

Keep Engaged with Toxicology
News in BC

Dedicated to Toxicological Issues in Population and Environmental Health in British Columbia

June 2018

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Senior contributors
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Contributors and Reviewers
Yasi Afshari
Michael Jonasson; English Editor
Tissa Rahim

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Contact us

BC Toxicology News Monthly Bulletin could be reached at

604 999 6185

BCTOX@yahoo.com

<https://blogs.ubc.ca/bctox2015/>

To contribute to the next issues, provide your opinion or report a mistake, please email us, your Feedback is greatly appreciated.

BCTOXScope

BCTOX publishes ONLINE your pictures related to environmental and clinical toxicological issues/news in BC under your name (mushrooms, spiders, bites, algae, spills, etc).

Take your photo(s) and email them to BCTOX@yahoo.com Make sure to write date, geographical area and other relevant information.

--- If not sure that it is related to toxicology, it is ok, we will come back to you!

BCTOX encourages all readers to share their views on its contexts.

BCTOX's Toxicology News Surveillance System in BC and Health Regions in June 2018

Reza Afshari*, Environmental Health Services, BC Centre for Disease Control, BC. Reza.Afshari@bccdc.ca [Editorial 2017-06-30]

Public Health & Environmental Toxicology: What is BCTOX & why?

Health professionals (HP) including policymakers, health educators and researchers need to be regularly updated on environmental toxicology issues to keep up with rapidly evolving toxicology information, emerging health risks from environmental chemicals and to manage issues that are locally highlighted in the popular press and news media.

Environmental toxicology training is limited during education, and when HPs enter the field, they lack information on the responsibilities for regulation and risk communication among local, provincial and federal agencies, as well as their relations to international organizations, scholarly articles, and private sectors, including industry¹. All of these factors lead to avoidable confusion.

BCTOX acts as a local up-to-date resource to answer current toxicology issues. The business model of BCTOX is flexible in order to maximise its applicability. BCTOX is also still developing, and will be determining its future directions along the way.

BCTOX acts like a pendulum. It mobilises your interventions to other places where they can also be used, and also back-translates the health activities that have had a "life outside of the health system" and have made societal impacts. While BCTOX is not official and not liable for the reported news from media, it is BC-related and full of concise information that is handpicked and fun to read. BCTOX keeps you engaged with toxicology news in BC. *BCTOX is full of inspiring ideas dedicated to B.C.*

➤ Rate of Suicide Deaths in BC by Health Authority.

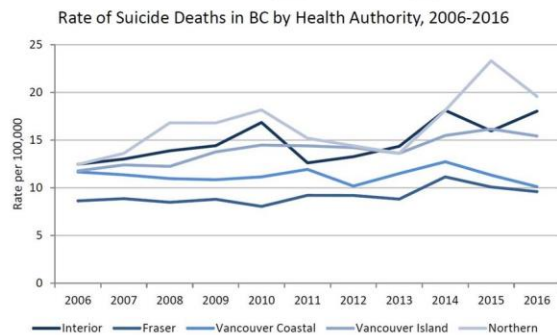


Figure adopted from BC Coroners Service²

Major toxicological statistics June 2018

Mortalities In total, around 700 premature deaths could be attributed to toxic exposures in BC in May including:

- **ACUTE exposures;** [estimated]≈
≈120 due to illicit drug overdose
10 due to suicides (CO, drugs and alcohol)
- **CHRONIC current and past exposures;** [estimated] ≈
 - 500 due to smoking and tobacco use,
 - 81 (air pollution),
 - 11 (radon)
 - 7 (asbestos)

These are equal to overall 15×10^{-5} population toxic exposure-induced deaths in March alone, including 2.4×10^{-5} acute and 13×10^{-5} chronic toxicities (estimations are subject to assumptions and limitations, and overlaps are possible (see BCTOX 2(8): 103)).

Morbidity Around 2200 calls were made to BC-DPIC (estimated from August 2017)

Sola dosis facit venenum **Only the dose makes the poison!**
Paracelsus (1493 – 1541 CE)

Summary of Toxicology News for First Nations Populations, June 2018, BC

➤ Penticton Indian Band and illegal drugs

The Penticton Indian Band will not be tolerating the use of illegal drugs within its boundaries.³

[\(Read more\)](#)

➤ Six time higher suicide rates among First Nations youth⁴

First Nations people are hugely overrepresented in suicide

Canada-wide, 25% of Indigenous adults have contemplated ending their lives.

And suicides among First Nations youth aged 15 to 24 are six times higher than the rate among non-Indigenous Canadians.

In BC, the number to call for help is 1-800-SUICIDE (1-800-784-2433).

Who can play a role in prevention?

- ✓ Ministry of Mental Health and Addictions
- ✓ Media
- ✓ Controlling prescription drugs with suicide as their side effects

[\(Read more\)](#)

➤ BC introduced two new 'bold' rules this week that could change the way salmon farming is done in the province⁵

Government did not give First Nations a veto over salmon farms [?]

