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# Inflicted injuries among children and youth during the pandemic:

A study across two Canadian provinces



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Grand Rounds, Public Health Ontario

## Disclosures

The authors of this work have no conflicts of interest to report.

## Background: COVID-19 Pandemic

- Stay-at-home policies
- Sustained school closures
- Disruptions to community service use
- Shift to remote work
- Hospital avoidance

Aimed to prevent spread of virus



## Inflicted Violence among Children and Youth

- Indirect impacts of COVID-19 policies on health outcomes
- Uptick in the number of reported violent incidents and sexual assaults in Ontario and British Columbia





## KEY GROUPS

Disproportionate impact on children and people of low socioeconomic status

## HIDDEN CRISIS

No data specific to the effects of COVID-19 on inflicted injury among Canadian children and youth.



## Inflicted Violence: Child Maltreatment

- Defined: The abuse or neglect of children and youth<sup>1</sup>
- Includes:
  - Physical abuse
  - Sexual abuse
  - Emotional abuse
  - Neglect
  - Exposure to family violence

1. World Health Organization. Available at: [www.who.int/news-room/fact-sheets/detail/child-maltreatment](http://www.who.int/news-room/fact-sheets/detail/child-maltreatment)

# Inflicted Violence among Children and Youth

## ONTARIO

- In 2018, 64.7% of people in Ontario reported some form of inflicted violence before the age of 15 years.<sup>1</sup>
- Over 7,000 cases of physical abuse, 1,000 sexual abuse, 8,000 cases of neglect, and over 17,000 reports of exposure to intimate partner violence.<sup>1</sup>

## BRITISH COLUMBIA

- In 2018, 69.5% of people in British Columbia reported some form of inflicted violence before the age of 15 years.<sup>1</sup>
- 28.8% report both physical and non-physical forms of violence.<sup>1</sup>

1. Statistics Canada. Canadian Child Welfare Research Portal [Internet]. Available from: [cwrp.ca/statistics/Ontario](http://cwrp.ca/statistics/Ontario)

2. Canadian Child Welfare Research Portal. Ontario – Statistics [Internet]. Available from: <https://cwrp.ca/statistics/ontario>



# Long-term Adverse Outcomes

## Child Maltreatment (CM):

- Physical abuse
- Sexual abuse
- Emotional abuse
- Neglect
- Exposure to Family Violence

## Adverse outcomes<sup>1</sup>:

- Cognitive disability
- Anxiety and depression
- Addiction disorder
- Obesity
- Cardiovascular disease

1. Statistics Canada. Canadian Child Welfare Research Portal [Internet]. Available from: [cwrp.ca/statistics/Ontario](http://cwrp.ca/statistics/Ontario)

## Project Objectives

1. To investigate what is reported on **inflicted violence** injuries among children and youth during the pandemic in the scientific literature
2. To investigate **inflicted violence** injuries among children and youth in **Ontario** and **British Columbia** during the pandemic and compare the data to previous to the pandemic
3. To describe the **context of injuries**, comparing data pre to during COVID in both provinces
4. To investigate **one type of child maltreatment** during the pandemic

# PROJECT ONE: Umbrella Review

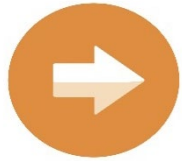


## Inflicted Violence in Children and Youth

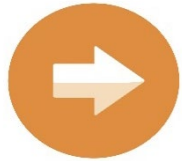
# SCOPING REVIEW: Inflicted Violence in Children and Youth

Over 2,000 studies published since 2020

physical, emotional, sexual abuse  
and neglect



HEALTH ADMINISTRATIVE DATA



POLICE/Child Protective Services  
(CPS) DATA



SURVEY/OTHER DATA

# Umbrella Review

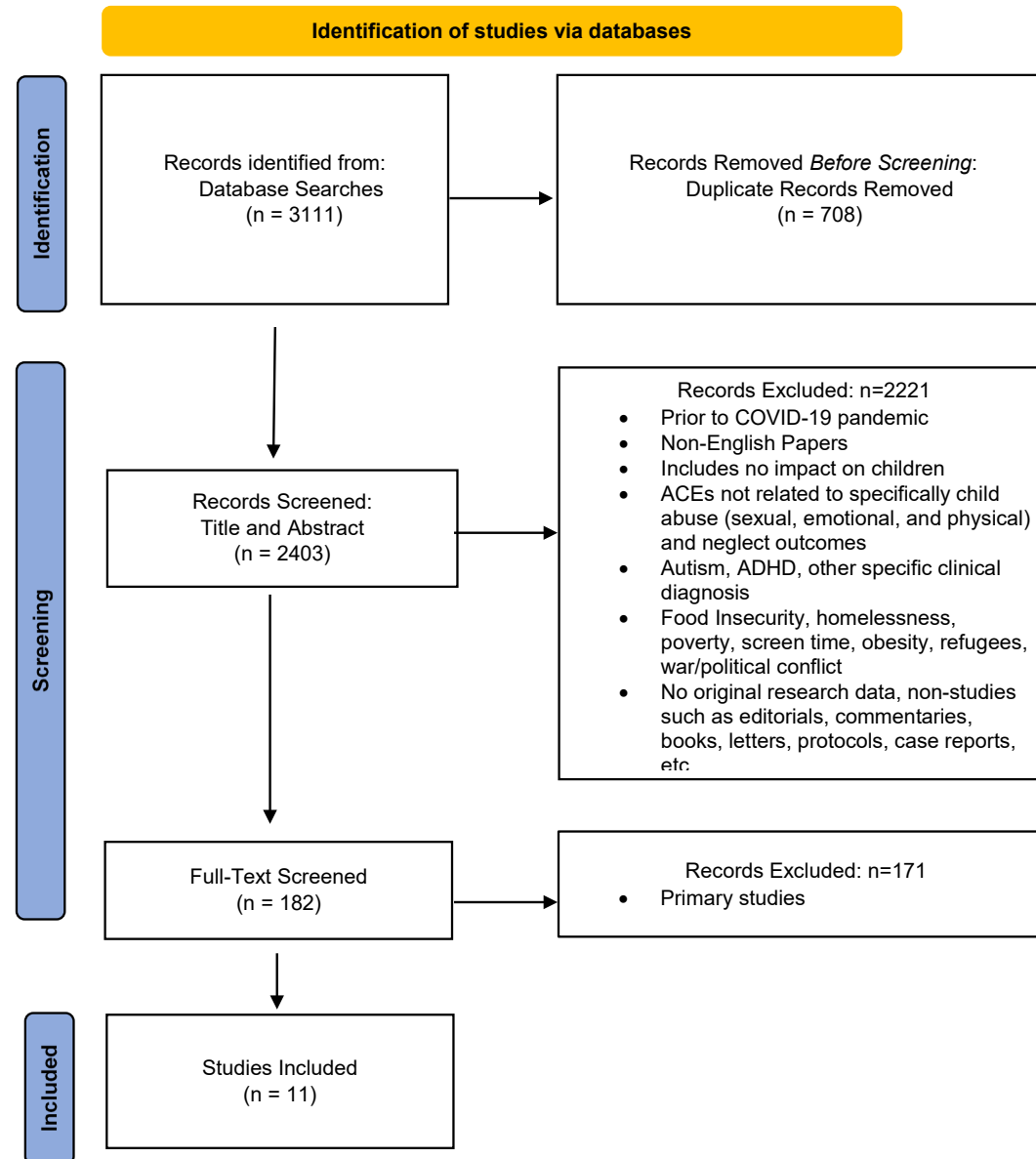
**AIM:** Impact of COVID-19 policies on child abuse and neglect; review author recommendations

**METHODS:** Search across 5 databases

- Inclusion Criteria:
  - Abuse or neglect related outcomes in children and youth
  - Published in English
  - All review types
- Exclusion Criteria:
  - Published previous to 2020
  - Did not include data during the pandemic
  - Study population of adults without children, or focused on other forms of adversity

Health  
Evidence  
Quality  
Appraisal Tool

# RESULTS:









# Umbrella Review

**RESULTS:** 11 reviews included

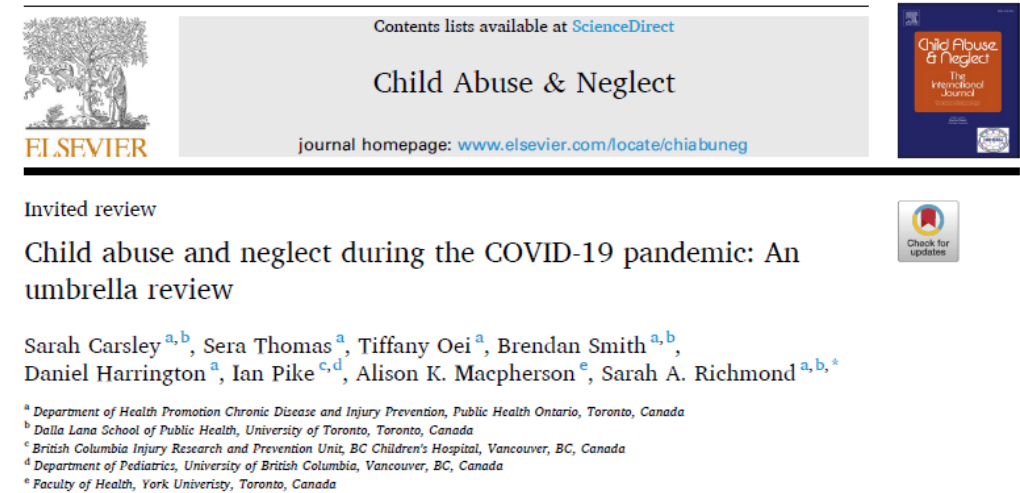
- Two strong quality, 7 moderate quality, 2 weak

