Residential Structure Fire Deaths in BC, 2007-2011

BC Coroners Service
Ministry of Justice

BRITISH COLUMBIA

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Introduction

This report summarizes all accidental residential structure fire (hereafter residential fire) deaths in BC from 2007 through 2011. Structural fire deaths are those resulting from a fire involving any part of a structure, or the furniture or other contents inside a structure. These data do not include incidents where fire was limited to the body or clothing.

Deaths classified as Homicide or Suicide were excluded.

The risk factors for residential fire death in other jurisdictions have been well described[1,2]. For example, children under five and adults over 65 have the highest risk of death. Males are at a higher risk of death and injury from home fires than females. Other risk factors include structure type (e.g. mobile or trailer homes), alcohol or other drug use, physical disability, and lack of a functioning smoke alarm.

[1] Flynn JD. Characteristics of home fire victims. Quincy (MA): National Fire Protection Association; 2010. http://www.nfpa.org/assets/files/pdf/os.homevictims.pdf

[2] Ahrens M. Home structure fires. Quincy (MA): National Fire Protection Association; 2011. http://www.nfpa.org/assets/files/pdf/os.homes.pdf

Key Findings

Between 2007 and 2011 in B.C.:

- There were 164 deaths in 135 residential fires:
  - An average of 32.8 deaths in 27.0 fires each year.
  - Average annual death rate of 7.4 per 1 million population.
- Victims were 60.4% male and 39.6% female; males are 1.5 times more likely to be victims of residential fires.
- The average age of victims was 52.1 years:
  - Fourteen were children (<19 years of age).
  - Unlike other jurisdictions, very young children in B.C. did not have an elevated risk of residential fire death (rate of 3.6 per million).
  - Similar to other jurisdictions, older adults did have an elevated risk of residential fire death (rate from 12.0 to 21.0 per million).
- Persons of Aboriginal identity had 4 times the rate of residential fire death and were 20 years younger on average than non-Aboriginal victims.
- 40.4% of Aboriginal victims died in fires on Federal Reserve land.
- While the Northern region had the lowest number of deaths (average of 3.8), it also had the highest rate of death (13.3 per million).
- Fatal residential fires occurred most often between midnight and 5:00 AM, 41.5%, and during the winter, 39.3%.
- Single-family dwellings accounted for 42.2% of fatal residential fires, and trailer or mobile homes accounted for a further 23.0%.
- Smoking materials caused 32.6% of fires and 30.5% of deaths.
- In 36.3% of deaths, a smoke alarm either was not present or did not activate.
- Alcohol and/or drug use was a contributing factor in 39.0% of all deaths.

Statistics

Incidence and Victim Demographics

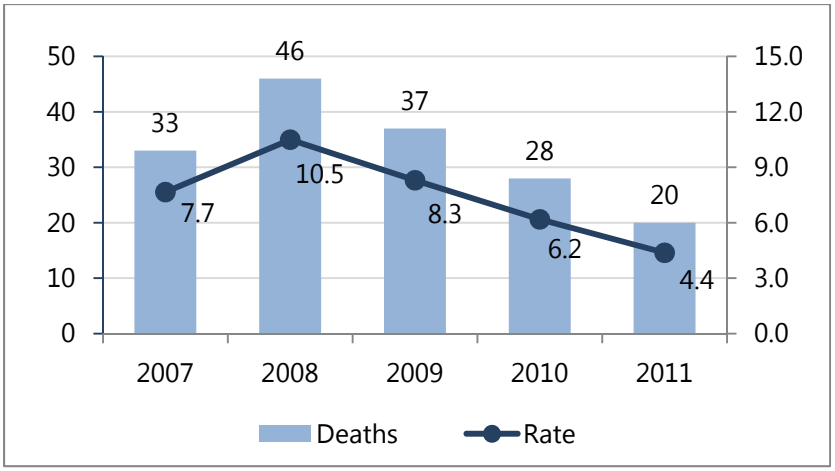

Figure 1. Number and Rate[3] of Residential Fire Deaths in BC, 2007-2011

Table 1. Number of Residential Fire Deaths and Number of Fatal Residential Fires, 2007-2011						
	2007	2008	2009	2010	2011	Total
Incidents	32	35	30	21	17	135
Deaths	33	46	37	28	20	164

One hundred and sixty-four British Columbians lost their lives in 135 residential fire incidents between 2007 and 2011. That is an average of 32.8 deaths in 27.0 fires each year. The residential fire death rate per 1 million population[3] during this period was 7.4, indicating that 7.4 of every million people in B.C. died each year in a residential fire. This is similar to the fire death rates observed in Alberta (7.8 per million in 2009[4]) and Ontario (10-year average 7.5 per million, 2001-2010[5]).

