Public Health Ontario | Santé publique Ontario

ENVIRONMENTAL SCAN

Childhood Fall Prevention Indicators for Public Health Practice in Ontario

1st Revision: February 2023

Key Findings

- Fall-related injury represents the highest cost of all injuries reported among children in Canada.
- There is a need to create a comprehensive, representative list of fall-related indicators to help practitioners inform fall prevention programs and evaluation efforts.
- Identified indicators were grouped into outcome and policy categories. Disaggregation of indicators to determine the specific mechanism of injury, geographic location and socioeconomic status are important to report, as noted across childhood fall prevention sectors.
- Challenges exist around the prioritization of indicators across sectors, due to the lack of existing indicators in use in public health practice and from the peer and grey reviewed literature.

Objectives and Scope

In public health in Ontario, practitioners reference a set of injury indicators for falls from a list developed by the Association of Public Health Epidemiologists in Ontario (APHEO).[1] This group developed the list of indicators across injury topics, including guidance on the specific data sources and methods needed to populate the indicators. Current indicators specific to fall-related injury in children include fall-related emergency department visits, hospitalizations and mortality. While the use of these indicators is appropriate to understand the burden of injury related to childhood falls, they are less relevant to determine specific mechanisms of childhood falls for public health programming and importantly, to assess the effectiveness of a program of public health. There is a need; therefore, to create a comprehensive list of relevant indicators for fall prevention programming that can be used in public health and across health sectors.

The aim of this work was to develop a list of indicators for childhood fall prevention to be used by practitioners across health sectors in Ontario, as well as to provide guidance on the use of each indicator. Further, this project aimed to populate one of the indicators prioritized through practitioner and expert consultation. Systematic use and reporting of indicators can reduce the duplication of reporting efforts across sectors and increase opportunities to compare data across settings. This work represents the first step in developing a set of indicators for use in public health programming. Further research will evaluate the use of the prioritized indicators in public health practice.

Background

Fall-related injuries among children is a public health issue in Ontario. In 2019, there were 129,911 emergency department visits and 3,221 hospitalizations due to fall-related injuries among 0 to 19 year olds, translating to rates of 4,149.6 and 102.9 per 100,000 population, respectively.[2,3] Additionally, the rate of emergency department visits and hospitalizations due to fall-related injuries among children has remained relatively stable since 2010, with no notable decline.

Fall-related injuries also incur costs to both the healthcare system, as well as the individuals and families of injured children and youth.[4] Unintentional injuries accounted for 86% of total injury costs in Canada at $25.3 billion.[4] Falls had a higher total cost than any other cause in 2018, accounting for $10.3 billion, or 35% of the total cost of injury.[4] Of the $10.3 billion, childhood falls (ages 0 to 14 years) represented the highest cost of all injuries among children at $996 million.[4]

In Ontario, the current fall-related injury indicators for children that are systematically reported include emergency department visits, hospitalizations, and mortality.[1] While these population-level indicators are important to understand the burden of fall-related injuries in Ontario, they alone do not provide a fulsome picture of childhood falls, nor are able to meaningfully inform or measure the impact of fall prevention programming.

The Ontario Child Injury Prevention Collaborative (OCIPC) is a collaborative group of fall prevention practitioners from public health units, early childhood education centers, and community health centers in Ontario. This network indicated a need for indicators that better serve their work in fall prevention; providing relevant and useful information for intervention planning and to measure the success of public health programming. Further, a need was expressed for guidance on populating the indicators as well as information specific to using the indicator in practice (i.e., developing specification tables). This need is supported by previous work published from Public Health Ontario (PHO) that described the need for data and indicators across injury topics, for effective public health programming in Ontario.[5] The overarching goal of this project was to use an environmental scan and Modified Delphi process to develop a list of childhood falls indicators that can be used systematically across sectors in childhood fall prevention.

Methods

We conducted an environmental scan of childhood fall prevention indicators, followed by a Modified Delphi process to develop consensus on a list of indicators recommended for use in childhood fall prevention practice. The process included: 1) a peer-reviewed and grey literature search to identify indicators from relevant government, public health, and injury prevention sites, 2) consultation with child fall prevention practitioners from the OCIPC and experts in the area of childhood injury indicators, 3) specifying indicators using guidance from existing literature and previous work in this area; and, 4) populating one, prioritized indicator using relevant data sources. The next step in this work is forthcoming and includes evaluating the use of one prioritized indicator in practice. A flow diagram outlining the entire process is visualized in Figure 1 of the Appendix.

Public Health Ontario Library Services conducted the peer-reviewed search in MEDLINE, CINAHL, SPORTDiscus, Child Development & Adolescent Studies, and Scopus using relevant vocabulary and subject headings. All database results were integrated and duplicates were removed. A grey literature search was also completed using relevant vocabulary and key words. The search strategy for both the peer-reviewed and grey literature searches are available upon request.

One reviewer (AM) screened all of the titles and abstracts for relevant indicators and a second reviewer (SR) screened a random selection of titles and abstracts. Full-text versions of all articles for inclusion were reviewed by two reviewers. One reviewer (AM) then performed a data extraction for the included articles and categorized the indicators by type (i.e., outcome and policy indicators). A random selection of articles were chosen by the second reviewer (SR) to identify any discrepancies in data extraction. Relevant reports from the grey literature were also included.

Consultation with members of the OCIPC as well as injury prevention experts was used to collect feedback on the list of identified indicators. Members of the OCIPC included injury prevention researchers and childhood fall prevention practitioners in primary care, early childhood education, and public health. The first feedback session included a webinar-based exercise where the full list of indicators identified from the literature was presented. Feedback was collected specific to the relevance of each indicator for use by practitioners in Ontario and where gaps existed. A second feedback session was conducted using a refined list of indicators, based on the webinar activity. Professional facilitation services from a third-party research organization were used to collect a final round of feedback from participants. Finally, experts in child and youth injury prevention with extensive experience in indicator development [6-8] were consulted throughout process to reorient participant feedback to the goal of developing a list of indicators that would improve child fall prevention practice at a system level, to prioritize and populate one indicator, and to provide guidance on the information to be included in the injury indicator specification tables. Injury indicator specification tables were additionally informed by consulting public sources such as APHEO, the Canadian Institute for Health Information (CIHI) and PHO Injury Snapshots Technical Notes, as well as recent literature and reports on injury indicators such as the Canadian Cost of Injury Report.[4]

The final step of this project was to populate one prioritized indicator. S*erious fall-related injury hospitalizations* was prioritized by participants during the consultation process due to its importance in distinguishing the most severe fall-related injuries from those with less severe outcomes. Public Health Ontario obtained fall-related hospitalization data for children and youth ages 0-19 from the National Ambulatory Care Reporting System (NACRS). All children and youth who presented to the emergency department (ED) for a fall-related injury and were subsequently admitted to hospital from 2010 to 2019, were included. This method and data source were selected based on guidance on the use of Ontario injury hospitalization data from APHEO and PHO.[9,10] A selection of codes from the International Classification of Diseases (ICD-10) was used to identify serious injuries. The ICD-10 contains diagnostic codes that indicate the primary reason(s) the patient required medical attention (S00-T88 for injuries), as well as external cause of injury codes which identify the mechanism of injury (W00-W19 for falls). These codes were used to identify all fall-related injuries. Injuries were determined to be "serious" as defined previously by Pike et al. (2016).[8] The ICD-10 codes that define a serious fall are listed in Table B1 of the Appendix. Cases of fall-related hospitalizations that did not include one of these ICD-10 codes were classified as "non-serious."

The rates per 100,000 population of serious and non-serious fall injury hospitalizations were calculated using the relevant age group populations of each public health unit. Rate ratios were calculated to compare serious and non-serious fall-related injury hospitalizations by dividing the rate of serious fall injury hospitalizations by the rate of non-serious fall injury hospitalizations for each age group (0-4, 5-9, 10-14, 15-19).

Results

The peer-reviewed and grey literature search identified several potential indicators and related concepts, broadly classified into two groups: 1) outcome indicators (Table 1); and, 2) policy indicators (Table 2). While these are one way of conceptualizing the identified indicators, it is important to note that these categories may overlap. Additionally, some concepts and measures specific to healthcare facilities represent critical components of childhood fall prevention that can inform indicator development, but may not be indicators on their own. For example, risk assessment tools are not indicators themselves, but can be considered in fall risk indicator development. Finally, of all the identified indicators, serious fall-related injury hospitalizations was the indicator prioritized by our participants and experts to populate with existing Ontario hospitalization data (Appendix D Tables D1-4).

