

Exploring the National Fire Information Database 2005-2021 for fire incidents involving Indigenous Communities in Canada: Residential Fire Information Observations

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Research team

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Work undertaken for **National Indigenous Fire Safety Council**

Overview

Presentation

- Description of the study
 - Initial motivation
 - Aims and larger objectives
- Background for the NIFD information leveraged
 - Brief introduction to the NFID that was drawn from
 - How it was used
 - Context for considerations and cautions
- Summary of observations for the residential fire information analysis
- Suggestions for consideration and potential next steps

Open-floor for questions and discussion

PROJECT OBJECTIVE

Reasons for current study

Motivation

- Current **scarcity** of fire incident information for Indigenous communities
- Potential for fire information for incidents that occurred in Indigenous communities where **municipal aid** was provided
 - Idea arose from reviewing aggregated P/T information in the National Fire Information Database (NFID)
 - NFID had undergone 1 survey cycle and was about to undergo a 2nd cycle
- Opportunity to explore the NFID, with a possibility of **adding to** available information
 - Longer-term, to inform considerations if potentially adding to information collected via the National Incident Reporting System (NIRS) that is managed by NIFSC

Aim of the project

Overall objective of this work

Initial exploration of the NFID contents to share insights into potentially available fire information that could be useful to Indigenous communities, so that the information could be combined with other information to help inform fire risk reduction plans tailored to and by each community

Project aims of this initial exploration

1. Identify if any data could be identified, based on reported geolocation information
2. If data is available, use a simple analysis to explore the data
3. Share the observations and insights to help next steps

CONTEXT & BACKGROUND

of the limitations of available and data information analyzed

Background:

National Fire Information Database (NFID)

What is included

- Fire incident information reported to provincial, territorial and federal-agency Fire Marshals' and Fire Commissioners' offices
- Note: what is collected can vary between jurisdictions

Survey cycles and participation

- Jurisdiction participation in the aggregation in NFID is voluntary
- Participation has varied between survey cycles
- 2 survey cycles so far: 2005 to 2014, and 2015 to 2021.

What might be useful

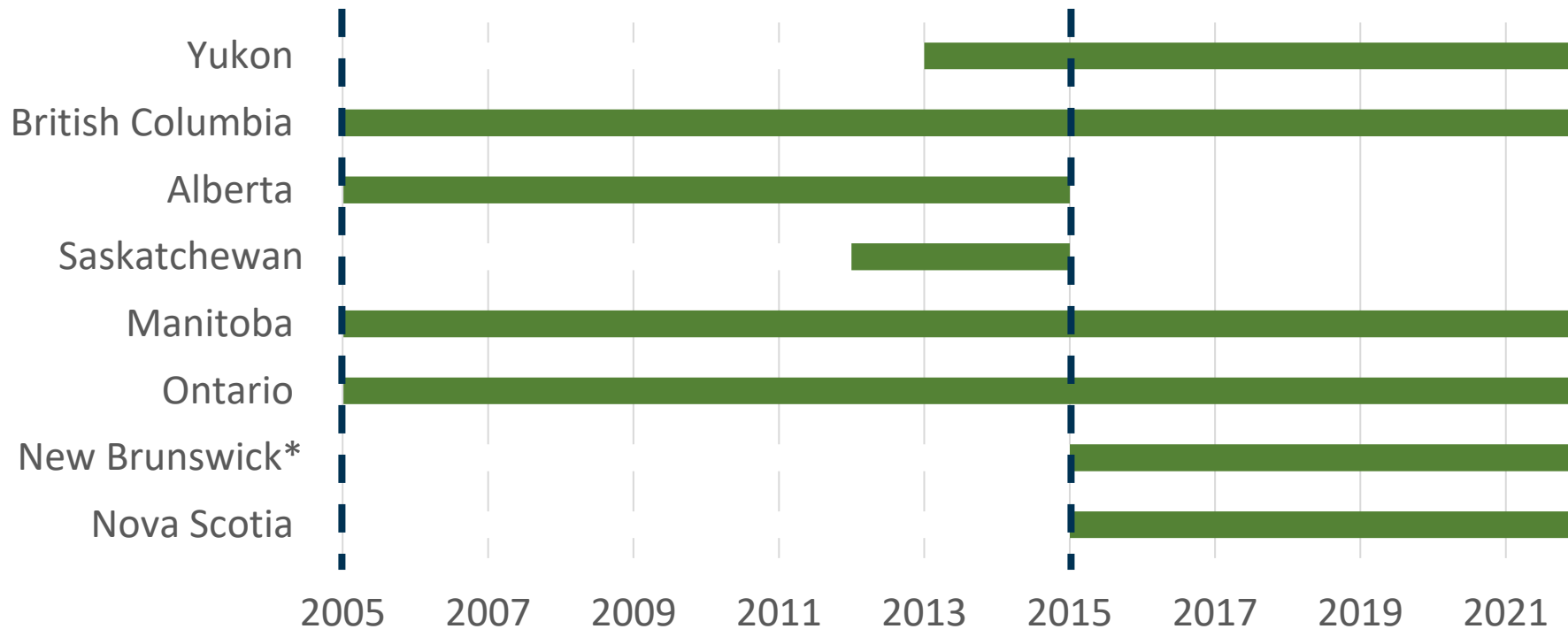
- Opportunity for geolocation information for incidents to be reported
- Potential information, where mutual aid is provided to adjacent communities

