

Assessing Fire Incidents on First Nations Communities: Identifying Baseline Data

Len Garis
Paul Maxim
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H & H Consulting
100-3086 Lincoln Ave.
Coquitlam, BC V3B 0L9

Email: lwgaris@outlook.com

Executive Summary

The current project to establish an Indigenous Fire Marshal (IFM) will have a to address issues of fire safety among Indigenous communities. Unfortunately, these communities have fire incident and casualty rates much higher than the national average. Overall life expectancy among Aboriginal peoples is significantly lower than the broader Canadian population. Death rates due to fire incidents are additionally higher among Aboriginal people across all age groups.

While traditional approaches to firefighting have been effective in some First Nations communities, this is not the case across the board. The traditional firehouse approach is costly and exceedingly difficult, if not impossible, to implement in many small and remote communities. Maintaining equipment, training personnel and providing overall support are constant problems. Consequently, non-traditional and innovative approaches to fire prevention and suppression are needed. Fire prevention strategies can be successful as is illustrated by the overall decline in fire incidents outside First Nations communities and in specific FN communities where targeted smoke alarm programs have been implemented.

One way to address this situation is through a more relevant and timely monitoring of fire incidents. While some local and national data are available, reliable and systematic data on fire incidents, casualties and precipitating factors on FN communities is lacking. Ongoing and reliable data are needed to assess the impact of any new policies or programs that might be implemented. As part of its mandate, the IFM may wish to consider a systematic program of collecting fire-incident and related data from FN communities across the country in addition to what is currently available.

The Indigenous Fire Marshal project team (the “IFM”) has a depth of understanding relating to fire incidents, fire prevention and firefighting that is lacking in agencies focussed on more general issues. By putting together a data resource consisting of official statistics and new material collected by the IFM, it should be possible to monitor and evaluate policy and program interventions in a more relevant and timely fashion. Ideally, this will result in a reduction of fire-related incidents and tragedies in First Nations communities and enhance the mandate of the Indigenous Fire Marshal. It is also likely that any lessons learned through those exercises would be transferrable to similar, off-reserve communities thereby benefiting the nation more broadly.

Table of Contents

Setting the Stage.....	3
Scope.....	4
Background – What do we Know?.....	5
Availability of Firefighting Resources.....	6
Issue of Wildfires.....	7
Available Data	8
Baseline Data	8
Cause of the Event	9
Outcome of the Event.....	9
Deaths	10
Injuries and Property Damage	10
Contextual Variables	11
Under-Enumerated Reserves.....	12
Going Forward	13
Targeted Data Collection — The Indigenous Fire Marshal’s Office	14
How Do We Know if it Works?.....	15
Alternatives.....	17
Conclusions	17
Appendix 1: Incompletely enumerated Indian reserves and Indian Settlements, 2006	19
Appendix 2: Incompletely Enumerated Indian reserves and Indian Settlements, 2011	20
Appendix C: Data Elements Reported to the NFID, by Jurisdiction	21
Author Biographical Information	24

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Setting the Stage

The Indigenous Fire Marshal project is tasked with assuring fire safety among First Nations Communities. These communities have fire incident and casualty rates significantly higher than the fire incident and casualty rates for Canadian communities overall.¹ This report speaks to how we propose to assess the impact of measures designed to significantly reduce those rates by focusing on the availability of reliable data on First Nations communities in Canada.

The traditional approach to assuring community fire safety has relied on investments in fire suppression capabilities (training, equipment, and facilities) based on evaluations of population composition, property at risk, and other community characteristics. However, recent research examining the socioeconomic and demographic components of fire risk has shown that alternate strategies for reducing the toll of fires can be more effective both in terms of reducing loss and in terms of cost. At the same time, the sustainability of traditional manual fire suppression services is being questioned and increased regulation has driven up the cost of providing service. Recruitment and retention is a challenge and training demands have also increased, raising the challenge of maintaining competency among responders who may have limited experience.

On the positive side, there are initiatives that have been shown to be effective in other circumstances. For example, in 2012, the BC Fire Chiefs Association which represents the major fire service organizations in British Columbia, raised the prospect of focusing on working smoke alarms as a major fire reduction strategy. Early research findings on smoke alarm installation and associated educational programming has produced remarkable results that may be significant in helping to further reduce fire-related deaths across Canada. Garis and his colleagues have also used advanced data analysis techniques to identify and target locations with high residential fire risks. This allows for a more precise and cost-effective allocation of limited resources to implement fire prevention programs.²

These developments suggest that a fresh, holistic, and data-driven approach be used to evaluate the effectiveness of current approaches, and to identify and document alternate approaches that can be used to reduce fire incidents and their consequences.

¹ Government of Canada (2010) First Nations Fire Strategy, 2010-2015. Ottawa: Indian and Northern Affairs. Also see: Government of Canada (2020) Joint First Nations Fire Protection Strategy (2016-2021) [<https://www.sac-isc.gc.ca/eng/1462282755363/1535122983939>] Last accessed March 10, 2020.

² Garis, L., S. Hughan and A. McCormick (2016) Targeted Residential Fire Risk Reduction. A Summary of At-Risk Areas in Canada. Abbotsford, BC: University of the Fraser Valley. Available at: <https://cjr.ufv.ca/wp-content/uploads/2016/06/Canada-Targeted-Residential-Fire-Risk-Reduction.pdf>

It is the purpose of this report to determine the feasibility and degree to which creating a new national baseline for first nations fire casualties is possible, to assist with fire intervention policies and programs in First Nations Communities.

Scope

As noted, there are other potential approaches beyond traditional fire suppression techniques, such as the BC smoke alarm project, or installation of fire sprinkler systems, that may have a greater and more cost-effective impact on reducing fire-related fatalities and losses. Determining whether those approaches work or not requires an understanding of the current situation among First Nations communities. That is, we need a series of baselines against which the impact of any proposed initiative can be applied and measured.

The purpose of this proposed project is:

- 1) to examine the *feasibility* of creating new baselines for examining fire-related incidents and consequences (mortality and morbidity) among First Nations communities in Canada.
- 2) to identify what additional data or information might be available to provide contextual information for assessing any potential interventions.
- 3) to identify any gaps that may exist in what data are currently available.

Specifically, this feasibility work includes analysing, reviewing and documenting available data that would be needed to provide a quantitative baseline against which any intervention might be assessed. Among the known possible data sources on fire-incident outcomes are death and morbidity statistics due to fires collected by Statistics Canada and the provincial coroners and medical examiners services. Limited data on outcomes relating to injuries and property loss are also available in the National Fire Information Database.

