Public Health Ontario | Santé publique Ontario

ENHANCED EPIDEMIOLOGICAL SUMMARY

# Injuries among Children using the Canadian Health Survey on Children and Youth

**2nd Edition: April 2024**

## Highlights

- Based on the 2019 Canadian Health Survey on Children and Youth (CHSCY), of the three injury types reported in this summary, head injury or concussion had the highest weighted prevalence at 4.4% for children in Ontario ages 1 to 17 years.
- By sex at birth, estimates suggest that males report a significantly higher prevalence across all injury types in comparison to females.
- Despite the fact that head injury or concussion is estimated to have the highest overall prevalence across the three injury types, it also had the lowest prevalence of those who consulted a health care professional for their injury.

## Introduction

This report provides an overview of the injury prevention indicators as measured by the 2019 CHSCY. The prevalence of injuries (head injury or concussion, fracture or broken bones, cut or puncture) are described, as well as their relationship with socio-demographic characteristics. Prevalence estimates are also presented by Public Health Unit, geographic region, and Statistics Canada Peer Group. For further information about the CHSCY data and population characteristics please see the CHSCY Technical Report.

The financial and human cost of injury in Canada is high. In 2018, both direct and indirect costs associated with injuries in Canada was $29.4 billion.[1] In particular, children and youth are vulnerable to injuries due to their small stature and developing bodies.[2] In fact, injuries constitute a leading cause of morbidity and mortality among children and youth in Canada.[3] Notably, preventable injuries has ranked first in the top 10 threats to the health and wellbeing of children in Canada by the recently published *Raising Canada Report*.[4] Of all injuries, the leading causes for children ages 0-14 include falls, sports injuries, and transport injuries, respectively. Injury is not experienced equitably across Ontario and is highly influenced by socioeconomic factors and their surrounding environments. These factors pose additional barriers to preventing injuries among children and to receiving adequate medical attention to respond to these injuries. Addressing underlying socioeconomic factors that influence the inequitable distribution of injuries is imperative to reducing the incidence of injuries and promoting equitable outcomes for all children.[5]

Physical activity in the form of sport participation is beneficial for a child's physical and mental health; however, literature suggests that sports are a common mechanism for injury among children.[6] Across all

sport-injury types, concussions are recognized as serious injuries among Canadian children and youth given the potential for severe short- and long-term consequences.[7] In 2017-18, it was reported that approximately 1 in 450 Canadians ages 12 years and older suffered a sport-related concussion that was the most significant cause of disability (defined as an injury serious enough to limit normal activities) in the previous year (221/100,000 population; 95% confidence interval: 179-264).[8]

Within the past decade, Ontario has made numerous strides in regard to concussion-specific awareness, recognition and public health programming. Rowan's Law Legislation was passed in 2018, establishing 21 actions for government concerning concussion legislation, surveillance, prevention, detection, management and awareness.[9] This legislation prompted revision of the Ministry of Education's existing concussion policy, the 2014 Policy/Program Memorandum No. 158 (PPM 158), in addition to adding concussion as a topic of consideration in the Ontario Public Health Standards (OPHS).[10] Specifically, the OPHS requires boards of health to develop and implement health-related curricula and public health programming with special consideration of concussion.[10] Despite this, there is a lack of concussion-specific data in Ontario, particularly data that captures mechanism of concussion among children and youth. In this report, the prevalence of injury among Ontarian children and youth are presented.

For information about the data source, indicator definitions and categorizations used in this summary, please see the Technical Notes at the end of this report.

## Race-based and Indigenous Identity Data

The CHSCY utilizes the following socio-demographic terms to describe its variables: "Population Group", "Visible Minority", and "Aboriginal Identity". To stay current with health equity language preferred by impacted communities and to reduce unintentional harms when discussing and utilizing findings of the CHSCY, we have replaced the CHSCY terminology with the following terms in this report, where possible: "race and ethnic origin," "racialized groups," "Indigenous" and to capture the diversity of Indigenous people in Canada, "First Nations, Inuit, and Métis peoples".

'Race' is a social construct without a biological basis and created to categorize people into different groups based on visual traits in ways that create and maintain power differentials within society.[11] 'Ethnic origin' refers to communities' learned or adopted characteristics such as language, practices, and beliefs.[12,13] Note that the categorization of people as Indigenous, Black, and other racial categories has been historically and currently used to mark certain groups for exclusion, discrimination, and oppression. Racism, racial categorization, and racial discrimination; therefore, continue to shape the lives and opportunities of those who are categorized as "racialized people".[13] For more information on socio-demographic terminology, please refer to the Technical Notes and Technical Report.

Race-based and Indigenous identity data are vital for the identification and monitoring of health inequities that stem from racism, bias, and discrimination[14] and to inform the design of programs and services to promote the health and well-being of racialized populations and Indigenous peoples.

Public Health Ontario (PHO) includes data and analyses on Indigenous peoples to advance understanding and support action to enhance Indigenous people's health. PHO recognizes the importance of Indigenous data sovereignty and the First Nations principles of Ownership, Control, Access and Possession (OCAP) and Métis Principles of Ownership, Control, Access and Stewardship (OCAS). We continue to strive to build processes and relationships to respectfully and meaningfully analyze and report on Indigenous data.

# Results

- Of the three injury types, head injury or concussion has the highest weighted prevalence at 4.4% (95% CI: 4.0-4.8). This is followed by broken or fractured bone with a prevalence of 3.0% (95% CI: 2.7-3.4) and cut or puncture with a prevalence of 2.4% (95% CI: 2.1-2.7) (Table 1, Figure 1).

