

Child and Youth Injuries in Nova Scotia

1995–2004

A REPORT


NOVA SCOTIA

Health Promotion
and Protection



Child and Youth Injuries in Nova Scotia

1995–2004

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May • 2009

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ISBN: 978-1-55457-298-4

Child and Youth Injuries in Nova Scotia (1995–2004): A Report

Population Health Research Unit (Dalhousie University) in collaboration with the Nova Scotia Department of Health Promotion and Protection.

Designed by Laura Graham Design

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How to cite this document:

Peter Nestman (Population Health Research Unit). (2009). Child and Youth Injuries in Nova Scotia: A Report, Halifax: Nova Scotia Department of Health Promotion and Protection.

May, 2009

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Acknowledgments

Development of this report required the advice, expertise, and support of many people and organizations who are passionate about improving the health and safety of Nova Scotia's children and youth. The Department of Health Promotion and Protection thanks all of those people who assisted in the creation of this report.

In particular, the Department of Health Promotion and Protection acknowledges with great appreciation the contributions made by the members of the steering committee established to help guide the development of this report and assist in the data analysis and interpretation.

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This report builds on the earlier work of Dr. Beth Bruce and Michael Pennock who, in 1999, released a *Comprehensive Report on Injuries in Nova Scotia: Trends and Patterns among Children and Youth 1992–1999*.

We also wish to acknowledge the contributions of Dr. S. Hussain (former analyst), Dr. Gordon Flowerdew, and Dr. Judy Guernsey of the Department of Community Health and Epidemiology, Dalhousie University.

The statistical analysis and this report were prepared by Researcher/Coordinator Peter Nestman with the assistance of Analyst Yan Wang and former Director Mark Smith of the Population Health Research Unit (PHRU) at Dalhousie University, in collaboration with Julian Young, Coordinator, Injury Prevention and Control, Nova Scotia Department of Health Promotion and Protection.

Foreword

Injury is the leading cause of death and hospitalization among children and youth in Nova Scotia. In fact, injury contributes to more death and disability for young Nova Scotians than all other causes combined. During the period of this report, Nova Scotia lost nearly one child every week as a result of an injury. This is unacceptable. I know that Nova Scotians would not accept this loss if the cause were meningitis or another infectious disease. Yet, as a society, we have come to accept injuries and-related deaths as natural and inevitable. They are not natural; they are not accidents. They can be prevented.

Children and youth are more vulnerable to injury—they don't always have the cognitive ability to process information about risks or have the physical skills to avoid harm. While allowing young people to explore the world, by climbing monkey bars or learning to skateboard, supports their learning and growth, risk taking must be balanced with the need to keep them safe. Achieving this balance is complex, but we have good evidence about what works to protect children and youth from injury. The real challenge lies in doing the right things.

Educating young people, parents, teachers, and others is an important part of keeping children and youth safe, but this alone will not suffice. The surrounding environment has a significant influence on the safety of our children and youth. For example, this report clearly demonstrates the connection between income and injury. Children and youth from lower-income households have much higher rates of injury-related deaths and hospitalizations.

We have made progress in Nova Scotia, through the Department of Health Promotion and Protection and many community partners, to improve the health and safety of children and youth. Many of these improvements have resulted from healthier environments, better policies, and improvements to legislation. But there is much more work to be done. We must do better and do more to eliminate unsafe risk, build healthy public policy, and address the social factors that predispose children and youth to injuries.

I encourage everyone who reads this report, as parents, as professionals, as Nova Scotians, to consider the role you can play in reducing injuries. Our department, through the renewed Injury Prevention Strategy for Nova Scotia, has identified children and youth as a priority. Working together, we can help prevent injuries and ease the pain and suffering experienced by families, friends, and communities. We can make Nova Scotia a healthier and safer place for all.

Robert Strang, MD
Chief Public Health Officer
Department of Health Promotion and Protection

Background

This report examines hospital and vital statistics records for child and youth injuries in Nova Scotia over a 10-year period, between fiscal years 1995 and 2004. The report presents a statistical picture of injury-related hospitalizations and injury-related deaths among children and youth. By clearly identifying some of the injury trends and patterns, it is hoped that this report will assist decision makers and injury prevention stakeholders in developing broad, evidence-based initiatives to respond to this health and social issue.

It is important to recognize that there has been progress in Nova Scotia in tackling the problem of child and youth injury. The renewed Nova Scotia Injury Prevention Strategy identifies children and youth as a priority population. Organizations like the IWK Child Safety Link, Safe Kids Canada, SMARTRISK, and ThinkFirst have done excellent work to educate children, parents, and caregivers about a variety of injury issues among children and youth. Additionally, these organizations and many others have advocated for and helped government shape advances in policy and legislation to create a safer physical and social environment for our children and youth. Some examples include improvements to the Graduated Driver Licensing system, updating child restraint legislation, and new helmet laws.

There is evidence that the share of child and youth injury-related deaths as a proportion of all deaths has increased from 1970 to 2000 across Organisation for Economic Co-operation and Development (OECD) countries (UNICEF 2001). While rates of children and youth injury have declined, rates of other causes of death for children and youth have declined more rapidly. Nova Scotia has accomplished much, but clearly much more remains to be done.

Beyond the devastating human impact of injury, the economic burden is staggering. Across all ages, injuries cost Nova Scotians \$518 million each year. In Canada, it is estimated that injuries among children and youth cost \$5.1 billion annually. Injuries to children and youth also present a human capital issue. It is predicted that by 2031, Nova Scotia's overall population will decline by 3.6 per cent, and deaths will outpace births and net migration inflow. This means that our province's population is aging and shrinking at the same time. In the future, there will be fewer young people to support this older population. Left unchecked, injuries among children and youth will further exacerbate this problem. As Nova Scotia strives to maintain a sufficient and competent workforce, it is imperative that we stop injury-related death and disability among young people poised to enter their most productive years.

Methodology

Child and youth injuries are identified in this report through the following categories¹ :

- **Intentional injuries**

- Violence (assault) inflicted by another person through bodily force, substances, hanging, strangulation, suffocation, drowning, or submersion, firearms discharge, explosive material, fire, hot, blunt, or sharp objects, motor vehicles, neglect, abandonment, and/or abusive behaviour, etc.
- Suicide or self-harm through self-poisoning, hanging, strangulation, and suffocation, drowning or submersion, firearms, cutting or piercing, jumping from a high place, jumping or lying before a moving object, and/or other means

- **Unintentional injuries**

- Unintentional falls include falls involving ice or snow, slipping, tripping, or stumbling, collisions between people, being dropped while being held, beds, wheelchairs, furniture, stairs, playground equipment, ladders, scaffolding, buildings, trees, cliffs, and other unspecified sources
- Motor vehicle collisions include pedestrians, cyclists, motorcyclists, ATVs, individuals in railway trains involved in a collision with a motor vehicle; also include occupants of cars, heavy transport vehicles, pickup trucks, vans, or buses involved in a collision with a motor vehicle; and also include car occupants in collisions with other structures such as animals, streetcars, etc.
- Other transportation collisions involve individuals in railway injuries, cycling injuries, animal transportation, non-collision injuries from motor vehicles, injuries excluding submersions on watercraft, and air and space transport injuries
- Sports related involves injuries through ice skates, skis, roller-skates, skateboards, sports equipment, certain objects, and rapid travel and motion
- Fire and flames involve exposure to fire in buildings, the environment, structures, flammable material, nightwear, clothing, and other exposures to smoke and flames
- Drowning or submerging in a bathtub, swimming pool, and natural water and drownings or submersions due to mishaps on watercraft
- Unintentional poisoning includes poisoning from drugs, medications, alcohol, organic solvents, gases, vapours, chemicals, pesticides, and other noxious substances
- Suffocation/choking includes through a foreign body entering through eye or natural orifice, bed linen, parent's body, pillow, strangulation or hanging, cave-ins from falling earth or being in low-oxygen environments, and inhalation or ingestion of food, objects, or gastric contents that cause asphyxia and/or obstruct the respiratory tract
- Cutting and/piercing includes being injured by power tools and equipment, appliances, knives, needles, glass, nails, splinters, and other sharp objects
- Firearms involve an injury due to a handgun, rifle, hunting, shotgun, etc.

1. For coding, see Appendix 1.

- Machine/machinery includes injuries from chains, drive belts, pulleys, ropes, cables, winches, wires, farm machines and agricultural equipment, and other machinery
- Overexertion movement includes injuries due to strenuous or repetitive movements
- Struck by objects includes being struck by falling rocks or debris, being caught between objects such as doors or machines, and being injured unintentionally by another person or by a crowd
- Natural and environmental factors include injuries due to excessive cold/heat, bites/stings, travel/motion, or other forces of nature
- Late effects of injury are when the effects of an injury become apparent well after the injury was initially incurred
- Other injuries include any other injury not otherwise specified
- **Injuries with undetermined intention** include events where there is not sufficient information to determine if events were intentional or unintentional

For the purposes of this report, children and youth are defined as individuals 25 years of age and under.

Child and youth injuries were analysed primarily from the following two data sets:

- **Vital Statistics Deaths Database (VS).** The VS database contains detailed information about all deaths in Nova Scotia, including demographics, causes of death, and underlying causes of death. This data was used to identify young Nova Scotia residents who died as a result of injury.
- **Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD).** The information in this database comes from admission/separation forms completed by hospitals at the end of each uninterrupted patient stay. The CIHI-DAD contains comprehensive, patient-level information (e.g., demographics, diagnoses, treatments) for each admission to a Nova Scotia hospital. This data provides information about the nature of injuries (e.g., type and means of injuries, anatomic site injured as a result of a motor vehicle collision, etc.).

Diagnostic information in both VS and CIHI-DAD is coded using the International Statistical Classification of Diseases and Related Health Problems, more commonly referred to as ICD coding (ICD-9-CM for years 1995–2001 and ICD-10-CA for 2001–2004). The ICD coding systems provide specific codes for health conditions and injuries. The codes used to identify injuries in this report are listed in Appendix 1b. The following data sets were also used to enhance these analyses.

- **Insured Patient Registry.** The Insured Patient Registry contains longitudinal information (e.g., data of birth, patient geography) about every resident of Nova Scotia who is registered as a beneficiary of provincial MSI health care. Records for some citizens whose health-care costs are covered under federal plans (e.g., Canadian Armed Forces, RCMP) are not captured in this database. This registry was used to determine the population eligible for health-care services in each year of the study.
- **2001 Census of Canada—Nova Scotia Component.** The 2001 Canadian census contains statistical data including demographics, household information, and socio-economic indicators. These data was used to assign median household income (at the dissemination area level) to the study sample.
- **Patient Geography Database.** The Patient Geography Database contains geographic information based on postal code for every patient in each of the other databases. In areas where postal codes do not map exactly to other geographic boundaries, the geographic code is assigned probabilistically using the relative population weights of the surrounding areas. This database was used to assign individual records to district health authorities (DHAs) and census dissemination areas (DAs).²

This report examines child and youth injury statistics across Nova Scotia over a 10-year period, between fiscal years 1995 and 2004 (April 1, 1995–March 31, 2005). It shows the numbers and rates of injuries across demographic groups. Crude numbers and rates and age-adjusted rates of injuries have been calculated. Crude rates represent the actual number of child and youth injury-related hospitalizations or deaths during each fiscal year (i.e., 11/100,000). They represent the actual number of incidences observed. An age-adjusted rate is a weighted average of the age-specific crude rates, where the weights are the proportions of persons in the corresponding age groups of a standard population. The purpose of using age-adjusted rates is to enable comparisons between different jurisdictions or groups that have populations with different age-sex compositions or to make comparisons across different years.

An admission was identified as injury related in cases where an ICD-9-CM code of E800–E999 or an ICD-10-CA code of V01–Y36 and Y85–Y98 was present. The rate of injuries was calculated by dividing the number of injury-related hospital admissions or injury-related deaths listed by the representative population and multiplying by 100,000. In 1999, for example, there were 1757 injury-related hospitalizations among 323,985 individuals aged 0–25. The crude rate per 100,000 was calculated to be $1757/323,985 \times 100,000$. In order to compare injury rates across DHAs, age-standardized rates were calculated using the 2001 Nova Scotia population as a standard population.³

Factors Associated with Injury

The report sought to measure the degree to which the following variables influence injuries.

- 1. Sex:** An individual is listed as male or female in both the vital statistics and the CIHI-DAD data sets.
- 2. Age:** Birth date is listed in the VS and the CIHI-DAD data sets.
- 3. Urban/rural comparison:** An area was defined as urban if it was designated as a census metropolitan area (CMA) or a census agglomeration (CA) in the Patient Geography Database. A CMA is a geographic region that encompasses an urban core with a population of 100,000 or more; a CA is a geographic region that encompasses an urban core with a population of 10,000–99,999. In Nova Scotia, there is one CMA (Halifax) and four CAs (Kentville, Truro, New Glasgow, and Sydney) (Statistics Canada 2008).
- 4. Household income.** Median household income for census dissemination areas (DAs) was obtained from the 2001 Canadian census and linked to individual records via the DA. The quartiles for median household income were computed for each DHA, and then children and youth were assigned to either the first, second, third, or fourth quartile for their particular DHA on the basis of the median household income of the DA in which they lived.

Throughout the report, various types of injuries are analysed. The broad injury-by-cause code definitions are listed in Appendix 1. The ICD codes for injuries by cause are derived and amended from the Alberta Centre for Injury Control (Alberta Centre for Injury Control and Research 2006, p. 85). The report also examines injuries by anatomic site; the definitions can be observed in Appendix 2a. The codes for anatomic site of injury are provided in Appendix 2b and were amended from the National Center for Health Statistics in Atlanta, USA (Centers for Disease Control and Prevention 2007).

2. Statistics Canada's Postal Code Conversion File (PCCF+) was used to convert census dissemination area data to postal code data.
3. Confidence intervals were calculated using the following formulas:

$$\text{Crude CI} = \text{Rate} \pm 1.96 \sqrt{\frac{\text{Rate} \times (100,000 - \text{Rate})}{\text{Total pop at year}}} \quad \text{Age Adjusted CI} = \text{Rate} \pm 1.96 * \left(\frac{\text{Rate} \times 100,000}{\text{Total population}} \right)$$

Limitations

This report analyses the overall numbers, rates, and demographic profile of injuries provincially. Through the analysis of the data sets, the report was able to compare injury rates according to sex, age, urban and rural status, and average household income. While these are important variables, other important areas of study such as ethnicity and education have not been included because, at the time of this report, no data sets were available to analyse these variables. Adverse events in medical treatment are often considered injuries but have not been included within this report. Although adverse events are an important issue in health-care policy, an examination of the problem would have been beyond the scope of this report.

It should also be noted that the validity of comparing injury rates across certain jurisdictions and groups can be questioned. Different coding practices across jurisdictions can affect both numbers and rates. Moreover, unreported injuries may be prevalent but cannot be quantified or easily understood.

The 2001 shift from the ICD-9-CM to the ICD-10-CM coding system may also alter injury numbers and statistics. It has also been noted that ICD-10-CA has more specific and a greater number of codes than did the previous ICD-9-CM. This may have the effect of either over- or under-reporting certain types of injuries before and/or after 2001. Moreover, the report has not examined how changes in health management may have altered hospital bed utilization for children and youth injuries. In other words, what may have been treated through a hospitalization in one time period may have been treated through other means (emergency rooms and other) in another time period. For certain analyses, such as examining injury by anatomic site, the years examined had to be narrowed to 2001–2004, as the data was not fully available prior to that period.

Another topic that this report only partially addresses would be the full scope of intentional injuries. As prevention programming for intentional injuries may differ from unintentional injuries, understanding the scope of both types of injuries is important. While this report does separate and examine intentional and unintentional injuries, the full impact of intentional injuries may be under-reported. It can be difficult to distinguish intentional from unintentional injuries, especially amongst children who may not communicate the full circumstances surrounding their injuries.

This report has not provided a complete picture of the total number of injuries incurred by children and youth in Nova Scotia over the years 1995–2004. It has provided evidence only of injuries that required a hospitalization or that resulted in death. One important omission, which would have provided a more comprehensive assessment of the injury toll on children and youth, would have been to calculate the total sum of injuries by type in emergency rooms provincially. Unfortunately, there is currently no way of identifying the cause of injury in emergency settings within the current data sets. It is possible to quantify overall injury-related emergency visits that were billed by MSI. However, this total number would be under-representative of all injuries in emergency settings, as some visits are not billed through MSI. Had it been possible, a broader assessment of total number of injuries provincially would have been provided. Furthermore, an improved assessment of the severity of certain injuries by cause could have been produced by assessing the total number of injuries by cause and assessing the frequency with which they resulted in death. Thus, the report has not assessed causes of injury by severity or assessed the long-term effects of injuries on health status over time. It has also not indicated any relationship between child and youth injuries with other ailments or social factors, such as chronic illnesses, mental disorders, substance abuse, and family history, as these factors were beyond the scope of the project.