Outcome Indicators

Outcome indicators include those that primarily capture interactions with the healthcare system due to fall-related injuries, such as emergency department visits and hospitalizations, as well as related consequences of fall-related injuries such as associated direct and indirect costs and potential years of life lost due to a fall. The final list of Outcome Indicators are available in Table 1.

Initially included in this category were healthcare facility indicators identified in the literature search. These indicators reflect the status of childhood falls within hospitals and other healthcare facilities. Indicators included the number of falls occurring within hospitals among pediatric patients, as well as consideration of whether fall prevention measures are implemented within the facility, and if hospital staff (i.e., nurses) are given sufficient education on preventing falls. Some indicators distinguish whether a fall was “anticipated” or “unanticipated” as determined by an individual being designated “at risk” by a fall risk assessment tool; another measures how many patients were given a falls risk assessment upon admission, using any tool.

Healthcare facility indicators (Table C1 in Appendix C) were deemed important primarily at a facility-level but were reported by participants to not contribute to fall prevention efforts across sectors in Ontario. Additionally, falls within healthcare facilities only represent a small proportion of the total burden of falls.[11] Healthcare-specific risk assessment tools are specialized tools used by healthcare practitioners to determine the fall-related injury risk for children. These include the Humpty Dumpty Falls Scale[12] and the Little Schmidy Falls Risk Assessment[13] that measure the risk of falls in children based on their health status and family history. Participant feedback indicated that to their knowledge, healthcare facility indicators are not used in Ontario, nor across Canada, and these indicators were subsequently excluded.

Table 1. Outcome Indicators

Outcome Indicators
1. Rate of emergency department visits due to a fall
2. Rate of hospitalizations due to a fall
3. Rate of mortality due to a fall
4. Rate of primary care visits for injuries related to a fall
5. Potential years of life lost due to a fall
6. Proportion of falls by place of occurrence
7. Direct and indirect cost associated with fall-related injuries
8. Rate of serious fall-related injury hospitalizations
9. Rate of home visitations completed among *Healthy Babies Healthy Children* participants

Policy Indicators

Policy indicators include those that capture data regarding existing legislation and policies related to child fall prevention, at a local or system level. More work is needed to develop a specific score or index which reflects the degree to which best practice is reflected within legislation and policy[14]; however, Table 2 includes the policy-level indicators that participants deemed important for reporting in childhood falls prevention, at a system-level.

Table 2. Policy Indicators

Policy Indicators
1. Fall prevention score (assigned at a system level) based on actions taken toward fall prevention
2. Municipal requirements for window guards in apartment buildings
3. Requirements for playgrounds to comply with the Canadian Standards Association (CSA)
4. Proportion of dedicated fall prevention leads, at a system level (e.g., public health units)

Indicator Specification Tables

Specification tables for each indicator in Tables 1 and 2 can be found in Appendix E. The specification tables provide information on the importance and use of each indicator, as well as how the data should be interpreted and used in practice. We provide operational definitions of each indicator, as well as key terms included in the indicator title or description to ensure consistent interpretation across sectors.

The methods and data required to calculate each indicator are included in the specification tables, as well as the existing or potential data sources needed to populate each indicator. Additionally, specification tables suggest potential variables for sub-analyses identified by participants as priorities for stratification including socioeconomic status (SES) or level of marginalization, geographic location and demographic characteristics such as race, age and sex.

Rate of Serious Fall-Related Injuries

The final step of this phase of the project was to populate one of the above indicators. Through the practitioner and expert consultation process, the rate of serious fall-related injury hospitalizations was determined to be a priority indicator for its ability to distinguish falls resulting in severe injuries from those that are less severe. This distinction was determined to be useful to target program planning toward preventing the most serious fall-related injuries. Further, it was noted that the indicator can be used for the evaluation of trends in severe pediatric trauma. As such, this indicator was chosen as the first indicator to be newly populated.

Through populating this indicator, it was observed from 2010-2019, there were a total of 31,857 hospitalizations for fall-related injuries among 0-19 year olds in Ontario; 4114 were classified as serious and 27,743 were classified as non-serious. The highest rate of serious fall-related injury hospitalizations per 100,000 population overall (0-19 years) were observed in Huron-Perth (279.7) and Grey Bruce (270.8) public health units. The highest age-specific rates of serious fall injury hospitalizations were observed among 0-4 year olds in Huron-Perth (485.6), 15-19 year olds in Timiskaming (369.4) and 0-4 year olds in Porcupine (365.9). As serious fall injury hospitalizations are a relatively rare event, and because these public health units have relatively small populations, these rates should be interpreted with caution.

The highest rate ratio of serious to non-serious fall injury hospitalizations was observed among 15-19 year olds in Timiskaming (0.88). This means that the rates of serious fall-related injury hospitalizations was 88% of the rate of those that were non-serious, or that the rate of serious injuries was only 12% lower than the rate of non-serious injuries in this population. Following Timiskaming, the highest rate ratios were observed among 15-19 year olds in Simcoe-Muskoka (0.84) and Haliburton, Kawartha, Pine Ridge (0.79). Due to the small population and case numbers of these public health units, these rate ratios should also be interpreted with caution.

Table 3. Rates of Serious and Non-serious Fall-Related Injury Hospitalizations and Corresponding Rate Ratios by Public Health Unit, Ages 0-19, 2010-2019

Public Health Unit	Serious Fall Rate	Non-Serious Falls Rate	Rate Ratio of Serious vs. Non-Serious Falls
The District of Algoma	129.93	1280.74	0.10
Brant County	168.70	1352.70	0.12
Chatham-Kent	170.68	1107.22	0.15
City of Hamilton	147.60	1618.52	0.09
City of Ottawa	113.21	728.61	0.16
City of Toronto	119.01	770.89	0.15
Durham Region	133.20	740.16	0.18
Eastern Ontario	170.30	1080.84	0.16
Grey Bruce	270.80	1516.47	0.18
Haldimand-Norfolk	241.77	2217.59	0.11
Haliburton, Kawartha, Pine Ridge	168.28	1115.61	0.15
Halton Region	119.73	867.36	0.14
Hastings and Prince Edward County	156.23	1353.96	0.12
Huron Perth	279.72	1830.61	0.15
Kingston, Frontenac and Lennox and Addington	148.47	1461.67	0.10
Lambton	162.02	1205.73	0.13
Leeds, Grenville and Lanark	177.65	1435.97	0.12
Middlesex-London	162.54	1165.18	0.14
Niagara Regional Area	179.51	1535.55	0.12
North Bay Parry Sound District	149.91	1174.27	0.13
Northwestern	106.06	904.04	0.12
Southwestern	199.04	1680.52	0.12

Public Health Unit	Serious Fall Rate	Non-Serious Falls Rate	Rate Ratio of Serious vs. Non-Serious Falls
Peel Region	98.38	651.88	0.15
Peterborough County-City	194.42	781.36	0.25
Porcupine	145.04	1045.26	0.14
Renfrew County and District	204.82	1470.19	0.14
Simcoe Muskoka District	178.47	705.45	0.25
Sudbury and District	118.59	607.45	0.20
Thunder Bay District	175.33	1178.10	0.15
Timiskaming	174.04	870.20	0.20
Waterloo	117.06	749.64	0.16
Wellington-Dufferin-Guelph	154.98	1073.29	0.14
Windsor-Essex County	86.97	464.18	0.19
York Region	125.70	672.87	0.19

Discussion

This environmental scan and Modified Delphi process identified outcome and policy indicators that can contribute to understanding the burden of fall-related injuries among children and priority areas for intervention. Additionally, specification of the final list of indicators can provide the guidance necessary for fall prevention practitioners to use the indicators in their work.

Overall, there were few child fall prevention indicators identified from the literature review and only three indicators identified as reported systematically in Ontario. Further, limited indicators exist that report specific information about falls that could inform intervention planning and evaluation. The practitioner and expert consultation process also presented challenges in refining a final list of indicators as the sectors involved with the OCIPC have differing priorities.

Participants and experts agreed; however, on the importance of reporting on higher level indicators that could then be disaggregated by users. For example, disaggregating the rate of ED visits and hospitalizations by levels of marginalization would allow users to identify the groups at highest risk and tailor their intervention planning accordingly. Expert consultation also emphasized the importance of listing indicators that are most likely to prompt action and lead to effective change in fall prevention efforts, at a system level.

The final list included indicators in outcome and policy categories, and excluded healthcare facility indicators and related concepts, including those that specified childhood risk assessment tools. This was due to their reported lack of utility among fall prevention practitioners in Ontario. Healthcare facilities account for a small proportion of childhood falls, and healthcare facility-specific indicators are useful primarily for internal quality improvement, rather than informing fall prevention practice at a population level.

