injuries was used to reassess injuries that should have been listed under another injury category.

If the respondent reported that someone in the household had been injured, the following details were then collected: the number of times that an injury event occurred; the number of household members injured on each of these occasions; the age and gender of each injured person; whether the injured person had to stay overnight in a hospital; the location where the injury occurred (except for motor vehicle crashes and sports-related injuries, as pilot testing found that these occurred on a public road, and at a sporting venue, respectively); and whether the injury resulted in a fatality. Only cases of non-fatal injury will be considered in this article. In order to make the definition of ‘injury’ used in this article consistent with the reporting of injury hospitalisation data, one case of injury is defined as one person who sustains one or more injuries in a single injury event. For example, if three household members sustained multiple injuries in a single motor vehicle crash, this was counted as three cases of injury.

Denominator data for calculation of injury rates were collected by asking respondents to report the number of people in each age group currently living in their household. Whilst it is possible that the number of people living in each household could have changed during the 12-month recall period for injuries, it was beyond the resources of this study to collect details on changes in household composition. Similarly, details of the gender composition of the household were not collected due to time constraints on the questionnaire.

All data were analysed using SAS Version 8.1 for Windows. Chi-squared tests were used to test the hypothesis that the venue of the injury event and injury severity would differ by gender and age. Chi-squared tests were also used to compare sample demographics to 1996 Census data<sup>6</sup> for the regions sampled. Ninety five per cent confidence intervals for the injury rates were calculated assuming a Poisson distribution.

## Results

Females accounted for 57.6% of the respondents, and while this was slightly higher than the percentage of females reported by Census data (51.3%), the gender

distributions did not differ significantly. With regard to the size of the households sampled, 19.5% were single occupant households and this did not differ significantly from the composition of households in the Census data (21.3% single occupant households). The age structure of the people in the households sampled was compared to Census data and no significant difference in distribution was found (sample: 0–4 = 7.2%, 5–14 = 16.4%, 15–24 = 14.6%, 25–64 = 51.7%, 65+ = 10.0%; Census: 0–4 = 7.1%, 5–14 = 14.2%, 15–24 = 15.9%, 25–64 = 50.5%, 65+ = 12.2%).

**Table 1. Breakdown of injury types**

Type of injury	Number of injuries	Percentage of all injuries
Injury caused by a fall	1186	33
Injury while playing sport (other than a fall)	996	28
Injury caused by lifting an object	568	16
Injury caused after being physically hurt by someone else	141	4
Injury caused by a motor vehicle crash	128	4
Injury caused by cutting or piercing	117	3
Injury caused by poisoning (excluding food poisoning)	50	1
All other injuries	392	11
<b>Total</b>	<b>3578</b>	<b>100</b>

Forty one per cent of the respondents reported that someone in their household had sustained a medically-treated injury during the previous twelve months. In total, 3578 non-fatal injuries were reported, an overall injury rate of 24 497 per 100 000 population. Eight per cent of the injuries required overnight hospitalisation. Twenty nine per cent of all injuries occurred at home; 28% occurred at a sporting venue; 16% occurred at work; 4% occurred at school; 4% occurred on a public road and 19% occurred at another location. As shown by Table 1, falls accounted for one third of all reported injuries. Sports-related injuries (28%) and lifting an object (16%) were also common. Males accounted for the majority (58%) of the injuries. Table 2 shows that young people aged 15–24 had the highest rate of injury (31 946 per 100 000), followed by adults aged 25–64 years (25 073 per 100 000).