NFID background:

Which jurisdictions reported location information?

Considering the 2 survey cycles of 2005 to 2014 and 2015 to 2021:

Summary of the years with reported geolocation information



Note * In New Brunswick, while having participated in both survey cycles, incident location information was only reported from 2015 to 2021, and casualty information was reported from 2010 to 2021.

NFID geolocation information

Project uses 2 datasets:

1. Where reported **location** variable information was available that **aligned with an Indigenous community location**
2. The **remainder** of dataset was used as incident information for **non-Indigenous community locations**

Forming these datasets:

- Requires a deep dive into the available “location” information
- Initial exploration if this could be done and how many potential incidents might be found
- Assumptions

NIFD geolocation information

Incident location, a city, municipality, town or village, however there may be other location descriptions

Postcode

Census subdivision number and name

Major occupancy, 1 jurisdiction uses a category of “First Nation community”

Property ownership, 1 jurisdiction uses a category of “Indian Reserve”

Indigenous community geolocation information

Locations: collected local community names from names of Nations or bands, settlements or hamlets

- Worked with NIFSC
- Cross-referenced Assembly of First Nations, Inuit Nunangat, Metis National Council, and individual community websites to identify names and also help identify changes of names over time
- Cross-referenced ISC lists and other various public government websites

Census subdivision (CSD) number and name:

- Lists from the Centre for Indigenous Statistics and Partnerships (CISP) for CSDs where Indigenous communities are included in the area of the subdivision

Postcodes:

- List of postcodes for Indigenous communities from the Canada Post postcodes for CSDs where Indigenous communities are included within the subdivision

Considering the NFID variable: Incident location

- Provided the **largest proportion of useful information** when trying to identify fire incidents that were located in an Indigenous community
- However, the manual alphanumeric data entry can lead to **many observed variations** that need to be reviewed and addressed in the data cleaning process
 - For example,
 - Changes in names over time and differences in names
 - Manual entry: typos, spelling mistakes, and non-standard abbreviations variations

Confidence of datasets' contents

Checking the contents of both datasets

- Understanding the contents of the datasets takes time
 - Understanding informs the both the verification process and the analysis approach
- Using cross-checks and manual reviews
- Fundamental work to support confidence in next steps
- Greatest investment of time and effort for this project

General NFID limitations to consider

Impacts of methodology and information

- How information is reported
 - Quality that is generally reported in the NFID, especially geolocation information
 - Variations in reporting between jurisdictions
 - Variations in participation of jurisdictions over and during the NFID survey cycles
- Who is reporting
 - Mutual aid for Fire Departments mandated to report to the P/T Office of Fire Marshal or Commissioner
 - Adjacent communities
 - Voluntary reporting for all other Fire Departments
- Identifying the location of each incident
 - High reliance on the accuracy and completeness of the address – manual text entry of data
 - Changes over time, e.g. community names and census subdivisions

Other limitations to consider:

Project dataset sizes and analysis results

Numbers and percentages of fire incidents, and civilian fire-related deaths and injuries

- Because of the way that this information is reported, knowing that this is not a full data set for Indigenous communities
 - Not all
- Relatively small data sets