- Despite the fact that head injury or concussion is estimated to have the highest overall prevalence across the three injury types, it showed the lowest prevalence of those who consulted a health care professional for their injury, at 76.0% (95% CI: 72.4-79.6) (Table 1, Figure 2). Estimates suggest that broken or fractured bone had the highest proportion that consulted a health care professional for their injury, at 97.9% (95% CI: 96.7-99.1), followed by serious cut or puncture, with 81.4% (95% CI: 76.6-86.2).

- For head injury or concussion and broken or fractured bone, the most common type of activity reportedly causing the injury was participation in sports or physical activity, other than riding a bike (Table 1). For cut or puncture injuries, playing was the type of activity most commonly reported to cause the injury at 45.9% (95%CI: 40.3-51.5) (Table 1).

**Table 1: Percentages and/or means of injury and potential exposure variables among children 1 to 17 years; Ontario, 2019**

| Injury Indicators | Weighted percentage and/or mean (95% CI) |
|---|---|
| **Experienced injury in past 12 months** | |
| Head injury or concussion | |
| Yes | 4.4 (4.0-4.8) |
| No | 95.6 (95.2-96.0) |
| Fracture or broken bone | |
| Yes | 3.0 (2.7-3.3) |
| No | 97.0 (96.7-97.3) |
| Cut or puncture | |
| Yes | 2.4 (2.1-2.7) |
| No | 97.6 (97.3-97.9) |
| **Consulted health care professional for injury** | |
| Head injury or concussion | |
| Yes | 76.0 (72.4-79.6) |
| No | 24.0 (20.4-27.6) |
| Fracture or broken bone | |
| Yes | 97.9 (96.7-99.1) |
| No | 2.1[D] (0.9-3.3) |
| Cut or puncture | |
| Yes | 81.4 (76.6-86.2) |
| No | 18.6 (13.8-23.4) |
| **Type of activity reportedly caused injury** | |
| Head injury or concussion | |
| Sports or physical activity other than riding a bike | 38.2 (33.9-42.6) |
| Playing | 34.2 (30.2-38.3) |
| Other | 27.5 (23.3-31.8) |
| Fracture or broken bone | |
| Sports or physical activity other than riding a bike | 53.4 (48.2-58.6) |
| Playing | 27.3 (22.8-31.8) |
| Other | 19.3 (15.2-23.4) |
| Cut or puncture | |
| Sports or physical activity other than riding a bike | 14.4 (10.3-18.5) |
| Playing | 45.9 (40.3-51.5) |
| Other | 39.7 (33.9-45.5) |

**Figure 1: Injury prevalence among children between 1 to 17 years; Ontario, 2019**

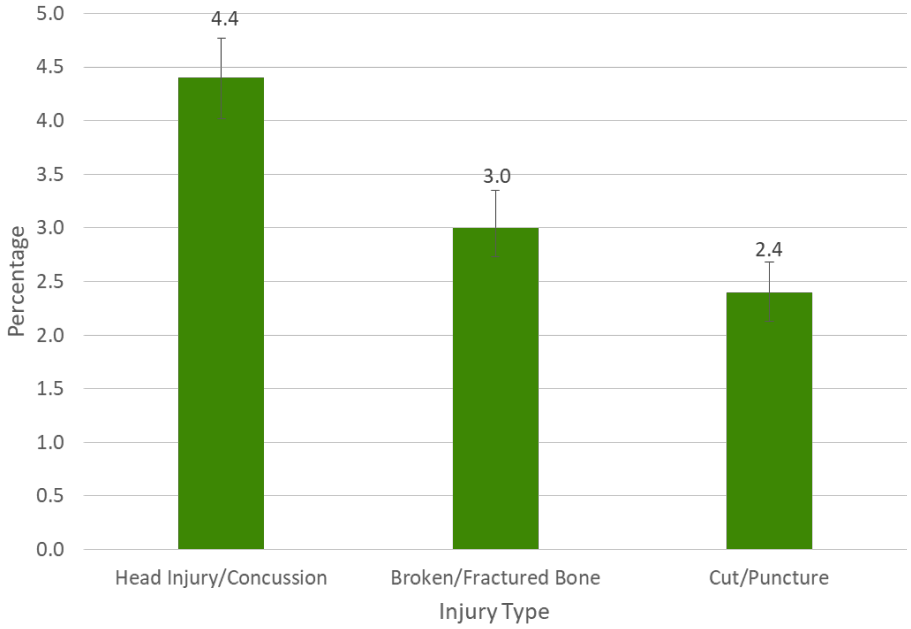
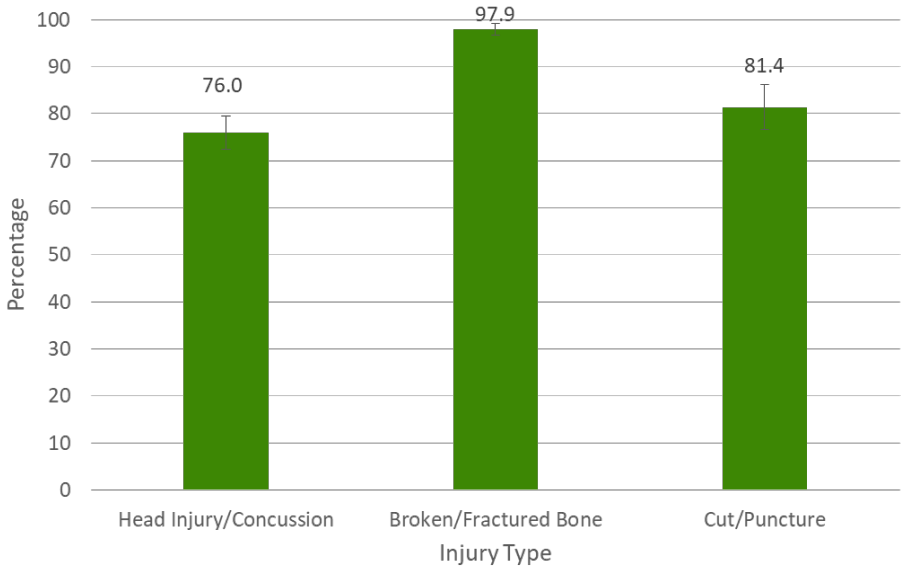