[\(Read more\)](#)

➤ Kinder Morgan

--- First Nations lose bid to reopen Trans Mountain appeal court file

[\(Read more\)](#)

--- Activists form 'human drawbridge' under bridge to stop tanker



Photo from CTV News [\(Read more\)](#)

➤ Squamish Nation, City of Vancouver to appeal Trans Mountain court ruling



A sign warns of an underground pipeline as people construct a "watch house" near a gate leading to Kinder Morgan's property during a protest against the company's Trans Mountain pipeline expansion in Burnaby. Photo from Global News

[\(Read more\)](#)

Summary of Toxicology News for Fraser Health, June 2018, BC

➤ Fentanyl deaths

124 people died in April due to opioid overdose in BC (four deaths a day) mostly involving fentanyl, which is often laced into street drugs such as heroin.

Most of the deaths occurred in the Fraser Health region (Burnaby to White Rock and Hope). A slight increase in overdose deaths in this region, while the number of suspected overdose deaths involving illicit drugs in BC decreased by 23% in April.⁶

[\(Read more\)](#)

➤ Fraser Health's first safe consumption site is one year old in June

"After more than 60,000 visits and hundreds of overdose reversals, not a single death reported at 135A Street site."

[\(Read more\)](#)

➤ Vancouver's drug problem is a student problem too⁷

With high number of overdose deaths and a lack of clean drugs in the city, knowledge is "key".

--- One in 30 university students have experimented with street drugs while enrolled at UBC [BCTOX---a study from 2013].

- ✓ A city-wide issue
- ✓ A campus problem
- ✓ A problem that hits close to home

--- Stay safe when clean drugs are sparse from: [UBC-Student Services-Health & wellness-Self-help resources-Drugs & alcohol.](#)

- ✓ "Educate yourself on drug use, effects, and risk.
- ✓ Never use alone
- ✓ Go slowly, with low doses
- ✓ Don't mix different drugs, or mix drugs with alcohol
- ✓ Carry a naloxone kit and know how to use it in case of an emergency
- ✓ Know the signs of an overdose (see below), and what to do in case one happens
- ✓ Stay hydrated
- ✓ Let someone know where you are and when you should be home/finished
- ✓ If you're worried about yourself or someone else, seek help immediately
- ✓ Consider using drugs at a safe-injection site, where your drugs can be tested for fentanyl
- ✓ Trust your instinct: if something doesn't feel right, take a step back to consider the situation. Ask questions about what you're being offered. Don't accept drugs from someone who you don't know or don't trust"

[\(Read more\)](#)

➤ Weather

➤ Heat warning

Heat wave prompts warning for Metro Vancouver, Fraser Valley.

[\(Read more\)](#)

➤ Public Weather Alerts for British Columbia

[\(Read more\)](#)

➤ CTV Vancouver's new (and free) weather app!

[\(Read more\)](#)

Summary of Toxicology News for Interior Health, June 2018, BC

➤ Interior Health had the highest rate of suicide deaths in BC after Northern Health

Interior Health had the highest rate of suicide deaths in BC after Northern Health (18 deaths per 100,000 individuals) in 2016.⁸

The overall rate of suicide deaths in BC was 13 deaths per 100,000 in 2016.²

➤ Overdose death rate holding steady [?] within Interior Health⁹

Overdose death rate holding steady within Interior Health Authority (down from 22 in March to 17 in April).

"The health authority has recorded 31.1 overdose deaths per 100,000 population in 2018, just slightly lower than the provincial average of 31.5."

➤ Less standing water means fewer mosquito bites¹⁰

Reducing the risk

- ✓ Prevent mosquito breeding around your home (anything that can hold water can be a mosquito breeding area).
- ✓ Install screens on windows.
- ✓ Avoid outdoor activities at dusk and dawn (at this time of day mosquitoes that can carry the West Nile virus are most active).
- ✓ Wear protective clothing including long-sleeved shirt.
- ✓ Use mosquito repellent (apply to areas of exposed skin).



Photo adopted from The Nelson Daily¹⁰

Summary of Toxicology News for Northern Health, June 2018, BC

- **Northern Health had the highest rate of suicide deaths in BC⁸**

Northern Health had the highest rate of suicide deaths in BC (20 deaths per 100,000 individuals) in 2016.

- **Northern Health records lowest amount of drowning deaths in BC¹¹**

66 out of 666 deaths have been recorded province-wide took place within the Northern Health region between 2008-2016.

Northern Health records lowest amount of drowning deaths in BC at 66. --- Lowest in terms of total numbers but that is 66 deaths too many.

In over a third of the deaths had alcohol or drugs detected in the post-testing.

People use lakes, rivers, going for swims, boating activity or going kayaking Should

- ✓ Wear a PFD
- ✓ Do not mix alcohol with any activity on the water

Summary of Toxicology News for Vancouver Coastal Health, June 2018, BC

- **No regular lead testing for drinking water in BC daycares¹²**

Two years after BC began requiring schools to test for lead in their drinking water, daycares are yet to compel. Although babies and young children are considered most vulnerable.¹²

BC is lagging behind Ontario, Oregon and Washington state.