**OVERALL:**

- Studies reported from administrative data 
- Studies reported from cross-sectional data 
- Examining data by types of abuse  

# Conclusions

- Our study found consistent results across reviews; depending on the data source
- Child abuse and neglect outcomes either increased or decreased during the COVID-19 pandemic
- Enhance data collection methods during public health emergencies
- Increased focus on rigor of reporting



## Strengths & Limitations

- Included all types of reviews which captured a variety of data sources
- We used a comprehensive and systematic search strategy, screening and quality appraisal process
- Appropriate quality appraisal tool
- Majority of moderate quality studies
- Short time period into pandemic; bias
- Generalizability to Ontario and BC populations due to varying policies
- Ability to collect violence-related outcomes

## PROJECT TWO: Pre-Post COVID: Interrupted Time Series



Rates of Inflicted Violence in Ontario and British Columbia

# Objectives

## VIOLENCE-RELATED INJURIES

To investigate **inflicted, violence-related injuries** among children and youth associated with COVID-19 stay-at-home policies in both **Ontario** and **British Columbia**

# METHODS: Data Sources

## ONTARIO

- Inflicted violence **ED visits** and **hospitalizations** [NACRS and DAD]
  - April 1, 2015 – March 31, 2022
  - 0-19 years
  - X85 – Y09 (all inflicted violence codes)
    - Physical assault
    - Sexual assault
    - Neglect and Abandonment
    - Other maltreatment

## BRITISH COLUMBIA

- Inflicted violence **hospitalizations** [DAD]
  - April 1, 2015 – March 31, 2022
  - 0-19 years
  - X85 – Y09 (all inflicted violence codes)
    - Physical assault
    - Sexual assault
    - Neglect and Abandonment
    - Other maltreatment



## Timeline: Ontario and British Columbia

- Periods:
  - Pre-COVID: April 2015 – March 2020 (**60 months**)
  - COVID: April 2020 – March 2022 (**24 months**)
- Sex and age groups:
  - 0-9 Males & Females, 10-19 Males, 10-19 Females
- ON-Marg and CAN-Marg deprivation quintiles:
  - 1, 2, 3, 4, 5



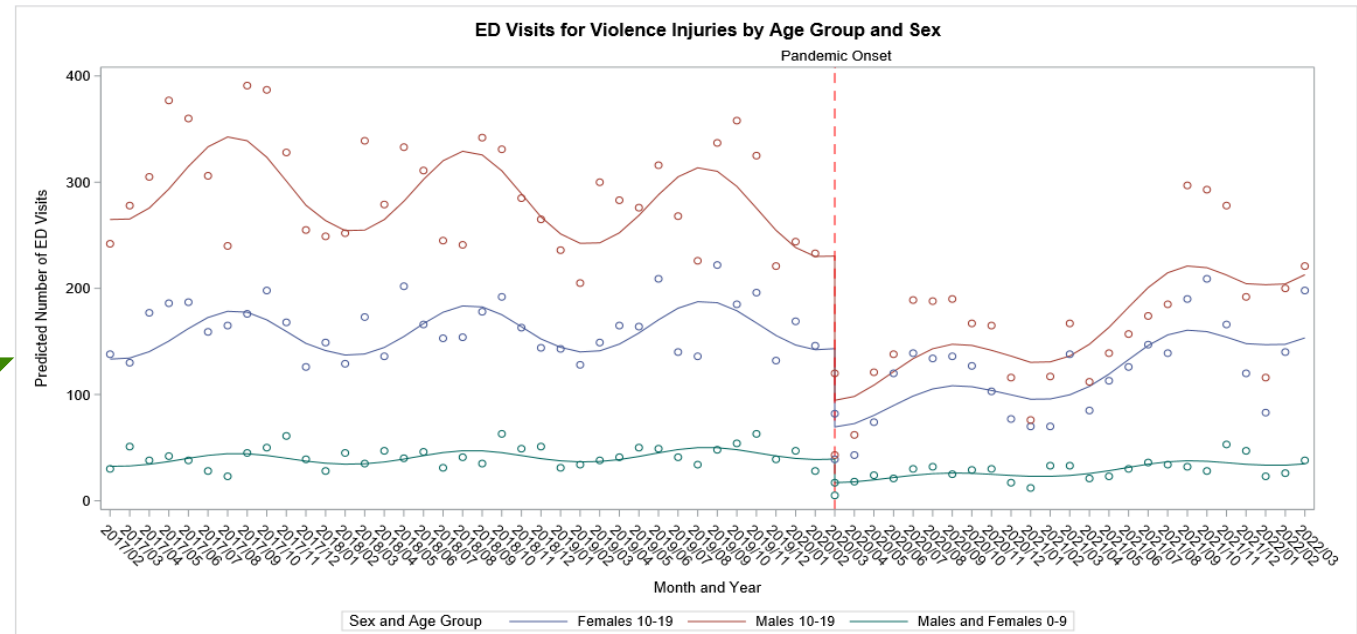
## METHODS: Analysis

- Interrupted time series design
- Negative binomial models to estimate the effect of the policy change on the number of injuries (policy change: April, 2020)
  - Ontario cohort:
    - Aggregate by month
  - BC cohort:
    - Aggregate by quarters

# Results: Ontario

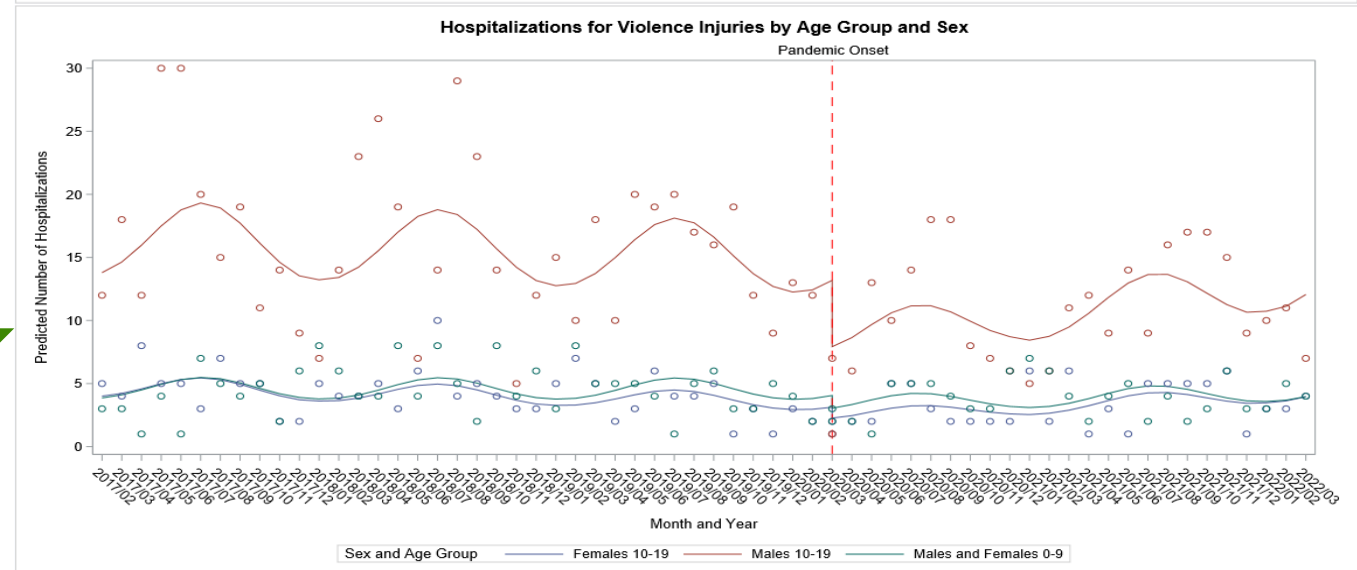
Variable	Rate Ratio (95%CI)
Pre-interruption trend	0.99 (0.99, 1.00)
Interruption (COVID)	0.44 (0.38, 0.50)
Post-interruption trend	1.03 (1.03, 1.04)
Sex and age group (0-9 MF)	REF
Sex and age group (10-19 F)	7.60 (7.07, 8.18)
Sex and age group (10-19 M)	12.61 (11.73, 13.55)