**Figure 2: Proportion injured who consulted a health care professional for injury among children between 1 to 17 years; Ontario, 2019**




# Socio-demographic Variables

## AGE AND SEX AT BIRTH

- When examining the prevalence of head injury or concussion stratified by age, our findings suggest that the 5 to 11 age group reported a higher prevalence (4.9%, 95% CI: 4.3-5.6) in comparison to the 1 to 4 (3.2%, 95% CI: 2.5-3.8) and the 12 to 17 (4.6%, 95% CI: 3.9-5.2) age groups (Table 2, Figure 3).

- For broken bone or fracture, 12-17 year olds reported a higher prevalence compared to other age groups. For cut and puncture, the 1-4 year olds reported the highest prevalence.
- By sex at birth, estimates suggest that males report a significantly higher prevalence across all injury types in comparison to females (Table 2, Figure 4).

**Table 2: Injury prevalence among children 1 to 17 years by age group and sex at birth; Ontario, 2019**

| Socio-demographic | Head injury or concussion* % (95% CI) | Broken bone or fracture† % (95% CI) | Cut or puncture* % (95% CI) |
|---|---|---|---|
| **Age Group (years)** | | | |
| 1-4 | 3.2 (2.5 - 3.8) | 1.3[C] (0.9 - 1.8) | 3.3 (2.7 - 3.9) |
| 5-11 | 4.9 (4.3 - 5.6) | 3.1 (2.6 - 3.5) | 2.4 (2.0 - 2.9) |
| 12-17 | 4.6 (3.9 - 5.2) | 4.1 (3.5 - 4.7) | 1.8 (1.4 - 2.2) |
| **Sex at birth** | | | |
| Male | 5.1 (4.5 - 6.5) | 3.2 (2.7 - 3.6) | 3.0 (2.6 - 3.5) |
| Female | 3.7 (3.2 - 4.2) | 2.9 (2.5 - 3.3) | 1.7 (1.4 - 2.1) |

C – This estimate should be interpreted with caution due to high sampling variability
*indicates a significant difference across age group and sex at birth (Rao-Scott Chi-Square Test p<0.05)
†indicates a significant difference across age group (Rao-Scott Chi-Square Test p<0.05)

**Figure 3: Prevalence of injuries among children 1 to 17 years, by age group; Ontario, 2019**

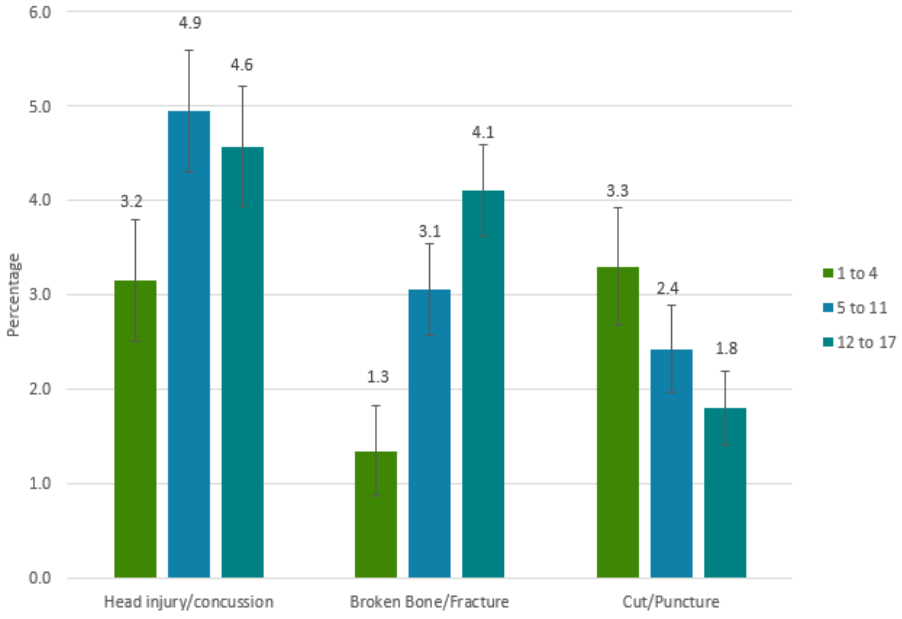
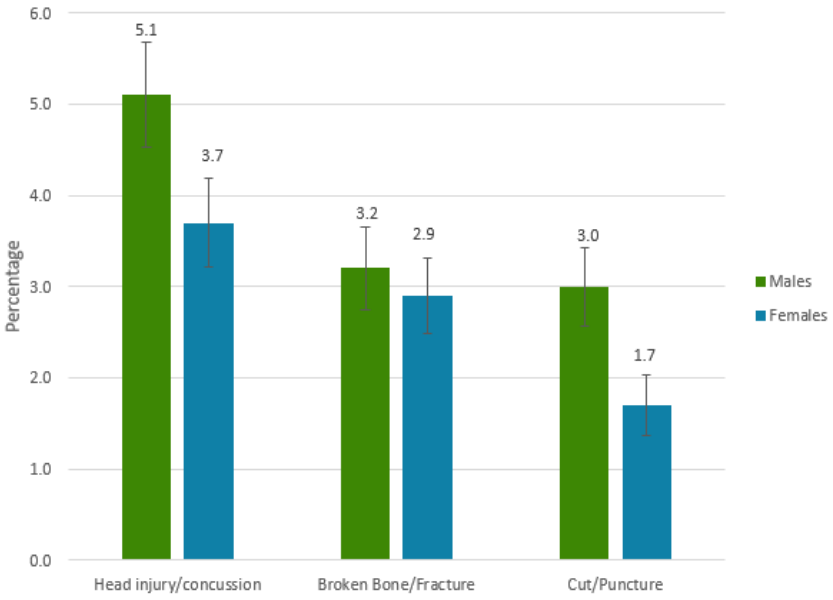