As well as measuring outcomes (deaths, injuries and property loss), it is also important to identify contextual data relating to the circumstances in which the fire incident occurred. Examples of available information here might include census material on the social characteristics of individual First Nations communities in Canada, along with possible Fire Commissioner/Marshall data relating to the casualty behavior at the time of the fire. Unfortunately, all existing data sources have some limitations which will be outlined below.

Going forward the goal of this report is to gain approval for a second stage study to establish actual baselines and associated indicators relating to existing and future investments in prevention services across these communities (for example, the distribution of smoke alarms and fire safety education programs).

Background – What do we Know?

While fire-related deaths occur across Canada, episodes on First Nations communities appear to be more frequent and often seem to include larger numbers of victims. In December 2016, for example, five people, including four children, died in a fire on the Oneida Nation of the Thames. In March of that year, three generations of one family died on the Pikangikum First Nation. A fire in Kitchenuhmaykoosib Inninuwug, (Big Trout Lake), on May 2, 2019 killed five people including four children under the age of 13. While these catastrophic fires are often attributed to substandard housing and water access issues in many communities, little systematic data exists to show definitively where and to what degree those confounding factors have an impact.

In his province alone, Ontario's chief coroner noted that 58 people died in house fires in Indigenous communities in Ontario over the course of a decade, and he was not clear as to why that was the case.³ A CMHC report/video from 2007 suggested that fire incidents are 2.4 times greater on First Nations communities than the rest of Canada. Death rates were estimated to be 10.4 times higher; injury rates are 2.1 times higher; and, fire damage is 2.1 times higher.⁴

Overall, it is known that aggregate mortality rates on First Nations communities and among Aboriginal people as a whole, are significantly higher than among the general Canadian population.⁵ Furthermore, standardized mortality rates indicate that the risk of death among First Nations people is higher among all age groups and across both sexes when compared with the general population. Fire-related deaths are also disproportionately higher among the very young and older adults (over age 65). These findings are consistent with regional studies, such as those conducted by the BC Coroner's Service.⁶

A detailed study of person years of lost life expectancy (PYLL) was conducted by Statistics Canada which examined disaggregated (that is, specific) causes of death. The results indicated that deaths due to fires had over five times the impact in areas with large Aboriginal populations as opposed to low Aboriginal populations.⁷

Part of the reason for this is situation likely due to there being no regulations or legislation governing fire protection in Indigenous communities, unlike in off-reserve municipalities. Furthermore, while most cities

³ <https://www.cbc.ca/news/canada/thunder-bay/fire-deaths-coroner-s-table-1.4515476>

⁴ See: InterINDigital Entertainment Inc. (2007) Fire Prevention in Aboriginal Communities. Ottawa: Canada Mortgage and Housing Corporation. Report ca1 MH 07F36. Videodisc version AV TH9148 F57. Report available at http://publications.gc.ca/collections/collection_2008/cmhc-schl/nh18-23/NH18-23-107-009E.pdf

⁵ Akee, R. and D. Feir (2018) First people lost: Determining the State of Status First Nations Mortality in Canada using Administrative Data. Department of Economics, University of Victoria (Department Discussion Paper DDP1802, ISSN 1914-2838)

⁶ British Columbia Coroners Service (2015) BC Coroners Service Child Death Review Panel: A Review of Fire-Related Deaths in Children and Youth 2005-2014, Victoria, BC. Available online at: <https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/child-death-review-unit/reports-publications/fire-related-deaths-children-youth.pdf> Also see Gilbert M, Dawar M, Armour R. (2006) Fire-related deaths among Aboriginal people. in British Columbia, 1991-2001. Can J Public Health;97(4):300-4.

⁷ Allard, Y.E., R. Wilkins and J-M. Berthelot (2004) Premature Mortality in Health Regions with High Aboriginal Populations. Health Reports, vol.15: Ottawa: Statistics Canada (Catalogue 82-003).

and towns have specialized risk assessments in place and plans to cover them, such assessments are rare for First Nations communities.

Regardless of our perceptions, the relative incidence, severity and causes of fires on First Nations communities in comparison with comparable communities is not known with any degree of certainty. Part of the reason for this is a lack of systematic research. In turn, this lack of research is largely due to fragmented and inconsistent data collection across the country. Fire statistics fall under the jurisdiction of provincial fire marshals/fire commissioners, and how those statistics are collected and what is recorded varies considerably from one province or territory to another. Some jurisdictions, such as British Columbia, appear to be relatively advanced in their inclusion of First Nations data while others collect little if any material. Having noted this, it should be said that the issue of data availability is not restricted to First Nations. It is only recently that a National Fire Information Database has been constructed by Statistics Canada which attempts to integrate regional fire statistics across the country.⁸ Despite best efforts, even that database has considerable shortfalls.

Compounding federal/provincial jurisdictional matters for First Nations communities is that inconsistent reporting may be due to on- and off-reserve jurisdictional matters.

While interventions have been made to reduce the risk of fire incidents and fire-related fatalities, the effectiveness of those interventions requires good baseline data and monitoring of incidents over time.⁹

Availability of Firefighting Resources

Through an Access to Information Request, the CBC obtained an internal federal government audit that indicated that 53 First Nations reserves lack adequate resources to fight fires.¹⁰ Specifically, the Briefing Note reported the following:

- “The inventory confirmed a total of 654 sites within 612 First Nations communities across Canada. On these sites, there were a total of 320 INAC-funded fire halls and 450 INAC-funded fire vehicles, wherein some sites had fire halls, fire vehicles or both.
- The inventory determined that 17 First Nations sites were underserved for fire protection, 13 within Saskatchewan and 4 in British Columbia.
- The inventory determined that 38 First Nations sites had limited service for fire protection, 18 within Ontario and 20 in British Columbia. . . .
- As of July 14, 2016, regions have confirmed some changes in their numbers of serviced or limited service sites. Presently, the overall count is as follows:
 - 14 underservice sites (13 within Saskatchewan and 1 in Manitoba); and

⁸ See: <http://nfidcanada.ca/>; also <https://www150.statcan.gc.ca/n1/daily-quotidien/170920/dq170920f-eng.htm>

⁹ Garis, L. and D. Plecas (n.d.) Smoke Alarm Distribution and Installations Initiative in First Nations Communities in British Columbia: Setting the Baseline for Evaluation. Abbotsford, BC: University of the Fraser Valley.