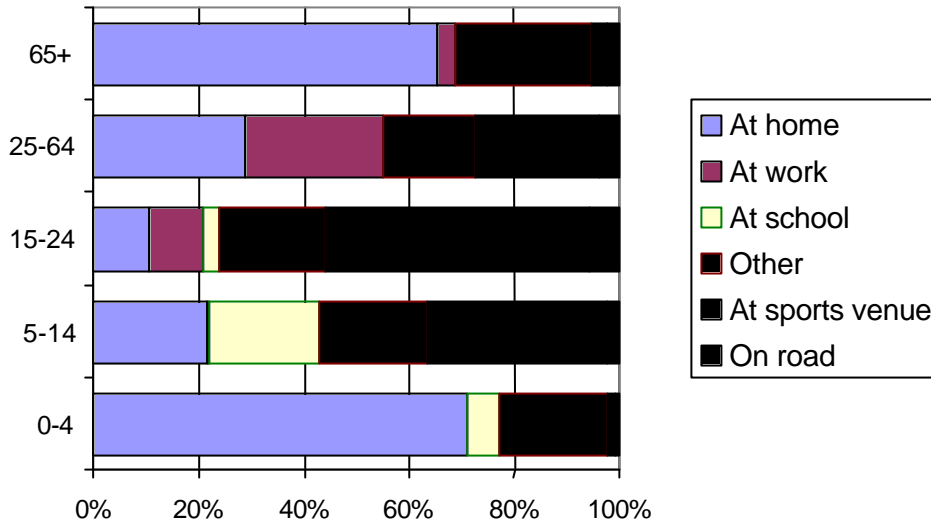
The patterns of where injuries occurred differed significantly by gender ( $p < 0.001$ ), with females more likely to be injured at home (41%) than males (21%), and males more likely to be injured at work (male 20% vs female 11%) and sports venues (male 34% vs female 19%). The location where injury events occurred also differed significantly by age group ( $p < 0.001$ ). As shown in Figure 1, young children and older people aged 65+ were most likely to be injured at home, and young people aged 15–24 were most likely to be injured at a sporting venue. Older people aged 65+ were significantly more likely to be admitted overnight to hospital (20%) than all other age groups (0–4 = 4%, 5–14 = 6%, 15–24 = 8%, 25–64 = 6%,  $p < 0.001$ ). No significant gender differences were found for hospital admission.

**Table 2. Reported injury rates by type of injury**

Age group (years)	No*	Rate†	95% CI‡	No*	Rate†	95% CI‡
	<b>All injuries</b>			<b>Injuries caused by motor vehicle crashes</b>		
0-4	135	12 760	10 607 – 14 912	1	95	-91 – 280
5-14	536	22 361	20 468 – 24 254	13	542	248 – 837
15-24	683	31 946	29 550 – 34 342	39	1824	1252 – 2397
25-64	1895	25 073	23 947 – 26 205	69	913	698 – 1129
65+	322	22 131	19 713 – 24 548	6	412	82 – 742
Unknown	7					
<b>Total</b>	<b>3578</b>	<b>24 497</b>	<b>23 696 – 25 301</b>	<b>128</b>	<b>876</b>	<b>725 – 1028</b>
	<b>Fall-related injuries</b>			<b>Injuries caused by cutting and piercing</b>		
0-4	91	8601	6834 – 10 368	3	284	-37 – 604
5-14	254	10 597	9293 – 11 900	13	542	248 – 837
15-24	146	6829	5721 – 7937	15	702	347 – 1057
25-64	505	6682	6100 – 7265	73	966	744 – 1188
65+	187	12 852	11 010 – 14 694	13	893	408 – 1379
Unknown	3					
<b>Total</b>	<b>1186</b>	<b>8120</b>	<b>7658 – 8583</b>	<b>117</b>	<b>801</b>	<b>656 – 946</b>
	<b>Sports-related injuries</b>			<b>Unintentional poisoning</b>		
0-4	2	189	-73 – 451	5	473	58 – 887
5-14	185	7718	6606 – 8830	5	209	26 – 391
15-24	346	16 183	14 478 – 17 889	9	421	146 – 696
25-64	449	5941	5392 – 6491	25	331	201 – 461
65+	10	687	261 – 1113	6	412	82 – 742
Unknown	4					
<b>Total</b>	<b>996</b>	<b>6819</b>	<b>6396 – 7243</b>	<b>50</b>	<b>342</b>	<b>247 – 437</b>
	<b>Lifting injuries</b>			<b>All other injuries</b>		
0-4	0	0		22	2079	1210 – 2948
5-14	1	42	-40 – 123	45	1877	1329 – 2426
15-24	54	2526	1852 – 3199	43	2011	1410 – 2612
25-64	470	6219	5657 – 6782	228	3017	2625 – 3409
65+	43	2955	2072 – 3839	54	3711	2721 – 4701
Unknown						
<b>Total</b>	<b>568</b>	<b>3889</b>	<b>3569 – 4209</b>	<b>392</b>	<b>2684</b>	<b>2418 – 2950</b>
	<b>Injuries caused by physical violence</b>					
0-4	11	1040	425 – 1654			
5-14	20	834	469 – 1200			
15-24	31	1450	940 – 1960			
25-64	76	1006	780 – 1232			
65+	3	206	-27 – 440			
Unknown						
<b>Total</b>	<b>141</b>	<b>965</b>	<b>806 – 1125</b>			