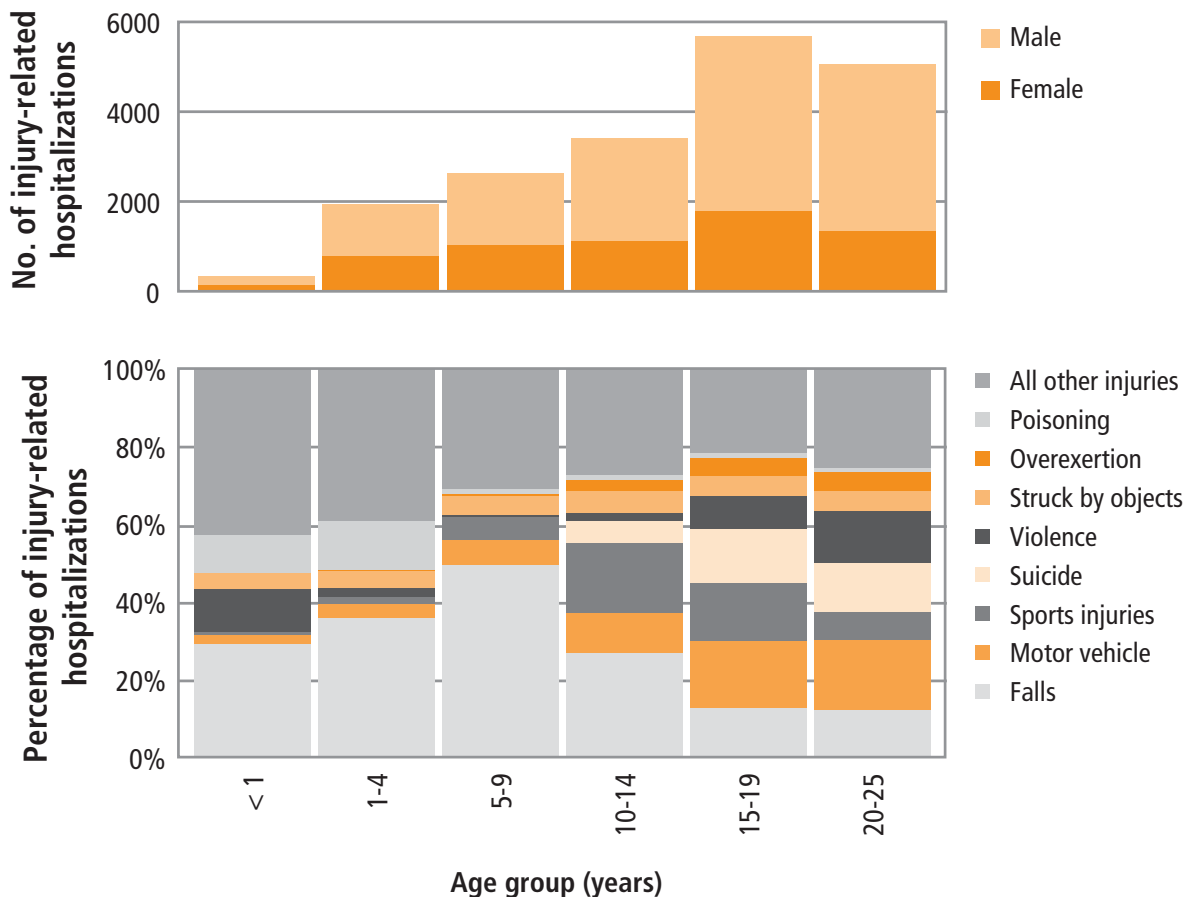
With these limitations in mind, this report indicates a lowering of hospitalizations for child and youth injuries across Nova Scotia, consistent with most other analyses into child and youth injuries. The decline in the mortality rate for injuries was not found to be statistically significant. This report demonstrates that child and youth injuries remain a significant concern to the health and safety of children and youth in Nova Scotia and that there are significant areas for improvement. Injuries remained the leading cause of death for children and youth in Nova Scotia during the time period of the analysis.

Overview of Child and Youth Injury-related Hospitalizations

Child and Youth Injury-Related Hospitalizations (1995–2004)

Over the 10-year period, 19,046 injury-related hospitalizations were recorded amongst children and youth between the ages of 0 and 25 years. **Figure 1** provides a frequency of these injuries according to age. The number of injuries increased from birth and peaked amongst those aged 15–19. Over 67 per cent of all injuries were incurred by males, and the proportion of males incurring injuries also increased by age. Males accounted for 54 per cent of injuries amongst children under the age of 1, and this proportion steadily increased to 73 per cent amongst 20- to 25-year-old males. The bottom histogram of the chart shows the distribution of these injuries by type. The largest category of injury-related hospitalizations was unintentional falls. The frequency of injuries due to falls was highest amongst children between the ages of 5 and 9. Motor vehicle collisions were the second most frequent cause of injury-related hospitalization, and this category was highest amongst older youth. Being struck by objects was more evenly distributed amongst all age groups. Unintentional poisonings were the most common amongst children between the ages of 0 and 4.

Figure 1: External cause for injury-related hospitalizations in Nova Scotia (1995–2004)



Child and Youth Injury-Related Hospitalizations by Age and Sex (1995–2004)

Table 1 shows the number of injury-related hospitalizations by age group. Fifteen- to 19-year-olds had the greatest number of hospitalizations. The frequency of male injury-related hospitalizations compared to female injury-related hospitalizations steadily increased with age.

Table 1. Injury hospitalizations by age in Nova Scotia, 1995–2004

Age	Hospitalizations		
	No.	%	Male/Female Ratio
0–4	2268	12%	1.8/1
5–9	2630	14%	1.6/1
10–14	3414	18%	2/1
15 – 19	5671	30%	2.2/1
20 – 25	5063	27%	2.7/1
Total	19046	100%	2/1

FACT

Sixty-four per cent of known exposures to poisoning occur amongst children and youth (ages 0–25) in Nova Scotia (2006). This table provides a breakdown of known poison exposures by the age of children and youth, compiled by the provincial poison centre.

(IWK Poison Centre, 2006 Annual Report)

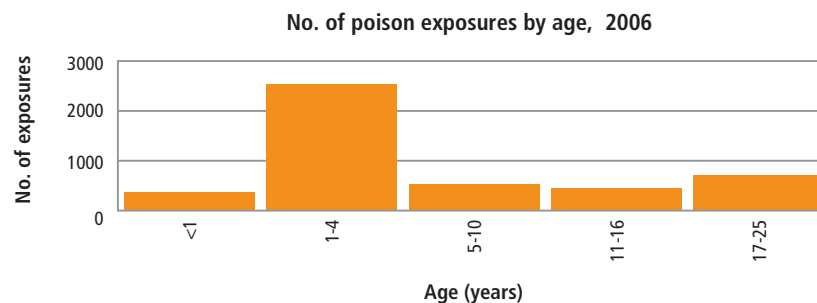
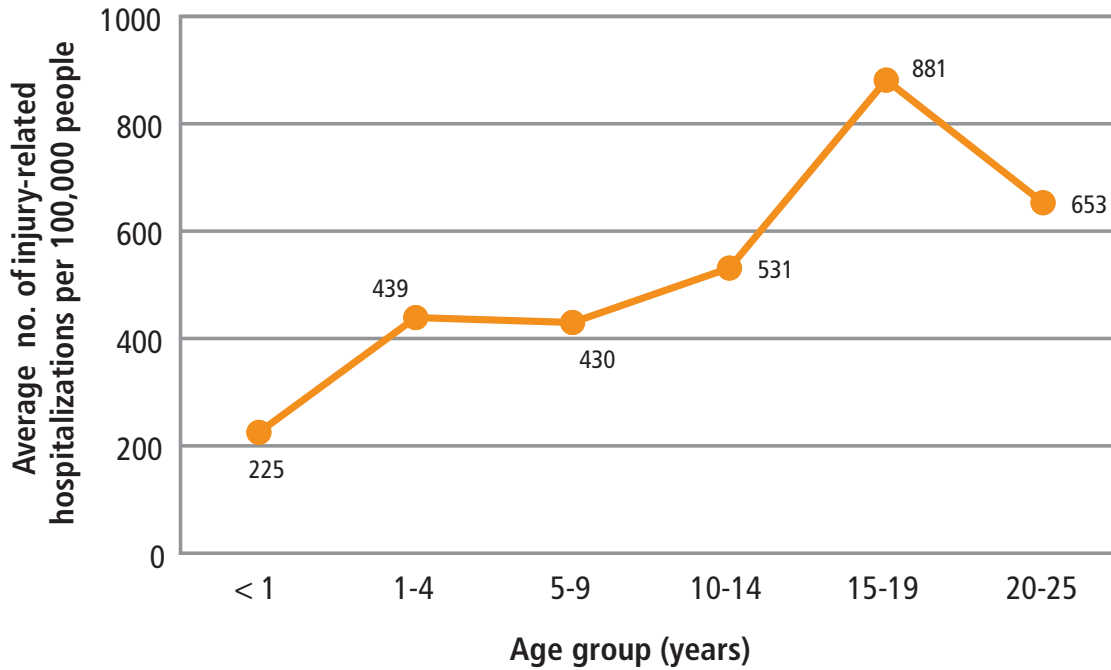


Figure 2 provides the overall injury rate by age. The rate of hospitalization was highest among those aged 15–19.

Figure 2: Annual injury-related hospitalization rate per 100,000 population by age in Nova Scotia (1995–2004)

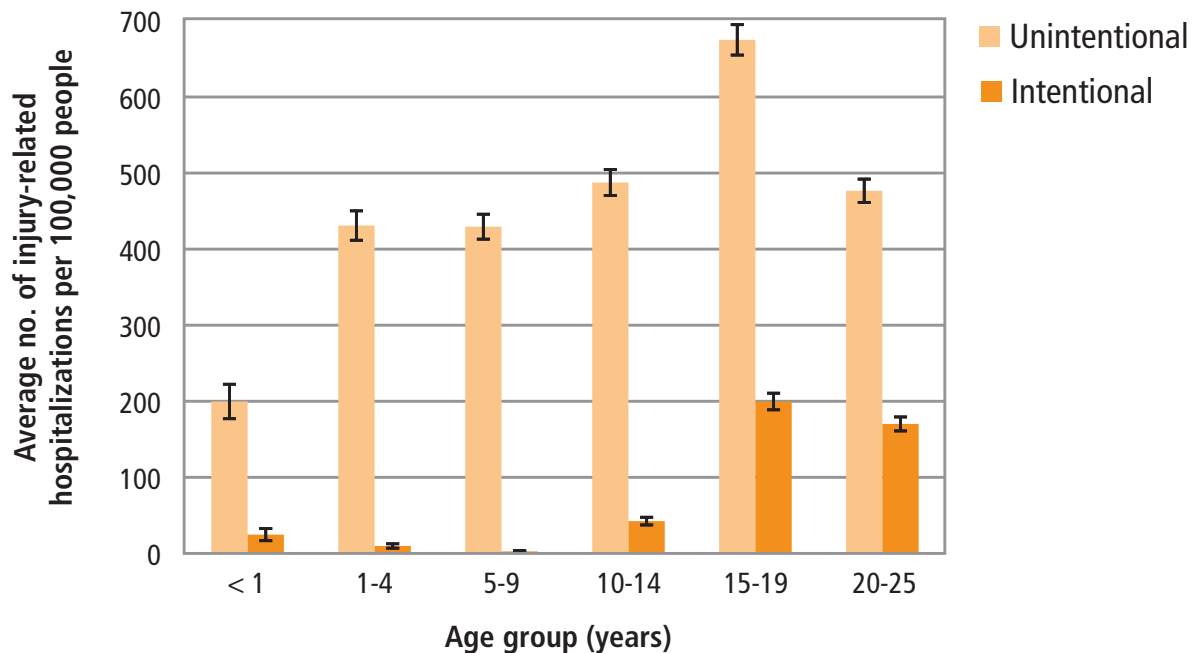


FACT

The rate for hospitalizations for injuries peaked amongst those aged 15–19, at 881 hospitalizations per 100,000 people.

Figure 3 provides the intentional and unintentional injury-related hospitalization rate by age. As can be observed, most injuries were unintentional. The rate of hospitalizations for unintentional injuries increased by age, peaked in teenage years, but declined among those aged 20–25. Hospitalizations for intentional injuries gradually declined after the first year and then increased in teenage years. Overall, approximately 84% of all injury-related hospitalizations were unintentional.

Figure 3: Annual intentional and unintentional injury-related hospitalization rate per 100,000 population by age in Nova Scotia (1995–2004)



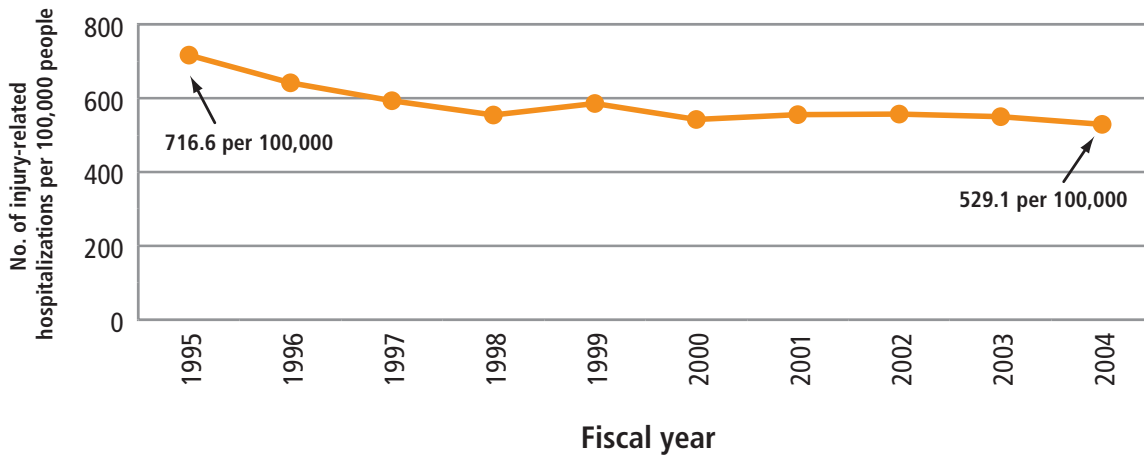
FACT

Approximately 84% of all injury-related hospitalizations were unintentional.

Trends in Child and Youth Injury-Related Hospitalizations (1995–2004)

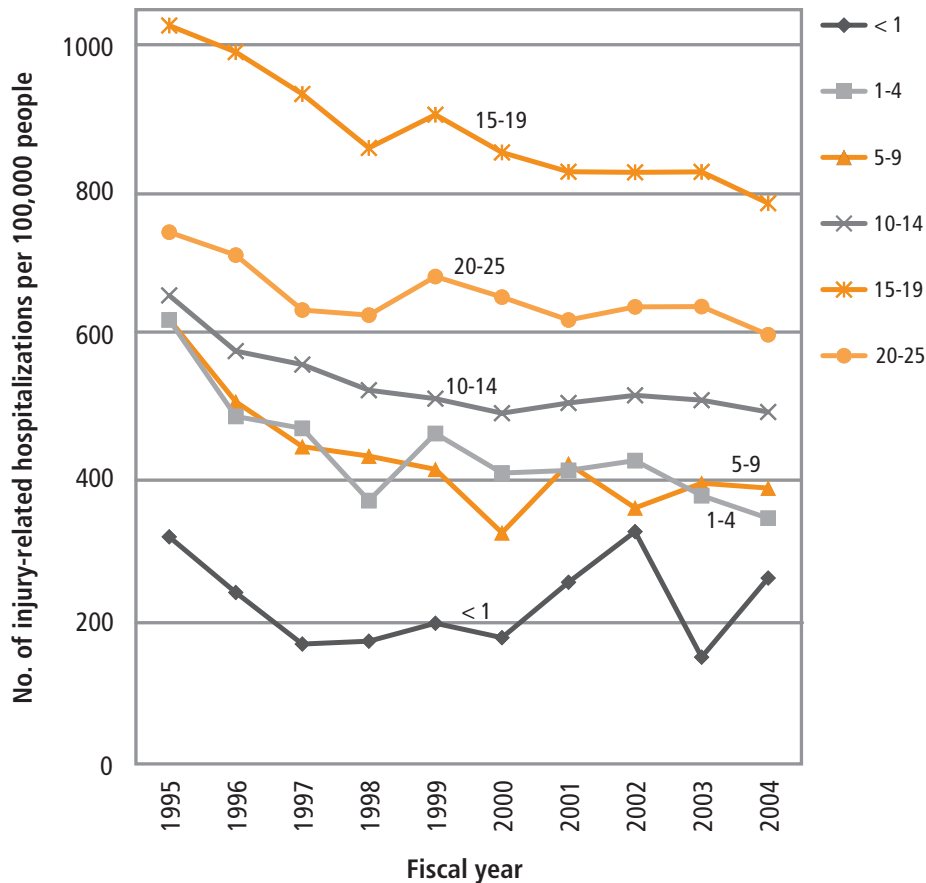
Consistent with national trends, the rates of injury-related hospitalizations for 0- to 25-year-olds declined steadily over the 10-year period (**Figure 4**). In 1995 the rate of injury-related hospitalizations was 717 per 100,000 people. In 2004 the rate of hospitalization was 529 per 100,000 people. This decline was significant ($p\text{-value} \leq 0.05$). As mentioned previously, this reduction should be interpreted with some caution, as the decline may have been affected by changes in coding and/or management practices.