Participants repeatedly emphasized the importance of understanding how measures of SES, such as levels of marginalization, impact fall risk among children. Further, how crucial it is to disaggregate data from the list of policy and outcome indicators by this construct. This is supported by existing literature that demonstrates an increased risk of fall-related injuries among children of families in low SES groups.[15] Study authors cite that the increased risk could be due to older housing and infrastructure that exists in areas of low SES; supporting the importance of this as a consideration in developing a targeted approach to child fall prevention planning. As recommended in the Health Equity Guideline in the Ontario Public Health Standards, reporting on the existence and impact of health inequities on health outcomes should be used to identify effective local strategies that decrease health inequities.[16]

Finally, we were able to populate the serious fall-related injury indicator. Overall, these findings demonstrated that the highest rates of fall-related and serious fall-related injury hospitalizations occurred primarily in rural public health units. These findings are consistent with those reported in previous studies that the risk of sustaining severe injuries was higher for children living in rural areas compared to urban areas.[17] Understanding how serious fall injury rates vary across settings, as well as the most common mechanisms of injury observed in those settings, is crucial for public health units to tailor their intervention planning to local needs. The process of populating this indicator, in addition to the indicator specification tables, can support the development of tailored programs of public health, as well as serve as a guideline for populating novel indicators moving forward.

Limitations and Strengths

Strengths of this report include using a systematic approach to identifying relevant indicators for childhood fall prevention. We developed a list of indicators using an environmental scan approach with a Modified Delphi process involving fall prevention practitioners from multiple sectors in Ontario and with Canadian injury prevention researchers, with specific indicator development expertise. Further, our methods were informed by experts, using a previously published process for developing indicators for children and youth.[6,7] Initial feedback from our participants and experts suggest that the indicators listed in this report are likely to be useful for fall prevention programming and to prompt action in the prevention of fall-related injuries.

There are; however, some limitations to this work. The literature review included only English-language sources, potentially excluding indicators used in non-English speaking settings. Many of the peer-reviewed sources identified through this search were not specific to falls among children, but on injury outcomes more generally including burns, poisonings and choking. Several studies combined injury outcomes, including home safety hazards and parental awareness of injury and risk mitigation strategies. Some studies used any injury, or any medically-treated injury as an outcome measure, without falls as the specific mechanism. Additionally, the healthcare facility indicators were determined to be unique to data collected within specific hospitals, primarily in the United States. If a selection of these indicators were collected and reported on systematically across healthcare facilities, they could then be compared and used to identify and address variations in facility performance. Participants further described these indicators as not useful or relevant to public health practice, subsequently excluding them from the final list.

An initial survey that was sent out to members of the OCIPC to understand indicators currently in use in fall prevention practice in Ontario was not included due to a low response rate. Many OCIPC members were redeployed to the COVID-19 pandemic response and; therefore, unable to participate in this work.

Populating the indicator specification tables presented challenges. For some indicators, the data necessary to populate them either does not currently exist or is not publicly available, resulting in challenges in describing and providing guidance on their use. Further, there is a lack of a 'gold standard' set of indicators to effectively validate the performance of the indicators in practice. Future work includes evaluating the use of the indicators in this report with public health practitioners in Ontario. Additionally, indices specific to the experiences and impact of injuries on the well-being of children and families were not identified in the literature review, nor specified from participant or expert consultation.

To calculate the rates of serious injury by public health unit, several years of data are required to report stable rates. Thus, 10 years of hospitalization data were used to calculate both serious and non-serious fall-related injuries. Finally, there is the potential for some cases of fall injury hospitalizations to have been misclassified as non-serious over a serious fall-related injury. In some cases, a fall case (W code) entered into the data collection system may not have the corresponding injury type codes (S and or T codes). In this way, this case would be categorized as a non-serious fall-related injury as not meeting the predetermined codes for a serious fall-related injury. If these cases were missing their injury type code due to a coding error, it is possible, though unlikely, that the case was classified as non-serious over a serious injury.

Implications for Practice

Currently, the number and systematic use of child fall prevention indicators across health sectors in Ontario is limited. This can create challenges for practitioners when charged with using data to influence program and policy development in the context of childhood fall prevention. Further, the lack of systematic use of indicators for program development and evaluation creates challenges when comparing data across geographic and program areas. Efforts to mobilize knowledge in childhood fall prevention should be increased to support efforts in protecting children from fall-related injuries and promoting positive child health outcomes.

This project has the potential to increase the systematic use of childhood fall prevention indicators, across sectors in Ontario. Systematically collecting and reporting on indicators would allow for tracking of trends over time and across geographic regions, effectively developing and evaluating fall prevention programs and reducing the duplication of efforts across sectors. Supporting the re-development of existing infrastructure for indicator reporting in Ontario that would allow users to disaggregate data into sub-categories is critical. Further, developing indicator specification tables' increases the reproducibility of the indicators when used in practice. Finally, bridging expertise from public health, early childhood educators, community organizations, and injury prevention researchers supports a multi-disciplinary, system-level approach to childhood fall prevention.

Conclusion

An environmental scan and Modified Delphi process was completed to identify indicators for childhood fall prevention that can be used locally, nationally, and internationally. Indicators were grouped into outcome and policy-level indicators with recommendations for the disaggregation of indicators to examine the specific mechanism of injury and rates by geographic location and SES. Limited literature on child fall prevention indicators demonstrates the lack of priority given to childhood falls as a health outcome, despite fall-related injury representing the highest cost among all injuries to children and youth. The next step of this project is to evaluate the use of the prioritized indicator (the rate of serious fall-related injury hospitalizations) among a sample of practitioners from public health units in Ontario. This work will be completed in consultation with APHEO, the OCIPC and injury prevention experts to determine whether the indicator suits the needs of those in childhood fall prevention practice. The evaluation will also assess the feasibility and sustainability of generating, analyzing, and reporting on the full list of indicators.

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Appendix A

Figure A1. Flow diagram of Environmental Scan and Indicator List Development Process

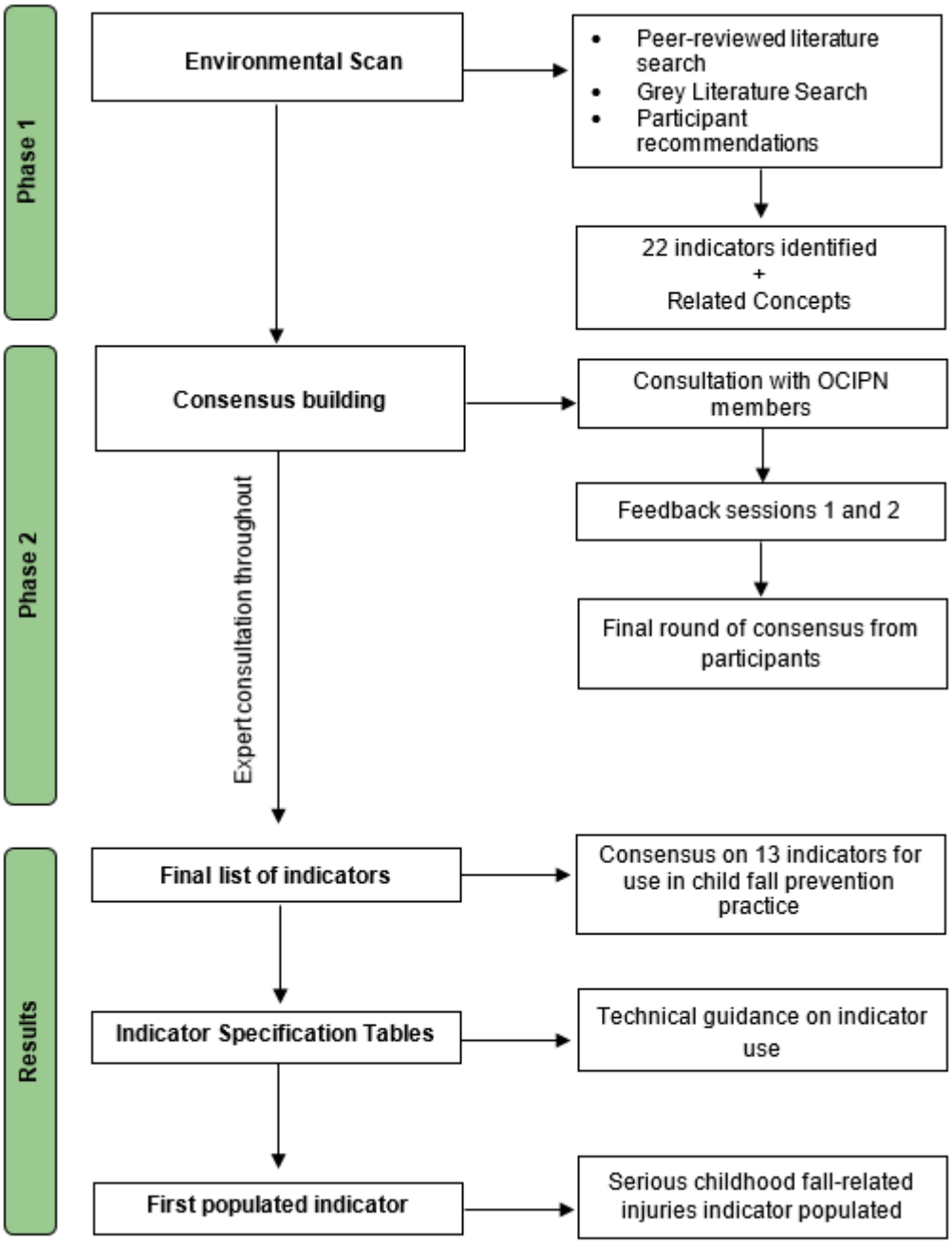

Figure 1: Flow diagram describing the process of indicator list development and prioritization, beginning from the Environmental Scan and culminating at the final list of indicators.