¹⁰ Briefing note to the Minister. See: <https://www.cbc.ca/news/politics/audit-reserves-inadequate-fire-protection-1.4124616>. The full report is available at: <https://www.documentcloud.org/documents/3727328-Fire-Protection-Briefing-Note-for-the-Minister.html#document/p6/a354436>

- 39 limited service sites (17 within Ontario and 22 in British Columbia).¹¹

Although Indigenous and Northern Affairs Canada (INAC) collects some data on the preparedness of First Nations communities and the amount of equipment they may have, that information is not always accurate or up to date. In Ontario, for example, Matthew Miller who is fire chief for the Six Nations of the Grand River, has argued that information on the level of fire protection in a community is often inaccurate. He and the Ontario Native Firefighters Society completed fire assessments in several First Nations and what they found was often not consistent with the government's statistics. As he told an interviewing reporter:

"We would have a list of the First Nation and what they were listed as in the federal database – whether or not they have fire protection – and Big Trout Lake was typical of many of the First Nations we went to...they were listed as having fire protection but when we arrived in the community, they did not have fire protection," said Miller. "By that I mean...they may have received a fire truck in the past, but unfortunately, an organized fire service was unable to be established."¹²

Issue of Wildfires

Making matters worse, First Nations communities are at disproportionate risk to wildfires due to where they are located. As the House of Commons' Standing Committee on Indigenous and Northern Affairs noted:

In summer 2017, Canada experienced an intense wildfire season. More than 5,300 fires burned over 34,000 square kilometres. During this period, First Nations faced 49 wildfire emergencies, and over 12,800 First Nations people were evacuated from their communities. Compared to non-Indigenous communities, First Nation communities are disproportionately affected by these emergency events for a number of reasons, such as their relative remoteness, isolation in fire-prone areas and limited access to emergency services.¹³

The Standing Committee went on to note that approximately 200 have a high risk in relation to wildfires.

The ability of First Nations communities to respond to fire incidents varies considerable from one community to another and one part of the country to another. Larger communities located in more central or more highly population parts of the country often have adequate access to local resources. This tends not to be the case for smaller communities and more remote locations. Rarely, do remote reserves with a population of 50 to 100 people have adequate firefighting equipment. Furthermore, for many

¹¹ Note to Minister, *supra*, pp. 5-6.

¹² <http://www.firstnationsdrum.com/2019/05/the-system-is-broken-say-ontario-first-nations-firefighters-of-fire-protection-in-indigenous-communities/>

¹³ Report of the Standing Committee on Indigenous and Northern Affairs (2018) *From the Ashes: Reimagining Fire Safety and Emergency Management in Indigenous Communities*. Ottawa: House of Commons.

communities, fire response challenges relate not only to a lack of equipment but also a lack of adequate training even when such equipment is available.¹⁴

Available Data

Detailed data relating to fires on First Nations communities is scarce, scattered and inconsistent. A Central Mortgage and Housing Corporation (CMHC) publication from 2007 indicated that the per capita fire incidence rate is 2.4 times higher in First Nation communities than in the rest of the country, and loss of life due to fire is 10 times higher.¹⁵ Unfortunately, more recent data are not available since, according to the Commons' Committee, the federal government stopped collecting systematic data on on-reserve fires in 2010.¹⁶ Witnesses before the Committee, however, made reference to a Toronto Star report indicating that: "at least 173 people have died in fires in First Nation communities across the country since the government stopped tracking the deaths seven years ago. At least 25 of them are children."¹⁷

Baseline Data

Until 2010, Statistics Canada collected on-reserve information through its Fire Losses Reports. This practice was discontinued, apparently to "ease the reporting burden" on First Nations communities although it coincided with cutbacks the government of the day made to Statistics Canada and other agencies.¹⁸ Consequently, it is necessary to examine other sources for any available data. The IFM is proposing to create and manage data collection about fires and their circumstances on reserves that will be helpful in evidence-based policy and programming. The timeline for implementation and then data use maturity is unknown but remains an important objective for the future value it can provide.

There are three types of information that we generally need to collect in order to assess the impact of any program or policy intervention. The first is information relating to the cause of the event; the second is information relating to the outcome of the event; and, the third is information relating to contextual or intervening matters.

¹⁴ Standing Committee, *supra.*, p. 16

¹⁵ Canada Mortgage and Housing Corporation (2007) Fire Prevention in Aboriginal Communities. Ottawa. Available online at: http://publications.gc.ca/collections/collection_2008/cmhc-schl/nh18-23/NH18-23-107-009E.pdf

¹⁶ Standing Committee on Indigenous and Northern Affairs, *supra.*, p. 34

¹⁷ Siekierska, A. and J. Winter, (2017) Fire and Death in Canada's First Nations, *Toronto Star*, 24 February 2017. Available online at: <https://projects.thestar.com/first-nations/fire-and-death-in-canadas-first-nations/>

¹⁸ Siekierska and Winter, *supra.*

Cause of the Event

The only reasonably current national source of information on the cause of fire incidents is the National Fire Information Database (NFID). The NFID merged data from the appropriate fire commissioner's/fire marshal's offices across Canada for the period 2005 to 2015 inclusive. It is possible to identify First Nations communities in five provinces: Ontario, Manitoba, Saskatchewan, Alberta and British Columbia. Data from the other provinces and territories is limited and even in those just mentioned, data are not available for all years. Except for Manitoba, a specific FN code does not exist so it would be necessary to modify the database to identify each location (a CMA or CA) as either being a FN community or not.

In general terms, the NFID contains information on the following:¹⁹

- i. fire incident characteristics (e.g., date, time, location);
- ii. property characteristics (e.g., type of property and use, type of construction, age of building);
- iii. fire protection features (e.g., use of sprinklers, alarms);
- iv. the circumstances contributing to the outbreak of fire (e.g., igniting object, fuel or energy associated with igniting object);
- v. the factors related to the origin and spread of fire (e.g., area of origin, flame and smoke spread areas);
- vi. fire loss details (e.g., extent of fire and damage, dollar amount of loss);
- vii. the discovery of fire and actions taken (e.g., how fire was initially detected, transmission of alarm to fire department, performance of extinguishing equipment and smoke alarm device, occupants in dwelling at time of fire);
- viii. fire casualties (e.g., age and sex of victim, nature of casualties (i.e., extent of injury, death), cause of failure to escape);
- ix. other existing socio-economic variables from Statistics Canada (e.g., average income data, employment rates, crime rates, etc.);
- x. other data elements not mentioned above, which may be collected only by selected fire services.