[3] Population rates calculated using population estimates obtained from BCStats, www.bcstats.gov.bc.ca.
[4] Alberta Emergency Management Agency. (2011). *Alberta Fire Commissioner's Statistical Report 2009*. Retrieved from www.aema.alberta.ca/documents/ema/2009- Fire_stat-report-aema-F.pdf
[5] Office of the Fire Marshall, Government of Ontario. (2011). *Fire Death Rate*. Retrieved from www.ofm.gov.on.ca/en/Media%20Relations%20and%20Resources/Statistics/Fire%20Death%20Rate.asp

Decedents were 39.6% female and 60.4% male, indicating that males were approximately 1.5 times more likely to be victims of residential fire than females. The average age of fire victims was 52.1 years.

Fourteen of the 164 decedent were children or youth (less than 19 years of age). Research in other jurisdictions has generally found that children under age 5 and adults over age 65 are at an increased risk of residential fire death[1]. The B.C. data showed a slightly different pattern: young children had a lower than average rate of residential fire death, 3.6 per million, while those aged 55 to 84 years had a higher than average rate, between 12.0 and 21.0 per million (the overall average rate was 7.4).

Decreased mobility was noted in the case files for 12.2% of residential fire victims. The average age of decedents with decreased mobility was 71.5 years, compared to 49.4 years for those with no mobility issues.

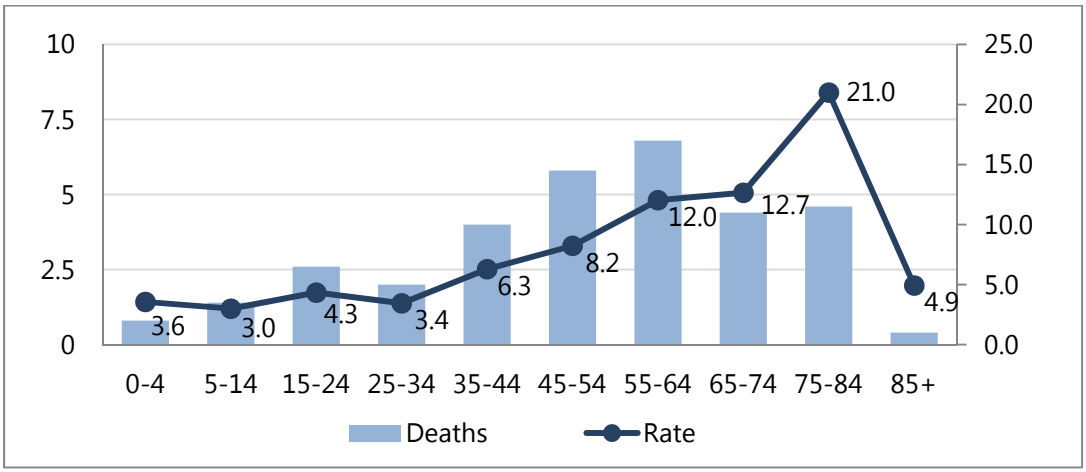

Figure 2. Average Number and Rate of Residential Fire Deaths by Age Group, 2007-2011

Table 2. Age Group of Residential Structure Fire Victims, 2007-2011

Deaths	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	Total
2007	-	-	2	4	3	9	7	2	4	2	33
2008	-	2	2	2	9	7	7	9	8	-	46
2009	-	4	4	3	3	6	13	1	3	-	37
2010	2	1	3	1	4	3	3	4	7	-	28
2011	2	-	2	-	1	4	4	6	1	-	20
Total	4	7	13	10	20	29	34	22	23	2	164
Average	0.8	1.4	2.6	2	4	5.8	6.8	4.4	4.6	0.4	32.8

Aboriginal Identity

In B.C. in 2006 (most recent year available), 4.8% of the population identified as Aboriginal[6], which includes First Nations, Métis and Inuit. However, 17.7% of residential fire victims were of Aboriginal identity. These data may underestimate the true number of Aboriginal victims, as Aboriginal identity is based on self-identity and information gathered during the investigation.

Using the 2006 population data, an estimated residential fire death rate is calculated at 29.6 per million per year, four times that of the general population. Of the 14 victims of residential fire on Federal Reserve land, 12 identified as Aboriginal. Overall, 41.4% of Aboriginal victims died in fires on Reserve land.

The average age of residential fire victims of Aboriginal identity was 35.5 years, much younger than victims not of Aboriginal identity, whose average age was 55.7 years. The age distribution of Aboriginal fire victims is markedly different than that of all other victims, as shown in Figure 4.