Appendix B

Table B1: ICD-10 Codes Constituting Serious Injury-related Hospitalizations among Children 0–19 years

Number	ICD-10	Diagnosis
1	S01.9	Open wound of head, part unspecified
2	S02.1	Fracture of base of skull
3	S02.7	Multiple fractures involving skull and facial bone
4	S02.9	Fracture of other facial bones
5	S04	Injury of cranial nerves
6	S05.7	Avulsion of eye
7	S06.1	Traumatic cerebral oedema
8	S06.2	Diffuse brain injury
9	S06.3	Focal brain injury
10	S06.4	Epidural haemorrhage
11	S06.5	Traumatic subdural haemorrhage
12	S06.6	Traumatic subarachnoid haemorrhage
13	S06.8	Other intracranial injuries
14	S06.9	Intracranial injury, unspecified
15	S07.0	Crushing injury of face
16	S11	Open wound of neck
17	S12	Fracture of neck
18	S13	Dislocation, sprain and strain of joints and ligaments at neck level
19	S14.1	Complete lesion of cervical spinal cord
20	S14.6	Other and unspecified injuries of neck
21	S15	Injury of blood vessels at neck level

Number	ICD-10	Diagnosis
22	S21	Open wound of thorax
23	S22	Fracture of rib(s), sternum and thoracic spine
24	S24	Injury of nerves and spinal cord at thorax level
25	S25.0	Injury of thoracic aorta
26	S25.3	Injury of innominate or subclavian vein
27	S25.4	Injury of pulmonary blood vessels
28	S26.0	Injury of heart with haemopericardium
29	S26.8	Other injuries of heart (contusion, laceration, puncture)
30	S27	Injury of other and unspecified intrathoracic organs
31	S28	Crushing injury of thorax and traumatic amputation of part of thorax
32	S31	Open wound of abdomen, lower back and pelvis
33	S32	Fracture of lumbar spine and pelvis
34	S35.0	Injury of abdominal aorta
35	S35.1	Injury of inferior vena cava
36	S36	Injury of intra-abdominal organs
37	S37	Injury of urinary and pelvic organs
38	S38.1	Crushing injury of other and unspecified parts of abdomen, lower back and pelvis
39	S42.0	Fracture of clavicle
40	S42.1	Fracture of scapula
41	S72.0	Fracture of neck of femur
42	S75.0	Injury of femoral artery
43	S77	Crushing injury of hip and thigh
44	S78	Traumatic amputation of hip and thigh
45	S86	Injury of muscle and tendon at lower leg level

Number	ICD-10	Diagnosis
46	S88.0	Traumatic amputation at knee level
47	T01.9	Multiple open wounds, unspecified
48	T06.8	Other specified injuries involving multiple body regions
49	T20.3	Burn of third degree of head and neck
50	T21	Burn and corrosion of trunk
51	T22.3	Burn of third degree of shoulder and upper limb, except wrist and hand
52	T24	Burn and corrosion of hip and lower limb, except ankle and foot
53	T27	Burn and corrosion of respiratory tract
54	T29.3	Burns of multiple regions, at least one burn of third degree mentioned
55	T30.3	Burn of third degree, body region unspecified
56	T58	Toxic effects of carbon monoxide
57	T68	Hypothermia
58	T71	Asphyxiation
59	T75.1	Drowning and non-fatal submersion
60	T79.4	Traumatic shock (immediate/delayed following injury)

Appendix C

Table C1. Healthcare Facility Indicators

Indicator	Description	Data Source
Pediatric falls in hospital	Number of falls per 1000 patient-days	Multiple; region-specific
In hospital fall prevention measures	Whether fall prevention measures were implemented in hospital.	Study-specific questionnaire completed by hospital staff
Fall prevention education sessions	Number of fall prevention education sessions administered to nurses and novice nurses	Study-specific questionnaire completed by hospital staff
Newborn falls/drops	Number of falls/drops per 10,000 live births. Defined as a newborn, infant, or child being held or carried, falls or slips from the carrier's hands, arms, or lap. The fall is counted regardless of the surface on which the child lands and regardless of whether the fall results in an injury.	A non-profit health system database consisting of data from one tertiary care center, three community hospitals, and four critical access hospitals National Databases of Nursing Quality Indicators (USA)
Developmental falls in hospital resulting in injury	Number of falls in developmental process. Defined as a fall in an infant, toddler, or preschooler learning to stand, walk, run, or pivot	National Database of Nursing Quality Indicators (USA)
Falls with caregiver present	Proportion of falls when patient was alone, with guardian or with staff	Tertiary care medical centre incident reports
Falls off bed in pediatric emergency department	Number of pediatric falls from bed in emergency department	Hospital database
Anticipated falls	Number of falls that occur in at risk patients (scored on a falls risk assessment tool)	State-based healthcare databases (Australia)
Unanticipated falls	Number of falls that occur in patients not at risk of falls (scored on a falls risk assessment tool)	State-based healthcare database (Australia)

Appendix D

Table D1. Rates and Rate Ratios of Serious and Non-Serious Fall-Related Injury Hospitalizations by Public Health Unit, Ages 0-4, 2010-2019

Public Health Unit	Serious Fall Rate	Non-Serious Falls Rate	Rate Ratio of Serious vs. Non-Serious Falls
The District of Algoma	171.10	1616.0	0.11
Brant County	184.94	2258.9	0.08
Chatham-Kent	322.27	1535.5	0.21
City of Hamilton	130.86	1817.9	0.07
City of Ottawa	161.65	931.0	0.17
City of Toronto	193.38	1015.4	0.19
Durham Region	170.89	1131.8	0.15
Eastern Ontario	217.39	1691.9	0.13
Grey Bruce	312.88	2358.6	0.13
Haldimand-Norfolk	355.24	2948.5	0.12
Haliburton, Kawartha, Pine Ridge	144.30	1659.5	0.09
Halton Region	160.13	1228.8	0.13
Hastings and Prince Edward County	209.15	2000.0	0.10
Huron Perth	485.62	3028.8	0.16
Kingston, Frontenac and Lennox and Addington	266.08	1895.8	0.14
Lambton	179.59	1812.2	0.10
Leeds, Grenville and Lanark	324.11	2268.7	0.14
Middlesex-London	252.27	1439.2	0.18
Niagara Regional Area	211.79	2069.8	0.10
North Bay Parry Sound District	218.38	1419.5	0.15

Public Health Unit	Serious Fall Rate	Non-Serious Falls Rate	Rate Ratio of Serious vs. Non-Serious Falls
Northwestern	104.71	1068.1	0.10
Southwestern	276.22	2373.8	0.12
Peel Region	170.35	1129.5	0.15
Peterborough County-City	225.23	1336.3	0.17
Porcupine	365.85	1585.4	0.23
Renfrew County and District	193.66	2077.5	0.09
Simcoe Muskoka District	160.81	1024.7	0.16
Sudbury and District	92.26	902.1	0.10
Thunder Bay District	180.3	1854.5	0.10
Timiskaming	*	1309.5	*
Waterloo	131.60	1036.4	0.13
Wellington-Dufferin-Guelph	246.76	1431.2	0.17
Windsor-Essex County	123.95	723.8	0.17
York Region	185.20	999.4	0.19

*Suppressed due to small cell sizes.