56%

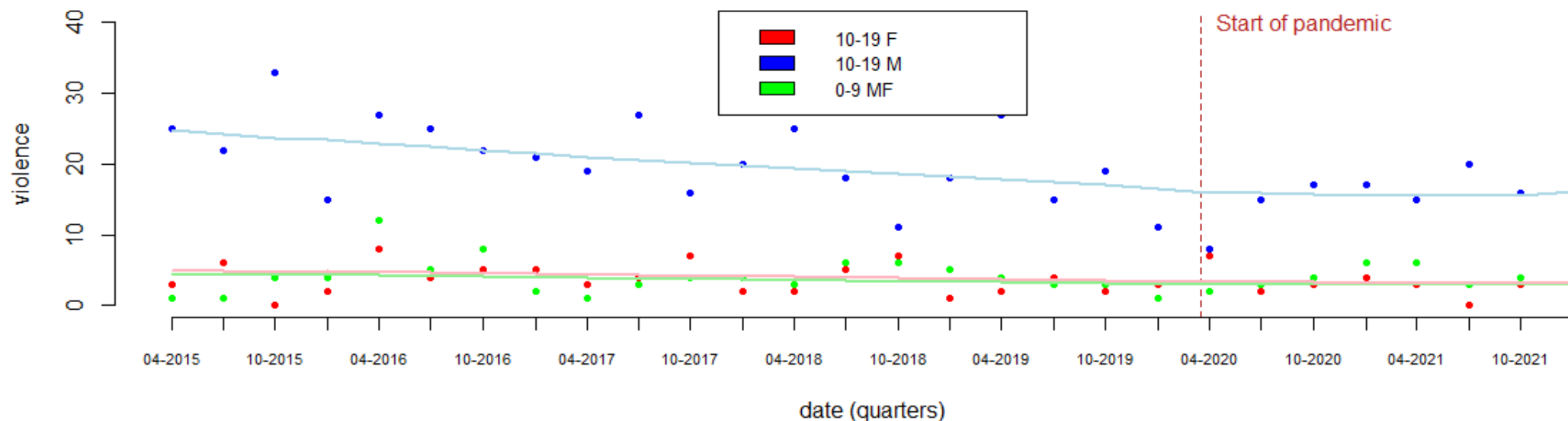


Variable	Rate Ratio (95%CI)
Pre-interruption trend	0.997 (0.939, 0.999)
Interruption (COVID)	0.65 (0.52, 0.82)
Post-interruption trend	1.02 (1.01, 1.04)
Sex and age group (0-9 MF)	REF
Sex and age group (10-19 F)	1.78 (1.53, 2.07)
Sex and age group (10-19 M)	5.84 (5.16, 6.61)

35%



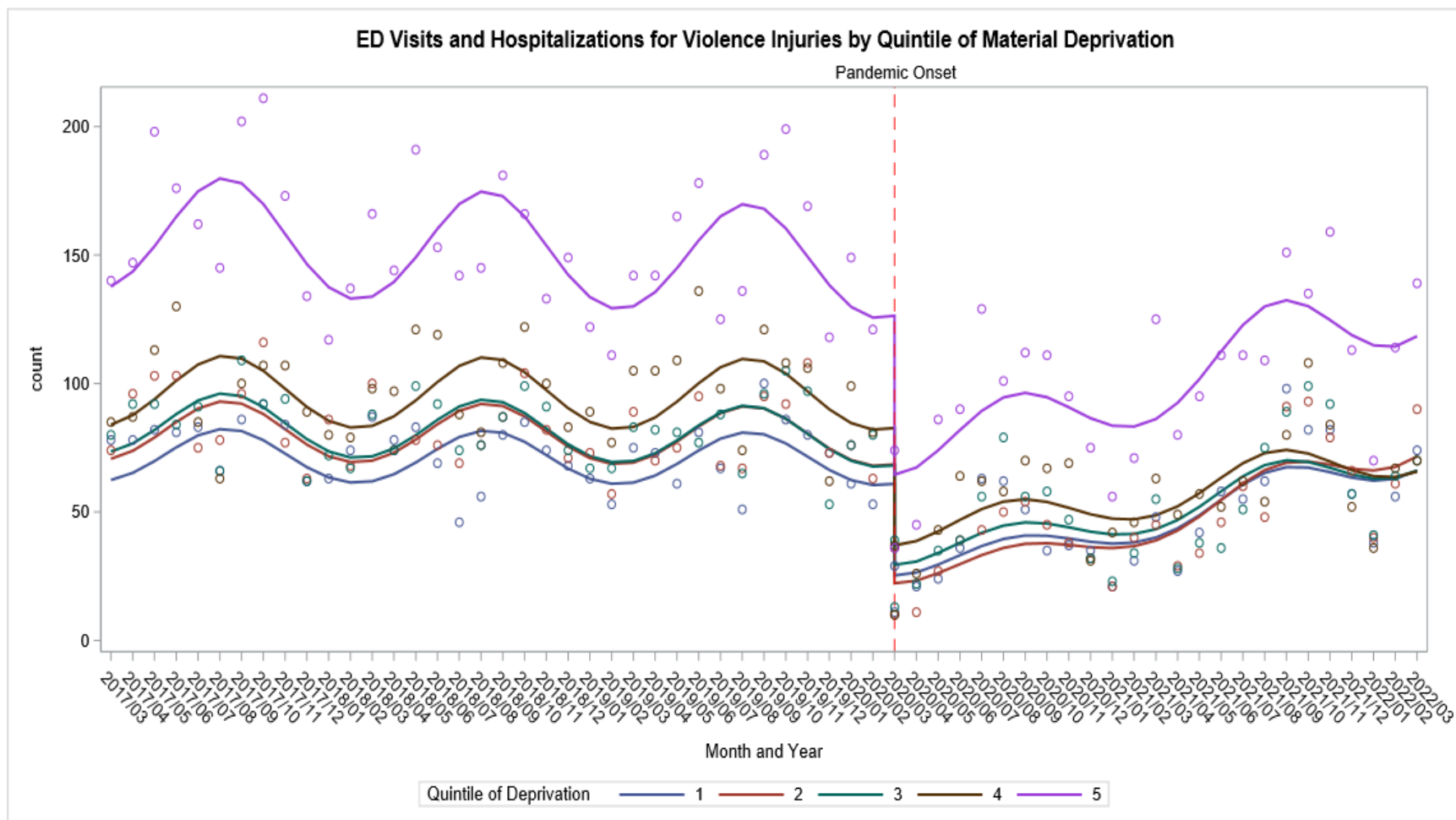
# RESULTS: British Columbia



Variable	Rate Ratio (95%CI)	p-value
Pre-interruption trend	0.978 (0.963, 0.993)	0.0037
Interruption (COVID)	0.966 (0.657, 1.421)	0.8614
Post-interruption trend	1.021 (0.953, 1.095)	0.5493
Sex and age group (10-19 F > 0-9 MF)	2.065 (1.567, 2.722)	<0.0001
Sex and age group (10-19 M > 0-9 MF)	9.617 (7.716, 11.967)	<0.0001

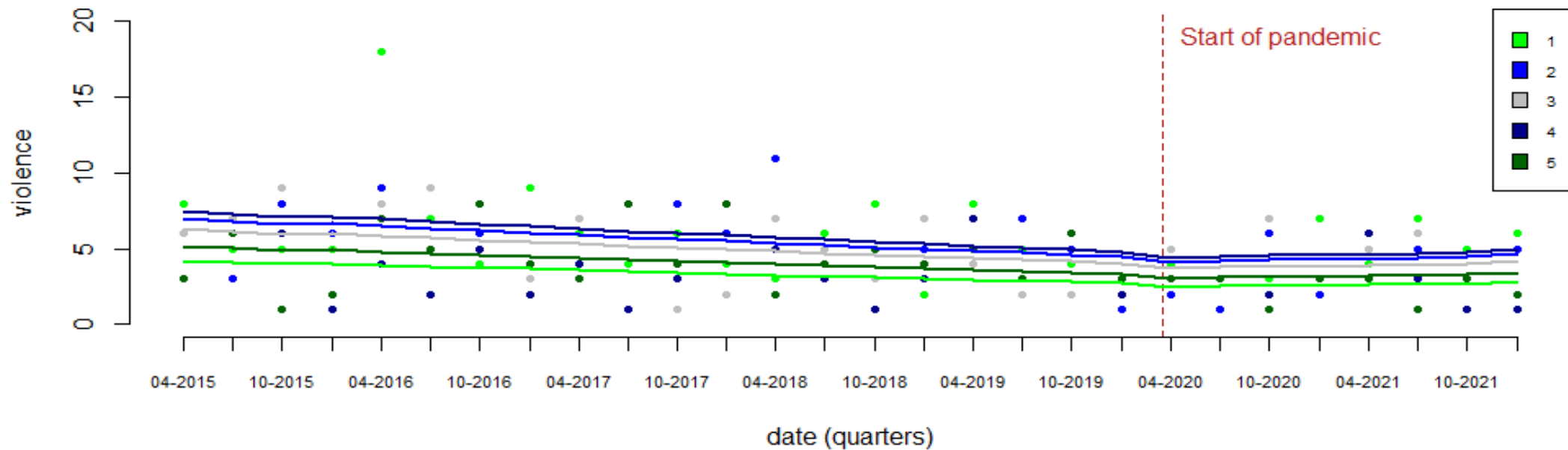
**\*\*Data presented are hospitalizations only**