Figure 4: Injury-related hospitalization rate of 0- to 25-year-olds in Nova Scotia (1995–2004)



Hospitalization rates for injuries declined for all age groups, as can be observed from **Figure 5**. The drop in injury rates was less noticeable among newborns under the age of 1. In 1995 the average hospitalization rate for this age group was 316 per 100,000 people, and in 2004 the rate declined to 258 injuries per 100,000 people, which constituted an 18 per cent drop in the hospitalization rate.

Figure 5: Injury-related hospitalization rate by age group (1995–2004)



Causes of Injury-Related Hospitalizations

Table 2 shows the top 20 causes of injury-related hospitalizations by cause of injury for the period 1995–2004. Unintentional falls, motor vehicle collisions, sports related, attempted suicides, and violence were the top five causes of injury-related hospitalization. The remaining categories accounted for approximately 38 per cent of injury-related hospitalizations.

Table 2: Frequency of injury-related hospitalizations by cause for ages 0–25 (1995–2004)

Injury type	Percentage of 19,046 injuries
Unintentional falls	23%
Motor vehicle	13%
Sports injuries	10%
Attempted suicide	9%
Violence and injury	7%
Struck by objects	5%
Other injuries	5%
Cutting/piercing	5%
Suffocation	4%
Other transport	4%
Late effects of injury	4%
Overexertion movement	3%
Unintentional poisoning	3%
Natural and environmental factors	2%
Fire and flames	2%
Undetermined intention	1%
Machine/machinery	1%
Firearms	<1%
Drowning	<1%

FACT

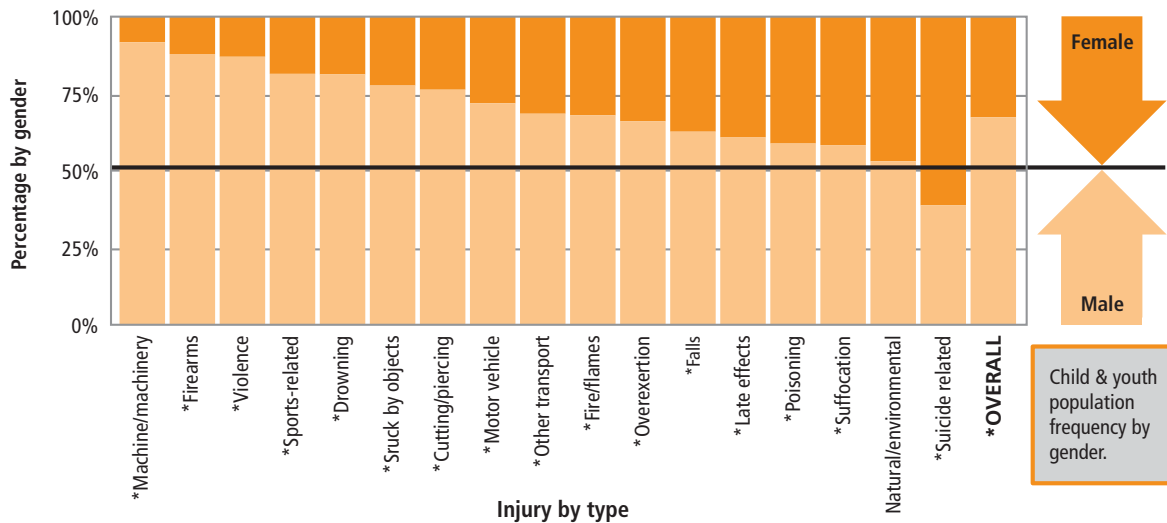
Unintentional falls were the most common cause of injury-related hospitalization amongst those aged 0–25.

Causes of Injury-Related Hospitalization—Comparison by Sex

During years 1995–2004, approximately 67% of child and youth injury-related hospitalizations were incurred by males (**Figure 6**). This represents a sex ratio of 2 to 1. Males had a higher proportional frequency of injury-related hospitalizations in all categories with the exception of hospitalizations for suicide attempts, which occurred more frequently among females. The sex difference was found to be statistically significant in all of the injury categories (p -values ≤ 0.05), except for injuries due to natural and environmental factors.

Figure 6: Sex distribution by type of injury-related hospitalization (1995–2004)

(*indicates p -value ≤ 0.05)



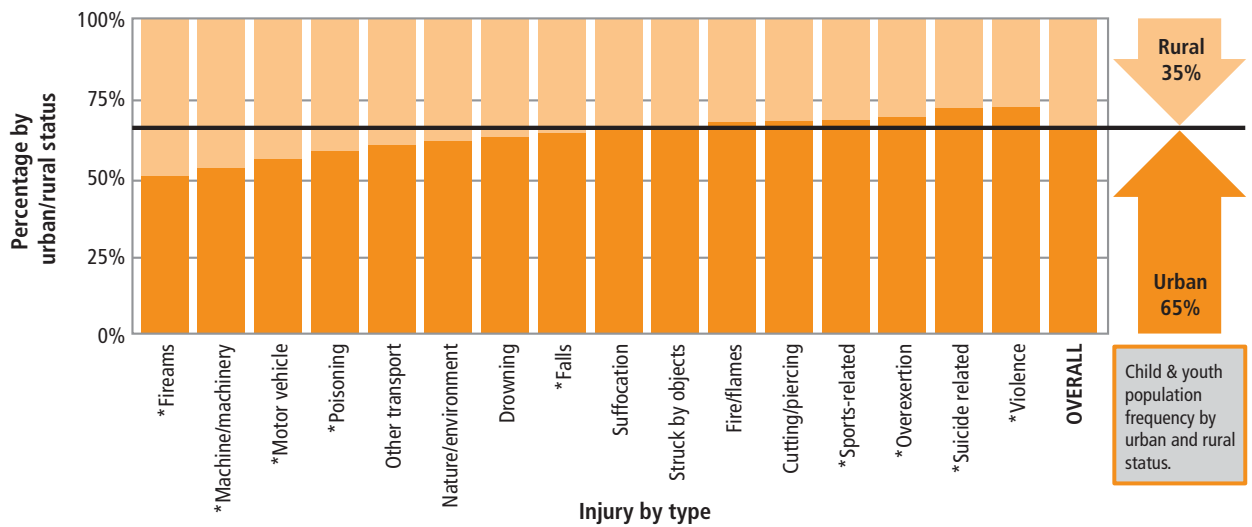
FACT

Males had a higher frequency of all injury-related hospitalization categories with the exception of hospitalizations for suicide attempts.

Causes of Injury-Related Hospitalization—Comparison by Urban/Rural Status

Thirty-five per cent of children and youth in Nova Scotia were classified as rural in this study. Comparatively, **Figure 7** graphically displays the frequency of urban versus rural injury-related hospitalizations. The figure demonstrates that overall the frequency of injury-related hospitalizations by rural and urban status was virtually identical to the urban/rural frequency of the total provincial population. Thus the relationship between overall injury-related hospitalizations and rural/urban status was not statistically significant.

Figure 7: Urban/rural distribution by type of injury-related hospitalization (1995–2004) (*indicates p-value ≤ 0.05)



However, there were variations in the types of injuries being incurred in rural/urban settings. Figure 7 indicates that urban areas had a greater proportion of violence, suicide, overexertion, and sports injuries compared to rural areas (p-values ≤ 0.05). In contrast, rural areas had a greater proportion of firearms, machinery, and motor vehicle collisions injuries, poisonings and unintentional falls (p-values ≤ 0.05). The relationship between urban and rural status and hospitalizations for other transportation collisions, natural and environmental factors, drowning, suffocation, being struck by objects, fire and flames, cutting and piercing, and late effects of an injury were not considered to be statistically significant.

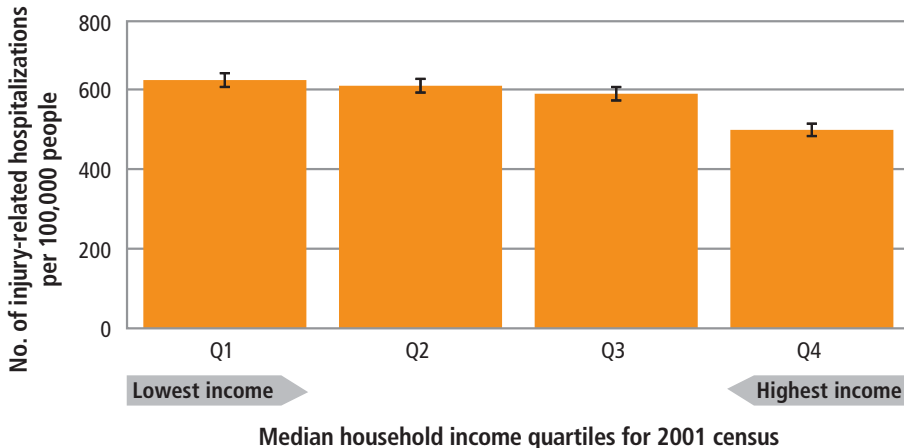
FACTS

- Urban areas had a greater proportion of violence, suicide, overexertion, and sports injuries compared to rural areas.
- Rural areas had a greater proportion of firearms, machinery, and motor vehicle collision injuries, poisonings, and unintentional falls.

Average Annual Injury-Related Hospitalization Rate by Income Quartile

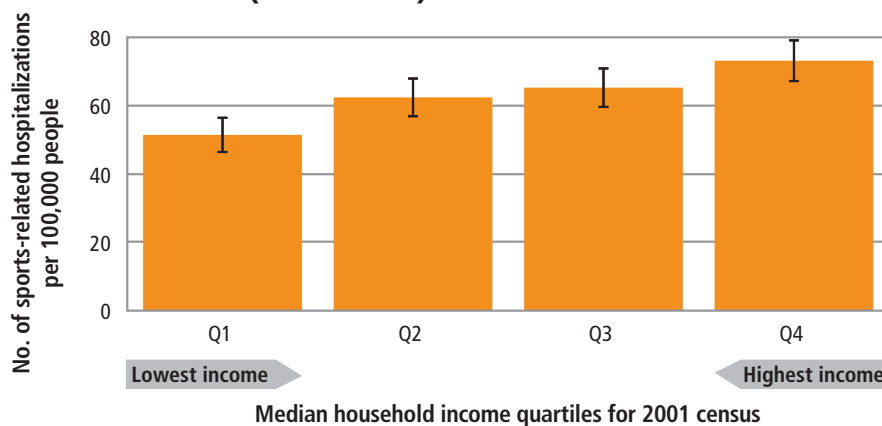
Median household incomes, obtained from the 2001 Canadian Census for Nova Scotia, were divided into four quartiles (see Appendix 3). As can be seen in **Figure 8**, the rate of injury-related hospitalization in the first income quartile differed significantly from the rate in the fourth income quartile (p value ≤ 0.05). Overall, income was inversely related to injury-related hospitalizations (chi square p value ≤ 0.05).

Figure 8: Annual rates for child and youth injury-related hospitalizations by median household income quartile in Nova Scotia (1995–2004)



In general, individuals in lower-income quartiles had higher rates of injury in most categories. One exception, in a large injury category, was higher rates of hospitalizations for sports injuries in higher-income quartiles. As can be seen in **Figure 9**, the rate of hospitalizations for sports-related injuries in the first income quartile differed significantly from the rate in the fourth income quartile (p value ≤ 0.05). Overall, there was a positive relationship between income and sports-related hospitalizations (chi square p value ≤ 0.05).

Figure 9: Annual rates for sports-injury hospitalizations amongst children and youth (ages 0–25) by median household income quartile in Nova Scotia (1995–2004)



FACTS

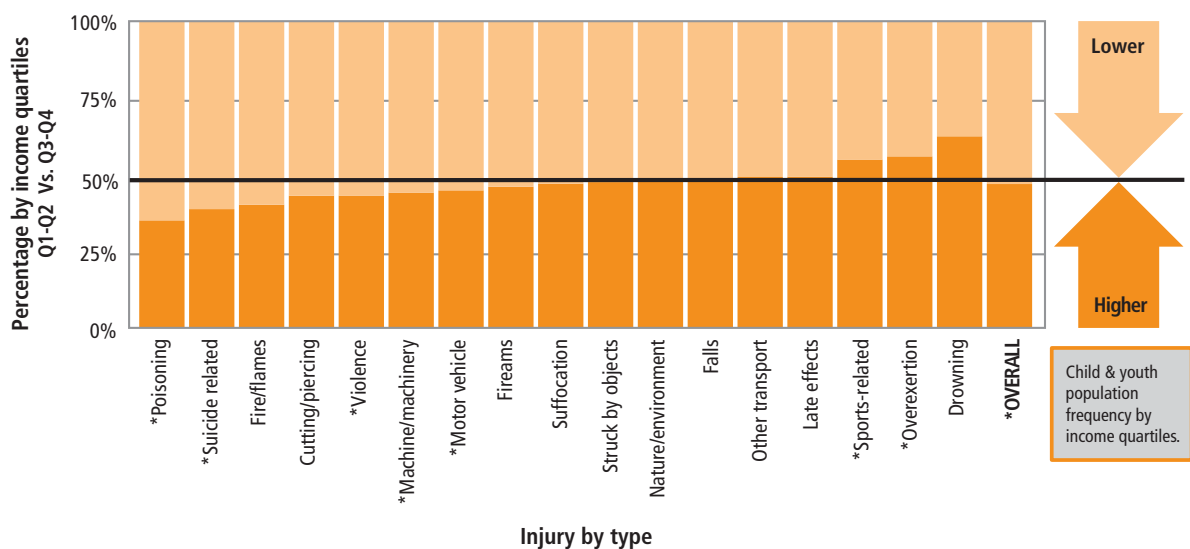
- Injury hospitalizations among children and youth were more frequent in lower-income neighbourhoods than higher-income neighbourhoods.
- Sports injuries were an exception to this overall trend, as sports-related hospitalizations among children and youth were more frequent in higher-income neighbourhoods than lower-income neighbourhoods.

Causes of Injury-Related Hospitalization—Comparison by Income Quartiles

Close to 50% of child and youth Nova Scotians were classified as being in the first two income quartiles. **Figure 10** graphically displays the distribution of injury-related hospitalizations by the first two income quartiles (lower income) and the two last income quartiles (higher income). The figure demonstrates that overall there was a greater frequency of injury-related hospitalizations in the first two income quartiles compared to the last two income quartiles ($p\text{-value} \leq 0.05$).

The figure also indicates that the first two income quartiles had a greater proportion of injury-related hospitalizations due to poisoning, attempted suicide, fire/flames, cutting/piercing, violence, and motor vehicle collisions compared to the two higher-income quartiles ($p\text{-values} \leq 0.05$). In contrast, higher-income quartiles had a greater proportion of injury-related hospitalizations due to sports and overexertion ($p\text{-values} \leq 0.05$). The relationship between income and hospitalizations for machine/machinery, firearms, suffocation, struck by objects, natural/environment, unintentional falls, other transportation collisions, and late effects of an injury were not considered to be statistically significant.

Figure 10: Percentage of injury-related hospitalizations by type according to income quartiles (1995–2004) (*indicates $p\text{-value} \leq 0.05$)



FACTS

- Overall, injury-related hospitalizations were more likely to occur in the first two income quartiles than they were in the two higher-income quartiles.
- Injury-related hospitalizations due to poisoning, attempted suicide, fire/flames, cutting/piercing, violence, and motor vehicle collisions were more likely to occur in the lower-income quartiles than they were in the two higher-income quartiles.
- Injury-related hospitalizations due to sports and overexertion were more likely to occur in the two higher-income quartiles than they were in the two lower-income quartiles.