Rates using the number of fire incidents as benchmark

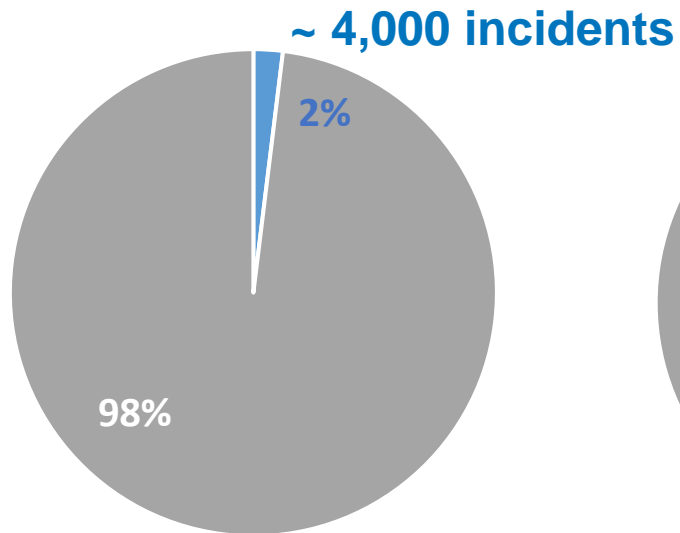
- Because of known incompleteness of the dataset (mutual aid), so trends within the dataset are considered
- Not appropriate to compare with population or number of households that would be community-related data.

RESIDENTIAL FIRE INFORMATION SOME OBSERVATIONS

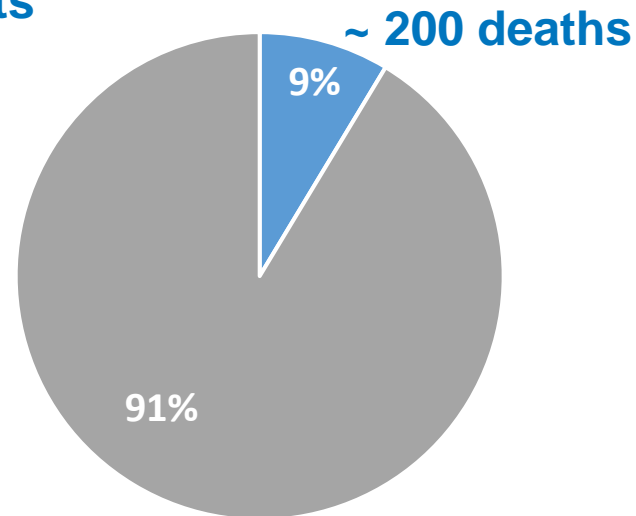
and comparison with other published insights, where possible

Residential fire information: Overview of available information

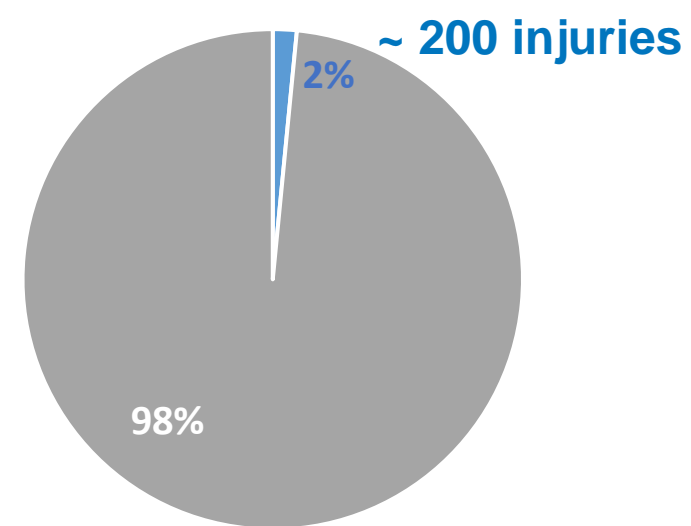
NUMBER OF FIRE INCIDENTS



NUMBER OF CIVILIAN FIRE-RELATED
DEATHS



NUMBER OF CIVILIAN FIRE-RELATED
INJURIES



- Indigenous Community Locations
- Non-Indigenous Community Locations

Rate of fire-related civilian **deaths** to 1,000 fire incidents ~ **5 times higher for Indigenous** community locations compared with non-Indigenous community information

Rate of fire-related civilian **injuries** to 1,000 fire incidents **about the same (~1) for Indigenous** community locations compared with non-Indigenous community information

Residential fire information:

Overview of rates – comparison to published

	Current Study	Previously Published Studies
Rate of fire-related civilian deaths to 1,000 incidents compared with non-Indigenous rates	~ 5x, for Indigenous community locations	~ 5x, for First Nations communities* ~ 17x, for Inuit communities* ~ 1x, for Metis communities* ~ 4.4x, for First Nations communities**
Ratio of deaths to injuries	~1, for Indigenous community locations	~1, for First Nations communities***

Dataset is drawn from a **different source** compared to previous studies, and **similar trends are observed** compared to previously published studies

References: * [Kumar, 2021]; ** [CMHC, 2004], *** [Weckman et al, 2023]

Residential fire information: Classifications of residential property

One- and two-family dwelling fire information

- **Majority of information** for each of fire incidents, and civilian fire-related deaths and injuries
 - For Indigenous community locations: 78% 83% 82%
 - For non-Indigenous community locations: 61% 59% 49%

The following information presented today is for **all residential structure** fire information.