# Results: Ontario



\*Ontario data includes ED visits and hospitalizations

# RESULTS: British Columbia



Variable	Rate Ratio (95%CI)	p-value
Pre-interruption trend	0.975 (0.960, 0.990)	0.0014
Interruption (COVID)	0.913 (0.609 1.369)	0.6597
Post-interruption trend	1.041 (0.968, 1.119)	0.2807
Deprivation quintile (2 > 1)	1.673 (1.284, 2.180)	0.0001
Deprivation quintile (3 > 1)	1.797 (1.372, 2.353)	<0.0001
Deprivation quintile (4 > 1)	2.709 (2.086, 3.518)	<0.0001
Deprivation quintile (5 > 1)	4.281 (3.231, 5.671)	<0.0001



## Summary

- Abrupt decrease in the rate of violence-related ED visits and hospitalizations immediately after the onset of pandemic policies in Ontario
- No changes to hospitalizations due to inflicted injuries in BC
- Post COVID: approaching pre-pandemic levels
- At baseline, inflicted injuries higher in boys, and areas of higher marginalization

## Strengths & Limitations

- First time to publish these data (length of post-COVID) in Ontario and BC
- Linked data to levels of marginalization
- Dearth of information on violence inflicted injuries in Canada
- Number of cases, relatively low
- Lack of control group
- Included all violence related ICD-10 codes (peer-peer violence)
- ICD-10 coding misclassification

## PROJECT THREE: Context of Inflicted Injury



Accessing new data sources to better understand the change in child maltreatment

## Objectives:

1. To identify changes in circumstances surrounding injuries **before to during the pandemic**
2. To compare cases in Ontario and British Columbia



## Methods: Data Source

- **Canadian Hospital Injury Reporting and Prevention Program (CHIRPP)<sup>1</sup>**

Sentinel surveillance system

Data on patients with injuries who present to emergency departments

20 participating hospitals across Canada to date (11 pediatric and 9 general hospitals)

Narrative component that provides uniquely detailed pre-event and event

- Asks the following questions:
- “What was the injured person doing when the injury occurred?”
- “What went wrong?”
- “Where did the injury take place?”

1. Canadian Hospitals Injury Reporting and Prevention Program [Internet]. Available from: [www. www.canada.ca/en/public-health/services/injury-prevention/canadian-hospitals-injury-reporting-prevention-program.html](http://www.canada.ca/en/public-health/services/injury-prevention/canadian-hospitals-injury-reporting-prevention-program.html)

# Overview of Study

## Extract CHIRPP Data

ON and BC patients  $\leq 18$  years

January 2018 – March 2022

## Content Analysis of Narrative Component

Codebook development

Contextualized text fields

## Statistical Analysis using R

Descriptive statistics

Statistical test for significance

### Variables of interest:

- Maltreatment type
- Child protective services and police involvement
- Perpetrator information
- Setting
- Weapon use
- Substance use



# Case Identification

## Inclusion Criteria

- Children and youth aged 18 and under
- Present to hospitals with **indications of inflicted violence**
  - Physical assault
  - Sexual assault
  - Neglect
  - Exposure to family violence
- Suspected cases (small number of cases)

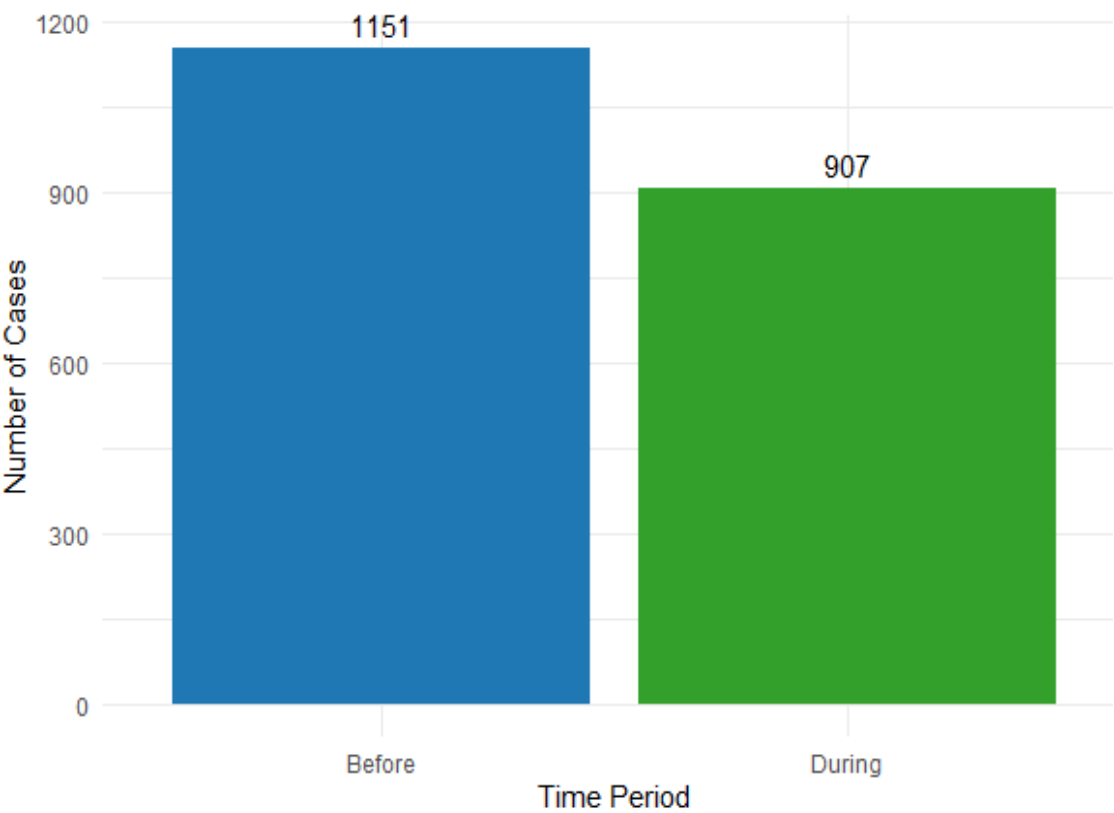
## Exclusion Criteria

- Unintentional
- Self-inflicted
- Emotional trauma from past assault without current injury at the time of visit
- Lacking indications of physical or sexual assault, neglect, or non-intentional injury.