Table 3. Aboriginal Identity of Residential Fire Victims, 2007-2011

Identity	2007	2008	2009	2010	2011	Total	%
First Nations, Métis & Inuit	6	6	8	5	4	29	17.7
All Others	27	40	29	23	16	135	82.3
Total	33	46	37	28	20	164	100.0

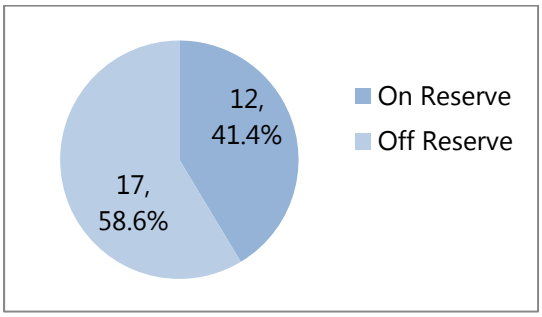

Figure 3. Location of Aboriginal Residential Fire Victims, 2007-2011

[6] Statistics Canada. Census 2006. Retrieved from www12.statcan.ca/census-recensement/2006/rt-td/ap-pa-eng.cfm

Table 4. Residential Fire Deaths on Federal Reserve Land, 2007-2011						
Location	2007	2008	2009	2010	2011	Total
On Reserve	3	4	6	0	1	14
Off Reserve	30	42	31	28	19	150
Total	33	46	37	28	20	164

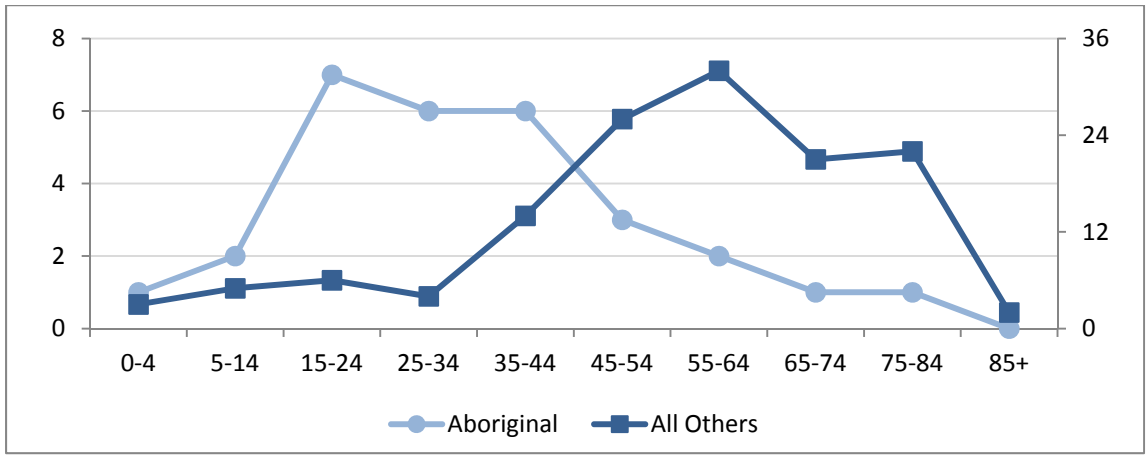

Figure 4. Age Group of Residential Fire Death Victims by Aboriginal and Other identity, 2007-2011

Table 5. Age Group of Aboriginal Residential Structure Fire Victims, 2007-2011											
Deaths	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	Total
2007	-	-	-	2	1	1	-	1	1	-	6
2008	-	1	-	1	2	1	1	-	-	-	6
2009	-	1	2	3	1	-	1	-	-	-	8
2010	-	-	3	-	1	1	-	-	-	-	5
2011	1	-	2	-	1	-	-	-	-	-	4
Total	1	2	7	6	6	3	2	1	1	-	29

Location and Time

There were large regional differences in the average yearly residential fire death rate per million population during the 5-year review period. Despite having the lowest number of deaths, the Northern region had the highest average death rate at 13.3 per million – almost double the provincial rate of 7.4 per million. The Island and Interior regions also had above average death rates, while the Fraser and Metro regions were below average.

Timing variables pertain to the fire incident (n=135) and not the time of death, which may have occurred some hours or days later. Winter[7] was the most common season for fatal residential fires, with 39.3% of incidents occurring during these months. Fatal residential fires occurred with similar frequency most days of the week: the first six days of the week each accounted for 15.2% of fires on average, however just 8.9% occurred on a Sunday. Almost half of the fires, 41.5%, occurred in the early morning hours between midnight and 5:00 AM, while a third, 33.3%, occurred during the evening hours from 6:00 to 11:00 pm.

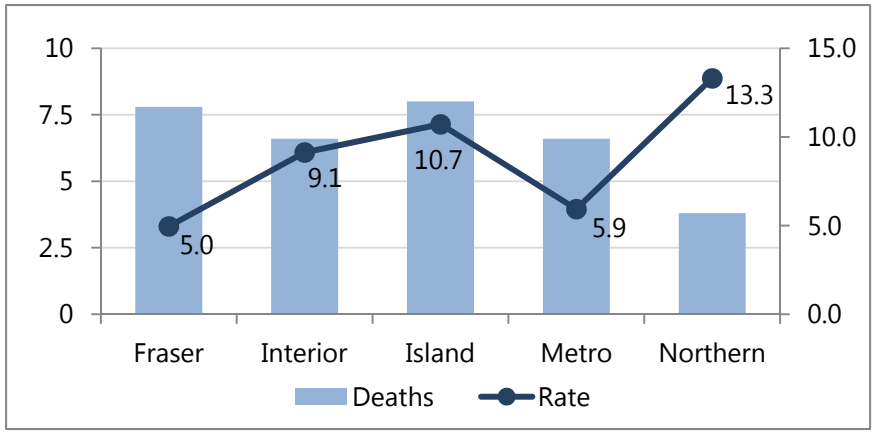

Figure 5. Average Number and Rate of Residential Fire Deaths by Region, 2007-2011