\* = Number of injuries; † = rate per 100 000 person years; ‡ = 95% confidence interval

**Figure 1: Age group comparison of where injuries occurred**



### Falls

Seventeen per cent of the respondents reported that someone in their household had suffered a fall-related injury during the previous 12 months, resulting in a total of 1186 injuries. The falls were most likely to occur at home (41%), followed by work (10%) and school (9%). A significant proportion of the falls occurred at an unspecified location (39%). Ten per cent of the injured persons were admitted overnight to hospital. Table 2 shows that older people aged 65+ had the highest rate of fall-related injury (12 852 per 100 000), followed by children aged 5–14 years (10 597 per 100 000). Females (52%) accounted for slightly more fall injuries than males.

### Sports-related injuries

Twelve per cent of the respondents reported that someone in their household had suffered a sports-related injury during the previous 12 months, resulting in a total of 996 injuries. Five per cent of the injured persons were admitted overnight to hospital. As shown in Table 2, young people aged 15–24 years had the highest rate of sports-related injury (16 183 per 100 000), a rate more than double the next highest age group, children aged 5–14 years (7718 per 100 000). Males (72%) were much more likely to suffer a sports-related injury than females.

### Lifting injuries

Nine per cent of the respondents reported that someone in their household had suffered an injury caused by lifting an object during the previous 12 months, resulting in a total of 568 injuries. Half of the lifting injuries occurred at work, 40% occurred at home, and nine per cent occurred at an unspecified location. Four per cent of the injured persons were admitted overnight to hospital. Adults aged 25–64 had the highest rate of lifting injury (6219 per 100 000, Table 2), followed by older people

aged 65+ (2955 per 100 000). Males (58%) accounted for more of the lifting injuries than females.

### **Violence**

Two per cent of the respondents reported that someone in their household had been injured as the result of physical violence inflicted by another person. A total of 141 injuries were recorded. Thirty five per cent of these intentional injuries occurred at home, and fourteen per cent occurred at work. A large proportion (37%) occurred at an unspecified location. Ten per cent of the injured persons were admitted overnight to hospital. Table 2 shows that young adults aged 15–24 had the highest rate of injury due to physical violence (1450 per 100 000), followed by pre-school children (1040 per 100 000). Males (55%) sustained more of the violent injuries than females.

### **Motor vehicle crashes**

Two per cent of the respondents reported that someone in their household had been injured in a motor vehicle crash, resulting in a total of 128 injuries. Twenty one per cent of the injured persons were admitted overnight to hospital. Table 2 shows that young adults aged 15–24 had the highest rate of injury caused by motor vehicle crashes (1824 per 100 000), followed by adults aged 25–64 (913 per 100 000). Males (57%) accounted for more motor vehicle injuries than females.

### **Cutting and piercing**

Two per cent of the respondents reported that someone in their household had suffered a cutting or piercing injury, resulting in a total of 117 injuries. Seven per cent of the injuries required overnight hospitalisation. More than half (57%) of the injuries occurred at home; 27% occurred at work; and 15% occurred at an unspecified venue. As shown in Table 2, adults aged 25–64 had the highest rate of cutting and piercing injury (966 per 100 000), followed by older people aged 65+ (893 per 100 000). Males accounted for the majority (62%) of these injuries.

### **Unintentional poisoning**

Less than one per cent of the respondents reported that someone in their household had been unintentionally poisoned. A total of 50 poisoning episodes were recorded and 18% of these cases required overnight hospitalisation. Just over half (52%) of the poisonings occurred at home; 18% occurred at work; and 26% occurred at an unspecified venue. Table 2 shows that pre-school children had the highest rate of unintentional poisoning (473 per 100 000), followed by young adults aged 15–24 (421 per 100 000). Males accounted for the majority (64%) of the poisonings.

### **Other injuries**

Seven per cent of the respondents reported that someone in their household had suffered another type of injury. A total of 392 'other' injuries were recorded, and included incidents such as burns, animal bites, being struck by a person or object, overexertion, foreign bodies in the eye, and repetitive strain injuries. Six per cent of the injuries required overnight hospitalisation. Forty five per cent of the injuries occurred at home; 30% occurred at work; and 20% occurred at an unspecified venue. Table 2 shows that older people aged 65+ had the highest rate of 'other' injuries (3711 per 100 000), followed by adults aged 25–64 (3017 per 100 000). Males accounted for the majority (56%) of these other injuries.