# RESULTS: Total Cases

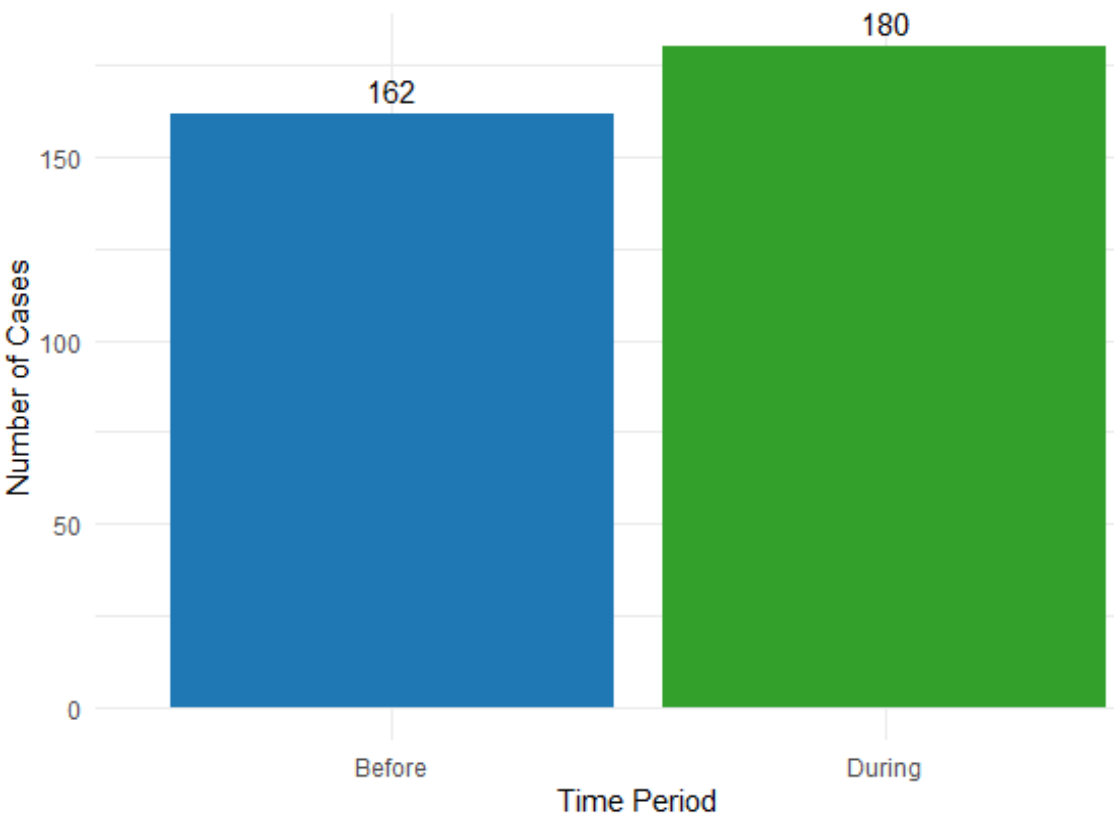
## Ontario

Total Cases: 2,058, 55% males, median age= 15.08 years



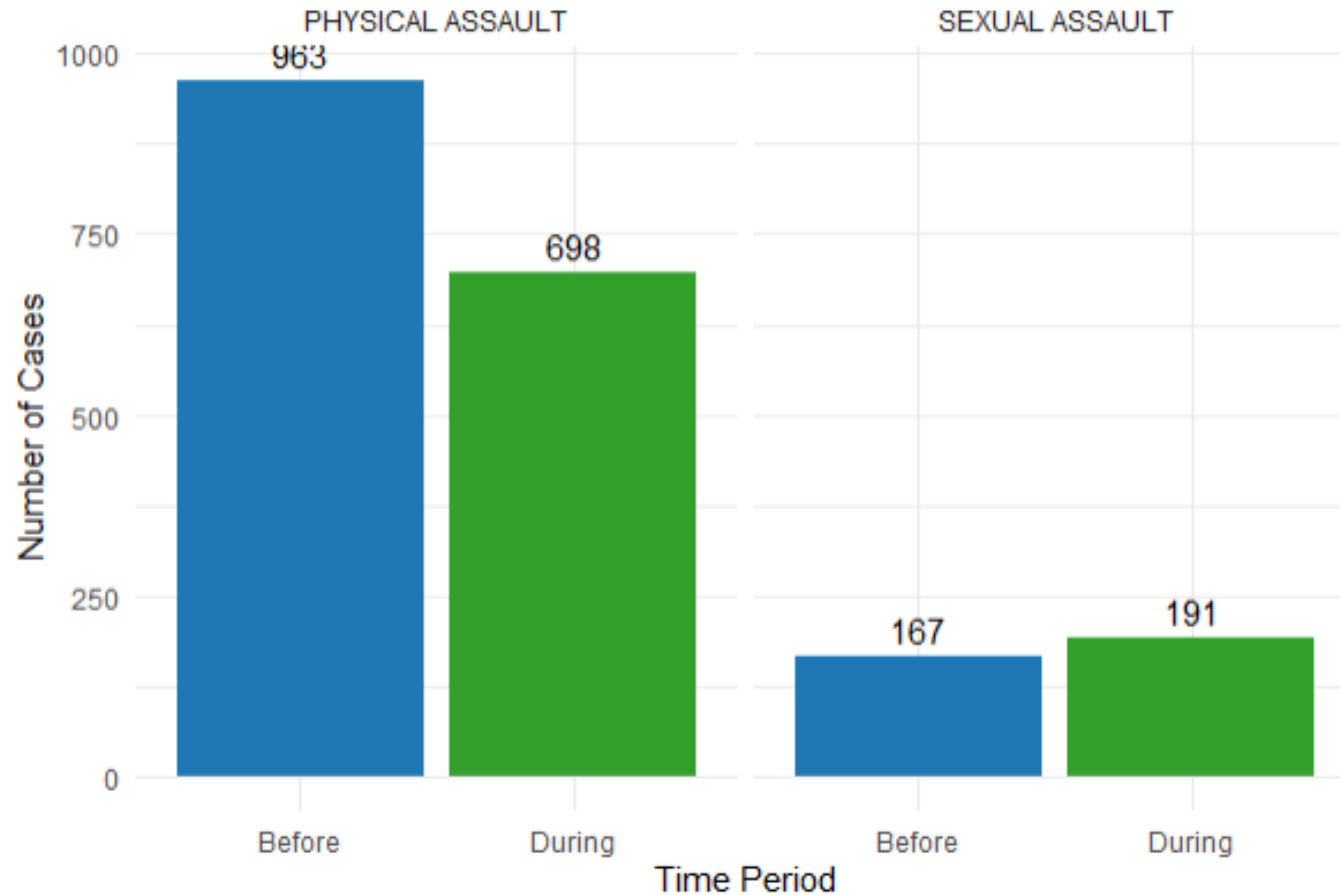
## British Columbia

Total Cases: 536, 61% males, median age= 13.83 years



# Child Maltreatment

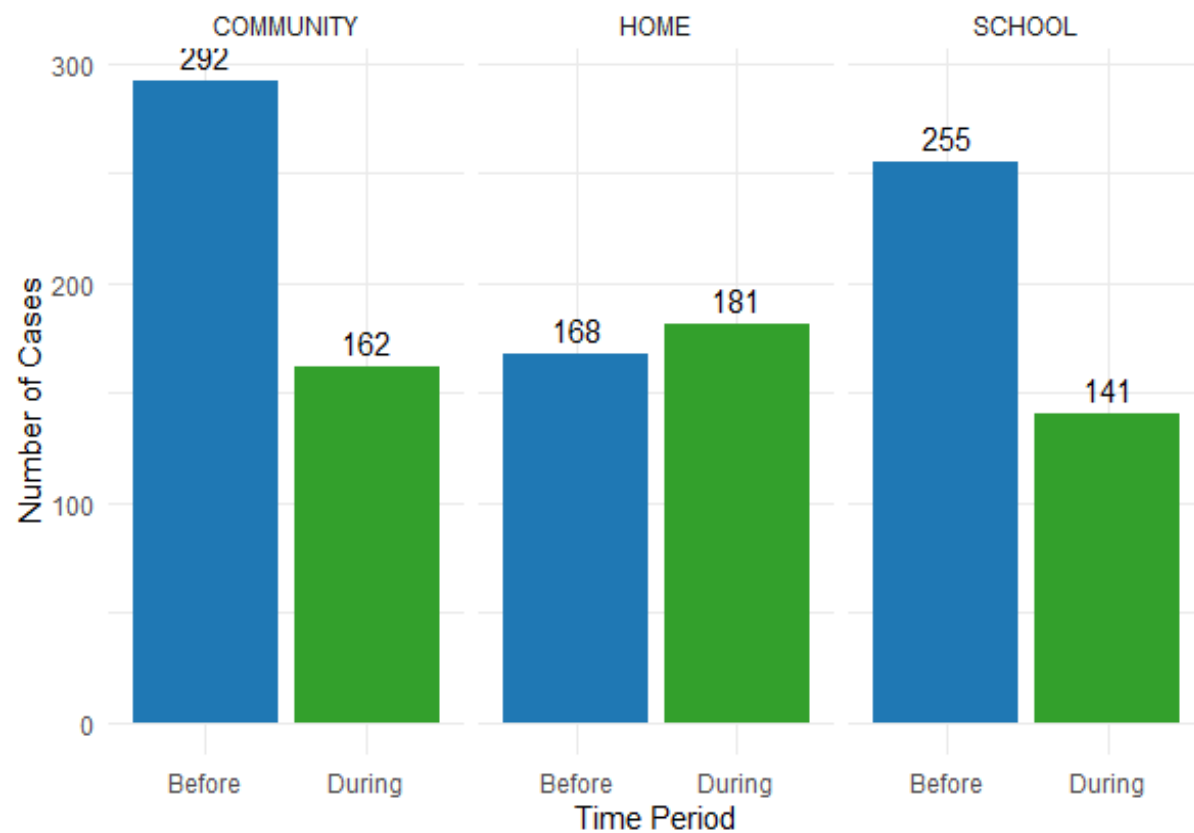
## Ontario



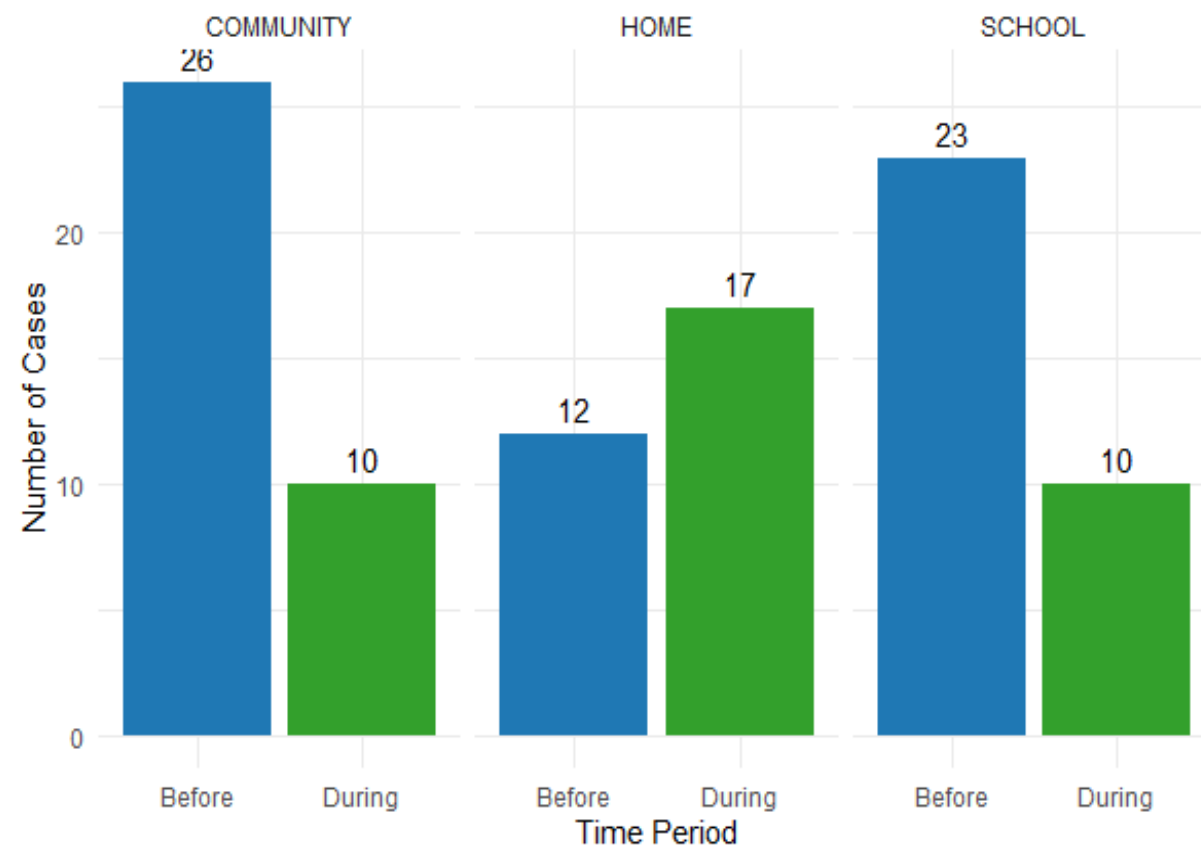
- Ontario **physical assault cases dropped**