Table 6. Residential Structure Fire Victims by Region, 2007-2011

Region	2007	2008	2009	2010	2011	Total	Average
Fraser	11	3	9	7	9	39	7.8
Interior	7	13	9	4	-	33	6.6
Island	8	12	10	4	6	40	8.0
Metro	4	11	6	11	1	33	6.6
Northern	3	7	3	2	4	19	3.8
Total	33	46	37	28	20	164	32.8

[7] Winter includes the months of December, January and February. Spring includes March, April and May. Summer includes June, July and August. Fall includes September, October and November.

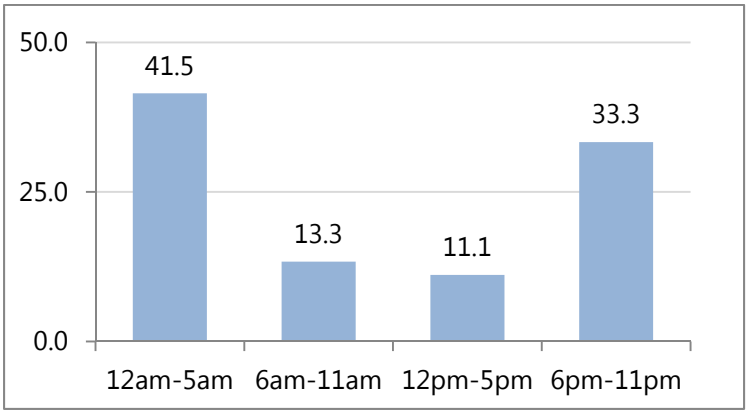

Figure 6. Percentage of Fatal Residential Fires by Time of Day, 2007-2011

Table 7. Fatal Residential Fires by Time of Day, 2007-2011						
Time of Day	2007	2008	2009	2010	2011	Total
12am-5am	12	13	10	13	8	56
6am-11am	2	7	4	2	3	18
12pm-5pm	7	3	3	-	2	15
6pm-11pm	11	12	13	5	4	45
Unknown	-	-	-	1	-	1
Total	32	35	30	21	17	135

Table 8. Fatal Residential Fires by Day of the Week, 2007-2011							
Day of Week	2007	2008	2009	2010	2011	Total	%
Monday	6	4	4	5	1	20	14.8
Tuesday	5	5	4	2	4	20	14.8
Wednesday	4	6	7	3	2	22	16.3
Thursday	3	5	5	2	6	21	15.6
Friday	4	8	4	3	-	19	14.1
Saturday	8	5	5	1	2	21	15.6
Sunday	2	2	1	5	2	12	8.9
Total	32	35	30	21	17	135	100.0

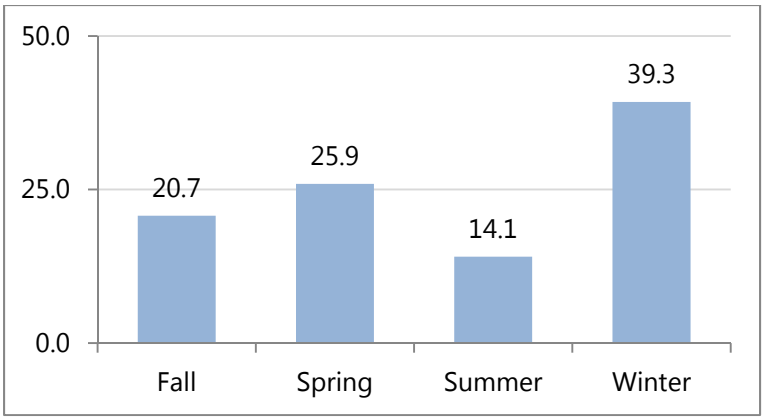

Figure 7. Percentage of Fatal Residential Fires by Season, 2007-2011

Table 9. Fatal Residential Fires by Season, 2007-2011

Season	2007	2008	2009	2010	2011	Total
Spring	7	8	9	3	1	28
Summer	8	12	4	4	7	35
Fall	7	4	4	3	1	19
Winter	10	11	13	11	8	53
Total	32	35	30	21	17	135

Structure type

The largest proportion of fatal residential fires involved single-family houses[8], accounting for 42.2%. The two other most common structure types were trailer homes, 23.0%, and apartment buildings, 17.8%. In total, these three structure types accounted for 83.0% of fires, and 81.7% of deaths.