Injury by Anatomic Site and Cause

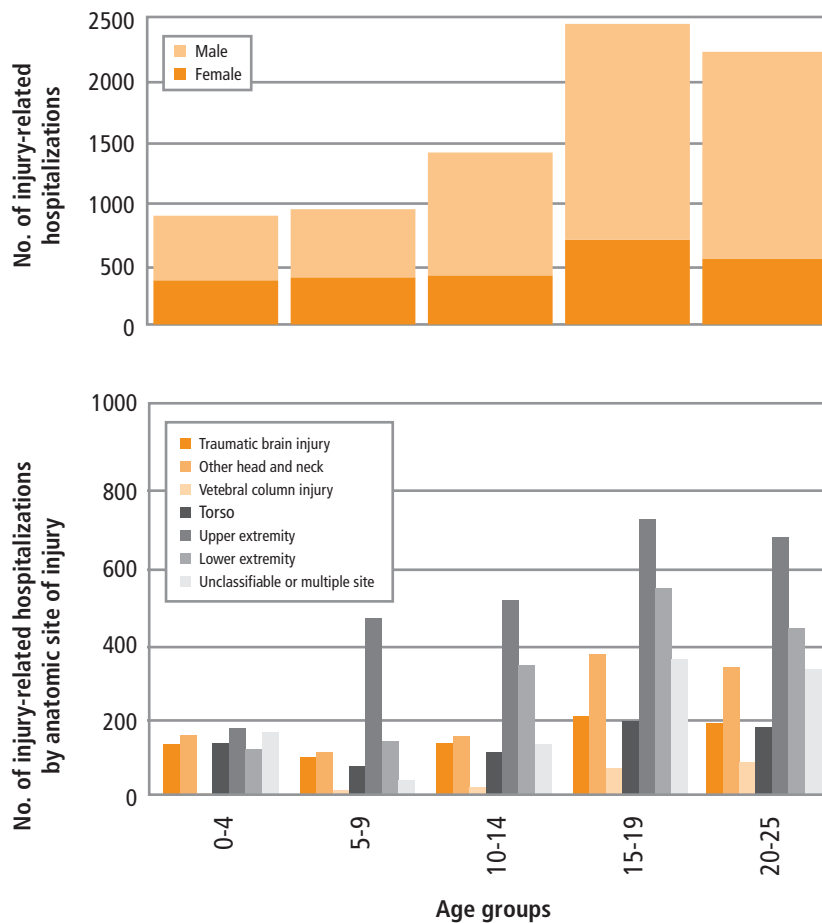
Overall

Between April 1, 2001, and March 31, 2005, records for a total of 7,880 child and youth injuries included information about the anatomic site of injury. Records from April 1, 1994, to March 31, 2001, could not be examined due to incomplete data on the anatomic sites of injuries at that time.

Figure 11 shows the total number of injuries by selected age groups during 2001–2004. The histogram at the bottom of the chart provides a distribution of the anatomic sites of injuries for those injuries. The most common anatomic injury site amongst children and youth overall was the upper extremity. Overall, upper extremity injuries made up approximately 32 per cent of all child and youth injury hospitalizations.

Children between the ages of 0 and 4 had the greatest proportion of injuries to the brain, the head and neck, and the torso that resulted in an injury hospitalization. Injuries to the vertebral column or spinal cord became more common in the late teens and amongst 20- to 25-year-olds. Lower extremity was the second most frequent anatomical site, accounting for 20 per cent of all injury-related hospitalizations.

Figure 11: Number of injury-related hospitalizations by age, gender, and anatomic site in Nova Scotia (2001–2004)



FACTS

- Upper extremity injuries made up approximately 32% of all child and youth injuries.
- Injuries to the vertebral column or spinal cord became more common in the late teens and amongst 20- to 25-year-olds.

Unintentional Falls

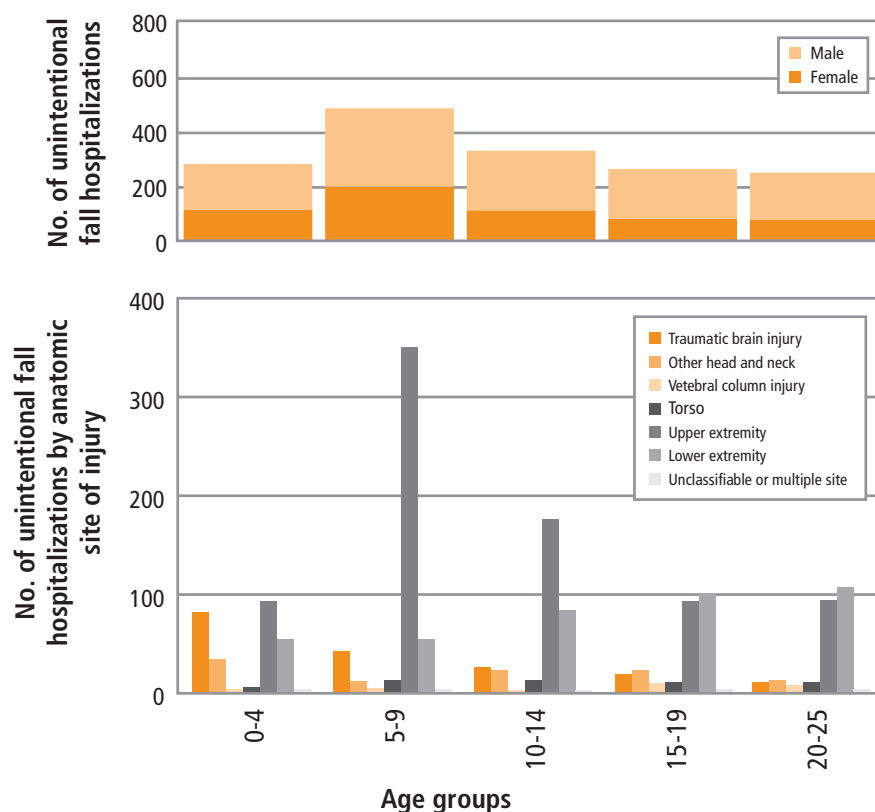
Unintentional falls were the most frequent cause of child and youth injury-related hospitalization. Nova Scotia hospitals recorded 1,598 fall hospitalizations between April 1, 2001, and March 31, 2005. The most frequent proportion of falls occurred amongst 5- to 9-year-olds. The high number of upper extremity injuries, which accounted for roughly 32 per cent of all child and youth injuries, was heavily affected by unintentional falls.

Approximately 50 per cent of all unintentional falls resulted in an injury to the upper extremity. Injuries to the upper extremity amongst fall hospitalizations was particularly pervasive for children between 5 and 9, where 73 per cent of falls resulted in an injury to the upper extremity.

Falls also contributed to high incidences of brain, head, and neck injuries for children between the ages of 0 and 4.

Twenty-nine per cent of unintentional fall hospitalizations among 0- to 4-year-olds involved brain injuries, and 13 per cent of injury-related hospitalizations involved injuries to the head or neck.

Figure 12: Number of unintentional fall hospitalizations by age, gender, and anatomic site in Nova Scotia (2001–2004)



FACT

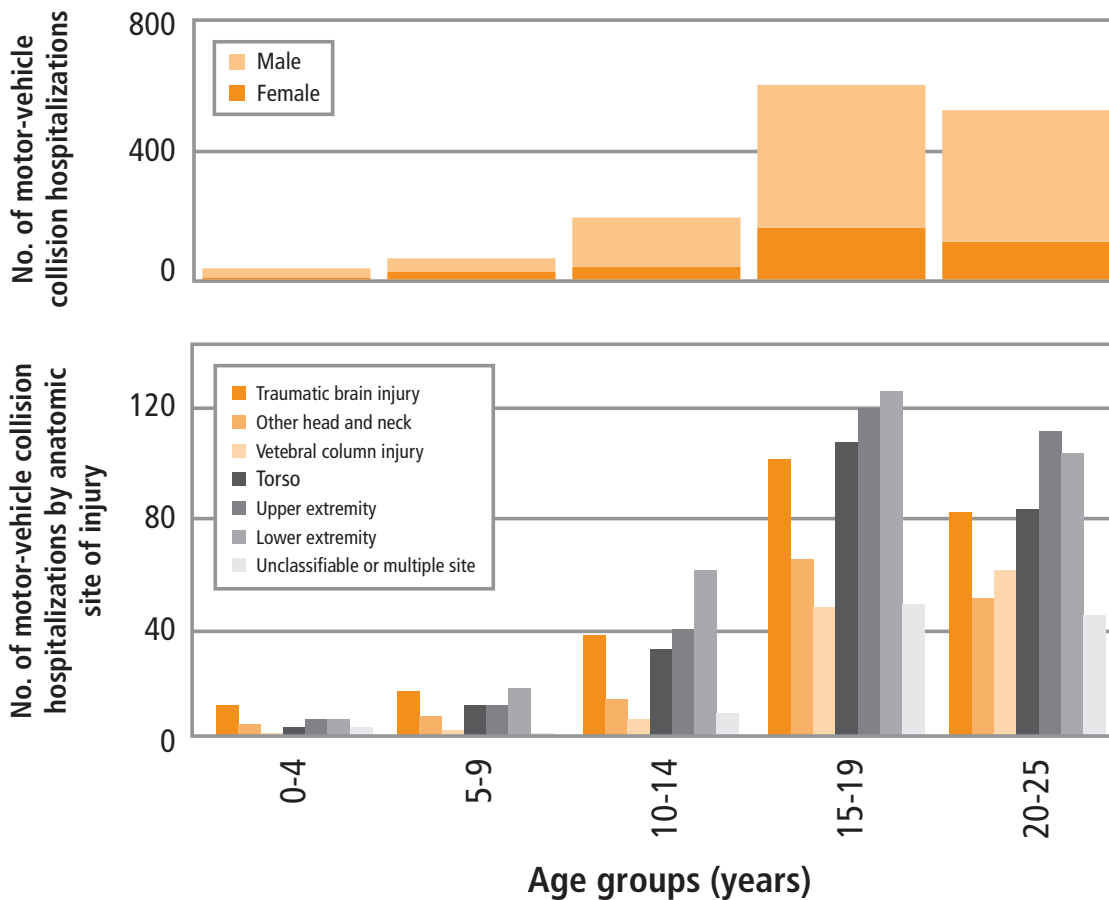
“An estimated 1,700 children age 14 and under are hospitalized every year in Canada for a fall related to chairs, beds, stairs, and steps.”

(Safe Kids Canada 2006, p. 23)

Motor Vehicle Collisions (MVCs)

Motor vehicle collisions were the second most frequent cause of child and youth injury-related hospitalization. There were 1,412 motor vehicle hospitalizations recorded in Nova Scotia between April 1, 2001, and March 31, 2005. Among these cases, there were a high number with multiple anatomical sites of injury. Traumatic brain injuries were high across all age groups. As will be seen later in this report, motor vehicle collisions were the most frequent cause of child and youth injury-related death in Nova Scotia, which would indicate that certain motor vehicle collisions have a high degree of lethality.

Figure 13: Number of motor vehicle collision hospitalizations by age, gender, and anatomic site in Nova Scotia (2001–2004)



FACT

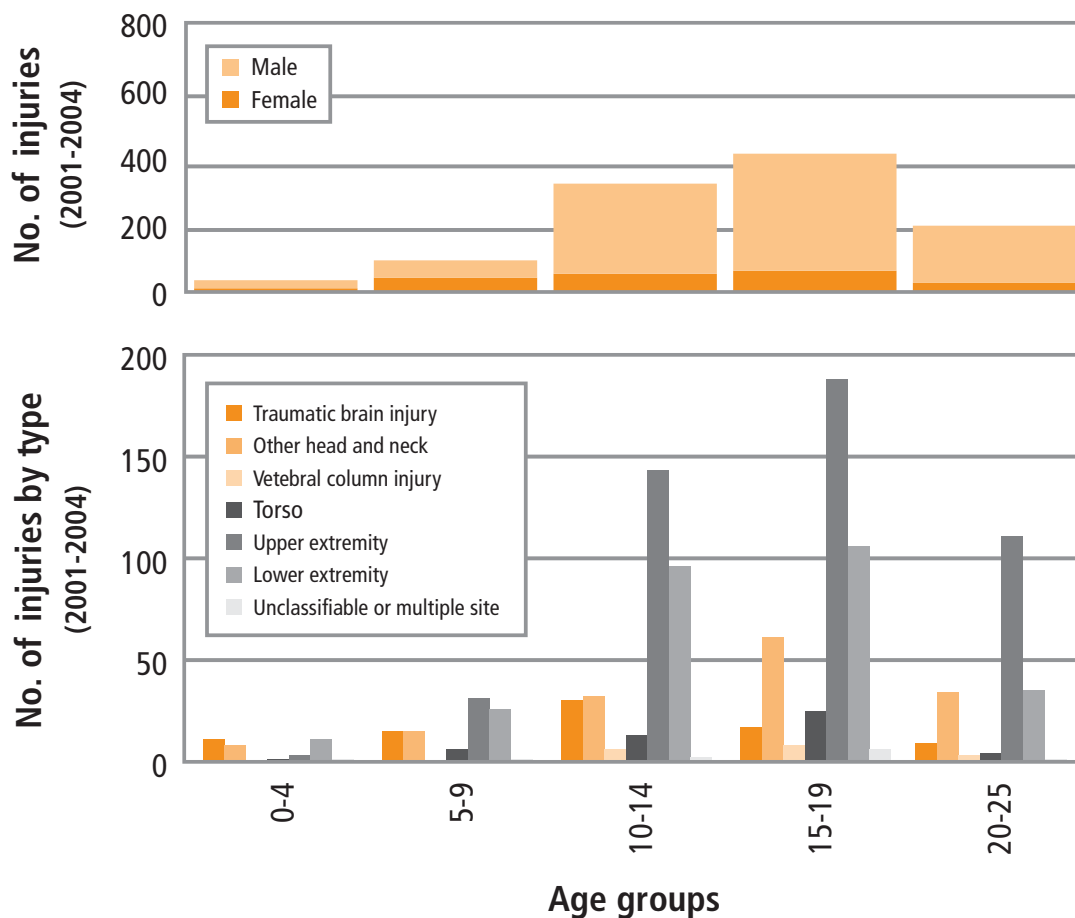
Traumatic brain injuries are the leading cause of traffic-deaths amongst youth in high income countries. *(World Health Organization, 2007(7))*

Sports Injuries

Sports injuries were the third most frequent cause of child and youth injury-related hospitalizations, and it was one of the few categories where injury-related hospitalization rates increased.

Forty-five per cent of sports injuries were in the upper extremity area. The proportion of upper extremity injuries increased with age—56 per cent of sports injuries amongst 20- to 25-year-olds were located in the upper extremity area. Thirty-one per cent of sports injuries amongst 0- to 4-year-olds involved a trauma to the brain.

Figure 14: Number of sports-related hospitalizations by age, gender, and anatomic site in Nova Scotia (2001–2004)



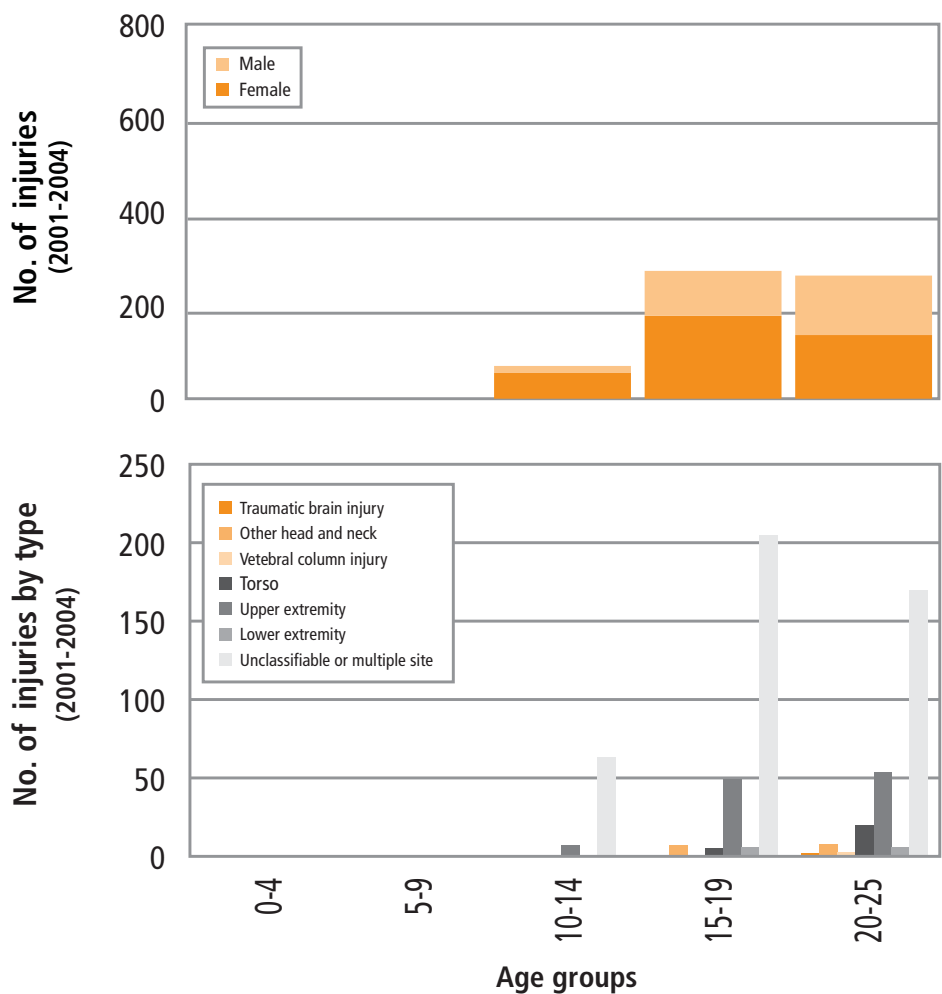
FACT

Forty-five per cent of sports injuries amongst children and youth in Nova Scotia occur in the upper extremity area.