- Ontario **sexual assault cases increased**
- Small case count for other CM types
- No significant change in the number of cases in British Columbia

# Setting

## Ontario

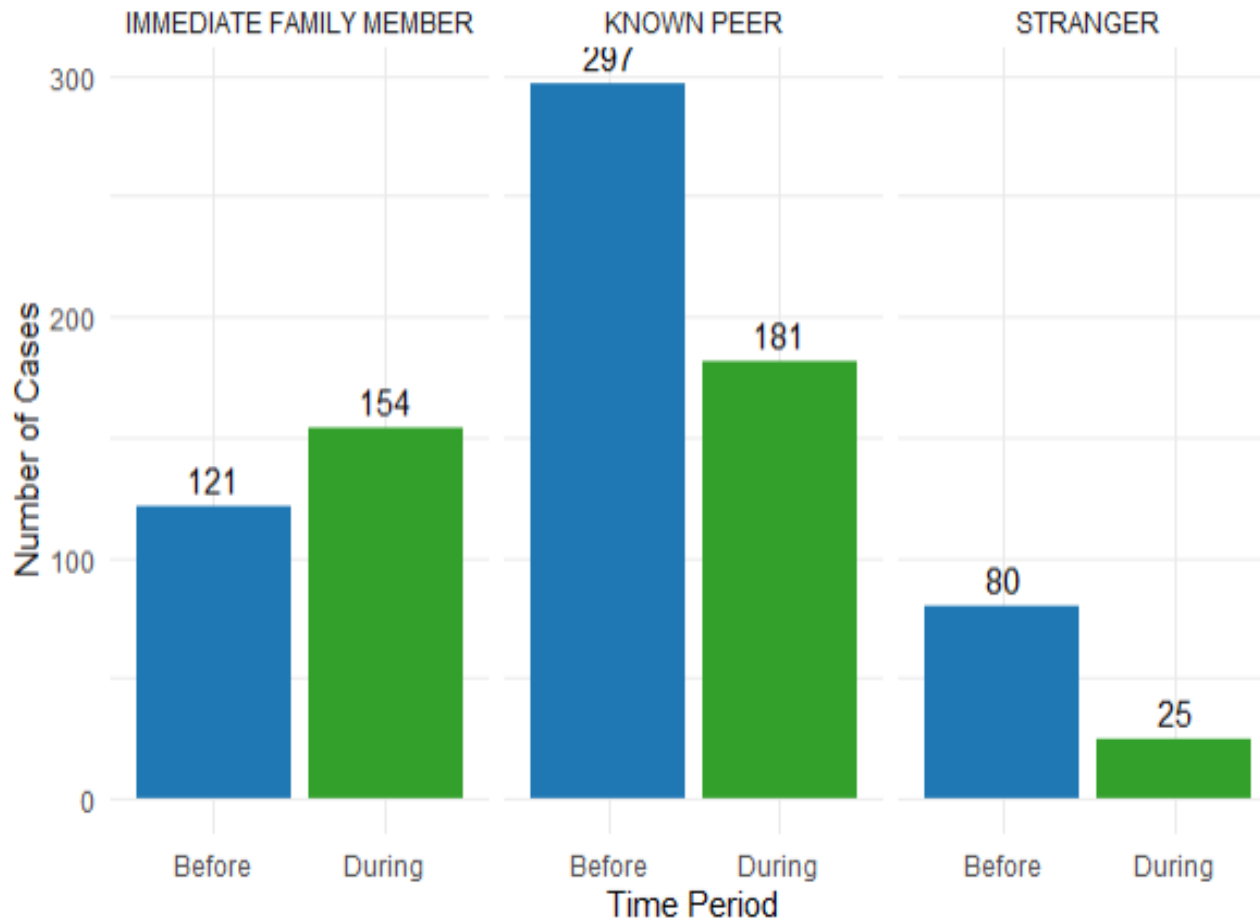


## British Columbia



# RESULTS: Perpetrator Type (PA)

## Ontario



- Ontario

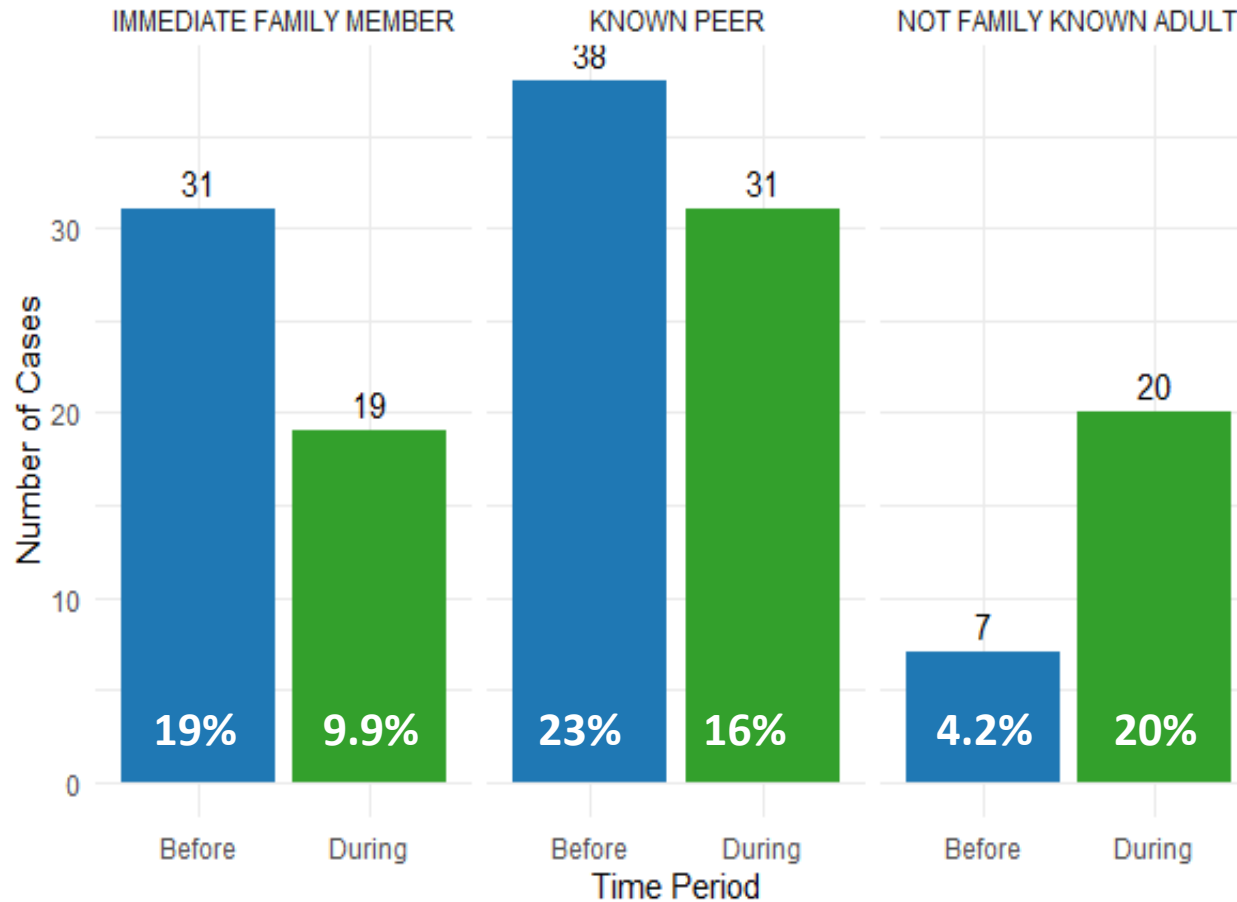
- **Decrease** in known peer and stranger cases
- **Increase** in immediate family member cases