To broaden the cause of fire data in the NFID to include a broader range of FN communities and to provide more up-to-date information, it is likely the IFM would have to address those communities not covered in the NFID directly. This is important because Quebec, the Maritimes and regions north of the 60th parallel contain a substantial proportion of Canada's First Nations population.

Outcome of the Event

In the current context, outcome data relates to the consequences of a fire incident. Here, we may look at deaths, injuries and property damage. Of the three of these indicators, deaths are the most consistent and reliable information available. What is missing from all the official datasets is some important context about the situation where and when the loss occurred. We know, for example, that there are often behavioural actions such as drinking and smoking that can influence outcomes in all fire incidents.

¹⁹ Statistics Canada (2017) National Fire Information Database (NFID): Data Dictionary. Ottawa.

Deaths

Limited information of deaths associated with fire incidents is available in the NFID. As indicated previously, however, detailed NFID data identifying First Nations communities is only available in five provinces. It is possible, however, to augment information of fire deaths through other sources, specifically, Statistics Canada's mortality database.

All deaths in Canada are required to be recorded by the provincial or territorial coroner or medical examiner's office that has jurisdiction over the Vital Statistics register.²⁰ Those data are then forwarded to Statistics Canada to be included in the annual report on deaths in Canada. The cause of death variable in the death database is classified according to the World Health Organization's "International Statistical Classification of Diseases and Related Health Problems" (ICD). The classification system has changed over time; however, ICD-10 has been consistent from 2000 to present.

In broad terms, the following items are reported for each death by the reporting jurisdictions:

- Age, sex, marital status, place of residence and birthplace of the deceased.
- Date of death.
- Underlying cause of death as classified by the ICD.
- Aboriginal ancestry (that is, First Nations [North American Indian], Métis, and Inuit).
- Province or territory of occurrence of death.
- Place of accident (for most non-transport accidental deaths).
- Autopsy (whether one was held and whether those results were used to the cause of death).

As might be expected, there is a time lag between when deaths occur and when they are entered into the Statistics Canada database. In some situations where information is missing on individual cases, imputations are made. For example, if an individual's age is missing, it might be imputed from the person's date of birth. Other information might be imputed using more complex procedures or algorithms.

Overall, the death data are reported by Statistics Canada as being highly reliable although the last comprehensive study of "data capture and data coding" was conducted in 1981. It is not clear whether on-reserve data are similar in quality to that collected off-reserve and it is also not clear how reliable the Aboriginal ancestry indicator might be.

Injuries and Property Damage

Limited information on injuries and property damage is available in the National Fire Information Database (NFID). The NFID merged data from the appropriate fire commissioner's/marshal's offices across Canada for the period 2005 to 2015 inclusive. It is possible to identify First Nations communities in five provinces: Ontario, Manitoba, Saskatchewan, Alberta and British Columbia. Except for Manitoba, a

²⁰ Provincial and territorial Vital Statistics Acts (or equivalent legislation) require that all live births, stillbirths, deaths and marriages within their jurisdictions be recorded.

specific FN code does not exist so it would be necessary to modify the database to identify each location (a CMA or CA) as either being a FN community or not. Manitoba, however, lists 1,564 fire incidents as having occurred on a FN community. There are 36 fire incidents identified where a death occurred; 33 incidents where a person was injured as a result of the fire; and, 62 incidents where the total number of deaths and persons injured was recorded.

The NFID also provides detailed information relating to the cause of the fire, the characteristics of the structure and characteristics of the overall community for many, but not all, occurrences.

Contextual Variables

The NFID contains some contextual variables relating to the socio-economic characteristics of the community in which the fire occurred. These are drawn from the 2006 and 2011 Censuses. Not all information available in the relevant Censuses was linked to the NFID. Similarly, communities in which a fire incident was not reported are not included in the NFID. If one wished to conduct a comparison of those communities which had fire incidents with those that did not, it would be possible to construct a comparison group from the Census databases.

Depending upon the Census year (2006, 2011 or 2016) it is possible to identify the following indicators for both First Nations (i.e., “on-reserve”) and non-First Nations communities.

1. Location
 - 1.1. Province
 - 1.2. Community (census subdivision)
2. Demographic
 - 2.1. Size of community (population)
 - 2.2. Age distribution
 - 2.2.1. Average age in community
 - 2.2.2. Proportion of young people (e.g., under age 10)
 - 2.2.3. Proportion of seniors
 - 2.2.4. Dependency ratio [(young+old)/working age]
 - 2.3. Number of Males and Females (gender ratio – females:males)
 - 2.4. Marital Status
 - 2.4.1. Legally married (and not separated)/living common law
 - 2.4.2. Separated/widowed/divorced
 - 2.4.3. Never legally married and not in common law
3. Education
 - 3.1. Proportion did not attend school
 - 3.2. Proportion elementary school
 - 3.3. Proportion secondary school
 - 3.4. Proportion some post-secondary

4. Labour Market Status
 - 4.1. Employed
 - 4.2. Unemployed
 - 4.3. Not in labour force

5. Income
 - 5.1. Median Income
 - 5.2. Proportion low income (LICO)

6. Family Composition

7. Households
 - 7.1. Household Size
 - 7.1.1. Number of children in household
 - 7.2. Household Type
 - 7.2.1. Single person
 - 7.2.2. Lone parent
 - 7.2.3. Cohabiting couple no children
 - 7.2.4. Cohabiting with children

8. Dwellings
 - 8.1. Number of bedrooms
 - 8.2. Number of rooms
 - 8.3. Proportion of not suitable housing (under NOS)
 - 8.4. Dwelling condition
 - 8.4.1. No repairs, only regular maintenance needed
 - 8.4.2. Minor repairs needed
 - 8.4.3. Major repairs needed

Under-Enumerated Reserves

In 2006, there were 22 First Nations communities (Indian reserves and settlements) out of 612 that were “incompletely enumerated” across Canada. Essentially, these were communities where permission was not given for the Census to be conducted. That number increased to 31 communities in 2011 but was subsequently reduced to 14 First Nations communities in the 2016 Census.