Attempted Suicide

There were 70 hospitalizations for attempted suicides amongst 10- to 14-year-olds from April 1, 2001, to March 31, 2005, an average of 17.5 yearly. In that same period, there were 273 hospitalizations for attempted suicides amongst 15- to 19-year-olds (an average of 69.25 yearly) and 263 hospitalizations for attempted suicides amongst 20- to 25-year-olds (an average of 65.75 yearly). Amongst 10- to 14-year-olds, 79 per cent of suicide attempts were female, while over all ages, 60 per cent of suicide attempts were female. A large proportion of these suicide attempts had unclassifiable/multiple sites of injury. This is because many of these suicide attempts involved a self-poisoning and may not have resulted in a physical injury to the body.

Figure 15: Number of hospitalizations due to attempted suicide by age, gender, and anatomic site in Nova Scotia (2001–2004)



FACT

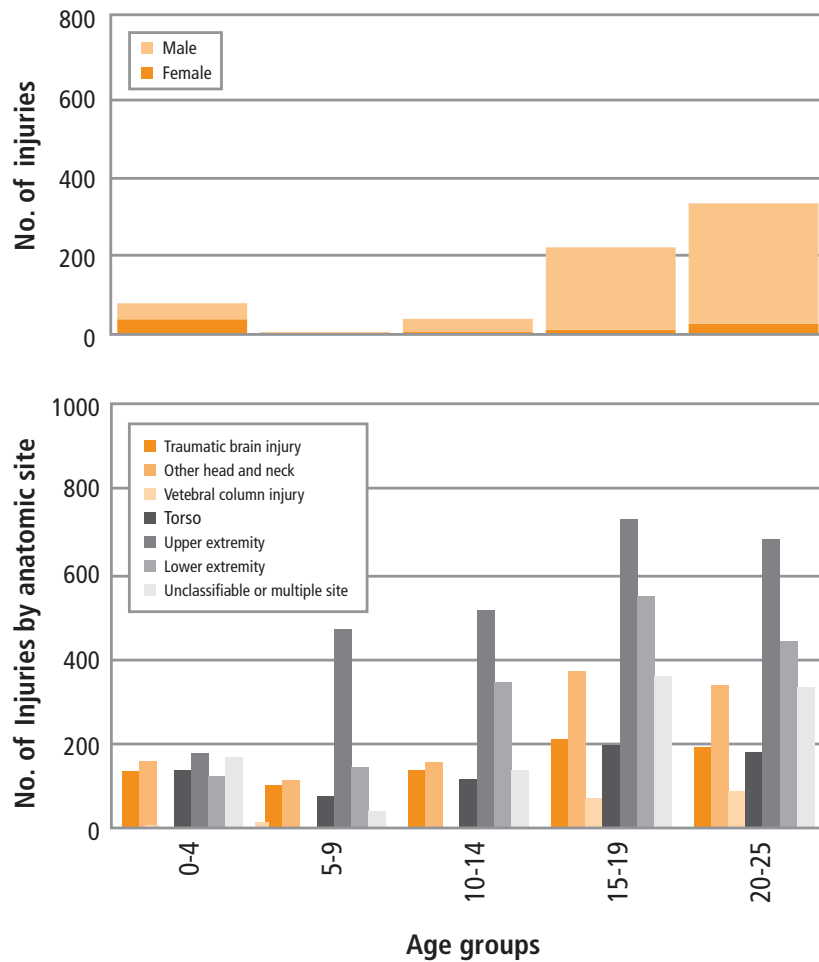
In both males and females, the greatest increase in suicide rates between 1960 and 1991 occurred in the 15- to 19-year age group, with a four-and-a-half-fold increase for males and a three-fold increase for females. *(Canadian Children's Rights Council 2007)*

Violence

Violence-related hospitalizations occurred most frequently amongst 15- to 25-year-olds. There were 546 child and youth violence-related hospitalizations recorded between April 1, 2001, and March 31, 2005. Eighty-seven per cent involved males.

Head and neck injuries were the most frequent site of violence-related injury hospitalizations; 45% of injuries due to violence led to head or neck injuries. Brain injuries were also frequent sites of injury for most age categories.

Figure 16: Number of violence-related hospitalizations by age, gender, and anatomic site in Nova Scotia (2001–2004)



FACT

The number of children seriously harmed or killed by parents has remained constant over the past 30 years in Canada. An average of 35 children under the age of 13 are killed by a parent each year, and 3% of known victims of violence (approximately 3,000 cases per year) are seriously injured (broken bones or head trauma).

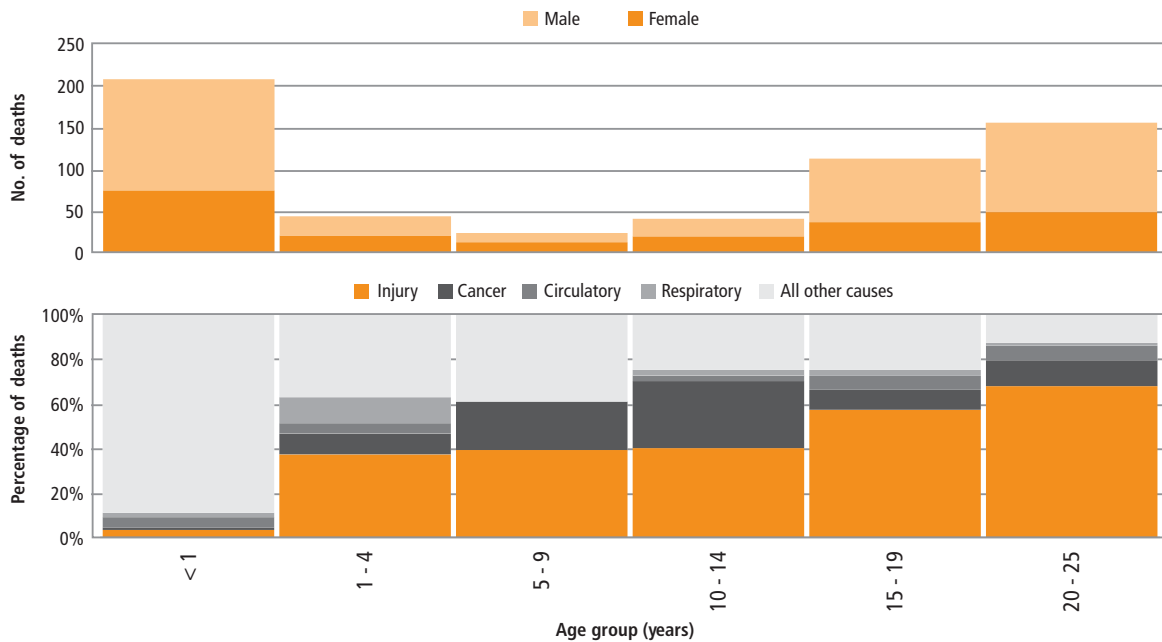
(Toomé, Lajoie, Fallon, and Felstiner 2007)

Child and Youth Injury-Related Deaths

Child and Youth Injury-Related Deaths in an Overall Context (2001–2004)

There were 582 total deaths amongst children and youth between the ages of 0 and 25 between fiscal years 2001 and 2004, which is an average of 146 total deaths per year. Children under the age of 1 had the highest number of deaths; the number declined considerably amongst 1- to 14-year-olds; and then increased amongst children and youth aged 15–19 and 20–25 (**Figure 17**). The percentage of all deaths that were due to injury increased steadily from birth to age 25. Injury-related deaths comprised approximately 3 per cent of deaths amongst children under 1 year of age, 40 per cent of deaths amongst children between the ages of 1 and 14, 57 per cent of deaths amongst children and youth between the ages of 15 and 19, and close to 68 per cent of deaths for youth between the ages of 20 and 25. Overall, 56 per cent of children and youth deaths between the ages 1 and 25 were the result of injury.⁴

Figure 17: External cause for child and youth deaths in Nova Scotia (2001–2004)



FACT

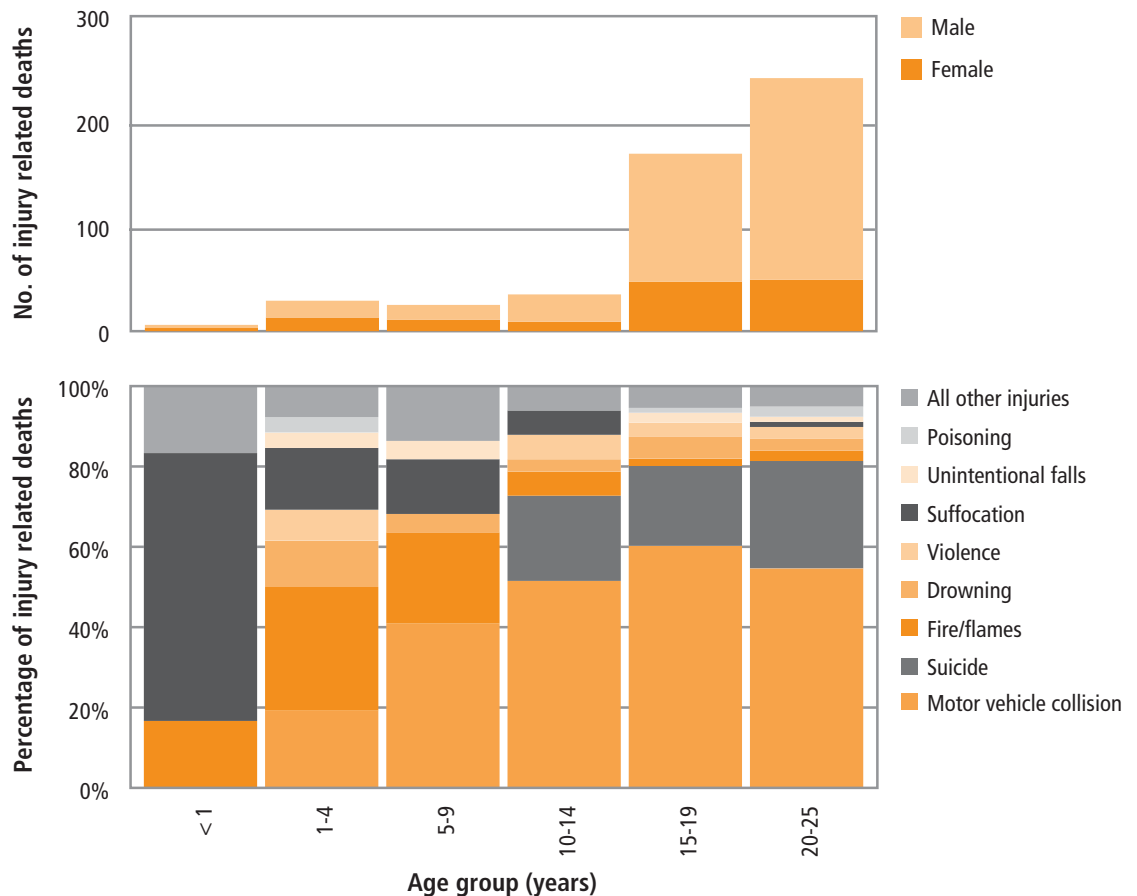
Between 2001 and 2004, 56% of mortalities for children and youth (ages 1–25) were caused by an injury.

4. Many of the deaths to babies under the age of 1 were related to sudden infant death syndrome, the sudden and unexpected death of a child in his or her sleep. Although this is not defined as an injury-related death, three babies die from sudden infant death syndrome in Canada every week (Health Canada 2005).

Child and Youth Injury-Related Deaths (1995–2004)

Figure 18 displays the number of injury-related deaths by age category. Over the 10-year period, 505 injury-related deaths were recorded amongst children and youth. The histogram at the top of the chart demonstrates that the frequency of these deaths rose dramatically amongst 15- to 25-year-olds. The frequency of male deaths in proportion to female deaths also increased with age. Overall, 74 per cent of injury-related deaths were male. The sex difference was not as large in younger years but steadily increased for males as they aged. As the bottom histogram shows, motor vehicle collisions were the most prevalent cause of injury mortality and were most frequent in teens and with individuals in their early 20s. Suicide was the second most frequent cause of death, followed by burning (fire and flames) and drowning. Burning deaths amongst 1- to 9-year-olds were frequent causes of injury-related deaths for these age groups.

Figure 18: External cause for injury-related deaths in Nova Scotia (1995–2004)



FACT

Seventy-four per cent of all injury-related deaths (1995–2004) among children and youth in Nova Scotia were male.

Child and Youth Injury-Related Deaths by Age and Sex (1995–2004)

Figure 19 provides the overall rate of injury-related deaths according to age. The rate of injury-related deaths increased significantly after the age of 14. This trend was different from the trend for injury-related hospitalizations as shown in the previous section (p. 17, Figure 2), where the rate of hospitalization peaked among those aged 15–19 and then declined.

Figure 19: Annual injury-related death rate by age in Nova Scotia (1995–2004)

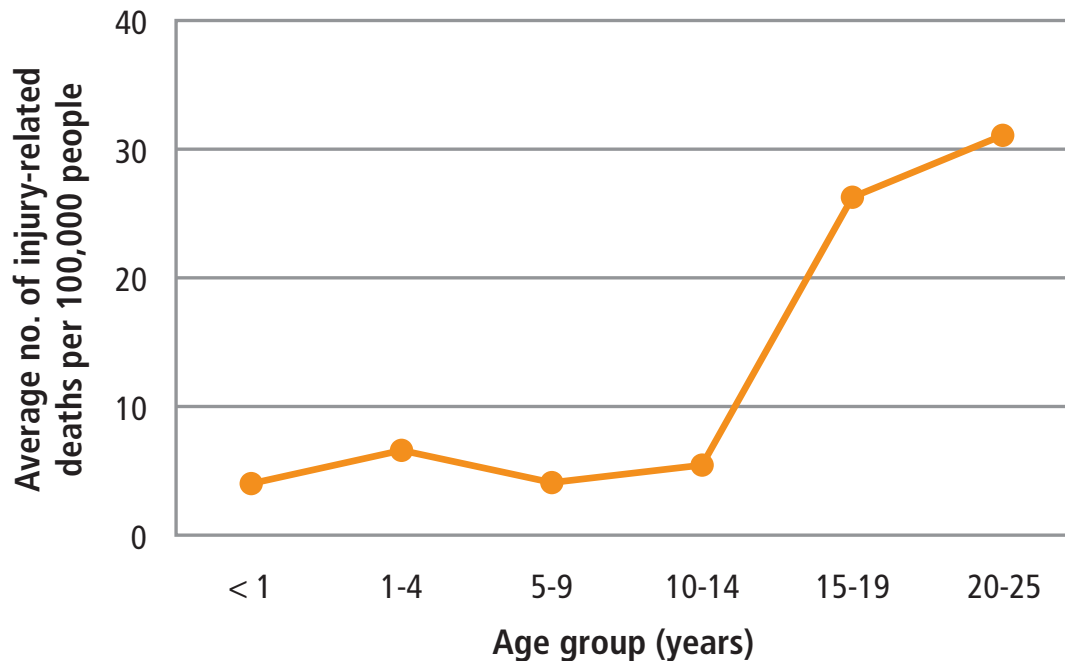


Table 3: Injury-related hospitalizations and deaths by age and sex in Nova Scotia (1995–2004)

Age	Hospitalizations			Deaths		
	No.	%	Male/Female Ratio	No.	%	Male/Female Ratio
0-4	2268	12%	1.8/1	35	7%	1.2/1
5-9	2630	14%	1.6/1	25	5%	1.3/1
10-14	3414	18%	2/1	35	7%	2.8/1
15-19	5671	30%	2.2/1	169	33%	2.6/1
20-25	5063	27%	2.7/1	241	48%	4/1
Total	19046	100%	2/1	505	100%	2.8/1