Residential fire information:

Area of fire origin – Most common

Incidents

Community Locations	Structural areas of the building	Kitchen or cooking areas	Storage, vehicle or outside areas	Sleeping areas	Assembly and family areas
Indigenous	1 st	2 nd	3 rd	4 th	5 th
Non-Indigenous	3 rd	1 st	2 nd	5 th	6 th

Deaths

Community Locations	Assembly and family areas	Sleeping areas	Structural areas	Kitchen and cooking areas
Indigenous	1 st	2 nd	3 rd	4 th
Non-Indigenous	1 st	2 nd	5 th	3 rd

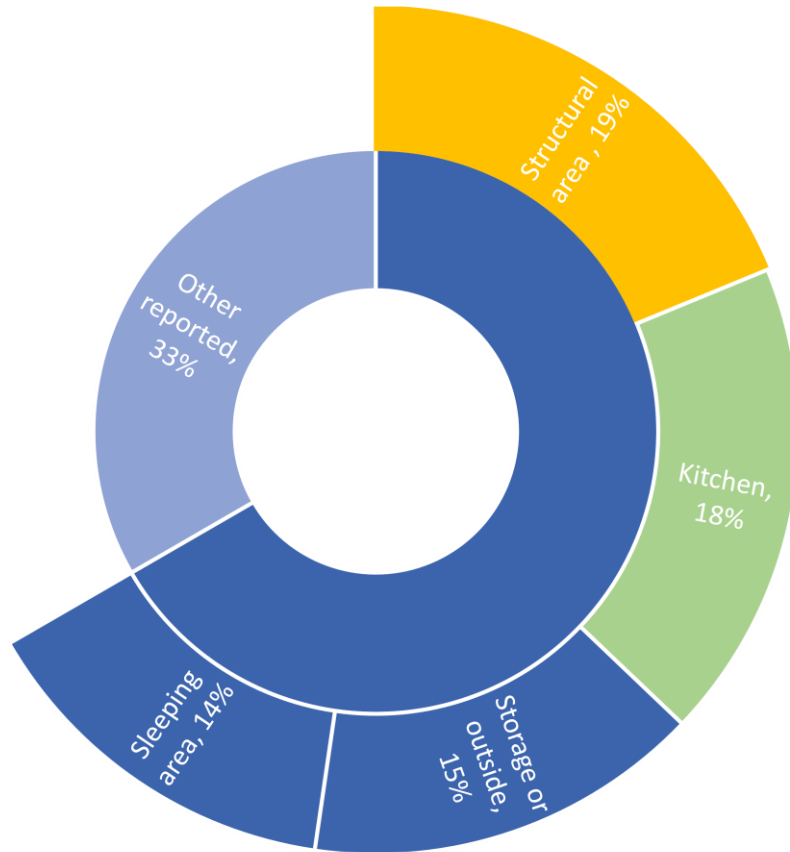
Injuries

Community Locations	Kitchen and cooking areas	Assembly or family areas	Sleeping areas	Storage, vehicle or outside areas
Indigenous	1 st	2 nd	3 rd	4 th
Non-Indigenous	1 st	3 rd	2 nd	4 th

Generally, the most common areas of fire origin are similar categories; however, considering the proportions and rates...

Residential fire information: Area of fire origin – Top 4

INDIGENOUS COMMUNITY LOCATIONS



NON-INDIGENOUS COMMUNITY LOCATIONS



Generally, for the most common compare well to previous study using NIRS information that was combined with Housing Safety Assessments information [Weckman et al., 2023]

Residential fire information:

Area of fire origin – comparison to published

Area of fire origin	Rate of fire-related civilian deaths to 1,000 incidents compared with non-Indigenous rates
Structural areas	~ 13x
Kitchen, cooking areas	~ 9x
Assembly, family areas, living room	~ 3x
Sleeping areas	~ 3x

For indigenous communities, **ratio of deaths to injuries** ranges from ~ **0.5 to 5** (compared to ~0.4 to 1 for non-Indigenous ratios)

- ~ **5 is for structural areas** (compared to ~0.2 for the non-Indigenous ratio)
- Generally, compares well to previous studies, indicating about 1 or greater for First Nations community information [Weckman et al., 2023]

Overall, the observed trends of the Indigenous and non-Indigenous community location datasets are very different.