Table D2. Rates and Rate Ratios of Serious and Non-Serious Fall-Related Injury Hospitalizations by Public Health Unit, Ages 5-9

Public Health Unit	Serious Fall Rate	Non-Serious Falls Rate	Rate Ratio of Serious vs. Non-Serious Falls
The District of Algoma	93.98	1654.1	0.06
Brant County	121.88	1852.5	0.07
Chatham-Kent	105.73	1674.0	0.06
City of Hamilton	95.38	2336.9	0.04
City of Ottawa	68.88	1068.6	0.06
City of Toronto	103.68	1213.8	0.09
Durham Region	112.70	1142.0	0.10
Eastern Ontario	106.15	1309.2	0.08
Grey Bruce	180.61	1878.4	0.10
Haldimand-Norfolk	155.84	2995.7	0.05
Haliburton, Kawartha, Pine Ridge	77.67	1799.4	0.04
Halton Region	94.80	1335.1	0.07
Hastings and Prince Edward County	169.29	1874.2	0.09
Huron Perth	199.88	2798.3	0.07
Kingston, Frontenac and Lennox and Addington	81.42	2147.6	0.04
Lambton	159.65	1669.1	0.10
Leeds, Grenville and Lanark	96.33	1842.3	0.05
Middlesex-London	104.87	1763.4	0.06
Niagara Regional Area	141.50	2149.0	0/07
North Bay Parry Sound District	82.99	1643.2	0.05
Northwestern	*	1085.3	*
Southwestern	112.04	2481.0	0.05

Public Health Unit	Serious Fall Rate	Non-Serious Falls Rate	Rate Ratio of Serious vs. Non-Serious Falls
Peel Region	80.22	945.4	0.08
Peterborough County-City	176.73	1001.5	0.18
Porcupine	*	1482.9	*
Renfrew County and District	285.46	1784.1	0.16
Simcoe Muskoka District	101.16	1042.0	0.10
Sudbury and District	106.49	803.5	0.13
Thunder Bay District	159.4	1312.1	0.12
Timiskaming	*	1058.8	*
Waterloo	91.66	1093.8	0.08
Wellington-Dufferin-Guelph	87.57	1628.7	0.05
Windsor-Essex County	79.54	698.2	0.11
York Region	115.82	1008.2	0.11

*Suppressed due to small cell sizes.

Table D3. Rates and Rate Ratios of Serious and Non-Serious Fall-Related Injury Hospitalizations by Public Health Unit, Ages 10-14

Public Health Unit	Serious Fall Rate	Non-Serious Falls Rate	Rate Ratio of Serious vs. Non-Serious Falls
The District of Algoma	*	868.7	*
Brant County	187.27	1011.2	0.19
Chatham-Kent	138.29	795.2	0.17
City of Hamilton	166.19	1644.9	0.10
City of Ottawa	75.34	612.1	0.12
City of Toronto	83.39	605.0	0.14
Durham Region	120.81	557.2	0.22
Eastern Ontario	101.10	836.4	0.12
Grey Bruce	248.60	1218.1	0.20
Haldimand-Norfolk	132.78	2190.9	0.06
Haliburton, Kawartha, Pine Ridge	180.72	903.6	0.20
Halton Region	124.21	621.0	0.20
Hastings and Prince Edward County	124.30	1118.7	0.11
Huron Perth	188.44	1067.8	0.18
Kingston, Frontenac and Lennox and Addington	135.06	1277.9	0.11
Lambton	166.92	956.0	0.17
Leeds, Grenville and Lanark	92.22	1095.1	0.08
Middlesex-London	112.40	1047.8	0.11
Niagara Regional Area	158.32	1399.2	0.11
North Bay Parry Sound District	82.99	1128.6	0.07
Northwestern	*	868.7	*
Southwestern	186.39	1345.2	0.14

Public Health Unit	Serious Fall Rate	Non-Serious Falls Rate	Rate Ratio of Serious vs. Non-Serious Falls
Peel Region	82.27	433.6	0.19
Peterborough County-City	263.57	511.6	0.52
Porcupine	*	625.0	*
Renfrew County and District	132.33	1228.7	0.11
Simcoe Muskoka District	204.42	537.4	0.38
Sudbury and District	109.34	477.1	0.23
Thunder Bay District	125.39	1053.3	0.12
Timiskaming	*	743.0	*
Waterloo	102.29	564.2	0.18
Wellington-Dufferin-Guelph	110.27	800.9	0.14
Windsor-Essex County	66.76	325.5	0.21
York Region	98.59	536.6	0.18

*Suppressed due to small cell sizes.

Table D4: Rates and Rate Ratios of Serious and Non-Serious Fall-Related Injury Hospitalizations by Public Health Unit, Ages 15-19

Public Health Unit	Serious Fall Rate	Non-Serious Falls Rate	Rate Ratio of Serious vs. Non-Serious Falls
The District of Algoma	193.66	1003.5	0.19
Brant County	182.26	352.4	0.52
Chatham-Kent	130.93	507.4	0.26
City of Hamilton	192.97	762.5	0.25
City of Ottawa	148.63	344.5	0.43
City of Toronto	94.83	276.3	0.34
Durham Region	132.65	214.1	0.62
Eastern Ontario	257.21	514.4	0.50
Grey Bruce	338.00	629.4	0.54
Haldimand-Norfolk	320.12	929.9	0.34
Haliburton, Kawartha, Pine Ridge	251.92	317.6	0.79
Halton Region	107.03	337.5	0.32
Hastings and Prince Edward County	126.80	507.2	0.25
Huron Perth	250.15	512.2	0.49
Kingston, Frontenac and Lennox and Addington	122.70	622.9	0.20
Lambton	144.09	446.7	0.32
Leeds, Grenville and Lanark	212.88	734.4	0.29
Middlesex-London	183.18	465.3	0.39
Niagara Regional Area	206.11	688.3	0.30
North Bay Parry Sound District	216.38	571.9	0.38
Northwestern	238.57	596.4	0.40
Southwestern	227.37	552.2	0.41

Public Health Unit	Serious Fall Rate	Non-Serious Falls Rate	Rate Ratio of Serious vs. Non-Serious Falls
Peel Region	73.08	215.1	0.34
Peterborough County-City	122.20	312.3	0.39
Porcupine	97.18	485.9	0.20
Renfrew County and District	204.08	742.1	0.28
Simcoe Muskoka District	240.14	286.9	0.84
Sudbury and District	161.00	286.2	0.56
Thunder Bay District	232.15	557.2	0.42
Timiskaming	369.39	422.2	0.88
Waterloo	142.81	333.2	0.43
Wellington-Dufferin-Guelph	178.62	498.0	0.36
Windsor-Essex County	83.27	178.4	0.47
York Region	114.80	251.0	0.46

Appendix E

Indicator Specification Tables

Table E1. Rate of Emergency Department Visits Due to a Fall

Indicator	Rate of emergency department visits due to a fall
Operational Definition	The number/rate per 100,000 of emergency department visits due to a fall
Importance and Use	The rate of emergency department visits due to a fall is a key indicator describing the burden of falls on the healthcare system. Reporting on these data annually would allow users to observe trends over time and gain a broad understanding of the burden of falls in the population.
Key terms	**Emergency department visit**: An emergency department visit occurs when a person presents the emergency department, or a hospital-based urgent care centre, either by their own means or by ambulance, and without a prior scheduled appointment.
How is it calculated?	**Numerator**: Number of emergency department visits due to falls for children and youth ages 0-19 years **Denominator**: the total resident population of Ontario ages 0-19 years **Method of Calculation**: (Numerator/Denominator) x 100,000
What data is needed?	Total number of emergency department visits due to a fall for children ages 0-4, 5-9, 10-14 and 15-19 years ICD-10 External Cause Codes: W00-W19 Population estimates 0-19 years
Where can it be found?	**Numerator:** The original source can be found on the Canadian institute for Health Information (CIHI) National Ambulatory Care Reporting System (NACRS). It is distributed by the Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO. **Denominator:** Population Estimate (2003 to 2017) Original source: Statistics Canada Distributed by: Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO

Indicator	Rate of emergency department visits due to a fall
Potential Sub-Analyses* *Note: These are suggestions of potential variables for sub-analysis, and not an exhaustive list.	To inform a more detailed understanding of falls, data can be analyzed by other variables such as: **Socio-economic status or level of marginalization** **Geographic location (Ontario, public health unit, municipality, and smaller areas of geography based on aggregated postal code)** **Demographic characteristics such as age, sex**
Limitations	Emergency department records without a valid age or sex cannot be included in age standardized rates and sex-specific age standardized rates. Population estimates are not available for the years 2018 or 2019.