Among the communities not included in the 2016 Census were the following:

Name	Type	Province	Census division	CMA/CA
Chippewas of the Thames First Nation 42	IRI	Ontario	Middlesex	...
Doncaster	IRI	Quebec	Les Laurentides	...
Esquimalt	IRI	British Columbia	Capital	Victoria
Goulais Bay 15A	IRI	Ontario	Algoma	...
Kahnawake	IRI	Quebec	Roussillon	Montréal
Kanesatake	S-É	Quebec	Deux-Montagnes	Montréal
Lac-Rapide	IRI	Quebec	La Vallée-de-la-Gatineau	...
Oneida 41	IRI	Ontario	Middlesex	...
Pikangikum 14	IRI	Ontario	Kenora	...
Rankin Location 15D	IRI	Ontario	Algoma	Sault Ste. Marie
Saddle Lake 125	IRI	Alberta	Division No. 12	...
Six Nations (Part) 40	IRI	Ontario	Brant	Brantford
Six Nations (Part) 40	IRI	Ontario	Haldimand-Norfolk	...
Wahta Mohawk Territory	IRI	Ontario	Muskoka	...
... not applicable IRI ≡ Indian reserve S-É ≡ Indian settlement Source: Statistics Canada, Census of Population, 2016.				

Going Forward

The data sources identified in this report indicate what exists and what could be used to create a baseline or the “before” part of a comparison. The question remains as to what we might be able to use to measure the performance of any intervention after it has been implemented.

The vital statistics data are collected by Statistics Canada annually so it will be possible to identify fire-related fatalities. Because the data are submitted by the provinces rather than collected in real time, there is about a year’s delay in the death data. It is possible to obtain copies of the necessary data in one of two ways. First, Statistics Canada is willing to generate specific tables upon request on a cost-recovery basis. It is also possible to access the raw data through as Statistics Canada Regional Data Centre (RDC). RDCs exist in most major universities across the country and are open to qualified researchers upon the submission of a proposal.

In many respects, the most useful database available is the NFID. Currently, it is only available for the years 2005-2015 inclusive. Also, only Ontario, Manitoba, Saskatchewan, Alberta and British Columbia are

included in the database. There are no current plans on the part of Statistics Canada to update the NFID but that might change. However, it is possible to bring much of the NFID up to date independently by requesting more recent fire commissioner/fire marshal data from the provinces mentioned. Most jurisdictions will likely provide the data upon request. If not, it would be possible to obtain it through a Freedom of Information request. As with the death data, there will be about a year's lag in the results.

A third database that we have identified is that kept by INAC relating to available firefighting equipment in First Nations communities. Questions have been raised as to the accuracy of the existing data and it is not clear to what extent INAC is committed to or capable of updating that resource. Again, it is likely that INAC would be willing to provide any updates to the IFM. It would also be possible to obtain that data through a Freedom of Information request.

The fourth set of data that would be of use is the Census of Canada. The Census is conducted every five years, with 2016 being the last once completed. The next Census will be conducted in 2021. There is generally a two-year lag between when the Census is conducted and when the data become available. Generally, the type of data required (community-level) is made publicly available through Statistics Canada's Data Liberation initiative. As with the vital statistics (death) data, it is possible to obtain special tabulations from Statistics Canada that are not in the public domain on a cost-recovery basis. It is also possible to gain access to the data through one of the RDCs. Again, access is generally granted to qualified researchers with the submission of a detailed proposal.

Targeted Data Collection — The Indigenous Fire Marshal Project

While the previously mentioned sources can provide useful data, they all have limitations. The two primary ones are the lag between when events occur and when they are reported, and a lack of complete geographical coverage. The latest information in the NFID, for example, is from 2015 with no immediate plans to update the database. It is also missing substantial amounts of information from the maritime provinces and the territories. Furthermore, it is often the case that First Nations communities are either incompletely covered or the necessary data are not provided in adequate detail.

One possible source of information that has not been discussed in this report is what might be obtained by conducting a specialized or targeted survey. The cost of conducting a telephone survey of all First Nations or their associated tribal councils, for example, would not be prohibitive. There are fewer than 650 communities across Canada and that number is substantially reduced if we consider them as being under the umbrella of a tribal council. Specialized surveys would allow for indicators to be collected that are not available through other sources. A targeted survey of FN communities would also allow for the collection of contextual information that is not relevant to the general surveys conducted by formal agencies such as INAC or Statistics Canada.

The IFM is well placed to collect timely information relating to FN communities that is not currently being collected by government agencies which may have different priorities. As noted previously, the federal

government collected data from individual FN communities on fire incidents until 2010. At that time, the program was discontinued as government priorities changed.²¹

Furthermore, it should be noted that the IFM has a depth of understanding relating to fire incidents, fire prevention and firefighting that is lacking in agencies focussed on more general issues. By putting together a data library consisting of official statistics and material collected by the IFM, it should be possible to monitor and evaluate policy and program interventions in a more relevant and timely fashion thereby enhancing the mandate of the IFM.

Based on these considerations, the IFM could consider fire incident monitoring and collecting relevant data as a core element of its mandate to protect First Nations communities.

How Do We Know if it Works?

The obvious way to determine whether an intervention works is to examine what occurred before and after the intervention was introduced. For example, we might wish to look at the rate at which fires occurred after a fire engine or a fire education program was introduced into a community. If fire deaths went down during the “after” period, we would likely conclude that the intervention had an impact.

Unfortunately, the situation is not that simple. It is possible that other factors could have changed while the intervention was being put in place. For example, if fire prevention programs such as smoke alarm installations and education programs were implemented at the same time, any reduction in fire deaths may be due as much to the smoke alarms and prevention programming as opposed to the existence of a fire engine. Similarly, there may be no difference in the before and after rates, which might lead one to conclude that the presence of the fire engine had no impact. Looking at surrounding communities, however, we note that deaths had increased because of a weather shift resulting in more wildfires and more deaths as a result. In this instance, while the death rate had not gone down in the community with the fire engine, it had not gone up as in other communities. In this instance, it would be reasonable to assume that the presence of a certain program or intervention had an influence on not allowing the rate of deaths to increase.

To get a better indication of whether a certain program or fire engine had an impact on its host community, we need to have something to compare it to. This leads to the concept of a “control group.” The term “control,” as used in research, originates from the word “counter-roll” which was a master list used to check and correct other lists. Boring²² notes that in the modern context there are four types or uses of the term control. These include constancy of conditions, control series, behavioural control, and control groups. Here we are using our process to create a constancy of conditions. The most common of the four “control” methods is the control group. Essentially, this implies that the researcher is holding one group constant by not subjecting it to some outside stimulus (variable) to which the target or experimental group is being exposed. Most experimental research is conducted in this way. In medical research subjects

²¹ Report of the Standing Committee on Indigenous and Northern Affairs (2018) *From the Ashes: Reimagining Fire Safety and Emergency Management in Indigenous Communities*. Ottawa: House of Commons. P. 34

²² Boring, E. G. (1969) Perspective: Artifact and control, in R. Rosenthal and R. Rosnow (eds). *Artifact in Behavioural Research*. Academic Press, New York, pp. 1-11.

are randomly assigned to different groups. One group (the control) is given a placebo, for example, while the experimental group gets a drug that is being tested. The researcher then compares the two groups to see whether the new drug differs from the placebo. What is assumed in this experimental design is that, except for the experimental condition, the two groups are similar and other influences that might affect the performance of the groups are not assumed to interfere.