Residential fire information:

Ignition source – Most common

Incidents

Community Location	Smokers' equipment and open flames	Cooking equipment	Heating equipment	Electrical appliances, distribution and other equipment
Indigenous	1 st	2 nd	3 rd	4 th
Non-Indigenous	2 nd	1 st	4 th	3 rd

Deaths

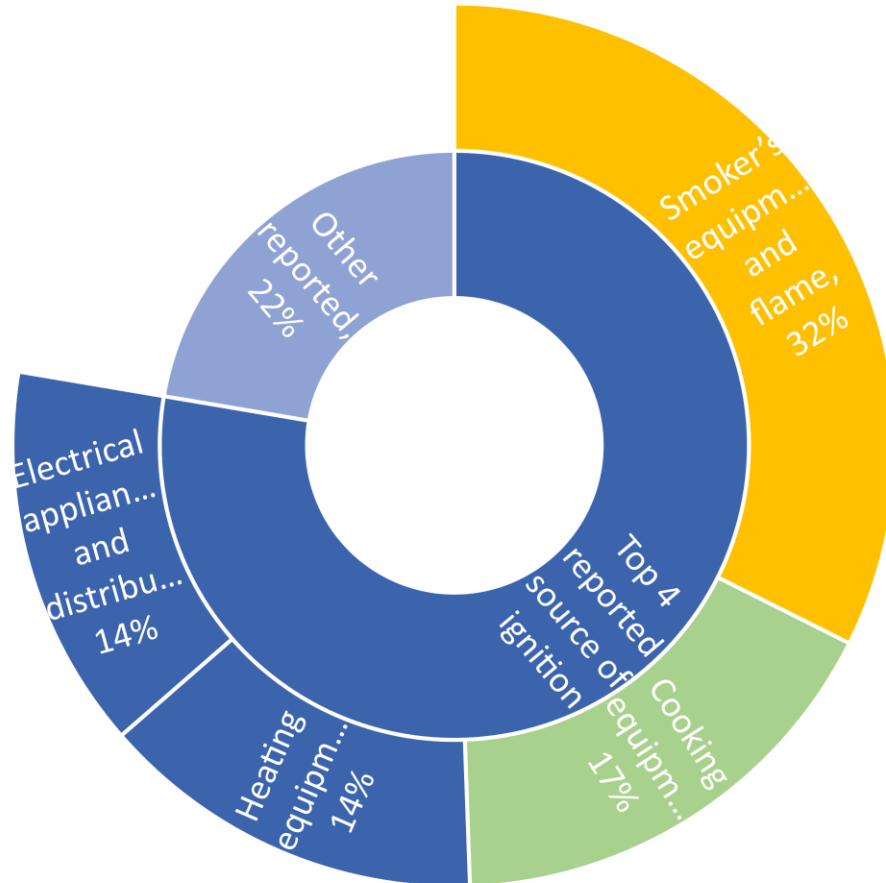
Community Location	Smokers' equipment and open flames	Miscellaneous	Cooking equipment	Heating equipment	Electrical appliances, distribution and other equipment
Indigenous	1 st	2 nd	3 rd	4 th	5 th
Non-Indigenous	1 st	2 nd	3 rd	5 th	4 th