**Figure 4: Prevalence of injury among children 1 to 17 years by sex at birth; Ontario, 2019**




## HIGHEST HOUSEHOLD EDUCATIONAL ATTAINMENT

- There was a significant difference in prevalence of head injury and concussion across highest household educational attainment (Table 3). No significant differences were detected for broken bone or fracture and cut or puncture injuries.

**Table 3: Prevalence of injury among children 1 to 17 years by highest household educational attainment; Ontario, 2019**

| Highest Household Education | Head injury or concussion* % (95% CI) | Broken bone or fracture % (95% CI) | Cut or puncture % (95% CI) |
|---|---|---|---|
| High School or less | 4.1 (3.0-5.0) | 3.7 (2.7-4.7) | 2.7[C] (1.9-3.5) |
| College/Trades | 5.2 (4.5-5.9) | 3.0 (2.6-3.5) | 2.3 (1.8-2.7) |
| University or more | 4.0 (3.5-4.5) | 2.9 (2.5-3.3) | 2.4 (2.1-2.8) |

C – This estimate should be interpreted with caution due to high sampling variability
*indicates a significant difference across educational attainment levels (Rao-Scott Chi-Square Test p<0.05)

## HOUSEHOLD INCOME AND LOW INCOME CUT OFF (LICO)

- There was a significant difference in the prevalence of cut or puncture injuries across the income levels; however, estimates should be interpreted with caution due to high sampling variability.

- There was a significantly higher prevalence of head injury or concussion among children living in high income households compared to low income households (4.6%, 95% CI: 4.2-5.1 vs. 3.6%, 95% CI: 2.7-4.4%; p=0.03) (Table 4).

**Table 4. Prevalence of injury among children 1 to 17 years by household income, income quintiles and low income cut off; Ontario, 2019**

| Household income | Head injury or concussion† % (95% CI) | Broken bone or fracture % (95% CI) | Cut or puncture* % (95% CI) |
|---|---|---|---|
| <$24,999 | 3.7[C] (2.3-5.1) | 3.2[C] (1.9-4.4) | 2.4[C] (1.5-3.4) |
| $25,000 to 49,999 | 3.9 (2.9-4.9) | 2.9 (2.1-3.7) | 2.5 (1.8-3.2) |
| $50,000 to 74,999 | 4.0 (3.0-4.9) | 3.3 (2.5-4.2) | 1.7 [C] (1.1-2.2) |
| $75,000 to 99,999 | 4.4 (3.4-5.4) | 3.1 (2.4-3.8) | 2.7 (1.9-3.4) |
| $100,000 to 149,999 | 4.3 (3.5-5.0) | 2.4 (1.9-3.0) | 1.7 (1.9-3.4) |
| $150,000 to 199,999 | 5.5 (4.4-6.7) | 3.6 (2.7-4.4) | 3.6 (2.6-4.5) |
| $200,000 and higher | 5.0 (3.9-6.2) | 3.2 (2.2-4.0) | 2.9[C] (1.9-3.8) |
| Income Quintiles | | | |
| Q1 | 3.7 (2.9-4.6) | 3.1 (2.3-3.8) | 2.4 (1.8-2.9) |
| Q2 | 4.0 (3.2-4.8) | 3.2 (2.5-4.0) | 1.9 (1.3-2.4) |
| Q3 | 4.5 (3.7-5.3) | 2.7 (2.1-3.2) | 2.1 (1.6-2.7) |
| Q4 | 4.9 (4.0-5.8) | 2.7 (2.0-3.4) | 2.2 (1.7-2.8) |
| Q5 | 5.0 (4.1-5.9) | 3.6 (2.9-4.3) | 3.5 (2.7-4.3) |
| Low Income Cut Off (LICO) | | | |
| High income | 4.6 (4.2-5.1) | 3.1 (2.8-3.4) | 2.4 (2.1-2.8) |
| Low income | 3.6 (2.7-4.4) | 2.8 (2.1-3.6) | 2.3 (1.7-2.8) |

C – This estimate should be interpreted with caution due to high sampling variability
*indicates a significant difference across income and income quintiles (Rao-Scott Chi-Square Test p<0.05)
†indicates a significant difference for the LICO (Rao-Scott Chi-Square Test p<0.05)

## RACE AND ETHNIC ORIGIN

- Estimates of the prevalence of injury by race and ethnic origin should be interpreted with caution as there is high sampling variability due to low numbers (Table 5, Figure 6).
- Children reported as white/not racialized had the highest prevalence of head injury or concussion and cut and puncture injuries compared to other groups.
- Estimates for Latin Americans could not be released as per Statistics Canada guidelines to not release estimates of unacceptable quality.