Complex social settings cannot be controlled in this way. The best we can do is to create some understanding of the outside effects that influence both groups and make them unique. We and others have noted in other research that First Nation communities, despite being of diverse languages, history and culture, share certain characteristics that set them aside a group, from non-First Nation communities.²³ We noted above that First Nation communities are generally smaller settlements and they are often isolated from labour, capital and consumer markets. We find it logical to argue that these factors may be interacting or “interfering” with the characteristics researchers and policy makers are interested in understanding. It makes sense, therefore, to select communities that can act as case comparators or “controls” for the effects of these structural limitations.

To adequately assess the impact of a given intervention, whether it is the introduction of fully equipped fire stations, the provision of fire alarms, or any other fire suppression technique, we need to select appropriate case controls. Generally, we would argue, it makes sense to identify both other First Nations and non-First Nations communities as case matches or controls against which any community receiving an intervention might be compared.

The situation can be diagrammed as follows:

Condition	Before		After
Target communities:	O ₁	X	O ₂
Control FN:	O ₃	X	O ₄
Control non-FN:	O ₅	X	O ₆

Here, O stands for “observation” and X stands for “intervention.” In the target communities, we take some observations before the introduction of the intervention (at O₁); introduce the intervention at time X, then observe what happens afterward (at O₂). Ideally, the outcome (say, a fire-related deaths), will be lower at O₂ than O₁. To determine whether any difference between O₂ and O₁ is meaningful, we would also

²³ White, J., D. Beavon and P. Maxim (eds). (1993) *Aboriginal Conditions: The Research Foundations of Public Policy*. Vancouver: UBC Press; Maxim, P., J. White and D. Beavon. (2003) Dispersion and Polarization of Income Among Aboriginal and Non-Aboriginal Canadians. In White, J., D. Beavon and P. Maxim (eds). (1993) *Aboriginal Conditions: The Research Foundations of Public Policy*. Vancouver: UBC Press.

compare any changes that might have also happened in comparison or control First Nations communities (O_4 vs. O_3), or perhaps in the non-First Nations communities (O_6 vs. O_5).

If the change in the target communities is different from those of the control communities, we have reason to believe that the intervention has had an impact.

Alternatives

Rather than explicitly creating groups of control communities, it is possible to achieve the same results by using complex statistical modelling. There are also some instances where these statistical models might generate superior results. The price to be paid, however, is that the results are not always intuitive and are generally very difficult for most people to understand. By explicitly creating categories of target and control communities, it is typically easier for people to understand the impact that an intervention might have. We generally take the approach that, unless absolutely necessary, simpler and more readily understandable approaches are superior to more complex ones.

Conclusions

From the research in conducted in this report its clear that a baseline for first nations fire casualties is feasible, necessary and recommended. Adequate baseline data are important for several reasons. As Garis and his colleagues have shown, it is possible to target the highest “at risk” populations in both on- and off-reserve communities.²⁴ This allows for a more effective and efficient allocation of resources. Baseline data are also important for providing a point of comparison to assess the effectiveness of policy and program interventions. This will allow the IFM to create a research agenda around activities such as building code standards and adoption, sprinkler standards, fire apparatus procurement intervals, fire insurance grading and other relevant issues.

One of the limiting factors with the Canadian situation, however, is that the appropriate data are scattered and inconsistent. We believe, however, that while not perfect, it is possible to put adequate data together to provide meaningful assessments.

Among the primary existing data sets we have identified are the following:

- The National Fire Information Database
- Provincial and territorial fire marshal/fire commissioner data
- The “deaths” component of the Vital Statistics database
- INAC administrative data
- Canadian census data

²⁴ Garis, L., S. Hughan, P. Maxim and A. Tyakoff (2016) Targeted Residential Fire Risk Reduction: A Summary of At-Risk Aboriginal Areas in Canada. Abbotsford, BC: University of the Fraser Valley. Available at: <https://cjr.ufv.ca/wp-content/uploads/2016/10/Canada-Aboriginal-FINAL-RESEARCH-STUDY-Targeted-Oct-2016.pdf>

- IFM initiated data collection

Existing fire-related data can provide a good starting point for monitoring and evaluating patterns of fires and fire outcome interventions in First Nations communities. The IFM also has the potential to conduct targeted, small-scale and cost-effective surveys of communities. These surveys need not be expensive but could be used to collect more relevant and more timely data on fire incidents in First Nations communities across the country. The Indigenous Fire Marshal has a depth of understanding relating to fire incidents, fire prevention and firefighting that may not exist in agencies focussed on more general issues. Furthermore, as has been shown, government agencies cannot be relied upon to collect and maintain the information they currently generate.

Appendix 1: Incompletely enumerated Indian reserves and Indian Settlements, 2006

Name	Type	Province	Census division	CMA/CA
... not applicable				
Source: Statistics Canada, 2006 Census of Population.				
Akwesasne (formerly Akwesasne (Partie))	IRI	Quebec	Le Haut-Saint-Laurent	...
Akwesasne (Part) 59	IRI	Ontario	Stormont, Dundas and Glengarry	...
Attawapiskat 91A	IRI	Ontario	Kenora	...
Bear Island 1	IRI	Ontario	Nipissing	...
Big Island Lake Cree Territory (formerly Big Head 145)	IRI	Saskatchewan	Division No. 17	...
Doncaster (formerly Doncaster 17)	IRI	Quebec	Les Laurentides	...
Esquimalt	IRI	British Columbia	Capital	Victoria
Factory Island 1	IRI	Ontario	Cochrane	...
Fort Severn 89	IRI	Ontario	Kenora	...
Gesgapegiag (formerly Gesgapegiag 2)	IRI	Quebec	Avignon	...
Kahnawake (formerly Kahnawake 14)	IRI	Quebec	Roussillon	Montréal
Kanesatake	S-É	Quebec	Deux-Montagnes	Montréal
Lac-Rapide	IRI	Quebec	La Vallée-de-la-Gatineau	...
Little Buffalo	S-É	Alberta	Division No. 17	...
Oneida 41	IRI	Ontario	Middlesex	...
Saddle Lake 125	IRI	Alberta	Division No. 12	...
Six Nations (Part) 40	IRI	Ontario	Brant	Brantford
Six Nations (Part) 40	IRI	Ontario	Haldimand-Norfolk	...
Tsuu T'ina Nation 145 (Sarcee 145)	IRI	Alberta	Division No. 6	Calgary
Tyendinaga Mohawk Territory	IRI	Ontario	Hastings	...
Wahta Mohawk Territory	IRI	Ontario	Muskoka	...
Wendake	IRI	Quebec	Quebec	Québec