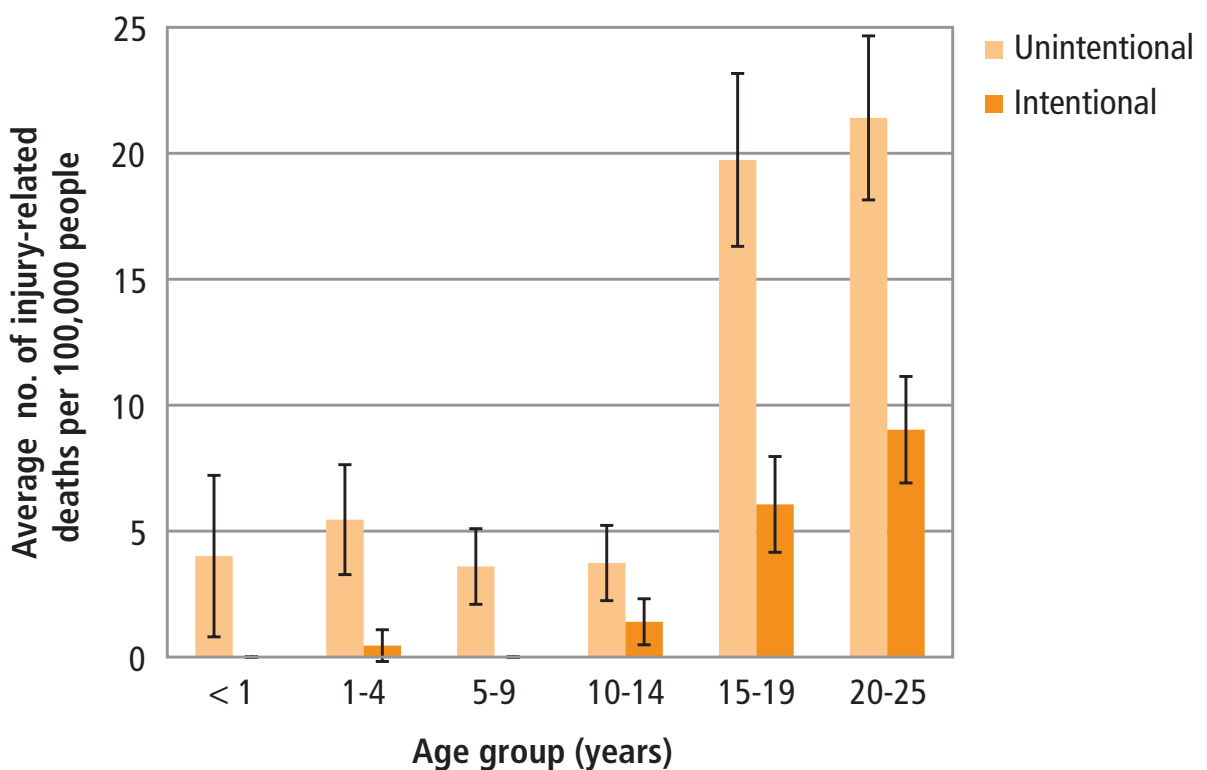
Table 3 compares the total number of injury-related hospitalizations and deaths by age and sex. What the table demonstrates is that the total number of injury-related hospitalizations was more evenly spread among the age groups than the total number of injury deaths, which were more frequently incurred by older age groups. This indicates that the lethality of injuries incurred increased with age during years 1995–2004. The lethality of injuries was more pronounced among males as well, as the male-female ratios for injury-related deaths were even more pronounced than they were for injury-related hospitalizations.

FACT

The rate of injury-related death increased sharply among those aged 15–25 in 1995–2004. The types of injuries incurred by those aged 15–25 were more lethal than those incurred by individuals aged 0–14.

Figure 20 provides the rate of intentional and unintentional injury-related deaths according to age. The rates of both unintentional and intentional injury-related death were highest amongst those aged 20–25.

Figure 20: Annual intentional and unintentional injury-related death rate by age in Nova Scotia (1995–2004)



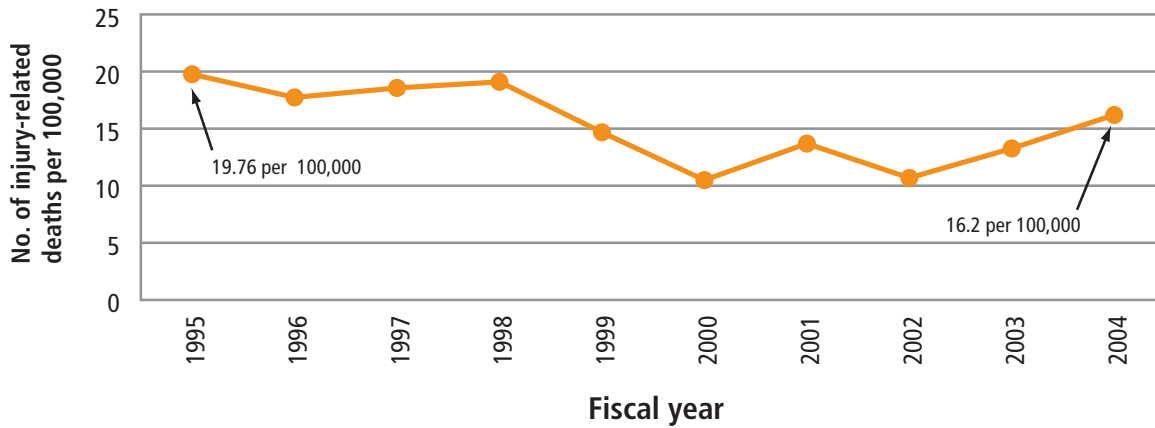
FACT

The rates of both unintentional and intentional injury-related death were highest amongst those aged 20–25.

Trends in Child and Youth Injury-Related Deaths (1995–2004)

Injury-related deaths for 0- to 25-year-olds declined over the 10-year period (**Figure 21**). In 1995, the rate of injury-related deaths for individuals in this age group was 19.8 per 100,000 people. In 2004, the rate was 16.2 per 100,000 people. However, the decline was not considered to be statistically significant (p -value > 0.05).

Figure 21: Injury-related death rate of 0- to 25-year-olds in Nova Scotia (1995–2004)



FACT

Canada has higher rates of child and youth injury-related deaths (ages 0–18) than those of Western Europe. (*World Health Organization 2006*)

As **Figure 22** illustrates, there was no overall trend among any age group in the 0–14 categories. While among 15- to 25-year-olds, there was an overall decline in injury-related deaths across the 10-year period.

Figure 22: Injury-related death rate by age group (1995–2004)

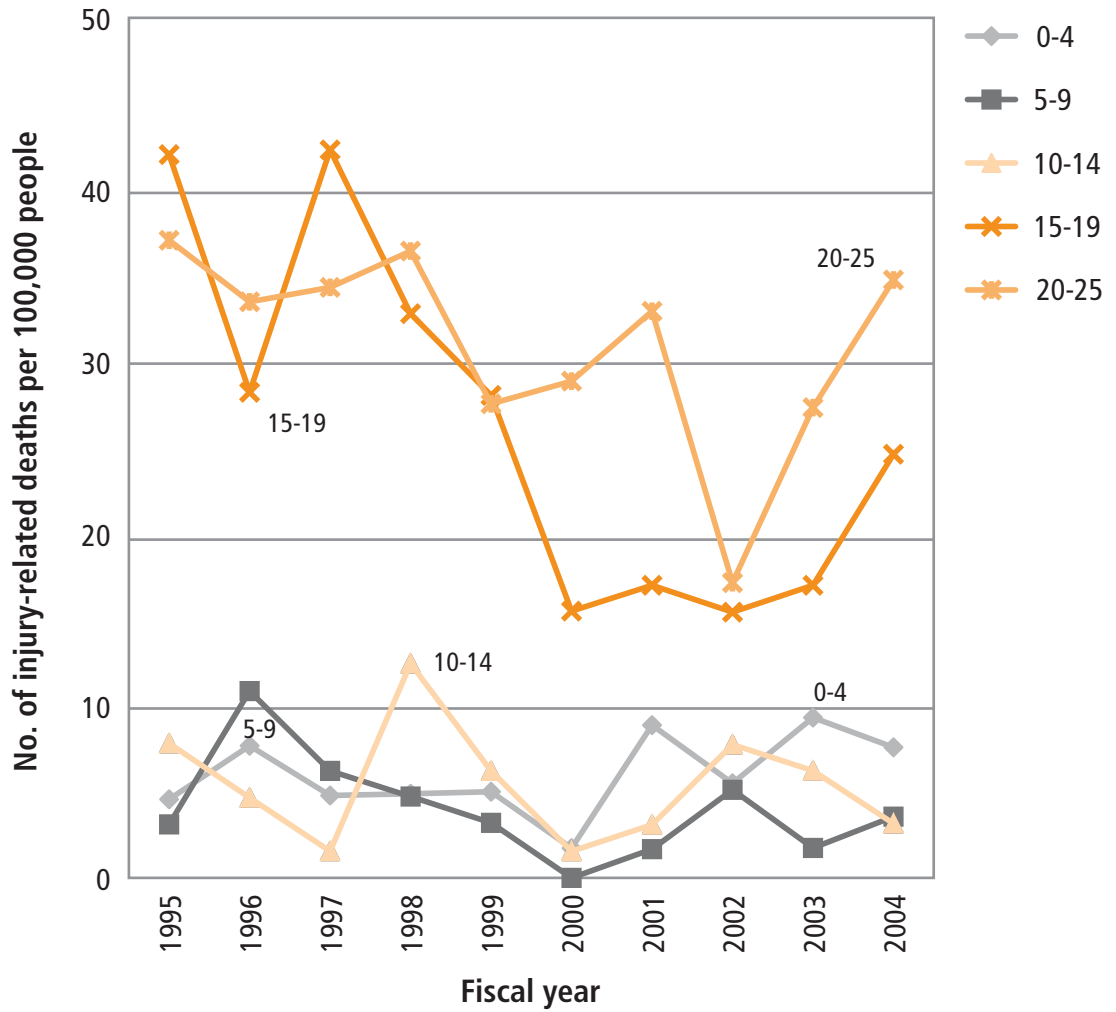


Table 4 shows the top 20 causes of injury-related deaths among children and youth. The most frequent cause of injury death, by a wide margin, was motor vehicle related at 53 per cent. Suicide, burning, drowning, and violence made up the other top five causes. The remaining causes made up approximately 24% of injury-related deaths.

Table 4: Frequency of injury-related deaths by cause for ages 0–25 (1995–2004)
(p-value ≤ 0.05)

Cause of Death	% of 505 deaths
Motor vehicle	53%
Suicide	21%
Fire and flames	5%
Drowning	4%
Violence	3%
Suffocation	3%
Unintentional falls	2%
Unintentional poisoning	2%
Other transport	1%
Other injuries	1%
Undetermined intention (excluding poisoning)	1%
Struck by objects	1%
Natural and environmental factors	1%
Sports injuries	<>
Firearms	<>
Late effects of injury	<>
Cutting/piercing	<>
Machine/machinery	<>
Overexertion movement	<>

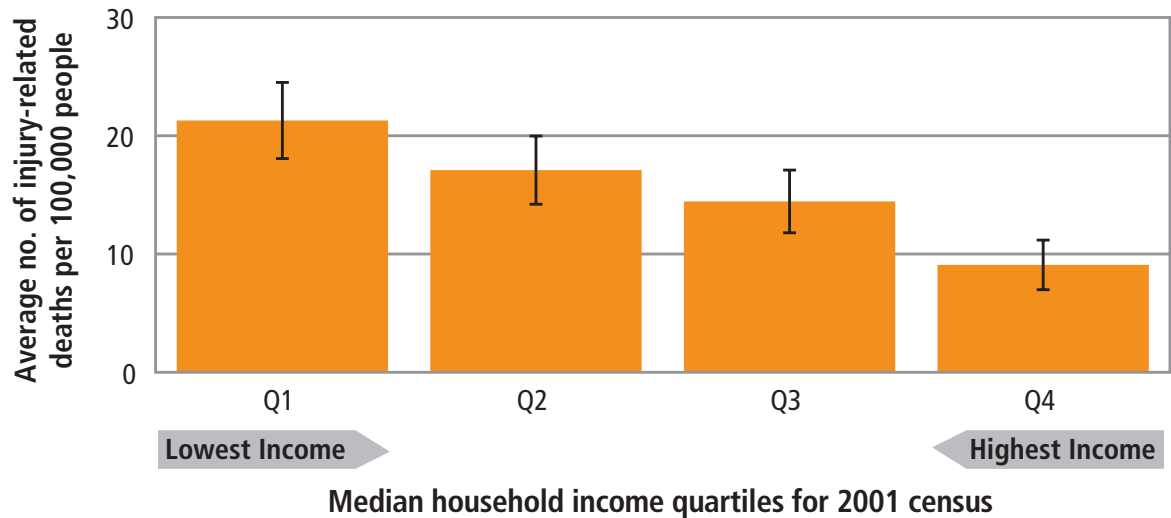
FACT

Motor vehicle collisions were the most common cause of injury-related deaths amongst those aged 0–25.

Average Annual Injury-Related Death Rate by Income Quartile

Median household incomes, obtained from the 2001 Canadian Census for Nova Scotia, were divided into four quartiles (Appendix 3). As can be seen in **Figure 23**, the rate of injury-related deaths in the lowest income quartile differed significantly from the rate in the highest-income quartile (p value ≤ 0.05). Overall income was inversely associated with injury-related deaths (chi square p value ≤ 0.05).

Figure 23: Annual rates for child and youth injury-related deaths by median household income quartile in Nova Scotia (2001–2002 to 2004–2005)



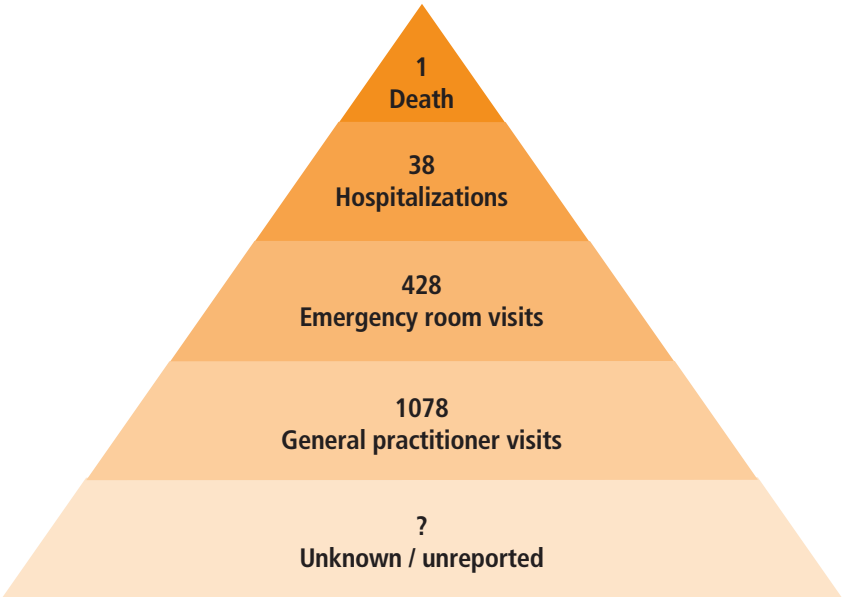
FACT

Although they engage in less organized sport, poor children have higher injury rates and twice the risk of death due to injury than children who are not poor. *(Public Health Agency of Canada, 2006)*

Concluding Comments

By calculating and analysing injury-related hospitalizations and deaths, this report provides only a partial picture of the social and economic costs associated with child and youth injuries. There were 505 injury-related deaths during years 1995–2004; 19,046 injury-related hospitalizations; 216,375 injury-related emergency room visits; 544,747 injury-related visits to a general practitioner; and unknown numbers of injuries that were unreported provincially. **Figure 24** is a child and youth injury pyramid. Most injuries do not even result in a hospitalization or death for children and youth. For every child and youth injury-related death calculated in Nova Scotia, there were 38 injury-related hospitalizations, 428 known injury-related emergency room visits, 1,078 injury-related general practitioner visits, and countless unknown or unreported injuries provincially.