**Table 5: Injury prevalence among children 1 to 17 years by race and ethnic origin; Ontario, 2019**

| Race and Ethnic Origin – Child | Head injury or concussion* % (95% CI) | Broken bone or fracture % (95% CI) | Cut or puncture % (95% CI) |
|---|---|---|---|
| White/Not racialized[E] | 5.3 (4.8 - 5.8) | 3.3 (2.9 - 3.7) | 2.9 (2.5 - 3.2) |
| Black | 4.0[C] (2.5 - 5.6) | 4.5[C] (2.9 - 6.2) | 2.1[D] (1.1 - 3.2) |
| East Asian | 2.7[C] (1.6 - 3.8) | 1.3[D] (0.6 - 1.9) | 2.1[D] (0.9 - 3.2) |
| Southeast Asian | 3.1 (1.6 - 3.8) | NR | NR |
| South Asian | 2.3[C] (1.4 - 3.1) | 2.3[C] (1.4 - 3.2) | 1.1[C] (0.6 - 1.6) |
| Latin American | NR | NR | NR |
| West Asian/Arab | 2.3[D] (1.0 – 3.7) | 4.2[D] (1.8 - 6.6) | NR |
| Other (Multiple) | 3.7[D] (1.1 - 5.0) | 2.3[D] (1.0 - 3.7) | NR |

C and D – This estimate should be interpreted with caution due to high sampling variability
*indicates a significant difference across race and ethnic origin (Rao-Scott Chi-Square Test p<0.05)
E – White/Non-racialized group excludes people who identified as Indigenous.

## INDIGENOUS IDENTITY

- There was no statistically significant difference in the prevalence of any injury type (head injury and concussion, broken bone or fracture or cut and puncture) in children who identified as Indigenous, compared to those who did not (Table 6).

**Table 6: Injury prevalence among children 1 to 17 years by Indigenous identity; Ontario, 2019**

| Indigenous Identity | Head injury or concussion % (95% CI) | Broken bone or fracture % (95% CI) | Cut or puncture % (95% CI) |
|---|---|---|---|
| Yes | 5.0[C] (3.1-6.9) | 4.1[D] (2.0-6.2) | 3.2[D] (1.6-4.7) |
| No | 4.4 (4.0-4.8) | 3.0 (2.7-3.3) | 2.4 (2.1-2.7) |

C and D – This estimate should be interpreted with caution due to high sampling variability

## IMMIGRATION STATUS – CHILD

- There was a significant difference in the prevalence of head injury or concussion between children who identified as non-immigrants (4.7%, 95% CI: 4.3-5.1) and those who identified as immigrants (1.9%, 95% CI: 1.1-2.7, estimate interpreted with caution). There were no significant differences in the prevalence of broken bone and fracture or cut and puncture (Table 7).

**Table 7: Injury prevalence among children 1 to 17 years by child immigration status; Ontario, 2019**

| Immigration status - Child | Head injury or concussion* % (95% CI) | Broken bone or fracture % (95% CI) | Cut or puncture % (95% CI) |
|---|---|---|---|
| Non-immigrant | 4.7 (4.3-5.1) | 3.0 (2.7-3.4) | 2.5 (2.2-2.8) |
| Immigrant | 1.9[C] (1.1-2.7) | 3.3 [C] (2.0-4.5) | 1.6 [C] (0.9-2.3) |
| Non-permanent resident | NR | NR | NR |

C – This estimate should be interpreted with caution due to high sampling variability
NR - This estimate could not be released as per Statistics Canada guidelines to not release estimates of unacceptable quality
*indicates a significant difference across immigration status (Rao-Scott Chi-Square Test p<0.05)

# Geographic analysis

## PEER GROUP

- There was a statistically significant difference in the prevalence of head injury and concussion and cut and puncture injuries across Peer Groups in Ontario (Table 8).

**Table 8: Percentage of children experiencing injury, by Statistics Canada Peer Group; Ontario, 2019**

| Peer Groups | Head injury or concussion* % (95% CI) | Broken bone or fracture % (95% CI) | Cut or puncture* % (95% CI) |
|---|---|---|---|
| B | 5.2 (4.4-6.1) | 3.0 (2.4-3.6) | 2.6 (2.0-3.2) |
| C | 5.1 (4.4-5.9) | 3.4 (2.7-4.0) | 2.6 (2.0-3.2) |
| D | 5.0 (1.2-5.7) | 3.3 (2.7-3.9) | 3.2 (2.7-3.9) |
| G&H | 3.1 (2.6-3.7) | 2.8 (2.3-3.4) | 1.8 (1.4-2.2) |

*indicates a significant difference across Peer Groups (Rao-Scott Chi-Square Test p<0.05)

## GEOGRAPHIC REGION

- There was a statistically significant difference in the prevalence of head injury or concussion by geographic region in Ontario. Children living in the South West region of Ontario had the highest prevalence of injury, compared to other regions. Children living in Toronto reported the lowest prevalence of head injury or concussion (Table 9).

**Table 9: Percentage of children experiencing injury, by geographic region; Ontario, 2019**

| Geographic Region | Head injury or concussion* % (95% CI) | Broken bone or fracture % (95% CI) | Cut or puncture % (95% CI) |
|---|---|---|---|
| North West | 4.0[C] (2.3-5.7) | 2.5[C] (1.4-3.8) | 2.7[D] (1.3-4.2) |
| North East | 5.0[C] (3.4-6.6) | 2.8[C] (1.7-4.0) | 3.8[C] (2.4-5.1) |
| South West | 5.4 (4.2-6.6) | 3.9 (3.0-4.9) | 2.9[C] (1.9-3.8) |
| Central West | 4.7 (3.8-5.6) | 2.7 (2.0-3.3) | 2.6 (1.9-3.4) |
| Toronto | 2.9 (2.3-3.5) | 2.7 (2.0-3.4) | 2.1 (1.6-2.7) |
| Central East | 4.4 (3.6-5.1) | 3.2 (2.6-3.8) | 2.0 (1.5-2.4) |
| East | 5.1 (4.0-6.2) | 3.0 (2.2-3.8) | 2.7 (1.9-3.4) |

C and D – This estimate should be interpreted with caution due to high sampling variability
*indicates a significant difference across geographic regions (Rao-Scott Chi-Square Test p<0.05)

## PUBLIC HEALTH UNIT

- Estimates across all injury types should be interpreted with caution due to high sampling variability. Children living in Lambton County had the highest prevalence of head injury and concussion, followed closely by those living in Eastern Ontario (Table 10).