## Discussion

Injury is a public health problem in New Zealand and this study provides previously unknown information on the incidence and nature of injuries at the lower end of the injury severity pyramid. While ACC data provide a measure of injury incidence, detailed information is only available for entitlement claims, which are likely to under represent children, the unemployed, homemakers and the elderly.<sup>2</sup> Findings from the current study extrapolated to the New Zealand population would indicate that each day 2500 people sustain an injury serious enough to require medical treatment by a doctor. This study also found that only 8% of the reported injuries resulted in overnight hospitalisation, indicating that the total burden of injury in New Zealand is much larger than estimated by routinely collected injury hospitalisation data. As reflected by hospital discharge data,<sup>7</sup> this study found that people were most likely to be hospitalised for motor vehicle crashes (21%), falls (10%) and violence (10%).

It should be noted that this survey was not a random sample of all New Zealanders, and is representative of the regions surveyed only. Comparisons of the sample demographics with Census data indicated that the households sampled were representative of the regions surveyed. It is also possible that the data were subject to recall bias. Several other studies have found a decline in recall of injury events when comparing a 12-month recall period to shorter periods, thereby resulting in an underestimate of the annual injury rate.<sup>8-10</sup> To improve recall in this study, the interviewers read out a list of different injury mechanisms and this may have helped respondents to remember a greater number of injuries. The respondents may also have been less likely to recall less medically serious incidents of injury,<sup>8-10</sup> and injuries due to physical violence may have been under reported due to the sensitive nature and/or legal implications of such incidents. Whilst it is acknowledged that the question on physical violence did not specifically include the word “intentional”, pilot testing demonstrated that respondents associated this question with injury intentionally inflicted by another person. A limitation of this study is that respondents may not have been aware of all injury incidents for their household.

As with NZHIS hospital discharge data,<sup>7</sup> the leading cause of injury reported in this study was falls (33%). However, the other leading causes of injury – sports and lifting of objects – differed from the second and third leading causes of injury hospitalisation – motor vehicle crashes and cutting and piercing.<sup>7</sup> One explanation for these differences relates to the E codes used within the hospital coding system, as the ICD-9 coding system does not easily identify sports-related injuries.<sup>11</sup> It is also likely that the differences in ranking are due to the fact that while sporting and lifting injuries appear to be the most common self-reported injuries, they also tend to be less severe (5% and 4% were hospitalised respectively), compared to injury events such as motor vehicle crashes (21% hospitalised).

The finding that 29% of the injuries occurred at home indicates a need for health promotion programmes that emphasise the importance of safety in the home. Older people and parents of pre-school children would be particularly suitable target groups for such initiatives, given that these age groups are most likely to be injured at home. Since these age groups may have high levels of contact with general practitioners, GP consultation could provide an opportunity for counselling on injury prevention practices.

Sports injuries accounted for more than one quarter of all injuries, indicating a need for ongoing targeting of people involved in sports, especially those in the 15–24 age group. Sixteen per cent of the injuries occurred at work. Injuries caused by lifting, and cutting and piercing often occurred as the result of work-related activities and more than one third of injuries in the 25–64 age group occurred in the workplace. These findings highlight the need for continued effort to ensure safety in workplace environments. It is important to acknowledge that while females were more likely to be injured at home, it was not ascertained whether these women were in paid work at the time of their injury. However, from an injury prevention perspective, the home is an important target regardless of activity.

It was of some concern that pre-school children had the second highest rate of injury inflicted by another person. This reinforces the need to support current efforts to increase the early identification and management of at risk children.<sup>12,13</sup> It was also surprising to find that 14% of injuries caused by physical violence occurred in the workplace. Internationally, workplace violence has been identified as an important public health issue.<sup>14</sup> However, in New Zealand this issue has received little attention from policy makers, employer organisations, unions or the media. Further investigation is needed to ascertain the circumstances surrounding these events, so that appropriate preventive strategies can be developed.

The findings from this study highlight the need for injury prevention activities to continue to occur in general practice. These could take the form of one-to-one discussion with patients regarding the prevention of further injuries, as well as dissemination of injury prevention pamphlets in surgery waiting rooms.

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