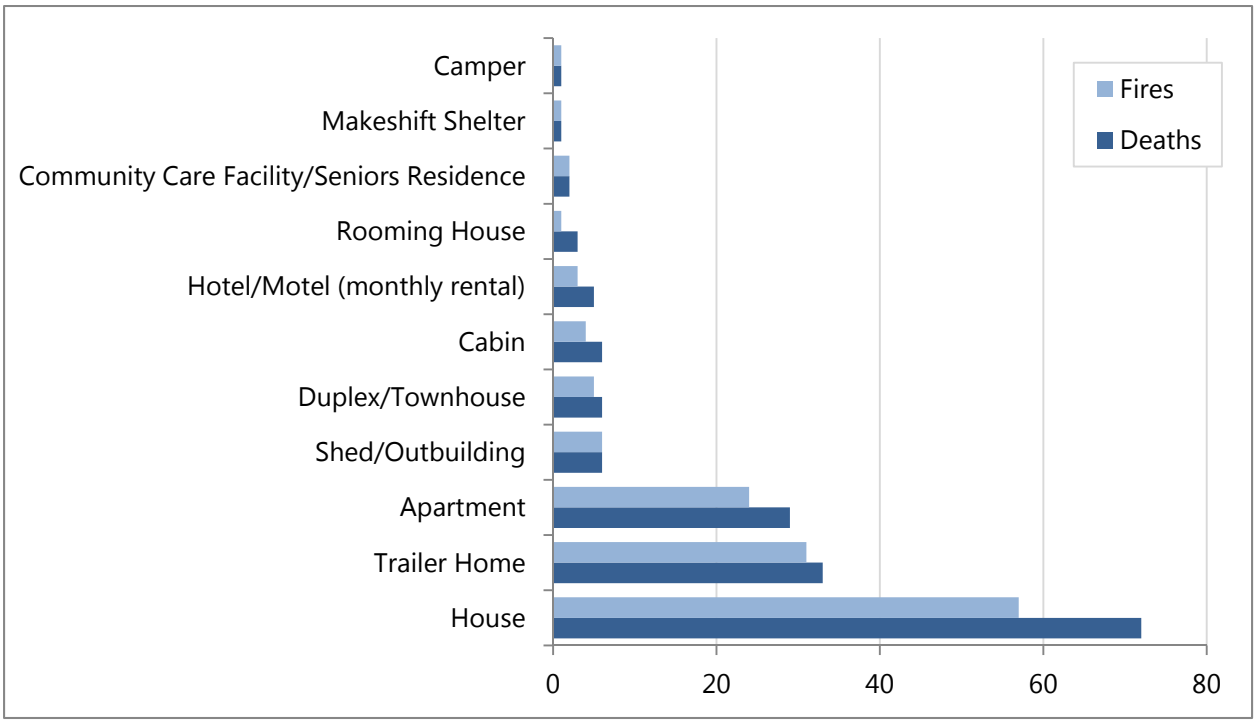

Figure 8. Deaths and Fires by Structure Type, Fatal Residential Fires 2007-2011

[8] Although specified as 'single-family', some houses may include rental accommodation in addition to the main living area, e.g. a basement suite.

Table 10. Number of Deaths and Fires by Structure Type, Fatal Residential Fires, 2007-2011

Structure Type	Deaths	% of Deaths	Fires	% of Fires
House	72	43.9	57	42.2
Trailer Home	33	20.1	31	23.0
Apartment	29	17.7	24	17.8
Shed/Outbuilding	6	3.7	6	4.4
Duplex/Townhouse	6	3.7	5	3.7
Cabin	6	3.7	4	3.0
Hotel/Motel (monthly rental)	5	3.0	3	2.2
Rooming House	3	1.8	1	0.7
Community Care Facility/ Seniors Residence	2	1.2	2	1.5
Makeshift Shelter	1	0.6	1	0.7
Camper	1	0.6	1	0.7
Total	164	100.0	135	100.0

Cause of Fire

By far the most common cause of fatal residential fires was smoking materials, which were responsible for 32.6% of fires and 30.5% of deaths. The cause of fire was unknown for around one quarter of incidents, 26.2%. No other single cause accounted for more than 10.0% of deaths or fires.