Injuries

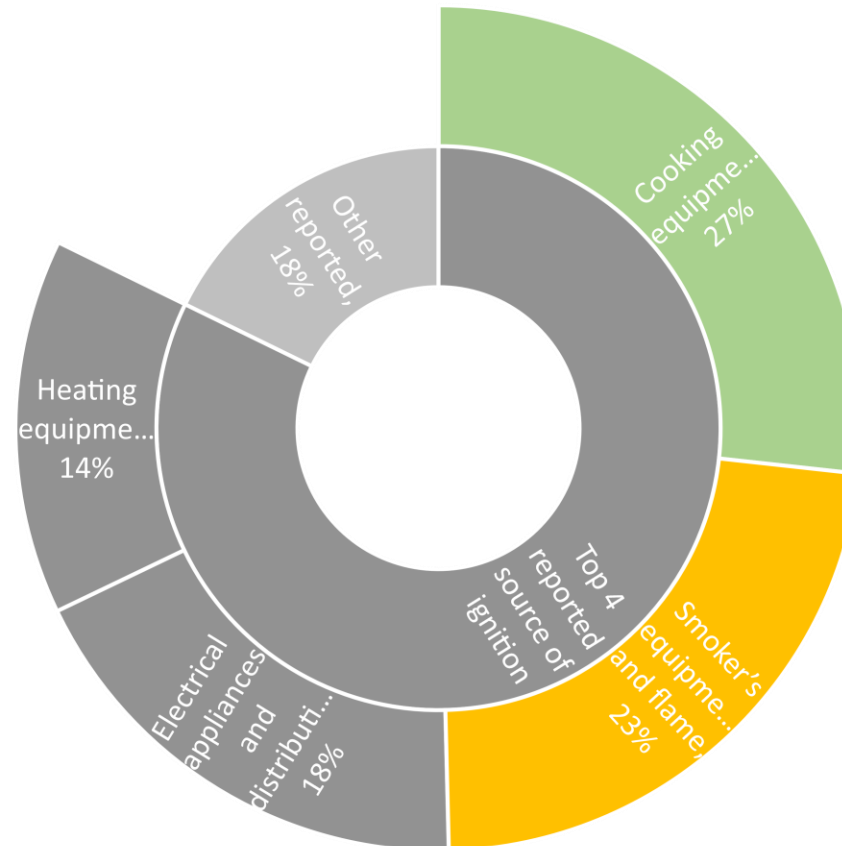
Community Location	Smokers' equipment and open flames	Cooking equipment	Heating equipment	Electrical appliances, distribution and other equipment
Indigenous	1 st	2 nd	3 rd	4 th
Non-Indigenous	2 nd	1 st	4 th	3 rd

Residential fire information: Ignition source – Top 4

INDIGENOUS COMMUNITY LOCATIONS



NON-INDIGENOUS COMMUNITY LOCATIONS



Generally good comparison with previous studies
[Weckman et al., 2023; OCC-ON, 2021]

Residential fire information:

Ignition source – comparison to published

Ignition source	Rate of fire-related civilian deaths to 1,000 incidents compared with non-Indigenous rates
Smoker's equipment and open flames	~ 3x
Cooking equipment	~ 9x
Heating equipment	~ 10x
Electrical appliances, distribution and equipment	~ 5x

For indigenous communities, **ratio of deaths to injuries** ranges from ~ **0.4 to 1.2** (compared to ~0 to 0.3 for non-Indigenous ratios)

- Generally, compares well to a previous study, that indicated ratios of about 1 or greater for First Nations community information [Weckman et al., 2023]

Overall, again, the observed trends of the Indigenous and non-Indigenous community location datasets are very different.

Residential fire information:

Smoke alarm performance – Alarm activated

Incidents

Community Locations	Percentage of reported fire incidents	
	Alarm activated	Unknown
Indigenous	~11%	~50%
Non-Indigenous	~33%	~32%