Appendix 2: Incompletely Enumerated Indian reserves and Indian Settlements, 2011

Name	Type	Province	Census division	CMA/CA
Akwesasne	IRI	Quebec	Le Haut-Saint-Laurent	...
Akwesasne (Part) 59	IRI	Ontario	Stormont, Dundas and Glengarry	...
Attawapiskat 91A	IRI	Ontario	Kenora	...
Bear Island 1	IRI	Ontario	Nipissing	...
Bearskin Lake	IRI	Ontario	Kenora	...
Big Island Lake Cree Territory	IRI	Saskatchewan	Division No. 17	...
Brokenhead 4	IRI	Manitoba	Division No. 13	Winnipeg
Dauphin River 48A	IRI	Manitoba	Division No. 19	...
Doncaster	IRI	Quebec	Les Laurentides	...
Esquimalt	IRI	British Columbia	Capital	Victoria
Fort Hope 64	IRI	Ontario	Kenora	...
Goulais Bay 15A	IRI	Ontario	Algoma	...
Kahnawake	IRI	Quebec	Roussillon	Montréal
Kanesatake	S-É	Quebec	Deux-Montagnes	Montréal
Kasabonika Lake	IRI	Ontario	Kenora	...
Kingfisher Lake 1	IRI	Ontario	Kenora	...
Lac-Rapide	IRI	Quebec	La Vallée-de-la-Gatineau	...
Neskantaga	IRI	Ontario	Kenora	...
Pikangikum 14	IRI	Ontario	Kenora	...
Poplar Hill	IRI	Ontario	Kenora	...
Rankin Location 15D	IRI	Ontario	Algoma	Sault Ste. Marie
Sachigo Lake 1	IRI	Ontario	Kenora	...
Saddle Lake 125	IRI	Alberta	Division No. 12	...
Summer Beaver	S-É	Ontario	Kenora	...
Wahta Mohawk Territory	IRI	Ontario	Muskoka	...
Walpole Island 46	IRI	Ontario	Lambton	...
Wawakapewin (Long Dog Lake)	IRI	Ontario	Kenora	...
Weagamow Lake 87	IRI	Ontario	Kenora	...
Webequie	IRI	Ontario	Kenora	...
Wendake	IRI	Quebec	Québec	Québec
Wunnumin 1	IRI	Ontario	Kenora	...
... not applicable				

Appendix C: Data Elements Reported to the NFID, by Jurisdiction

Data Element Description	Variable name	British Columbia	Alberta	Saskatchewan	Manitoba	Ontario	New Brunswick	Canadian Armed Forces
1. INCIDENT FILE								
<i>Incident information</i>								
Jurisdiction	JURIS	✓	✓	✓	✓	✓	✓	✓
Incident ID	INCDNTID	✓	✓	✓	✓	✓	✓	✓
Year	YEAR	✓	✓	✓	✓	✓	✓	✓
Month of year	MONTH	✓	✓	✓	✓	✓		
Date of month	DATE	✓	✓	✓	✓	✓		
Day of week	DAY		✓					
Time	TIME	✓	✓		✓			
Incident location	INCIDLOC	✓	✓	✓	✓	✓		
Response of first vehicle	RESPONSE		✓	✓				
Mutual aid	MUTLAID		✓	✓		✓		
Crew size	CREWSIZE				✓	✓		
Response time of subsequent vehicles	RESPSUB			✓				
Subsequent crew size	SUBSIZE			✓		✓		
# of engines	NUMBENG			✓				
# of aerials	NUMBAER			✓				
# of tankers	NUMBTANK			✓				
# of CFR vehicles	NUMBCFR			✓				
# of other vehicles	NUMBOTH							
Distance from fire department to emergency	DISTANCE					✓		
Status on arrival	STATARR					✓		
Number of persons rescued	NUMBRES				✓	✓		
Number of deaths	NUMDEATH	✓	✓	✓	✓	✓	✓	
Number of injured persons	NUMBINJ	✓	✓	✓	✓	✓	✓	
Total casualties	NUMBCAS	✓	✓	✓	✓	✓	✓	

Data Element Description	Variable name	British Columbia	Alberta	Saskatchewan	Manitoba	Ontario	New Brunswick	Canadian Armed Forces
<i>Property description</i>								
Fire type (structure, vehicle, outdoor) - derived variable	FIRETYPE	✓	✓	✓	✓	✓		✓
Type of structure - derived variable	STRUCTYP	✓	✓	✓	✓	✓		✓
Major occupancy	MAJOCC	✓	✓	✓	✓	✓		✓
Major occupancy - grouped variable	MAJOCGRP	✓	✓	✓	✓	✓		✓
Property classification	PROPCLAS	✓	✓	✓	✓	✓		✓
Property classification - grouped variable	PROPGRP	✓	✓	✓	✓	✓		✓
Property classification - subgrouped variable	PROPSUBG	✓	✓	✓	✓	✓		✓
Property ownership	PROPOWN					✓		
Illegal use of building	ILLUSE					✓		
<i>Property details</i>								
General construction	GENCONST	✓	✓		✓	✓		
Method of construction	METHCONS		✓					
Year of construction	YEARCONS	✓	✓					
Building height	HEIGHT	✓	✓	✓	✓	✓		
Ground floor area	FLRAREA	✓	✓	✓	✓			
Number of occupants	NUMBOCC	✓	✓					
Value at risk - Building/vehicle	RISKVALA	✓	✓	✓				
Value at risk - Contents	RISKVALB	✓	✓	✓				
Value at risk - Total	RISKVALC	✓		✓		✓		
<i>Fire protection features</i>								
Manual fire protection facilities	MANPROT	✓	✓		✓	✓		
Sprinkler protection	SPRINPRO	✓	✓	✓	✓	✓	✓	
Fixed system other than sprinklers	FIXEDSYS		✓	✓		✓		
Automatic fire detection system	AUTODET	✓	✓		✓	✓		
Fire detection devices	FIREDET		✓	✓		✓		
Outside fire protection	OUTPROT	✓	✓		✓			
Water situation	WATER					✓		
Fire service in area	SERVICE	✓	✓		✓			