Table E2. Rate of Hospitalizations Due to a Fall

Indicator	Rate of hospitalizations due to a fall
Operational Definition	The number/rate of hospitalizations due to a fall per 100, 000 population
Use and Importance	The rate of hospitalizations due to a fall describes the number of fall-related injuries that presented the emergency department and were subsequently admitted to the hospital as an inpatient. This indicator captures fall-related injuries severe enough to require inpatient care and contribute to the understanding of fall injury burden. Reporting these data annually can inform users of the trends in fall-related injuries requiring hospitalization over time, representing how effective current fall prevention efforts are in preventing serious injuries.
Key terms	**Hospitalization:** hospitalization occurs when a patient is admitted as an inpatient after being seen in the emergency department for an unscheduled visit.
How is it calculated?	**Numerator**: number of admitted hospitalizations from the emergency department due to a fall-related injury **Denominator**: the total resident population of Ontario ages 0-19 years **Method of calculation**: (Numerator/Denominator) x 100,000
What data is needed?	Total number of admitted hospitalizations due to fall-related injuries among children ages 0-4, 5-9, 10-14 and 15-19 years Population estimates, 0-19 years

Indicator	Rate of hospitalizations due to a fall
Where can it be found?	**Numerator:** The original source can be found on the Canadian institute for Health Information (CIHI) National Ambulatory Care Reporting System (NACRS). It is distributed by the Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO. **Denominator:** Population Estimate (2003 to 2017) Original source: Statistics Canada Distributed by: Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO
Potential Sub-Analyses* *Note: These are suggestions of potential variables for sub-analysis, and not an exhaustive list.	To inform a more detailed understanding of falls, data can be analyzed by other variables such as: **Socio-economic status or level of marginalization** **Geographic location** (Ontario, public health unit, municipality, and smaller areas of geography based on aggregated postal code) **Demographic characteristics such as age, sex**
Limitations	Hospitalization records without a valid age or sex cannot be included in standardized rates and sex-specific standardized rates. Population estimates are not available for 2018 or 2019.

Table E3. Rate of Mortality Due to a Fall

Indicator	Rate of mortality due to a fall
Operational Definition	The rate of deaths due to a fall per 100,000 population
Use and Importance	Mortality due to a fall, while a relatively rare event, describes the most severe fall-related injuries, resulting in death. This can be used to identify the cause of the most severe injuries resulting in death. Couple with other indicators, mortality due to a fall can contribute to understanding the population burden of fall-related injuries.
Key terms	**Location of mortality** indicates where the fall occurred that led to mortality (at home, outside of home, at the hospital, etc.) **Intentional mortality** is the result from the intent to harm, self-harm or assault, resulting in falling and leading to mortality. **Unintentional mortality** is an event that had no intent to harm, accidental and usually classified by their means of occurrence (i.e., how they fell, what body parts were affected, cause of mortality).

Indicator	Rate of mortality due to a fall
How is it calculated?	**Numerator:** Total number of deaths due to fall-related injuries among 0- to 19-year-olds **Denominator:** the total resident population of Ontario of 0 to 19 years old **Method of calculation**: (Numerator/Denominator) x 100,000
What data is needed?	Total number of deaths due to fall-related injuries ages 0-4, 5-9, 10-14 and 15-19 years Population estimates 0-19 years Data needed for desired stratifications (e.g., sex, geographic location)
Where can it be found?	**Numerator:** Original source: Vital Statistics, Ontario Office of Registrar General (ORG). It is distributed by the Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO. **Denominator:** Population Estimate (2003 to 2015) Original source: Statistics Canada Distributed by: Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO
Potential Sub-Analyses* *Note: These are suggestions of potential variables for sub-analysis, and not an exhaustive list.	To inform a more detailed understanding of falls, data can be analyzed by other variables such as: **Socio-economic status or level of marginalization** **Geographic location** (Ontario, public health unit, municipality, and smaller areas of geography based on aggregated postal code) **Demographic characteristics such as age, sex**
Limitations	Death due to a fall is a relatively rare event; therefore, data across several years is often required to generate mortality estimates.

Table E4: Rate of Primary Care Visits for Fall-Related Injuries

Indicator	Rate of primary care visits for fall-related injuries
Operational Definition	The rate of primary care visits for a fall-related injury per 100 person-years
Use and Importance	Not all injurious falls present to the emergency department, and some instead visit a primary care physician for treatment. Capturing primary care visits for fall-related injuries will contribute to understanding the burden of falls on the healthcare system, as well as what healthcare resources are utilized following a fall.

Indicator	Rate of primary care visits for fall-related injuries
Key terms	**Rate of primary care visits** is the total number of primary care visits for fall related injuries among 0 to 19 years olds over a specified time period, within a larger group of patients.
How is it calculated?	**Numerator**: number of primary care visits due to a fall related injury **Denominator**: number of primary care visits (for all causes) over a specified time period (e.g., 1 year). **Method of calculation**: Numerator/Denominator For example, if a doctor saw 1000 youth/child patients in primary care in 1 year, the population at risk would be 1000 person years. In that same time, if there were 25 youth/child patients that presented with a fall related injury, then there would be 25 fall-related injury primary care visits per 1000 person years, or 2.5 per 100 person years.
What data is needed?	**Numerator**: number of primary care visits due to a fall related injury for ages 0-4, 5-9, 10-14 and 15-19 years in Ontario in a specified time period (e.g., 1 year) **Denominator**: number of primary care visits (for all causes) over a specified time period (e.g., 1 year) for children 0-19 years in Ontario.
Where can it be found?	Primary care visits can be accessed through physician claims submitted to the Ontario Health Insurance Plan (OHIP data); however, specific reasons for visits, such as for a fall-related injury, are not systematically coded. Additionally, in the United States, some data on primary care visits for injuries can be found in the National Ambulatory Medical Care Survey, conducted by the National Center for Health Statistics.
Potential Sub-Analyses* *Note: These are suggestions of potential variables for sub-analysis, and not an exhaustive list.	To inform a more detailed understanding of falls, data can be analyzed by other variables such as: **Socio-economic status or level of marginalization** **Geographic location (Ontario, public health unit, municipality, and smaller areas of geography based on aggregated postal code)** **Demographic characteristics such as age, sex**
Limitations	Data for this indicator are not publically available.

Table E5. Potential Years of Life Lost Due to a Fall

Indicator	Potential Years of Life Lost due to a fall
Operational Definition	Potential Years of Life Lost due to a fall-related injury among 0-19 year olds
Use and Importance	Potential Years of Life Lost (PYLL) allows us to measure the loss of life due to 'premature' death attributable to fall-related injuries. PYLL gives more importance to the causes of death that occurred at younger ages than those occurred at older ages, and highlights the proportional impact of childhood deaths in a way that is more evident than mortality rates alone, particularly when comparing to other major causes of death that are often experienced by older populations (i.e. cardiovascular disease) (5).
Key terms	**Potential Years of Life Lost (PYLL)** is an indicator of premature mortality. It represents the total number of years NOT lived by an individual who died prior to age 75.
How is it calculated?	PYLL can be calculated in two ways: **Individual:** The PYLL due to death is calculated for each person who died before the age of 75. For example, someone who died at age 15 would contribute 60 years of potential life lost. PYLL correspond to the sum of the PYLL contributed for each individual. The rate is then obtained by dividing the total potential years of life lost by the total population less than 75 years of age. **Age group:** The PYLL for death due to a fall-related injury is calculated for each age group (i.e. 0-4, 5-9, etc.) by multiplying the number of deaths by the difference between age 75 and the mean age at death in each age group. Potential years of life lost correspond to the sum of the products obtained for each age group. The rate is then obtained by dividing the total PYLL by the total population under 75 years.
What data is needed?	Total number of deaths due to fall-related injuries for children ages 0-4, 5-9, 10-14 and 15-19 Population of children and youth ages 0-19 years
Where can it be found?	The central Vital Statistics Registry in each province and territory provides data from death registrations to Statistics Canada. National death datasets could also be collected through the Canadian Institute for Health Information's (CIHI) National Trauma Registry (NTR)

Indicator	Potential Years of Life Lost due to a fall
Potential Sub-Analyses* *Note: These are suggestions of potential variables for sub-analysis, and not an exhaustive list.	To inform a more detailed understanding of falls, data can be analyzed by other variables such as: **Socio-economic status or level of marginalization** **Geographic location** (Ontario, public health unit, municipality, and smaller areas of geography based on aggregated postal code) **Demographic characteristics such as age, sex**
Limitations	Potential years of life lost is an indicator not often reported in the literature which can create challenges when comparing data.