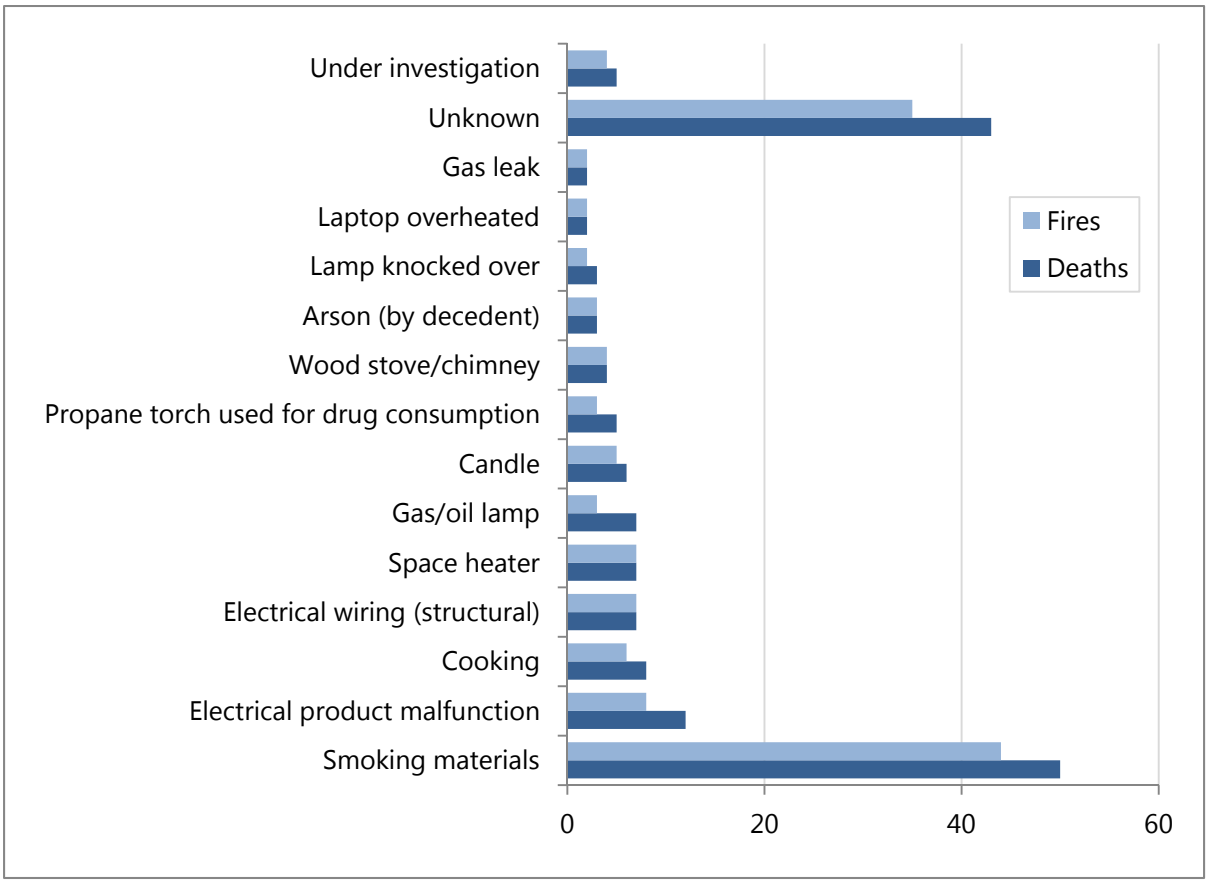

Figure 9. Number of Deaths and Fires by Cause of Fire, Fatal Residential Fires, 2007-2011

Table 11. Number and Percentage of Deaths and Fires by Cause of Fire, Fatal Residential Fires, 2007-2011

Cause of Fire	Deaths	% of Deaths	Fires	% of Fires
Smoking materials	50	30.5	44	32.6
Electrical product malfunction	12	7.3	8	5.9
Cooking	8	4.9	6	4.4
Electrical wiring (structural)	7	4.3	7	5.2
Space heater	7	4.3	7	5.2
Gas/oil lamp	7	4.3	3	2.2
Candle	6	3.7	5	3.7
Propane torch used for drug consumption	5	3.0	3	2.2
Wood stove/chimney	4	2.4	4	3.0
Arson (by decedent)	3	1.8	3	2.2
Lamp knocked over	3	1.8	2	1.5
Laptop overheated	2	1.2	2	1.5
Gas leak	2	1.2	2	1.5
Unknown	43	26.2	35	25.9
Under investigation	5	3.0	4	3.0
Total	164	100.0	135	100.0

Smoke Alarm

A smoke alarm was known to have activated in 15.9% of deaths (13.3% of fires, 18). In more than twice as many fatalities, 41.5%, a smoke alarm either was not available in the home, or was not known to have activated (due to lack of batteries, being disconnected, or for unknown reasons). Information about smoke alarms was not available for 38.4% of cases, for reasons including the destruction of evidence by fire, no survivor to report on alarm activation, or no information on smoke alarm present in file. Where information was available on the status of smoke alarms, this was taken from the Fire Investigator's report.

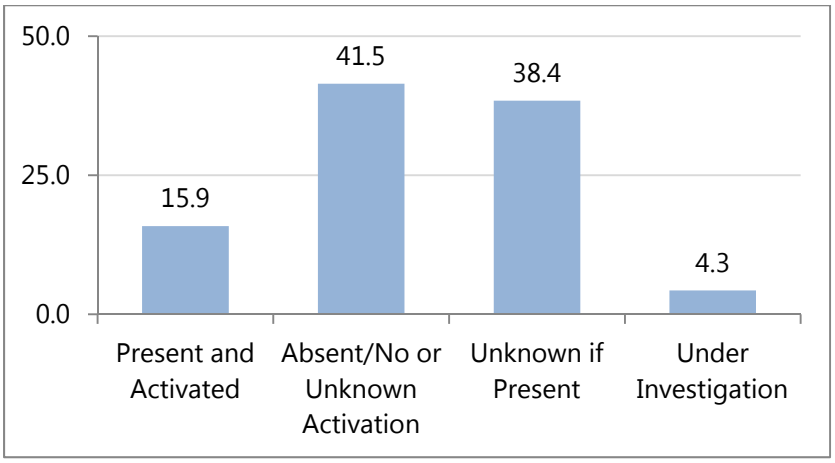

Figure 10. Percentage of Residential Fire Deaths by Status of Smoke Alarm, 2007-2011