Figure 24: Child and youth injury pyramid in Nova Scotia (1995–2004)

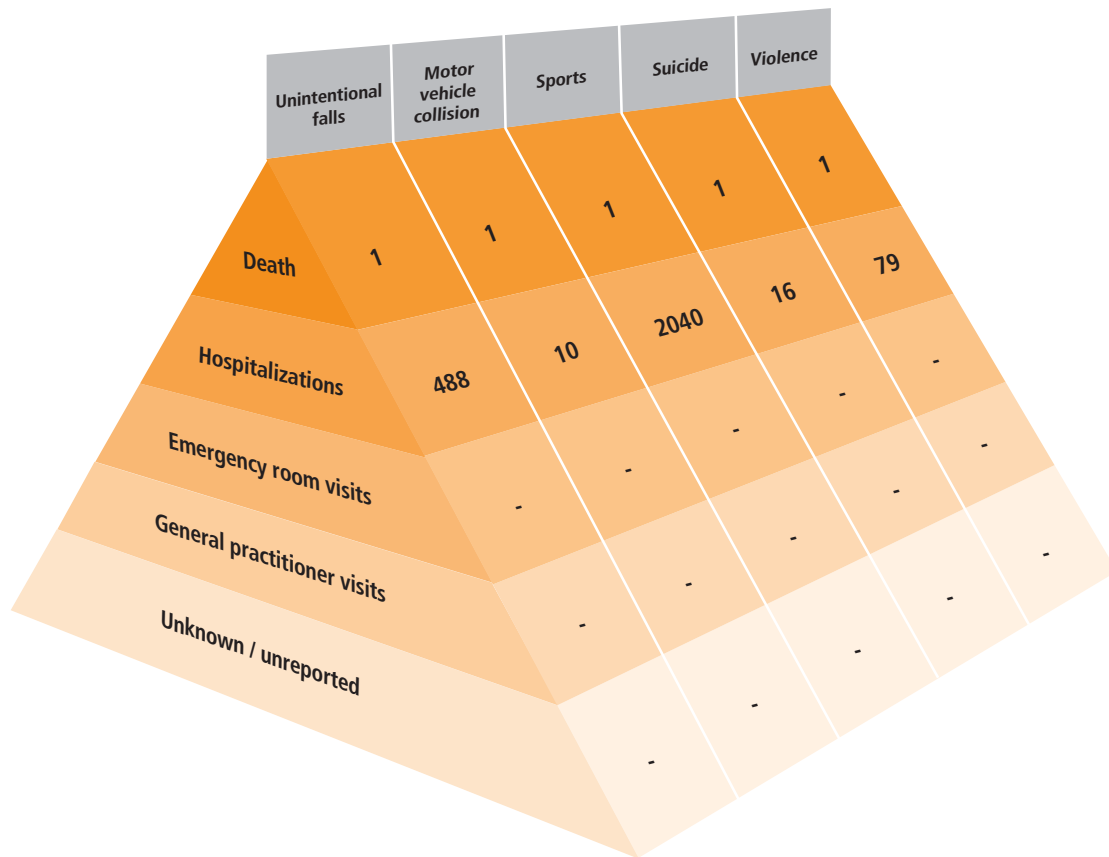


Furthermore, this report has not provided an analysis of the number of injuries that required rehabilitative services or of those injuries that resulted in long-term disability. An additional layer could be added to the pyramid between death and hospitalizations to ascertain the number of children and youth who require rehabilitation and/or long-term care. Future research into the numbers of children and youth requiring rehabilitation and/or long-term care would provide a valuable contribution to our understanding of the impact and outcome of child and youth injuries in our province.

The toll of injuries on children and youth can be calculated in two ways. Firstly, it can be calculated by ranking the causes of all recorded injuries according to frequency. While it was possible to calculate overall numbers of emergency room and general practitioner visits that were injury related, there was no way of identifying injuries by cause in the provincial data set. Secondly, a ranking of injuries according to severity or lethality can be calculated. While some injuries may be rare or less frequent than others, they may have higher degrees of cost or be more lethal. In other words, they are more likely to be counted in the upper layers of the pyramid, meaning they should not be overlooked as a significant risk to children and youth. **Figure 25** provides an incomplete child and youth injury pyramid for the top five most frequent causes of injury-related hospitalizations provincially during 1995–2004. As can be observed,

motor vehicle collisions and suicide resulted in death more frequently than in hospitalization in comparison to the other three causes of injury. Unintentional falls and sports-related injuries were very frequent causes of hospitalization; however, they resulted in death much less frequently than the other four causes of injury.

Figure 25: Child and youth injury pyramid in Nova Scotia by cause (1995–2004)



Other causes of injury also had a lower ratio of hospitalizations compared to deaths, specifically drowning and fire and flames. In other words, while these types of injuries were not recorded as frequently, as the above causes, they had a higher likelihood of resulting in death when they did occur. For all ratios of injury-related deaths to hospitalizations by cause see Appendix 4.

Report Highlights

Children and Youth Injury-related Hospitalizations

- Two thirds of all injury-related hospitalizations among children and youth were incurred by males.
- Females were hospitalized for a suicide attempt with greater frequency than males. Males were hospitalized with greater frequency than females for all other injury categories.
- The top five most frequent injury-related hospitalizations during that period were, in order, unintentional falls (23 per cent), motor vehicle collisions (13 per cent), sports injuries (10 per cent), attempted suicide (9 per cent), and violence (7 per cent). Sports injuries increased as a proportion of all injuries during the 10-year period (1995–2004).
- The frequency of injuries due to unintentional falls was highest among ages 5–9. The frequency of hospitalizations due to motor vehicle collisions increased with age.
- The rates of injury-related hospitalization per 100,000 people across age groups were
 - 225 for those under 1
 - 439 for those aged 1–4
 - 430 for those aged 5–9
 - 531 for those aged 10–14
 - 881 for those aged 15–19
 - 653 for those aged 20–25
- Close to 86% of injury-related hospitalizations were unintentional. Under 14% were intentional, while a very small proportion had unknown intent.
- Injury hospitalization rates declined from 1995 to 2004. This should be interpreted with some caution as the decline may be a result of changes in coding and/or management practices.
- Urban areas had a greater frequency of hospitalizations due to violence, suicide, overexertion, and sports injuries. Rural areas had a greater frequency of hospitalizations due to firearms, machinery, and motor vehicle injuries.
- Overall, injury-related hospitalization rates were higher in lower-income quartiles than they were in higher-income quartiles. Hospitalizations for sports injuries and overexertion were exceptions, as higher-income quartiles had higher frequencies of hospitalizations for these types of injuries than lower-income quartiles.
- The most frequent anatomic site of injury was upper extremity injuries (36 per cent of all injuries) followed by lower extremity injuries (20 per cent of all injuries). Children aged between 0 and 4 had the greatest frequency of injuries to the brain, the head and neck, and the torso. Injuries to the vertebral column or spinal cord were more frequent among 15- to 25-year-olds.

Children and Youth Injury-related Deaths

- Between 2001 and 2004, 56 per cent of mortalities for children and youth ages 1–25 were the result of an injury.
- The overall trend in injury-related deaths was not considered to be statistically significant over the 1995–2004 period.
- Over 74 per cent of injury-related deaths were incurred by males.
- The rates of injury-related death per 100,000 people across age groups were
 - 4 for those under 1
 - 7 for those aged 1–4
 - 4 for those aged 5–9
 - 5.5 for those aged 10–14
 - 26 for those aged 15–19
 - 31 for those aged 20–25
- The rates of both unintentional and intentional injury related death were highest amongst those aged 20–25.
- The top five most frequent injury-related deaths during 1995–2004 were, in order, motor vehicle (53 per cent), suicide (21 per cent), burning (5 per cent), drowning (4 per cent), and violence (3 per cent).

Child and Youth Injury Ratios

- For every child and youth injury-related death calculated in Nova Scotia, there were 38 injury-related hospitalizations; 428 injury-related emergency room visitations; 1,078 injury-related general practitioner visits; and countless unknown or unreported injuries provincially.
- For every child and youth unintended fall death calculated in Nova Scotia, there were 488 injury-related hospitalizations.
- For every child and youth motor vehicle–related death calculated in Nova Scotia, there were 10 injury-related hospitalizations.
- For every child and youth sports-related death calculated in Nova Scotia, there were 2,040 injury-related hospitalizations.
- For every child and youth violence-related death calculated in Nova Scotia, there were 79 injury-related hospitalizations.
- For every child and youth suicide-related death calculated in Nova Scotia, there were 16 injury-related hospitalizations.

Appendix 1: Codes for Injury by Cause

Mechanism of Injury	ICD-9/ICD-9-CM	ICD-10/ICD-0-CA (Codes identified in bold are specific to ICD-10-CA)
Motor Vehicle	E810-E819 (fourth digits 0-9), E820-E825 (fourth digits 0-9), E846, E847, E848	V02.0-V02.9, V03.0-V03.9, V04.0-V04.9, V09.0, V09.2, V12.0-V12.4, V12.5, V12.9, V13.0-V13.2, V13.4, V13.5, V13.9, V14.0-V14.2, V14.4, V14.5, V14.9, V19.0-V19.2, V19.4, V19.5, V19.6, V2*.0 (0-9), V2*.1 (0-9), V2*.2 (0-9), V2*.3 (0-8), V2*.4 (0-9), V2*.5 (0-9), V29.3, V3*.0 (0-9), V3*.1 (0-9), V3*.2 (0-9), V3*.3 (0-9), V3*.4 (0-8), V3*.6 (0-8), V3*.7 (0-8), V3*.9 (0-8), V39.5, V39.6, V39.8, V39.9, V4*.0 (0-9), V4*.1 (0-9), V4*.2 (0-9), V4*.3 (0-9), V4*.4 (0-8), V4*.6 (0-8), V4*.7 (0-8), V4*.9 (0-8), V49.5, V49.6, V49.8, V49.9, V5*.0 (0-9), V5*.1 (0-9), V5*.2 (0-9), V5*.3 (0-9), V5*.4 (0-8), V5*.5 (0-8), V5*.6 (0-8), V5*.7 (0-8), V5*.9 (0-8), V59.4, V59.5, V59.6, V59.8, V59.9, V6*.0 (0-9), V6*.1 (0-9), V6*.2 (0-9), V6*.3 (0-9), V6*.4 (0-8), V6*.5 (0-8), V6*.6 (0-8), V6*.7 (0-8), V6*.9 (0-8), V69.4, V69.5, V69.6, V69.8, V69.9, V7*.0 (0-9), V7*.1 (0-9), V7*.2 (0-9), V7*.3 (0-9), V7*.4 (0-8), V7*.5 (0-8), V7*.6 (0-8), V7*.7 (0-8), V7*.9 (0-8), V79.4, V79.5, V79.6, V79.8, V79.9, V80.3, V80.4, V80.5, V82.0, V82.1, V83.2, V8*.0 (3-5), V8*.1 (3-5), V83.3, V83.4, V83.5, V83.6, V83.7, V83.9, V84.2, V84.3, V84.4, V84.5, V84.6, V84.7, V84.9, V85.3, V85.4, V85.5, V85.6, V85.7, V85.9, V86.00, V86.08, V86.10, V86.18, V86.2, V86.30, V86.38, V86.4, V86.50, V86.51, V86.58, V86.60, V86.61, V86.68, V86.7, V86.90, V86.91, V86.98, V87.0-V87.8, V88.0-V88.8, V89.0, V89.2, V89.9, V98, V99
Other transportation	E800-E807 fourth digit E826-E829 fourth digit 0-9 E831.0-E831.9, E833.0-E837.9, E838.0-E838.9, E840.0-E845.9	V05.0-V05.9, V15.0-V15.9, V80.6, V81.0-V81.9, V01.0-V01.9, V06.0-V06.9, V09.1, V09.3, V09.9, V10.0-V10.9, V11.0-V11.9, V12.3, V13.3, V14.3, V16.0-V16.9, V17.0-V17.9, V18.0-V18.9, V19.3, V19.8, V19.9, V80.0-V80.9, V82.2-V82.9, V87.9, V88.9, V89.1, V89.3, V91.0-V91.9, V93.0-V93.9, V94.0-V94.9, V95.0-V95.9, V96.0-V96.9, V97.0-V97.8
Unintentional Falls	E880-E885, E886.9, E880.0, E880.1, E880.9, E881.0, E881.1, E882, E883.0-E884.9, E888	W00, W01, W03, W04, W05.00-W05.09, W06-W19
Sports Injuries	E886.0, E917.0	W02.00-W02.08, W21.00-W21.09, W22.00-W22.08, W51.00-W51.08
Fire and Flames	E890.0-E899.9, E924.0-E924.9	X00-X06, X08-X16, X18, X19
Drowning	E830.0-E830.9	W65-W70, W73, W74, V90.0-V90.9, V92.0-V92.9
Suicide and Self- injury	E950.0-E958.9	X60-X73, X74.00-X74.09, X75-X84
Unintentional Poisoning	E850.0-E869.9	X40-X49
Undetermined Intention	E980.0-E982.9, E983.0-E988.9	Y10-Y23, Y24.00-Y24.09, Y25-Y34
Violence and Injury	E960-E968.9	X85-X94, X95.00-X95.09, X96-X99, Y00-Y09
Suffocation/Foreign Body/Choking	E911, E912, E913.0-E913.9, E914, E915	W44, W75-W84
Cutting/Piercing	E920.0-E920.9	W25-W29, W45, W60
Firearms	E922.0-E922.9	W32, W33, W34.00-W34.09

Mechanism of Injury	ICD-9/ICD-9-CM	ICD-10/ICD-0-CA (Codes identified in bold are specific to ICD-10-CA)
Machine/Machinery	E919.0–E919.9	W24, W30, W31, X17
Overexertion/ Strenuous Movement	E927	X50
Struck by or against Objects/Persons	E916, E917.1-E917.9, E918	W20, W22.09, W23, W50, W51.09, W52
Other Classifiable Injuries	E921.0–E921.9, E923.0– E923.9, E925.0–E925.9, E926.0–E926.9, E970–E978, E990.0–E998, E887, E928.0–E928.9	W35-40, W85-W91, X32, Y35.0–Y35.7, Y36.0–Y36.9, W41-W43, W49, X58, X59
Natural and Environmental Factors	E900.0–E909.9	W53-W59, W64, W92-W94, W99, X20, X31, X33-X36, X37.00–X37.09, X38, X39, X51-X54, X57
Late Effects of Injury	E929.0–E929.9, E959, E969, E977, E989, E999	Y85.0–Y89.9

Appendix 2a: Definitions for Anatomic Site of Injury

3. Upper extremity injury: Includes injuries to the shoulder, upper arm, elbow, forearm, wrist, and hands

1. Traumatic brain injury: Examples include open wounds to the head, fracture of base of skull, and intracranial injury, e.g., concussion and traumatic hemorrhage, etc.

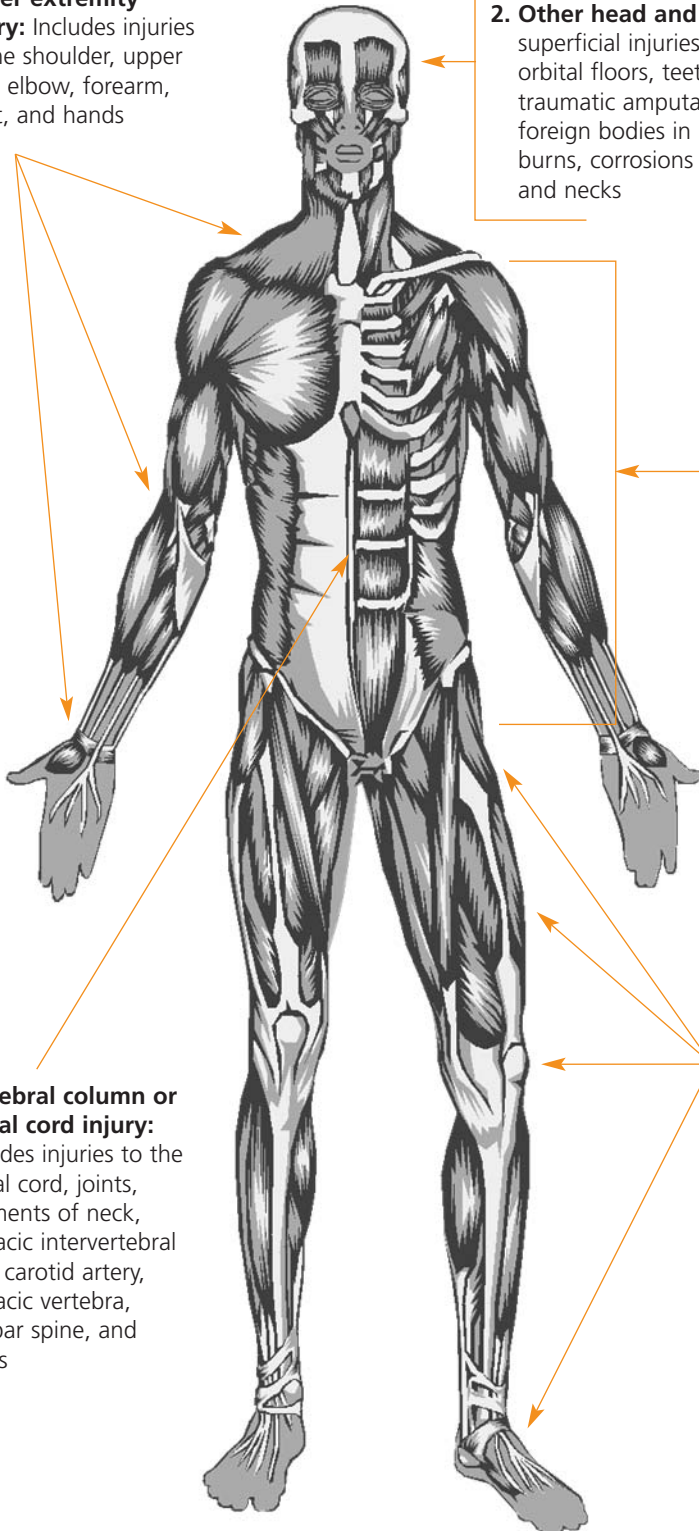
2. Other head and neck injury: Examples include superficial injuries of the head, fractures of nasal bones, orbital floors, teeth, jaws, cranial nerves, eyes, etc., traumatic amputations of part of head (e.g., ears), foreign bodies in nasal sinus, nostril, mouth, eye, and burns, corrosions and frostbite to eyes, faces, heads, and necks

4. Torso: Includes injuries of the thorax, abdomen, lower back, heart, pelvis or intra-abdominal organs, rib(s), sternum, thoracic spine, etc.