Deaths

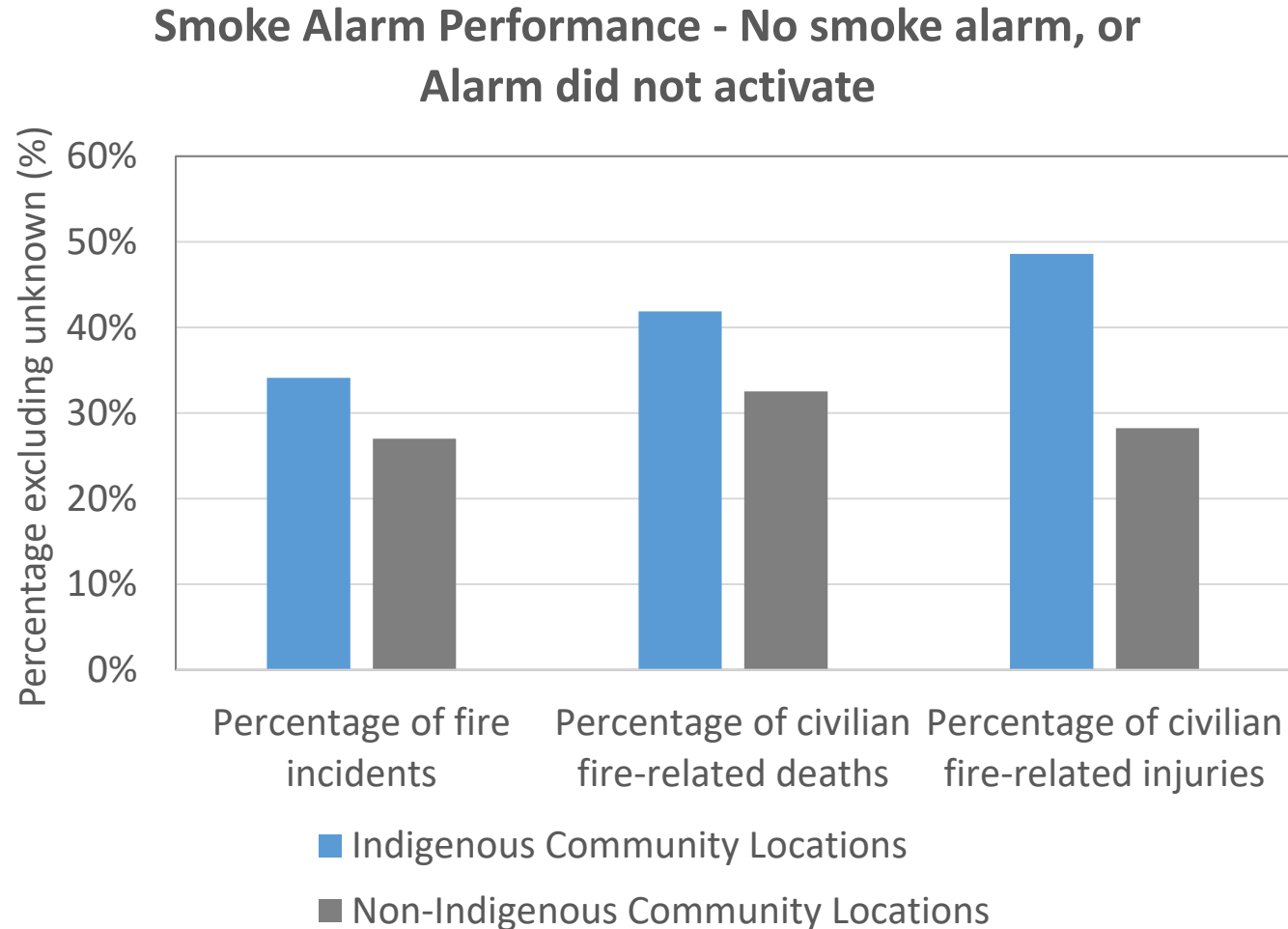
Community Locations	Percentage of reported fire incidents	
	Alarm activated	Unknown
Indigenous	~14%	~50%
Non-Indigenous	~43%	~39%

Injuries

Community Locations	Percentage of reported fire incidents	
	Alarm activated	Unknown
Indigenous	~18%	~33%
Non-Indigenous	~57%	~16%

Generally good comparison with previous studies
[Weckman et al. 2023; OCC-ON, 2021]

Residential fire information: No smoke alarms present, or Alarm did not activate



Rate of fire-related civilian deaths to 1,000 fire incidents:

- **~57 for Indigenous community locations**
 - ~12 for non-Indigenous community locations
- **~ 5 times higher for Indigenous** community locations compared to non-Indigenous information

Residential fire information:

Act or omission – Most common

Incidents

Community Locations	Incendiary fires	Miscellaneous	Mechanical or electrical failure or malfunction	Human Failing
Indigenous	1 st	2 nd	3 rd	4 th
Non-Indigenous	6 th	4 th	2 nd	2 st

Deaths

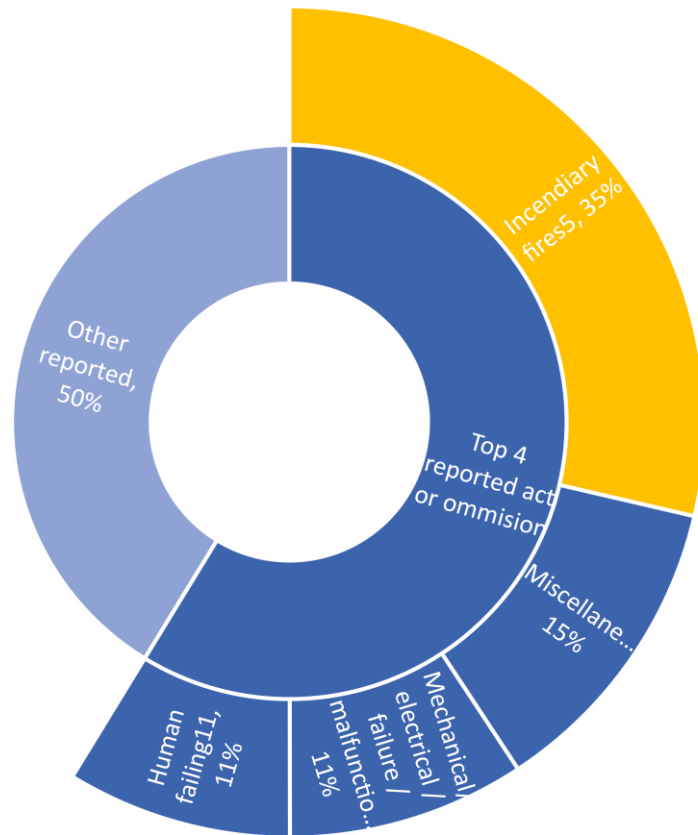
Community Locations	Human failing	Incendiary fires	Misuse of source of ignition	Miscellaneous
Indigenous	1 st	2 nd	3 rd	4 th
Non-Indigenous	3 rd	2 nd	1 st	7 th