Data Element Description	Variable name	British Columbia	Alberta	Saskatchewan	Manitoba	Ontario	New Brunswick	Canadian Armed Forces
<i>Circumstances contributing to the outbreak of fire</i>								
Igniting object	IGNIOBJ	✓	✓	✓	✓	✓	✓	✓
Igniting object - grouped variable	IGNOGRP	✓	✓	✓	✓	✓	✓	✓
Fuel or energy associated with igniting object	FUELEGRY	✓	✓	✓	✓	✓		
Energy causing ignition (Form of heat)	ENERGY	✓	✓	✓	✓			
Material first ignited	MATERIAL	✓	✓		✓	✓	✓	✓
Material first ignited - grouped variable	MATERGRP	✓	✓	✓	✓	✓	✓	✓
Act or omission	ACTOROM	✓	✓	✓	✓	✓	✓	✓
Act or omission - grouped variable	ACTOMGRP	✓	✓	✓	✓	✓	✓	✓
<i>Factors relating to the origin and spread of fire</i>								
Area of origin	ORIGIN	✓	✓	✓	✓	✓	✓	✓
Area of origin - grouped variable	ORIGGRP	✓	✓	✓	✓	✓	✓	✓
Level of origin	LEVELOR	✓	✓	✓	✓	✓		
Flame spread - interior finish	FLAMEINT		✓	✓	✓			
Flame spread - verticle openings	FLAMEVER		✓		✓			
Flame spread - horizontal openings	FLAMEHOR		✓		✓			
Smoke spread avenues	SMOKSPRD		✓		✓			
<i>Fire loss details</i>								
Extent of fire	FIREEXT	✓	✓			✓		
Extent of damage	DAMEXT	✓	✓					
Dollar loss - Building/vehicle	DOLLOSSA			✓				
Dollar loss - Contents	DOLLOSSB			✓				
Dollar loss - Total	DOLLOSSC		✓	✓		✓		
<i>Discovery of fire and actions taken</i>								
Initial detection	DETECT	✓	✓		✓	✓		
Transmission of alarm to fire department	TRANSALM	✓	✓		✓	✓		
Action taken	ACTION	✓	✓		✓	✓		
Performance of automatic extinguishing equipment	PERFORM	✓	✓		✓	✓		
Method of fire control and extinguishment	CONTMETH	✓	✓		✓			✓

Data Element Description	Variable name	British Columbia	Alberta	Saskatchewan	Manitoba	Ontario	New Brunswick	Canadian Armed Forces
Method of fire control and extinguishment - grouped variable	METHDGRP				✓			✓
Performance of smoke alarm device	SADPERF	✓	✓	✓	✓	✓	✓	
Impact of smoke alarm activation on occupant response/evacuat	IMPACT		✓		✓	✓		
Occupants in dwelling unit at time of fire - Senior citizens	OCCPNTSA		✓					
Occupants in dwelling unit at time of fire - Adults	OCCPNTSB		✓					
Occupants in dwelling unit at time of fire - Youth	OCCPNTSC		✓					
Occupants in dwelling unit at time of fire - Children	OCCPNTSD		✓					
2. VICTIM FILE								
<i>Fire casualties</i>								
Jurisdiction	JURIS	✓	✓	✓	✓	✓	✓	
Year of incident	YEAR	✓	✓	✓	✓	✓	✓	
Incident ID	INCDNTID							
Age of victim	VICAGE	✓	✓	✓	✓	✓	✓	
Sex of victim	VICSEX	✓	✓	✓	✓	✓	✓	
Status of victim	VICSTAT	✓	✓	✓	✓	✓	✓	
Firefighter status	FFSTATUS					✓		
Fire fighting years of experience	FFYEARS					✓		
Height of firefighter	FFHEIGHT					✓		
Weight of firefighter	FFWEIGHT					✓		
Firefighter - Helmet worn at tine of injury/death	FFHELMET					✓		
Firefighter - Helmet line used at time of injury/death	FFHLINE					✓		
Firefighter - Face shield used at time of injury/death	FFSHIELD					✓		
Firefighter - Other eye protection used at time of injury/death	FFOTHEYE					✓		
Firefighter - Coat (turnout) worn at time of injury/death	FFCOAT					✓		
Firefighter - Gloves worn at time of injury/death	FFGLOVES					✓		
Firefighter - Boots worn at time of injury1death	FFBOOTS					✓		
Firefighter - Hose key belt worn at time of injury/death	FFHKBELT					✓		

Data Element Description	Variable name	British Columbia	Alberta	Saskatchewan	Manitoba	Ontario	New Brunswick	Canadian Armed Forces
Firefighter - Breathing apparatus used at time of injury/death	FFBRAPP					✓		
Firefighter - Bunker suit worn at time of injury/death	FFBUNKER					✓		
Firefighter - Protective hood worn at time of injury/death	FFPRHOOD					✓		
Nature of casualties	NATCAS	✓	✓	✓	✓	✓	✓	
Probable/possible cause	CAUSE	✓	✓	✓				
Type of injury	INJURTP					✓		
Class of victim	CLASSVIC	✓	✓		✓	✓		
Condition of casualty	CONDCAS	✓	✓	✓	✓	✓		
Action of casualty	ACTCAS	✓	✓	✓	✓	✓		
Cause of failure to escape	CAUSFAIL	✓	✓	✓	✓	✓		
Ignition of clothing or other fabrics	IGNITVIC	✓	✓		✓			
Type of fabric or material ignited	MATTYPE	✓	✓		✓			

Source: National Fire Information Database (NFID), Statistics Canada

Author Biographical Information

Len Garis (Ret) Fire Chief for the City of Surrey, British Columbia, is an Adjunct Professor in the School of Criminology and Criminal Justice & Associate to the Centre for Social Research at the University of the Fraser Valley (UFV), a member of the Affiliated Research Faculty at John Jay College of Criminal Justice in New York, Associate Scientist Emeritus at the BC Injury Prevention Unit and a faculty member of the Institute of Canadian Urban Research Studies at Simon Fraser University. Contact him at lwgaris@outlook.com.

Paul Maxim obtained his MA in criminology at the University of Ottawa and his PhD in sociology at the University of Pennsylvania where he specialized in criminology and research methods. He is formerly a professor in the Department of Economics and the Balsillie School of International Affairs at Wilfrid Laurier University in Waterloo, Ontario and is a Professor Emeritus in the Department of Sociology at Western University in London, Ontario. His current research interests focus on population and labour economics. Contact him at pmaxim@wlu.ca