6. Lower extremity injury: Includes injuries to the hip, thigh, knee, lower leg, ankle, or foot

5. Vertebral column or spinal cord injury: Includes injuries to the spinal cord, joints, ligaments of neck, thoracic intervertebral disc, carotid artery, thoracic vertebra, lumbar spine, and pelvis

7. Other/multiple site injury



Appendix 2b: Codes for Anatomic Site of Injury

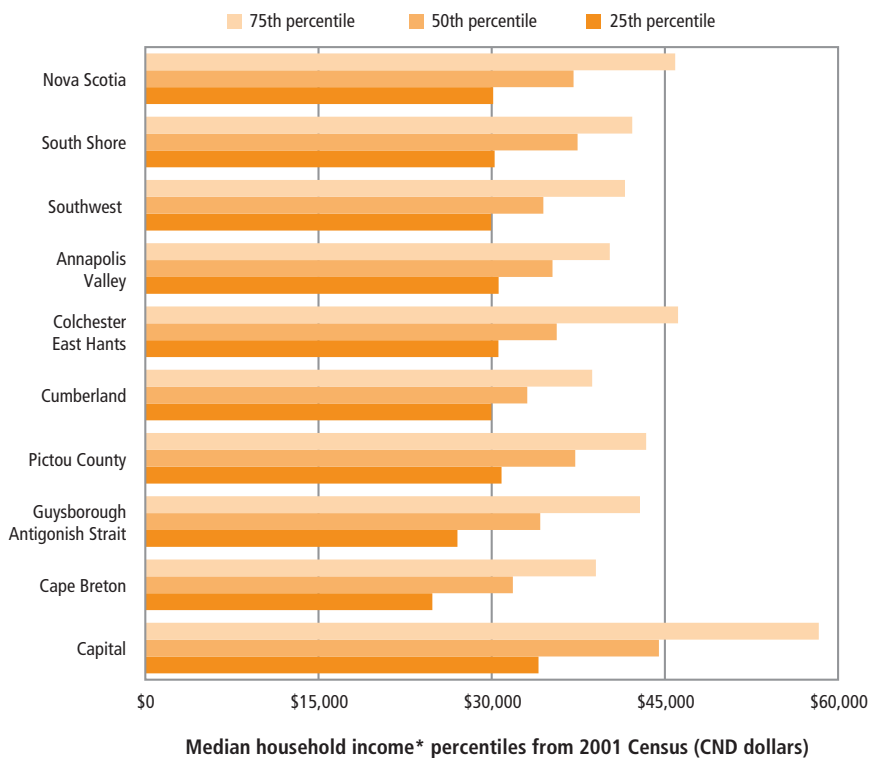
Anatomic Site	ICD-10–CA Codes
Traumatic brain injury	S01(.1-.9), S02.1, S02.3, S02 (.7 -.9), S04.0, S06(.1-.9), S07, S09(.7-.9), T90.1, T90.2, T90.4, T90.5, T90.8, T90.9
Other head and neck	S00, S02.2, S02(.4-.6), S03(.1-.5), S04, S05, S08, S09(.0-.1), T17(.0-.1), T18.0, T26.0, S09.2, T15, T16, T26(.7-.9), T33.0, T26(.1-.6), S10(.8-.9), S11(.0-.1), T34.0, T90.0, T90.3, S10(.0-.1), S10.7, S13(.2-.3), S13(.5-.6), S11.2, S11(.7-.9), S12(.8-.9), S15.3, S15(.7-.9), S14(.3-.6), S15.0, S15.2, S19(.8-.9), T17(.2-.3), S16, S17.0, S17(.8-.9), S18, S19.7, T20(.1-.4), T17.4, T27.0, T27.4, T33.1, T34.1, T20.0, T20(.5-.7), T28.0, T28.5, T35.2, T95.0
Spinal cord	S14.0, S14.1, S24.0, S24.1, S34.0, S34.1, S34.3, T09.3, T91.3
Vertebral column injury	S12(.0-.2), S12.7, S13(.0-.1), S13.4, S14.2, S15.1, S22(.0-.1), S23(.0-.1), S23.3, S24.2, S32(.0-.2), S33(.0-.2), S33(.5-.7), S34.2, S34.4, T08, T09.4, T91.1
Torso	S20, S21, S22(.2-.9), S23.2, S23(.4-.5), S24(.3-.6), S25, S26.0, S26(.8-.9), S27, S28(.0-.1), S29.0, S29(.7-.9), T17.5, T28.1, T28.6, T33.2, T34.2, T91.2, T91.4, S30.1, S31.1, S31.8, S35(.0-.4), S36, T18(.2-.4), S30.0, S30.2, S31.0, S31(.2-.5), S32(.3-.8), S33(.3-.4), S34(.5-.6), S35.5, S37(.0-.9), S38.0, S38.2, T18.5, T19, T28.3, T28.8, S30(.7-.9), S31.7, S34.8, S35(.7-.9), S38.1, S38.3, S39.0, S39(.6-.9), T02.1, T03.1, T06.5, T33.3, T34.3, T35.3, T91.5, T04.1, T09(.0-.2), T09(.5-.9), T17(.8-.9), T18.1, T18(.8-.9), T21(.0-.7), T27(.2-.3), T27(.6-.7), T28.2, T28.7, T95.1
Upper extremities	S40.0, S40(.7-.9), S41(.0-.1), S41(.7-.8), S42, S43, S44(.0-.9), S45, S46, S47, S48(.0-.1), S48.9, S49(.7-.9), S50(.0-.1), S50(.7-.9), S51.0, S51(.7-.9), S52, S53(.0-.4), S54(.0-.3), S54(.7-.9), S55(.0-.2), S55(.7-.9), S56, S57.0, S57(.8-.9), S58(.0-.1), S58.9, S59(.7-.9), S60(.0-.2), S60(.7-.9), S61, S62, S63, S64, S65, S66, S67.0, S67.8, S68, S69(.7-.9), T00.2, T01.2, T02.2, T02.4, T03.2, T04.2, T05.0, T05.2, T10, T11, T22, T23, T33(.4-.5), T34(.4-.5), T35.4, T92, T95.2
Lower extremities	S70.0, S71.0, S72.0, S72.1, S72.2, S73.0, S73.1, S76.0, S77.0, S78.0, S70.1, S70.7, S70.8, S70.9, S71.1, S71.7, S71.8, S72.3, S72.4, S72.7, S72.8, S72.9, S74.0, S74.1, S74.2, S74.7, S74.8, S74.9, S75.0, S75.1, S75.2, S75.7, S75.8, S75.9, S76.1, S76.2, S76.3, S76.4, S76.7, S77.1, S77.2, S78.1, S78.9, S79.7, S79.8, S79.9, S80.0, S80.1, S80.7, S80.8, S80.9, S81.0, S81.7, S81.8, S81.9, S82.0, S82.1, S82.2, S82.3, S82.4, S82.5, S82.6, S82.7, S82.8, S82.9, S83.0, S83.1, S83.2, S83.3, S83.4, S83.5, S83.6, S83.7, S84.0, S84.1, S84.2, S84.7, S84.8, S84.9, S85.0, S85.1, S85.2, S85.3, S85.4, S85.5, S85.7, S85.8, S85.9, S86.0, S86.1, S86.2, S86.3, S86.7, S86.8, S86.9, S87.0, S87.8, S88.0, S88.1, S88.9, S89.7, S89.8, S89.9, S90.0, S90.1, S90.2, S90.3, S90.7, S90.8, S90.9, S91.0, S91.1, S91.2, S91.3, S91.7, S92.0, S92.1, S92.2, S92.3, S92.4, S92.5, S92.7, S92.9, S93.0, S93.1, S93.2, S93.3, S93.4, S93.5, S93.6, S94.0, S94.1, S94.2, S94.3, S94.7, S94.8, S94.9, S95.0, S95.1, S95.2, S95.7, S95.8, S95.9, S96.0, S96.1, S96.2, S96.7, S96.8, S96.9, S97.0, S97.1, S97.8, S98.0, S98.1, S98.2, S98.3, S98.4, S99.7, S99.8, S99.9, T00.3, T01.3, T02.3, T02.5, T03.3, T04.3, T05.3, T05.5, T12, T13.0, T13.1, T13.2, T13.3, T13.4, T13.5, T13.6, T13.8, T13.9, T24.0, T24.1, T24.2, T24.3, T24.4, T24.5, T24.6, T24.7, T25.0, T25.1, T25.2, T25.3, T25.4, T25.5, T25.6, T25.7, T33.6, T33.7, T33.8, T34.6, T34.7, T34.8, T35.5, T93.0, T93.1, T93.2, T93.3, T93.4, T93.5, T93.6, T93.8, T93.9, T95.3
Unclassifiable by site/multiple sites	T00.8, T00.9, T01.9, T02.8, T02.9, T03.8, T03.9, T04.8, T04.9, T05.8, T05.9, T06.2, T06.3, T06.4, T07, T27.1, T27.5, T28.9, T35.0, T35.1, T35.6, T91.0, T91.8, T91.9, T94.0, T36.0, T36.1, T36.2, T36.3, T36.4, T36.5, T36.6, T36.7, T36.8, T36.9, T37.0, T37.1, T37.2, T37.3, T37.4, T37.5, T37.8, T37.9, T38.0, T38.1, T38.2, T38.3, T38.4, T38.5, T38.6, T38.7, T38.8, T38.9, T39.0, T39.1, T39.2, T39.3, T39.4, T39.8, T39.9, T40.0, T40.1, T40.2, T40.3, T40.4, T40.5, T40.6, T40.7, T40.8, T40.9, T41.0, T41.1, T41.2, T41.3, T41.4, T41.5, T42.0, T42.1, T42.2, T42.3, T42.4, T42.5, T42.6, T42.7, T42.8, T43.0, T43.1, T43.2, T43.3, T43.4, T43.5, T43.6, T43.8, T43.9, T44.0, T44.1, T44.2, T44.3, T44.4, T44.5, T44.6, T44.7, T44.8, T44.9, T45.0, T45.1, T45.2, T45.3, T45.4, T45.5, T45.6, T45.7, T45.8, T45.9, T46.0, T46.1, T46.2, T46.3, T46.4, T46.5, T46.6, T46.7, T46.8, T46.9, T47.0, T47.1, T47.2, T47.3, T47.4, T47.5, T47.6, T47.7, T47.8, T47.9, T48.0, T48.1, T48.2, T48.3, T48.4, T48.5, T48.6, T48.7, T49.0, T49.1, T49.2, T49.3, T49.4, T49.5, T49.6, T49.7, T49.8, T49.9, T50.0, T50.1, T50.2, T50.3, T50.4, T50.5, T50.6, T50.7, T50.8, T50.9, T51.0, T51.1, T51.2, T51.3, T51.8, T51.9, T52.0, T52.1, T52.2, T52.3, T52.4, T52.8, T52.9, T53.0, T53.1, T53.2, T53.3, T53.4, T53.5, T53.6, T53.7, T53.9, T54.0, T54.1, T54.2, T54.3, T54.9, T55, T56.0, T56.1, T56.2, T56.3, T56.4, T56.5, T56.6, T56.7, T56.8, T56.9, T57.0, T57.1, T57.2, T57.3, T57.8, T57.9, T58, T59.0, T59.1, T59.2, T59.3, T59.4, T59.5, T59.6, T59.7, T59.8, T59.9, T60.0, T60.1, T60.2, T60.3, T60.4, T60.8, T60.9, T61.0, T61.1, T61.2, T61.8, T61.9, T62.0, T62.1, T62.2, T62.8, T62.9, T63.0, T63.1, T63.2, T63.3, T63.4, T63.5, T63.6, T63.8, T63.9, T64., T65.0, T65.1, T65.2, T65.3, T65.4, T65.5, T65.6, T65.8, T65.9, T66., T67.0, T67.1, T67.2, T67.3, T67.4, T67.5, T67.6, T67.7, T67.8, T67.9, T68, T69.0, T69.1, T69.8, T69.9, T70.0, T70.1, T70.2, T70.3, T70.4, T70.8, T70.9, T71, T73.0, T73.1, T73.2, T73.3, T73.8, T73.9, T74.0, T74.1, T74.2, T74.3, T74.8, T74.9, T75.0, T75.1, T75.2, T75.3, T75.4, T75.8, T79.0, T79.1, T79.2, T79.3, T79.4, T79.5, T79.6, T79.7, T79.8, T79.9, T96, T97, T98.2, T14.0, T14.1, T14.2, T14.3, T14.4, T14.5, T14.6, T14.7, T14.8, T14.9, T28.4, T30.0, T30.1, T30.2, T30.3, T30.4, T30.5, T30.6, T30.7, T31.0, T31.1, T31.2, T31.3, T31.4, T31.5, T31.6, T31.7, T31.8, T31.9, T32.0, T32.1, T32.2, T32.3, T32.4, T32.5, T32.6, T32.7, T32.8, T32.9, T33.9, T34.9, T35.7, T94.1, T95.4, T95.8, T95.9, T98.0, T98.1

Appendix 3: Average Annual Injury Rate by Income Quartile

Median household income, obtained from the 2001 Canadian Census, varied across DHA (**Table 5**). The highest incomes were observed in Capital District Health Authority, where median household incomes in the 50th percentile were higher than those in the 75th percentile for all other districts except Colchester East Hants (**Figure 26**).

District Health Authority	1st Quartile	2nd Quartile	3rd Quartile	4th Quartile
Annapolis Valley	\$0–\$30,599	\$30,600–\$35,266	\$35,267–\$40,226	≥ \$40,227
Cape Breton	\$0–\$24,859	\$24,860–\$31,832	\$31,833–\$39,024	≥ \$39,025
Capital	\$0–\$34,053	\$34,054–\$44,482	\$44,483–\$58,328	≥ \$58,329
Colchester East Hants	\$0–\$30,582	\$30,583–\$35,631	\$35,632–\$46,139	≥ \$46,140
Cumberland	\$0–\$29,969	\$29,970–\$33,080	\$33,081–\$38,701	≥ \$38,702
Guysborough Antigonish Strait	\$0–\$27,033	\$27,034–\$34,204	\$34,205–\$42,842	≥ \$42,843
Pictou County	\$0–\$30,851	\$30,852–\$37,235	\$37,236–\$43,377	≥ \$43,378
South Shore	\$0–\$30,253	\$30,254–\$37,437	\$37,438–\$42,171	≥ \$42,172
Southwest Nova	\$0–\$29,949	\$29,950–\$34,473	\$34,474–\$41,543	≥ \$41,544
Nova Scotia	\$0–\$30,127	\$30,128–\$37,088	\$37,089–\$45,891	≥ \$45,892

Figure 26. Average household income percentiles from 2001 Census by district health authority



* Median household income for neighbourhood was assigned to records at the level of dissemination area.

Appendix 4: Number of Child and Youth Injury-Related Hospitalizations per Death by Cause (1995–2004)

(*Some results omitted to protect confidentiality)

	Drowning	Motor vehicle	Fire and flames	Suicide	OVERALL	Undetermined intention	Suffocation	Poisoning	Firearms	Natural/ environmental	Violence	Other transport	Struck by objects	Unintentional falls	Sports-related	
Death	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Hospitalizations	-	1	10	11	16	38	46	52	55	66	77	79	104	246	488	2040
Emergency room visits	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
General practitioner visits	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown / unreported	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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