Table 12. Residential Fire Deaths by Status of Smoke Alarm, 2007-2011

Smoke Alarm		2007	2008	2009	2010	2011	Total
Present	Activated	1	9	9	4	3	26
	Not activated	6	5	2	6	2	21
	Activation unknown	1	5	1	2	-	9
	Present subtotal	8	19	12	12	5	56
Absent		13	8	9	6	2	38
Unknown		12	19	16	9	7	63
Under investigation		-	-	-	1	6	7
Total		33	46	37	28	20	164

Alcohol and Other Drug Use

Alcohol and/or other drug use was determined to be a contributing factor in 39.0% of residential fire deaths during the review period. Although the number of alcohol and/or drug-related fire deaths in the Northern region was low at 1.8 per year on average, the population rate was higher than that of any other region, at 6.3 per million.

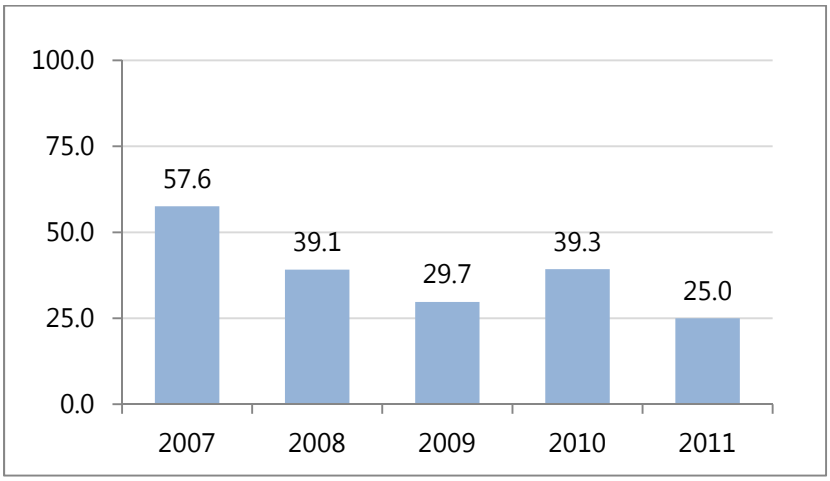

Figure 11. Percentage of Residential Fire Deaths with Alcohol and/or Drug Use as a Contributing Factor, 2007-2011

Table 13. Residential Fire Deaths with Alcohol and/or Drug use Contributing, 2007-2011

Alcohol and/or Drugs	2007	2008	2009	2010	2011	Total	%
Present	19	18	11	11	5	64	39.0
Absent	14	28	26	16	6	90	54.9
Under investigation	-	-	-	1	9	10	6.1
Total	33	46	37	28	20	164	100.0

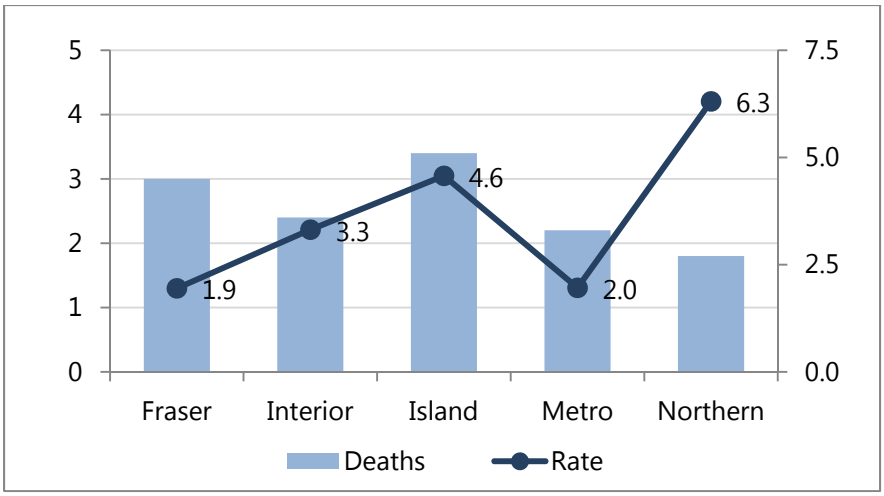

Figure 12. Average Number and Rate of Residential Fire Deaths with Alcohol and/or Drug use Contributing by Region, 2007-2011

Table 14. Residential Fire Deaths with Alcohol and/or Drug use Contributing by Region, 2007-2011

Alcohol and/or Drugs	Fraser	Interior	Island	Metro	Northern	Total
Present	15	12	17	11	9	64
Absent	17	21	20	22	10	90
Under investigation	7	-	3	-	-	10
Total	39	33	40	33	19	164
Yearly Average	3.0	2.4	3.4	2.2	1.8	12.8
% Alcohol +/or Drugs	38.5	36.4	42.5	33.3	47.4	39.0

Other Circumstances

The first detection or report of fire in fatal incidents was usually made by a neighbour, 40.0%, or other occupant of the home, 29.6%. Most of the victims, 91.5% (150), died at the scene of the fire, although a few, 8.5% (14), died some time later in hospital. Many victims were found in their bedrooms, 36.6%.