**Table 10: Percentage of children experiencing injury, by public health unit (PHU); Ontario, 2019**

| PHU Name | Head injury or concussion % (95% CI) | Broken bone or fracture % (95% CI) | Cut or puncture % (95% CI) |
|---|---|---|---|
| The District of Algoma Health Unit | NR | NR | 4.7[D] (1.8-7.5) |
| Brant County Health Unit | 5.6[D] (1.6-2.5) | 4.9[D] (2.2-7.6) | NR |
| Durham Regional Health Unit | 7.1[C] (4.5-9.6) | 3.8[C] (1.9-5.6) | 2.1[D] (0.8-3.3) |
| Grey Bruce Health Unit | 5.2[C] (1.3-7.7) | 5.4[D] (2.7-8.1) | 2.8[D] (1.0-4.6) |
| Haldimand-Norfolk Health Unit | NR | NR | NR |
| Haliburton, Kawartha, Pine Ridge District Health Unit | 5.6[C] (3.2-8.0) | 4.5[C] (2.7-6.4) | 1.9[D] (0.6-3.2) |
| Halton Regional Health Unit | 4.0[C] (2.7-5.2) | 3.5[C] (2.2-4.7) | 2.8[C] (1.6-4.1) |
| City of Hamilton Health Unit | 4.7[D] (1.9-7.6) | NR | NR |
| Hastings and Prince Edward Counties Health Unit | 4.2[C] (2.2-6.3) | 3.4[D] (1.5-5.3) | NR |
| Huron County Health Unit | NR | NR | NR |
| Chatham-Kent Health Unit | 4.7[C] (2.8-6.7) | 4.6[C] (2.5-6.6) | 2.2[D] (0.8-3.7) |
| Kingston, Frontenac, Lennox and Addington Health Unit | 5.1[C] (3.1-7.2) | 4.0[C] (2.1-5.8) | 3.3[D] (1.4-5.2) |
| Lambton Health Unit | 8.1[C] (4.5-11.6) | 4.2[D] (1.7-6.9) | NR |

| PHU Name | Head injury or concussion % (95% CI) | Broken bone or fracture % (95% CI) | Cut or puncture % (95% CI) |
|---|---|---|---|
| Leeds, Grenville and Lanark District Health Unit | 5.4[C] (2.8-8.0) | 3.6[D] (1.5-5.7) | NR |
| Middlesex–London Health Unit | 6.9[C] (3.6-10.2) | 3.6[D] (1.2-5.9) | NR |
| Niagara Regional Area Health Unit | 3.4[D] (1.3-5.5) | NR | NR |
| North Bay Parry Sound District Health Unit | 6.6[D] (2.9-10.3) | NR | 4.6[D] (1.6-7.7) |
| Northwestern Health Unit | 2.8[D] (1.1-4.5) | 2.3[D] (0.9-3.4) | 3.2[D] (1.4-4.9) |
| City of Ottawa Health Unit | 4.7[D] (3.0-4.5) | 2.8[C] (1.6-4.1) | 2.8[C] (1.7-3.9) |
| Peel Regional Health Unit | 2.9 (2.1-3.7) | 2.7[C] (1.8-3.5) | 1.9[C] (1.2-2.6) |
| Perth District Health Unit | NR | NR | NR |
| Peterborough County–City Health Unit | 5.6[D] (2.4-8.7) | 3.0[D] (1.0-5.0) | NR |
| Porcupine Health Unit | 4.7[D] (1.9-7.5) | NR | NR |
| Renfrew County and District Health Unit | NR | NR | NR |
| The Eastern Ontario Health Unit | 7.9[C] (4.4-11.4) | NR | NR |
| Simcoe Muskoka District Health Unit | 4.9 (3.6-6.3) | 3.3[C] (2.3-4.3) | 3.7[C] (2.3-5.0) |
| Sudbury and District Health Unit | 6.1[D] (2.8-9.5) | NR | NR |
| Thunder Bay District Health Unit | 4.5[D] (2.1-6.9) | NR | NR |
| Timiskaming Health Unit | NR | NR | NR |
| Waterloo Health Unit | 5.7[C] (3.6-7.7) | 1.6[D] (0.5-2.7) | NR |
| Wellington–Dufferin-Guelph Health Unit | 6.1[C] (4.3-8.0) | 3.1[C] (1.8-4.5) | 3.5[C] (2.2-4.8) |
| Windsor–Essex County Health Unit | 3.5[C] (1.9-5.1) | 4.4[C] (2.5-6.3) | 2.2[D] (0.9-3.5) |
| York Regional Health Unit | 4.0[C] (2.4-5.6) | 3.4[C] (1.9-4.9) | 1.1[D] (0.4-1.9) |
| Oxford Elgin St. Thomas Health Unit (Southwestern) | 6.0[C] (3.8-8.3) | 3.2[D] (1.6-4.9) | 3.0[C] (1.6-4.5) |
| City of Toronto Health Unit | 2.9 (2.3-3.5) | 2.7 (2.0-3.4) | 2.1 (1.6-2.7) |
| Ontario Total | 4.4 (4.0-4.8) | 3.0 (2.7-3.3) | 2.4 (2.1-2.7) |

C and D – This estimate should be interpreted with caution due to high sampling variability
NR - This estimate could not be released as per Statistics Canada guidelines to not release estimates of unacceptable quality

## Mechanism of Injury – Head injury or Concussion

- Among all children and youth who experienced a head injury or concussion, 38.2% (95% CI: 33.9-42.6) reported sports, 34.2% (95% CI: 30.2-38.3) reported playing, and 27.5% (95% CI: 23.3-31.8) reported other as a cause of their injury (Table 11).