- British Columbia

- **Decrease** in known peer cases from 25% to 14%
- Others were not significant

# RESULTS: Perpetrator Type (SA)

## Ontario



- ON cases

- **Decrease** in immediate family member cases
- **Increase** in known adults (not family) cases
- Known peer cases not significant

- BC cases

- No discernible differences

# Summary of Results

- Overall CM cases during the pandemic: ↓ in Ontario, ↑ in B.C.
- In Ontario, physical assault cases ↓ while sexual assault cases ↑
  - Shift from known peers + strangers → immediate family members + **known adults (not family)**
  - CM cases ↓ in community and school but ↑ at home
- BC showed no difference in maltreatment type
  - Shift from known peers → immediate family members

# Strengths and Limitations of the Study

## Strength

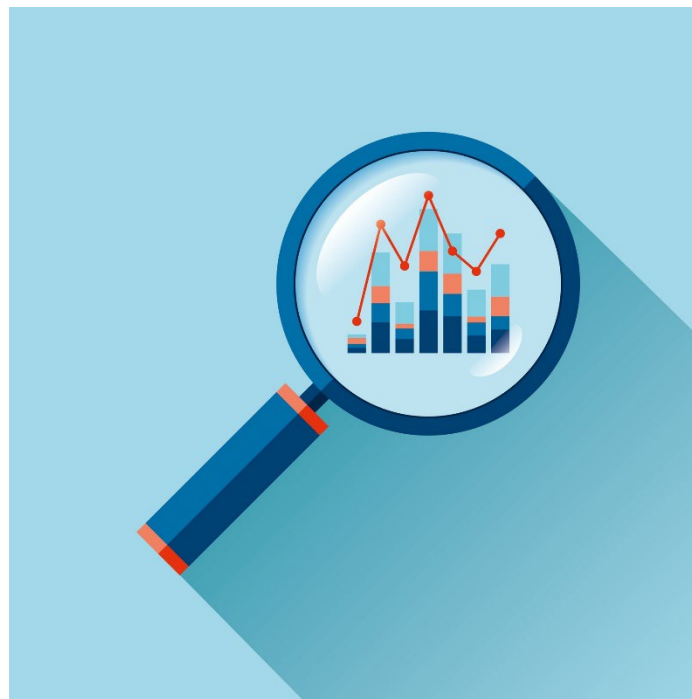
- Explores alternative dataset
- Uses the unique narrative component that provides details of the complexities of injury events not found in other datasets
  - **Insights to risk and protective factors**

## Limitations

- Not representative of the Canadian population
- Narrative not filled in a standardized way
  - Subject to possible omission
- **Doesn't capture cases that are not presented to the ED**
  - Underreports true number of cases



## PROJECT FOUR: Inflicted Injury



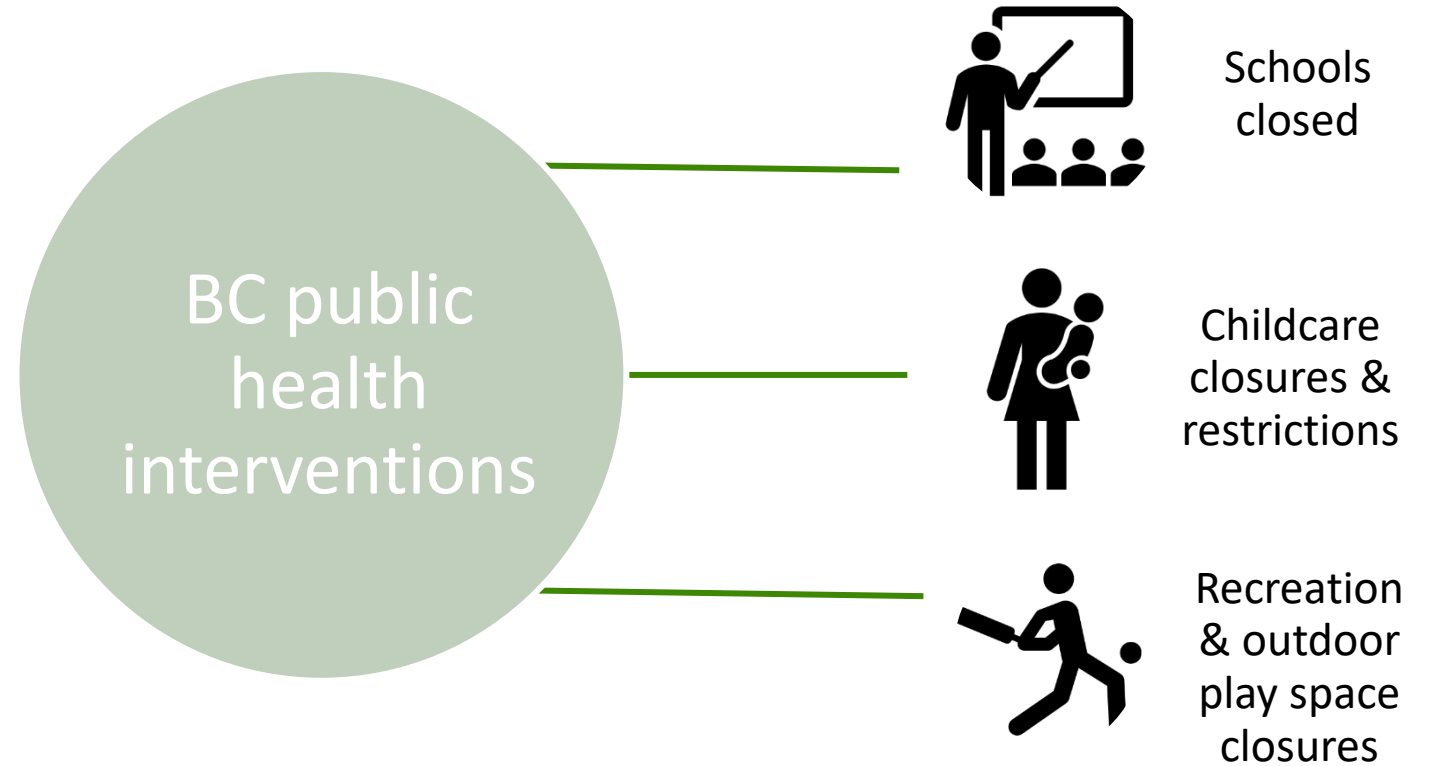
Traumatic Head Injury-Child Maltreatment/Shaken Baby Syndrome (THI-CM/SBS) in British Columbia

## PURPOSE OF STUDY:

To determine the effect of COVID-19 policies on the rate of Traumatic Head Injury-Child Maltreatment / Shaken Baby Syndrome (THI-CM/SBS) in BC

## OBJECTIVE:

To understand the burden of THI-CM/SBS among 0≤2 yr olds in relation to the pandemic policies, to better inform prevention