The majority of fatal residential fires resulted in a single death, 70.7%. There were two fatalities in 13.4% of fires, while the remaining 15.9% resulted in the deaths of between three and five individuals. A large proportion of deaths were of a single individual who was home alone, 45.7%. The remainder occurred in homes with more than one occupant and variously resulted in a single (25.0%) or multiple (29.3%) deaths.

Table 15. First Detection or Report of Residential Fire, 2007-2011

Source	Total	%
Neighbour	54	40.0
Other occupant	40	29.6
Passerby	14	10.4
Decedent	12	8.9
Other	5	3.7
Unknown	9	6.7
Under investigation	1	0.7
Total	135	100.0

Table 16. Location of Decedent within Home, Fatal Residential Fires 2007-2011

Location	Total	%
Bedroom	60	36.6
Living room	23	14.0
In rubble (location unspecified)	18	11.0
Just inside front door	15	9.1
Kitchen	11	6.7
Outside home	6	3.7
Other	30	18.3
Under Investigation	1	0.6
Total	164	100.0

Table 17. Number of Occupants and Number of Deaths at Fatal Residential Fires, 2007-2011					
Occupants	1 Death	2 Deaths	3+ Deaths	Total	%
1	75	-	-	75	45.7
2	18	10	-	28	17.1
3	9	2	6	17	10.4
4	5	-	3	8	4.9
5	2	-	3	5	3.0
6	2	-	-	2	1.2
7	-	2	3	5	3.0
10	-	6	5	11	6.7
Unknown, multiple	5	2	6	13	7.9
Total	116	22	26	164	100.0
%	70.7	13.4	15.9	100.0	

Recommendations

During the five-year review period, one incident – which caused three deaths – resulted in recommendations being issued. One other case is going to Coroner's Inquest, and will likely also result in recommendations. The Inquest has yet to be scheduled.

The incident that resulted in recommendations was a fire at a rooming house in Vancouver, which occurred in December of 2010. The three decedents, all adult males, were living in a house designed as a single family dwelling. The owner was renting rooms to an undetermined number of people on a monthly basis. The residence had come to the attention of City of Vancouver officials several times, as it was not in compliance with existing by-laws. The owner was non-compliant with the improvement orders issued to her. The fire started due to a short circuit of a faulty electrical cord.

The Coroner's Inquest was held from October 24-28, 2011, and the jury's recommendations were distributed on November 25, 2011. Two responses have been received to date.

Recommendations

To the City of Vancouver:

1. Inspection officials should be required to communicate with complementary inspection units (such as bylaw, building, electrical, plumbing, health and fire) in order to more quickly facilitate the safe operation of any property.
2. There should be a clear avenue for any tenant, landlord or owner to utilize governing bodies to report violations in order to provide a safe living environment. Governing agencies should be required to respond, assess and report as defined in point (1) above.
3. The requirement of "imminent life threat" was required to demand a ceasing of occupancy of this property. This requirement should be amended to "life threat" in order to provide greater ability to protect occupants of a property.

To the City of Vancouver and the Vancouver Police Department:

4. Neighbourhood liaison officials should be notified of problem or bylaw infringing properties. These officials should have the authority to further investigate the properties, owners, landlords and tenants. Police should be required to notify any governing agencies of these properties, owners, landlords or tenants for accordance of their appropriate policies and follow-up of those agencies.

To the Attorney General:

5. Inspection units should have the authority to issue immediate penalties through a fines or ticketing process. Further, an escalating penalty scale should be in place for repeat offenses. Maximum fines would need to be reviewed for this purpose. These penalties or any related charges should be governed by municipal court, specifically to accelerate the process.

Response: *The recommendation was reviewed by staff from the Ministry of Justice, the Ministry of Community, Sport and Cultural Development (MCSCD), (which is responsible for local government), and the Ministry of Energy and Mines (which is responsible for the Safety Standards Act). It was determined that the recommendation should be addressed by the MCSCD, as that ministry has primary responsibility for legislation relating to the enforcement of bylaws. A copy of the recommendation has been forwarded to the Minister responsible for review.*

To the Ministry of Health:

6. Hospital policy should be reviewed for emergency drug administration procedures, specifically storage location and stock quantities.

Response: *The Ministry of Health has carefully reviewed the recommendation from a provincial perspective. The Ministry will present the recommendation to the Emergency Department Working Group, and will work with them to address this issue.*