Table E6. Proportion of Falls by Place of Occurrence

Indicator	Proportion of Falls by Place of Occurrence
Operational Definition	Proportion of total falls by place of occurrence
Use and Importance	Understanding where injury-related falls occur can inform intervention planning. By identifying where falls happen most often, prevention efforts can be tailored to where they are most needed.
Key terms	**Location of fall** is determined by the type of location where a fall is experienced (i.e. playground)
How is it calculated?	For the rate of falls by location: **Numerator:** number of falls reported for 0- to 19-year-olds in a given location in a given time period (i.e., 1 year) when accessing treatment for a fall-related injury. **Denominator:** Population estimate of 0- to 19-year-olds in Ontario in a given time period (i.e., 1 year). **Method of calculation:** Numerator/Denominator x 100, 000
What data is needed?	Number of falls recorded ages 0-4, 5-9, 10-14 and 15-19 in Ontario in a by location of fall The population estimate of 0- to 19-year-olds in Ontario in a given time period (i.e., 1 year)
Where can it be found?	**Numerator:** Data on fall-related injuries that attended an emergency department can be found on the Canadian institute for Health Information (CIHI) National Ambulatory Care Reporting System (NACRS). It is distributed by the Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO. **Denominator:** Population Estimate (2003 to 2015)

Indicator	Proportion of Falls by Place of Occurrence
	Original source: Statistics Canada Distributed by: Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO
Potential Sub-Analyses* *Note: These are suggestions of potential variables for sub-analysis, and not an exhaustive list.	To inform a more detailed understanding of falls, data can be analyzed by other variables such as: **Socio-economic status or level of marginalization** **Geographic location (Ontario, public health unit, municipality, and smaller areas of geography based on aggregated postal code)** **Demographic characteristics such as age, sex**
Limitations	Data related to location of falls is not consistently reported in existing data sources (e.g., DAD and NACRS).

Table E7. Direct and Indirect Costs Associated with Fall-Related Injuries

Indicator	Direct and Indirect Costs Associated with Fall-related Injuries
Operational Definition	Annual direct and indirect costs associated with a fall-related injury
Use and Importance	The cost of fall-related injuries is an estimate of the **direct costs** to the healthcare system, as well as the **indirect costs** to due to loss of human capital; this method is called incidence costing. This indicator estimates the overall economic impact of fall-related injuries.
Key terms	**Incidence costing** is an approach to cost-of-illness studies that accounts for the direct and indirect costs associated with a condition in a given year. **Direct costs** are costs to the healthcare system, consisting of all of the goods and services required to treat a patient. This can include medical supplies, medication, diagnosis, treatment, and rehabilitation, among others. **Indirect costs** are societal productivity losses, considering an injured person's inability to perform their regular activities. Indirect costs are calculated for those of typical working age (15-64) and therefore are only relevant for the 15-19 age group in this case.
How is it calculated?	**Direct costs:** Sum of the direct healthcare costs incurred by fall-related injuries among 0-19 year olds. **Indirect costs:** Calculated using unemployment rates, labour force participation rates and average wage rates. For a more detailed method of calculation, please consult the Parachute 2021 Cost of Injury report.[4]

Indicator	Direct and Indirect Costs Associated with Fall-related Injuries
What data is needed?	The Electronic Resource Allocation Tool (ERAT) provides a classification and costing framework based on existing Canadian injury data and data in the injury costing literature in order to model total costs of injuries. Data in the ERAT includes: ED visits Hospitalizations Deaths Disability Lost productivity
Where can it be found?	ERAT data is supplied from several sources: **Emergency Department Visits:** National Ambulatory Care Reporting System from the Centre of Surveillance and Applied Research within the Public Health Agency of Canada **Hospitalizations:** Discharge Abstract Database at the Canadian Institute for Health Information **Deaths:** Canadian Socio-Economic Information Management System (CANSIM) at Statistics Canada **Lost Productivity:** Unemployment rates, labour force participation rate and average wage rates to calculate lost productivity were also obtained from CANSIM at Statistics Canada.
Potential Sub-Analyses* *Note: These are suggestions of potential variables for sub-analysis, and not an exhaustive list.	To inform a more detailed understanding of falls, data can be analyzed by other variables such as: **Mechanism of fall-related injury** **Geographic location (provincial, national comparisons)**
Limitations	Intangible costs associated with injuries, including pain, dependence and social isolation are not included in the calculation.

Table E8. Rate of Serious Injury-Related Hospitalizations Due to a Fall

Indicator	Rate of Serious Injury-related Hospitalizations due to a Fall
Operational Definition	The number/rate per 100,000 of serious injury-related hospitalizations due to a fall
Use and importance	While sustaining injuries from falls are a normal part of child development, some falls can result in serious injuries requiring medical attention. Understanding what proportion of falls result in serious injuries, as well as what falls mechanisms lead to these serious injuries, can inform intervention planning to prevent the most severe injury outcomes.
Key terms	Serious Fall-related Injuries can be determined by several different methods; however, the following is the recommended method developed specifically for injuries among children. They are a subset of fall-related injury hospitalizations determined by a selection of ICD-10 codes as described by Pike et al. (2016)[8] including injuries such as fractures of the head, neck, spine or pelvis and spinal cord injuries.
How is it calculated?	**Numerator:** Number of serious injury-related hospitalizations due to falls for children and youth (0-19 years) for the years 2010-2019 **Denominator:** Number of total fall-related injury hospitalizations OR total resident population ages 0-19 years **Method of calculation:** (Numerator/Denominator) x 100,000
What data is needed?	Total number of serious injury-related hospitalizations due to a fall for children and youth ages 0-4, 5-9, 10-14 and 15-19 years, by selecting those admitted to the hospital from the emergency department, ICD-10 code for injury, poisoning and certain other consequences of external causes (S00-T88) ICD-10 code for fall injuries (External Cause Codes: W00-W19) ICD-10 code for serious injury-related hospitalizations as defined by Pike et al. 2017 (S01.9-T79.4) Population of children and youth 0-19 years (stratified by age group (0-4, 5-9, 10-14, 15-19), sex and public health unit)
Where can it be found?	**Numerator:** The original source can be found on the Canadian institute for Health Information (CIHI) National Ambulatory Care Reporting System (NACRS). It is distributed by the Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO. **Denominator:** Population of children and youth 0-19 years (2016 to 2017) **Original source:** Statistics Canada, 2016 census of population **Distributed by:** Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO

Indicator	Rate of Serious Injury-related Hospitalizations due to a Fall
Potential Sub-Analyses* ***Note: These are suggestions of potential variables for sub-analysis, and not an exhaustive list.**	To inform a more detailed understanding falls data can be analyzed by other variables such as: Socio-economic status or level of marginalization Geographic location (Ontario, public health unit, municipality, and smaller areas of geography based on aggregated postal code) Demographic characteristics such as age, sex External cause of injury
Limitations	For some of the public health units, the number of serious injury-related fall hospitalizations need to be suppressed for certain age groups as the cell counts were under 5. Population data for children and youth are not available for the years 2010 or 2019.

Table E9. Rate of Home Visitations Completed by Healthy Babies Healthy Children

Indicator	Rate of Home Visitations Completed by Healthy Babies Healthy Children.
Operational Definition	Rate of home visitations completed among *Healthy Babies Healthy Children* participants
Use and Importance	Healthy Babies Healthy Children (HBHC) is a program designed to help children in Ontario have a healthy start in life and provide them with opportunities to reach their potential. It is important to understand the extent of successfully completed home visitation program sessions because the tools, methods and education provided can help the children in this program live a healthier life, thereby reducing the risk of unintentional injuries due to falls. Reducing this risk can help lower the injury burden on the healthcare system and improve the quality of life for the affected families. **The rate of successfully completed programs** will be used as a measure to determine how many eligible families complete the program (no loss to follow up).
Key terms	
How is it calculated?	**Numerator:** the number of eligible mothers that complete the *Healthy Babies Healthy Children* program **Denominator:** The total number of eligible mothers that participate in the *Healthy Babies Healthy Children* program **Method of calculation:** Numerator/Denominator x 100,000

Indicator	Rate of Home Visitations Completed by Healthy Babies Healthy Children.
What data is needed?	The number of mothers enrolled in the HBHC program that successfully completed the program in a given time period The number of mothers enrolled in the HBHC program that only completed a portion of the program in a given time period.
Where can it be found?	Healthy Babies Healthy Children Integrated Services for Children Information System (HBHC-ISCIS)
Potential Sub-Analyses* *Note: These are suggestions of potential variables for sub-analysis, and not an exhaustive list.	To inform a more detailed understanding falls data can be analyzed by other variables such as: **Socio-economic status or level of marginalization** **Geographic location** (Ontario, public health unit, municipality, and smaller areas of geography based on aggregated postal code) **Demographic characteristics such as age, sex**
Limitations	The program is voluntary, which may limit the reach of the program to eligible participants