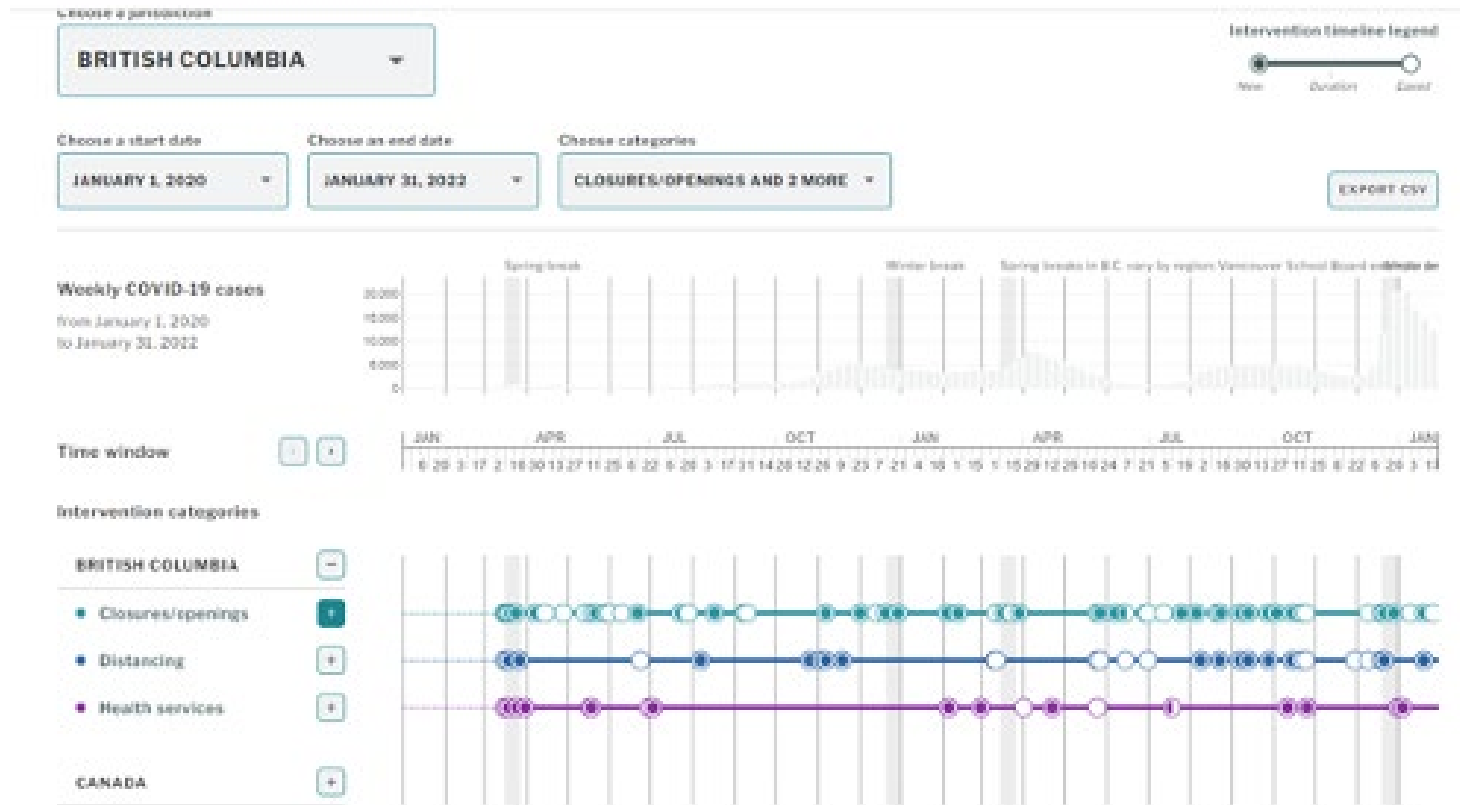
# Data Sources: COVID Timeline

## Canadian Institute for Health Information (CIHI)

- 140 various public health Interventions in BC during pandemic
- 3 intervention categories included:
  - Openings and closures
  - Health services
  - Distancing

## Surveillance data: Jan 2016 to May 2022

- Pre-pandemic intervention: Jan 2016 – March 2020
- Post-pandemic: April 2020- May 2022



Canadian Institute for Health Information. Canadian Data Set of COVID-19 Interventions — Data Tables. Ottawa, ON: CIHI; October 13, 2022.

# Data Sources: THI-CM Cases

- Child Protection Service (CPS) data
  - Review of all physical abuse case charts
  - On going chart review (6-member team)
  - Using an adaptation of certainty from Feldman et al. (Feldman et al., 2001), cases were classified

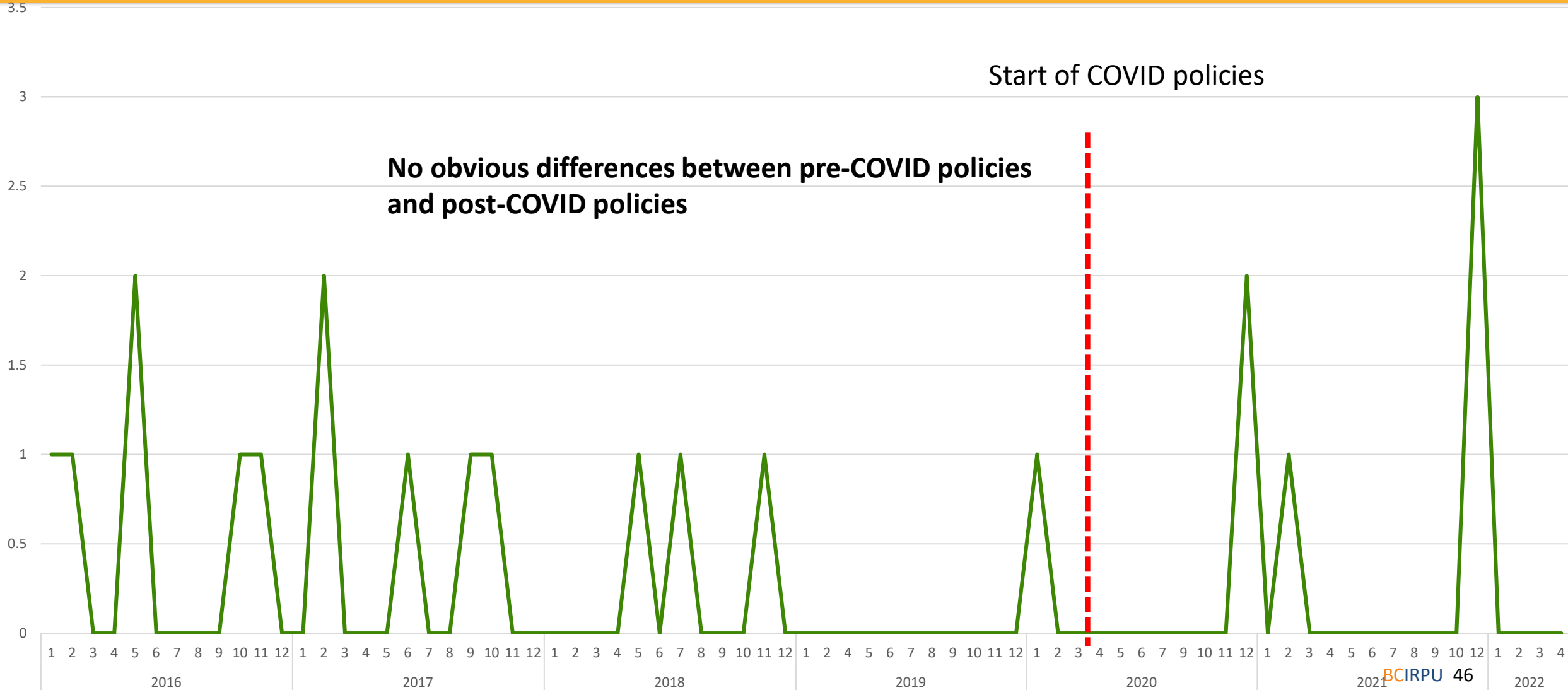
Adapted Feldman Criteria
Definitely Not
Unknown
Possible
Probable
Definite

## Methods:

- COVID-19 policies were aggregated by month and by year to allow for meaningful analysis of CPS cases
- Compared THI-CM rates pre-COVID period with post-COVID period using Poisson regression model

# THI-CM/SBS CASES PER MONTH

## JAN 2016 TO APR 2022



# RESULTS: THI-CM/SBS

## PRE-COVID VS POST-COVID

### Using monthly counts:

Variable	Comparison	Rate Ratio	95% CI		p-value
COVID	post > pre	0.904	0.365	2.239	0.8271

	Monthly average
pre	0.3
post	0.26

### Using yearly counts:

Variable	Comparison	Rate Ratio	95% CI		p-value
COVID	post > pre	0.667	0.269	1.652	0.3811

	Yearly average
pre	3.5
post	3.5

Neither monthly nor yearly counts were statistically significant. In British Columbia, COVID-19 stay-at-home policies did not appear to have a significant impact on THI-CM among children 0-2 years of age.

# Strengths and Limitations



## Strengths

- Robust child protection services surveillance system
- Feldman Criteria and expert case review team for identifying THI-CM/SBS cases

## Limitations

- Low number of cases
- Possible underestimation as cases may not be reported or come to the attention of either police or child protection services



# Key Findings

- Overall **health administrative data** demonstrated **decreases** in the number of cases pre to during the pandemic
- Other data sources demonstrated **increases**
- Appears that there was a change in **maltreatment type**, **setting** and **perpetrator type** during the pandemic
- Unsure of change in **specific inflicted violence** injuries (e.g., THI)

# Public Health Significance

Highlights gaps in **preventive measures and support systems** for children during stay at home policies

Highlights **the indirect effects** of stay at home policies and future considerations for such policies

Highlights the need for **awareness and targeted interventions** to address increased risk situations

# Future Work

## Ontario

- Partnered with PHUs to support integrating the results of this work into their program planning
- Community Safety Plans
- Violence Prevention Framework
- SCAN data

## British Columbia

- Mandate to monitor inflicted violence in BC
- Efforts to evaluate Period of Purple Crying on THI-CM

- Entire COVID-19 policies and violence outcomes in children and youth in Canada CIHR Project Team and CIHR Funding
- Colleagues at:
  - Public Health Ontario
  - University of British Columbia
  - York University
- Public Health Agency of Canada (CHIRPP)
- BC Children's Hospital Child Protective Services

Dr. Sarah A. Richmond ([sarah.richmond@oahpp.ca](mailto:sarah.richmond@oahpp.ca))

Dr. Ian Pike ([ipike@bcchr.ca](mailto:ipike@bcchr.ca))

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