- When mechanism of concussion was stratified by sex at birth, males and females reported similar proportions.

- As age increased, sports were reported more often as a cause of head injury or concussion over playing and other activities.

**Table 11: Prevalence of activity causing head injury or concussion among children 1 to 17 years, by age and sex at birth; Ontario, 2019**

| Characteristic | Sports or physical activity other than riding a bike % (95% CI) | Playing % (95% CI) | Other activity % (95% CI) |
|---|---|---|---|
| **Age group (years)** | | | |
| 1 to 4 | NR | 58.0 (47.0-68.9) | 38.5 (27.4-49.6) |
| 5 to 11 | 31.1 (24.8-37.3) | 45.7 (39.1-52.3) | 23.2 (17.6-28.9) |
| 12 to 17 | 62.5 (55.4-69.7) | 9.5[C] (5.5-13.5) | 28.0 (20.9-35.1) |
| Total | 38.2 (33.9-42.6) | 34.2 (30.2-38.2) | 27.5 (23.3-31.8) |
| **Sex at birth** | | | |
| Male | 38.1 (32.2-44.0) | 36.0 (30.6-41.5) | 25.9 (20.5-31.2) |
| Female | 38.4 (32.1-44.7) | 31.7 (25.8-37.5) | 29.9 (23.1-36.7) |
| Total | 38.2 (33.9-42.6) | 34.2 (30.2-38.2) | 27.5 (23.3-31.8) |

C – This estimate should be interpreted with caution due to high sampling variability
NR - This estimate could not be released as per Statistics Canada guidelines to not release estimates of unacceptable quality

# Discussion

Overall, head injury or concussion had the highest weighted prevalence at 4.4% for children in Ontario ages 1 to 17 years. For other injury types, the prevalence rates were 3.0% for broken or fractured bone and 2.4% for cut or puncture. Our estimates suggest that males report a significantly higher prevalence across all injury types in comparison to females and head injury or concussion is estimated to have the lowest overall prevalence of those who consulted a health care professional for their injury. There was a significantly higher prevalence of head injury or concussion among children living in high income households compared to low income households as well as those who reported being a non-immigrant and white/not racialized. This is consistent with published literature in this area where sport-related injury is higher in populations with higher socioeconomic status[15] and those who identify as white ("Caucasian") in Canada.[16] This may be due to the fact that access to opportunities for engaging in sports and obtaining the benefits of participation are inequitably distributed[17] and are strongly predicted by household income,[18] among a wide range of other socioeconomic factors.

There are strengths and limitations to this work. First, there is a lack of head injury or concussion data in Ontario, particularly at a PHU level that can be used to inform prevention efforts. Concussion is an area of injury prevention practice added to the 2018 iteration of the Ontario Public Health Standards.[19] In this way, public health practitioners are charged to develop and implement a program specific to concussion and concussion prevention. The data presented in this summary provides some insight to the mechanisms of head injury and concussion in children and youth in Ontario. Injury prevention practitioners can seek additional information based on the results presented here, that can be used as the next step in prevention planning. For example, given sports or physical activity other than riding a

bike was reported most often as the activity causing the head injury or concussion, future work can include modeling these data to examine the odds of suffering a head injury or concussion, given the number of hours children and youth report participating in physical activity. The 2019 CHSCY has both physical activity and proxy sport participation variables (i.e., physical activity with a coach or instructor) that can be used to report on injuries, controlling for the amount of play each week. Finally, another strength in reporting these data include the ability to compare the results of the 2019 CHSCY to the forthcoming 2023 CHSCY which would allow a comparison of health outcomes pre to during the COVID-19 pandemic.

There are; however, several limitations to this work. First, the survey data presented in this report lacks the specificity needed to understand how and where children were injured. For example, we do not know the specific sport or activity the child was participating in when they suffered their injury. Further, for sport-related head injury or concussion, these data do not provide us with the level of play (e.g., organized versus unorganized sporting activity, or elite versus recreational). This information would give some additional context to these injuries where intervention could be appropriate. Second, the data presented here does not capture the true prevalence of injury in Ontario. Survey data captures information at one point in time; therefore, it does not capture multiple injuries in the same category (e.g., if the child suffered a concussion more than once in the previous one year), or injuries outside of the given categories (i.e., head injury or concussion, broken or fractured bone and cut or puncture injuries but not sprain and strain injuries, for example). Most importantly, the data presented here does not capture the inequitable distribution of injuries in children in Ontario. Finally, the nature of survey data collection increases the risk of recall bias. The number of injuries may be underreported due to the inability of participants to accurately recall an injury suffered in the previous one-year.

The data presented in this summary provides some information specific to head injuries in children and youth in Ontario. Given the need for more work in this area, further analyses is warranted.

# Technical notes

## Data Source

This report examined the Ontario portion of the 2019 Canadian Health Survey on Children and Youth (CHSCY) which used the Canadian Child Tax Benefit (CCB) as the sampling frame to select children and youth between the ages of 1 to 17 years old as of January 31, 2019.

- Children living in private dwellings across 10 provinces and 3 territories were eligible.
- Children living on First Nation reserves or other Indigenous settlements were excluded from the survey. Further, children living in foster care and children and youth who were institutionalized were excluded.