Table E10. Fall Prevention Score

Indicator	Fall Prevention Score
Operational Definition	Injury prevention report card fall prevention score (assigned to a region) based on actions taken toward fall prevention
Use and Importance	Injury prevention report cards have been published by the European Safety Alliance and the WHO to raise awareness about the preventability of childhood injuries. They can be used to compare regions' injury prevention practices. These have been adapted for use in a Canadian context to compare provinces on injury rates and prevention policies.[14]
Key terms	
How is it calculated?	Five metrics can be used to compare provinces on childhood injury prevention rates and strategies including: Population-based hospitalizations rate per 100,000 Percent change in hospitalization rate per 100,000 Population-based mortality rate per 100,000 Percent change in mortality rate per 100,000 Score on evidence-based prevention policies/legislation

Indicator	Fall Prevention Score
	For more information on calculating provincial fall prevention scores, consult Fridman et al. 2019.[14] *The current report card evaluates six injury prevention policies in their policy score, however none related to fall prevention. Future adaptation of this indicator for fall prevention should evaluate fall-prevention policies specifically.
What data is needed?	Total number of admitted hospitalizations due to fall-related injuries among children ages 0-4, 5-9, 10-14 and 15-19. Total number of deaths due to a fall-related injury among children ages 0-4, 5-9, 10-14 and 15-19. Population estimates, 0-19 years
Where can it be found?	**Numerator (Hospitalizations):** The original source can be found on the Canadian institute for Health Information (CIHI) Discharge Abstract Database (DAD). It is distributed by the Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO. **Numerator (Mortality):** Death data can be obtained from the Canadian Vital Statistics Death database which holds demographic and medical information from all provincial and territorial vital statistics registries on all deaths in Canada. **Denominator:** Population Estimate (2003 to 2017) Original source: Statistics Canada Distributed by: Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO
Potential Sub-Analyses* *Note: These are suggestions of potential variables for sub-analysis, and not an exhaustive list.	To inform a more detailed understanding falls data can be analyzed by other variables such as: **Socio-economic status or level of marginalization** **Geographic location** (Ontario, public health unit, municipality, and smaller areas of geography based on aggregated postal code)
Limitations	The Child Safety Report Card currently evaluates injury rates and policies broadly, and needs to be adapted for fall-prevention specifically.

Table E11. Municipal Requirements for Window Guards in Apartment Buildings

Indicator	Municipal Requirements for Window Guards in Apartment Buildings
Operational Definition	The proportion of municipalities in Ontario that require window guards on all apartment buildings.
Use and Importance	Window guards are effective at preventing falls from heights, particularly among children living in multi-family dwellings. Compliance with a by-law places the responsibilities on landlords to ensure that children cannot fall from building windows. Ideally this indicator would be further developed to compare the following: 1. How many children and youth are injured or killed due to falls from windows? 2. How many of those injuries and deaths took place in municipalities that had a by-law requiring window coverings? 3. How many of those injuries and deaths took place in municipalities that did not have a by-law requiring window coverings on buildings? Separately, it would also be ideal to measure the rate of compliance to the window-guard by-law by landlords and homeowners.
Key terms	**Window Guard By-Law Article 629-21 (E & F) of the Toronto Municipal Code Property Standards[18]:** (E) In every multiple dwelling, every window, any part of which is capable of being opened, that does not lead to a balcony and that is located two meters or more above a finished grade of land upon which it faces, shall be equipped with a safety device to prevent an opening in any part of the window greater than 100 millimeters. (F) All windows in any common area of multiple dwelling that are greater than two meters above grade and do not lead to a balcony must have a guard that complies with the Ontario Building Code, if the lower sill is less than one meter from the floor.
How is it calculated?	**Numerator:** Number of Canadian municipalities in each of the following categories: 1. Has a by-law that includes the elements above 2. Does not have a by-law **Denominator:** Total number of Canadian municipalities (1,400 members of Canadian Federation of Municipalities). **Method of calculation:** (number in category/total number of municipalities) x 100.

Indicator	Municipal Requirements for Window Guards in Apartment Buildings
What data is needed?	Total number municipal by-laws for window guards Total number of Canadian municipalities.
Where can it be found?	Municipal by-laws information found online or by contacting each municipality.
Potential Sub-Analyses* *Note: These are suggestions of potential variables for sub-analysis, and not an exhaustive list.	To inform a more detailed understanding of falls, data can be analyzed by other variables such as: **Socio-economic status or level of marginalization** **Geographic location (Ontario, public health unit, municipality, and smaller areas of geography based on aggregated postal code)** **Demographic characteristics such as age, sex**
Limitations	Data may be difficult to obtain and keep up to date.

Table E12: Requirement for Playgrounds to Comply with Canadian Standards Association (CSA) Safety Standards

Indicator	Requirement for Playgrounds to Comply with Canadian Standards Association (CSA) Safety Standards.
Operational Definition	The proportion of municipalities in Ontario that require playgrounds to comply with CSA standards.
Use and Importance	Compliance with CSA standards has been shown to prevent playground-related injuries.[19] Ideally this indicator would be further developed to compare the following: 1. How many children are injured on playgrounds? 2. How many of those injuries took place in provinces that required all playgrounds to meet CSA standards? 3. How many of those injuries and deaths took place in provinces with no requirement for playgrounds to meet CSA standards? Separately, it would also be ideal to determine the rate of compliance to CSA playground standards in provinces that require them.
Key terms	**The Canadian Standards Association (CSA)** provides standards related to play spaces for children of different ages.

Indicator	Requirement for Playgrounds to Comply with Canadian Standards Association (CSA) Safety Standards.
How is it calculated?	**Numerator:** Provinces with requirements for playgrounds to meet CSA standards in one of the following categories: 1. Has a law requiring all playgrounds to meet CSA standards 2. Has a law requiring some playgrounds (e.g., childcare centres) meet CSA standards 3. Does not have a law requiring playgrounds to meet CSA standards. **Denominator:** Number of provinces and territories (13) **Method of calculation:** (Numerator/Denominator) x 100
What data is needed?	Data on provincial playground standards and applicable laws
Where can it be found?	Provincial laws related to playgrounds
Potential Sub-Analyses* *Note: These are suggestions of potential variables for sub-analysis, and not an exhaustive list.	To inform a more detailed understanding of falls, data can be analyzed by other variables such as: **Socio-economic status or level of marginalization** **Geographic location** (Ontario, public health unit, municipality, and smaller areas of geography based on aggregated postal code)
Limitations	Some playgrounds (e.g., private, hotel) may fall outside provincial regulations.

Table E13. Proportion of Dedicated Fall Prevention Leads, at a System Level (e.g., Public health units)

Indicator	Proportion of Dedicated Fall Prevention Leads, at a System Level (e.g., Public health units)
Operational Definition	The proportion of health public health units that have a dedicated fall prevention lead.
Use and Importance	Having dedicated fall-prevention staff working in public health would benefit a strong fall-prevention system across health sectors. Having access to a standardized and centralized framework, outlining the best practices to reduce and prevent falls, allows continuity of care and education across jurisdictions. This can help improve equity of care across jurisdictions for fall prevention and treating fall related injuries.

Indicator	Proportion of Dedicated Fall Prevention Leads, at a System Level (e.g., Public health units)
Key terms	**Public Health Units** are jurisdictions within a province that directly offer health services to populations in a given geographic area.
How is it calculated?	**Numerator**: The number of public health units that have a full-time fall prevention lead, implementing fall prevention programming. **Denominator:** The total number of public health units in Ontario. **Method of calculation**: Numerator/Denominator
What data is needed?	The number of public health units that have a full-time fall prevention lead, implementing fall prevention programming
Where can it be found?	There is no current systematic collection or reporting on these data.
Potential Sub-Analyses* *Note: These are suggestions of potential variables for sub-analysis, and not an exhaustive list.	To inform a more detailed understanding of falls, data can be analyzed by other variables such as: **Geographic location** (Ontario, public health unit, municipality, and smaller areas of geography based on aggregated postal code)
Limitations	There is no existing framework for reporting structure for sectors (e.g., public health units) that currently have a fall prevention lead on staff.

Summary of Revisions

Page	Revision	Implementation Date
2	Numbers changed in introduction for accuracy. Change previously approved but had not been incorporated into final document	February 9, 2023
5	Numbered table had 9 indicators, but only 1-8 were numbered. Number 9 added to table.	February 9, 2023

Citation

Ontario Agency for Health Protection and Promotion (Public Health Ontario). Environmental scan: childhood fall prevention indicators for public health practice in Ontario. 1st revision. Toronto, ON: King's Printer for Ontario; 2023.

Disclaimer

Publication History

Published: January 2023

1st Revision: February 2023

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