Injuries

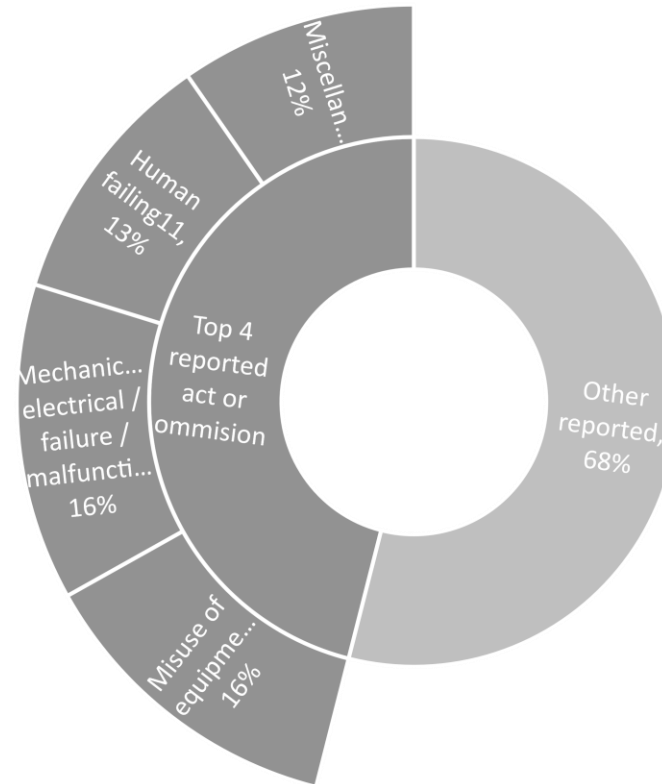
Community Locations	Human failing	Incendiary fires	Construction, design or installation deficiency	Misuse of material ignited
Indigenous	1 st	2 nd	3 rd	4 th
Non-Indigenous	3 rd	7 th	8 th	2 nd

Residential fire information: Act or omission – Top 4

INDIGENOUS COMMUNITY LOCATIONS



NON-INDIGENOUS COMMUNITY
LOCATIONS



For **incendiary fire incidents**, Indigenous community locations incidents were reported with a higher proportion **(35%)** compared to non-Indigenous portions **(12%)**.

Residential fire information:

Act or omission – comparison to published

Act or omission	Rate of fire-related civilian deaths to 1,000 incidents compared with non-Indigenous rates
Incendiary fires	~ 1.4x
Construction, design or installation deficiencies	~ 14x
Human failing	~ 12x

For indigenous communities, **ratio of deaths to injuries** ranges from ~ 1.0 to 1.3 (compared to ~0.1 to 0.5 for non-Indigenous ratios)

Residential fire information: Small data sizes within results

Other variables were explored but **not reported in detail** because

One or more major **categories** of the variable had a **very small data size** including:

- **Age classification of casualty**
- **Act or omission**

Or a significant proportion of each data set **reported as unknown**, including:

- **Status of fire on arrival**
- **Extent of damage**
- **Method of control and extinguishment**

* These are shared, to help prompt discussion/planning for future work

Summary of observations and considerations

- **Dataset** was drawn from a **source (NFID) not used in previous studies**
- Even considering the dataset limitations, including data sizes, **similar trends to previous studies** were observed
- Potential to use this dataset **for future targeted studies**, and to use this dataset to complement other sources without overlap
 - Thus, to consider combining with NIRS
- Consider future NFID data collection
 - More broadly, collection of location is a manual text entry, so some level of automation or other approach to support time, correctness may assist generally also
 - Consider if there are other variables that can help refine/cross-check geolocation information

OPEN-FLOOR FOR QUESTIONS AND DISCUSSION

Thank you!

For questions and follow up, please don't hesitate to reach out to Amanda and she will connect you, as appropriate
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