## Indicators

### INJURY VARIABLES

The injury variables used in this analysis include head injury or concussion, broken bone or fracture and cut or puncture injuries. Injury questions asked in the 2019 CHSCY include self-reported injury in the previous 12-months, across injury types (Y/N). Each injury question was asked as follows:

1. During the past 12 months, has this child had any of the following injuries? - A head injury or concussion? (Y/N/Not stated)
2. During the past 12 months, has this child had any of the following injuries? - A broken or fractured bone? (Y/N/Not stated)
3. During the past 12 months, has this child had any of the following injuries? - A serious cut or puncture? (Y/N/Not stated)

Mechanism of head injury or concussion included three potential responses: sports or physical activity (PA) other than riding a bike, playing or other. Each injury question was asked as follows:

4. What was this child doing when he was injured? Was it:
    a. Riding a bike
    b. Sports or physical activity other than riding a bike
    c. Household chores, outdoor yard maintenance, paid/unpaid work
    d. Riding or driving an off-road motor vehicle
    e. Riding or driving a road motor vehicle
    f. Playing
    g. Other activity
    h. Valid skip
    i. Not stated

In our categorization of "other" we included all other answer options (i.e., household chores, outdoor yard work, maintenance and paid or unpaid work, riding or driving an off-road motor vehicle and riding or driving an off-road or on-road motor vehicle and other activity).

## SOCIO-DEMOGRAPHIC VARIABLES

The socio-demographic variables used in this analysis include age, sex at birth, household income, education of person most knowledgeable (PMK) of the child and their spouse, race and ethnic origin (including Indigenous identity), and immigration status. For more information on these socio-demographic variables and how they were recoded please see the full Technical Report.

- Age was categorized as 1-4, 5-11, and 12-17 years.
- Sex at birth was categorized as male or female.
- Household income was categorized into 7 levels (<$24,999, $25,000-$49,999, $50,000-$74,999, $75,000-$99,999, $100,000-$149,999, $150,000-$199,999, and $200,000+).
- Low income cut-off (LICO) measure is a dichotomous variable describing low or high income. It was calculated using Canadian 2019 before-tax income adjusted for community and household size
- Highest Household Educational Attainment of the PMK or PMK Spouse was categorized into three groups (high-school or less, college/vocational/university certificate or diploma, and university or more).
- Race and ethnic origin were categorized as South Asian, Black, East Asian, Southeast Asian/Filipino, West Asian/Arab, White/Not a Racialized Group, Latin American, and other (or multiple).
- Indigenous identity (First Nations, Inuit or Métis) was defined as 'Yes' or 'No'
- Immigration status was categorized as non-immigrant, immigrant, and non-permanent residents.

## GEOGRAPHIC VARIABLES

The proportion of children with an injury was categorized by Public Health Unit (PHU), by Statistics Canada Peer Groups, and by major geographic regions.

**Statistics Canada Peer Groups** are based on the following list:

- Group B – Mainly urban centres with moderate population density
    - Durham Region Health Department, Halton Region Public Health, City of Hamilton Public Health Services, Middlesex-London Health Unit, Ottawa Public Health, Region of Waterloo Public Health and Emergency Services, Windsor-Essex County Health Unit
- Group C – Sparsely populated urban-rural mix
    - Algoma Public Health, Brant County Health Unit, Chatham-Kent Public Health, Eastern Ontario Health Unit, Haliburton, Kawartha, Pine Ridge District Health Unit, Hastings Prince Edward Public Health, Kingston, Frontenac and Lennox & Addington Public Health,

Lambton Public Health, Niagara Region Public Health, North Bay Parry Sound District Health Unit, Porcupine Health Unit, Peterborough Public Health, Public Health Sudbury & Districts, Thunder Bay District Health Unit, Timiskaming Health Unit

- Group D – Mainly rural
    - Grey Bruce Health Unit, Haldimand-Norfolk Health Unit, Huron Perth Public Health, Leeds, Grenville & Lanark District Health Unit, Northwestern Health Unit, Renfrew County and District Health Unit, Simcoe Muskoka District Health Unit, Southwestern Public Health, Wellington-Dufferin-Guelph Public Health
- Group G&H – Largest population centres with high population density
    - City of Toronto, Peel Public Health, York Region Public Health

The major **geographic regions** are the following:

- North West – Northwestern Health Unit, Thunder Bay District Health Unit
- North East – Porcupine Health Unit, Timiskaming Health Unit, Public Health Sudbury & Districts, Algoma Public Health, North Bay and Parry Sound District Health Unit
- South West – Windsor-Essex County Health Unit, Chatham-Kent Public Health, Southwestern Public Health, Lambton Public Health, Middlesex-London Health Unit, Huron Perth Public Health, Grey Bruce Health Unit
- Central West – Wellington-Dufferin-Guelph Public Health, Halton Region Public Health, City of Hamilton Public Health Services, Niagara Region Public Health, Region of Waterloo Public Health and Emergency Services, Haldimand-Norfolk Health Units, Brant County Health Unit
- Toronto Public Health
- Central East – Peel Public Health, York Region Public Health, Durham Region Health Department, Haliburton, Kawartha, Pine Ridge District Health Unit, Peterborough Public Health, Simcoe-Muskoka District Health Unit
- East – Renfrew County and District Health Unit, Hastings Prince Edward Public Health, Kingston, Frontenac and Lennox & Addington Public Health, Leeds, Grenville & Lanark District Health Unit, Ottawa Public Health, Eastern Ontario Health Unit

## Data Analysis

SAS Enterprise Guide was used to conduct all statistical analysis. Bivariate analyses was conducted between the covariates and injury type.

- PROC SURVEY commands were used with bootstrap replications (n=1,000) and bootstrap weights provided by Statistics Canada. Using these, point estimates and 95% confidence intervals were calculated.
- Statistics Canada approved guidelines were used to report outcomes, where estimates with coefficients of variation (CV) with less than 0.15% were reported without warnings.

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