According to The Star, 55% of Vancouver daycares were in buildings constructed before 1990.

- **Proposed rules for chronic pain treatments could create 'crisis' for patients**

[\(Read more\)](#)

- **One B.C. community hits 37 degrees as heat wave sees 6 places reach record highs**

[\(Read more\)](#)

--- **WOODS CROSS, Utah** – Stars of the Discovery Channel show “Diesel Brothers” have been ordered not to modify vehicles in ways that could lead to greater pollution.

[\(Read more\)](#)

Summary of Toxicology News for Vancouver Island, June 2018, BC

- **Toxic shock syndrome killed teenager¹³**

Toxic shock syndrome killed teen in her sleep during school trip according to BC coroner. --- A strain of *Staphylococcus aureus* on a tampon found in place, as well as other symptoms consistent with toxic shock syndrome.

Toxic shock syndrome is due to toxins made by certain strains of *Staphylococcus aureus* bacteria that get into the bloodstream. Initially it resembles flu with high fever, nausea, vomiting, diarrhea, dizziness, fainting and disorientation.¹³



Photo is unrelated to the incident and is adopted from dailyhunt.in

- **Largest Island Health supervised consumption site¹⁴**



Photo from [April Lawrence](#)

[\(Read more\)](#)

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Clinical toxicology and Drug and Poison Information Centre

BC Drug and Poison Information Centre

British Columbia

The most common drug-related generic categories & generic substances from Jan to Aug 2017 were analgesics, sedative/hypnotics/antipsychotics, stimulants and street drugs, cardiovascular drugs, vitamins, hormones and hormone antagonists, dietary supplements/herbals/homeopathic, antihistamines, topical preparations and antimicrobials.

The Poison Information (24-Hour Line) is available: 604-682-5050 for the lower mainland and 1-800-567-8911 for outside lower mainland.

Differences in Strategies for Reducing Opioid-Overdose Deaths in Canada and States

Unlike Canada where the overdose-reversal drug naloxone available without a prescription, in 36 US states possession of naloxone without a prescription illegal.

Medically supervised injection facilities in Canada is legally approved; there are few if any in the States.

Rates of criminal-justice involvement remain lower in Canada than rates in the United States [but increasing].¹

Reasons for refusing or accepting emergency department-based take-home naloxone in BC

➤ **Reasons for refusing**

- ✓ Not at risk of overdose
- ✓ Their ED visit was not the right time or place for take-home naloxone.

➤ **Reasons for accepting**

- ✓ Wanted to save the lives of others.

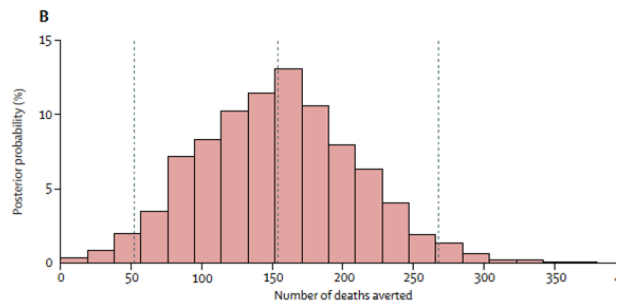
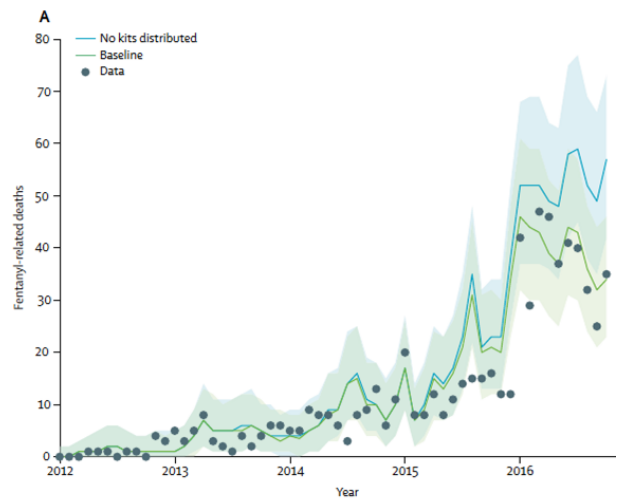
--- Those refusing emergency department-based take-home naloxone may accept elsewhere if referred to appropriate community services for overdose risk education and take-home naloxone distribution.²

Estimated number of deaths averted from Jan 1 to Oct 31, 2016, for the retrospective scenarios. The scenarios were: the actual number of take-home naloxone kits that were distributed (baseline); the rate of fentanyl in the supply was the same as in 2015; all the kits distributed in 2016 were instead distributed on Jan 1, 2016; the population of people who use drugs was halved; and the kits were distributed on Jan 1, 2016, and the at-risk population was reduced by a half. Middle line is the median, shaded area is the 50% credible interval, whiskers show the 95% credible interval, and diamonds show the 5% outliers. (figure adopted from Irvine MA, et al.)³

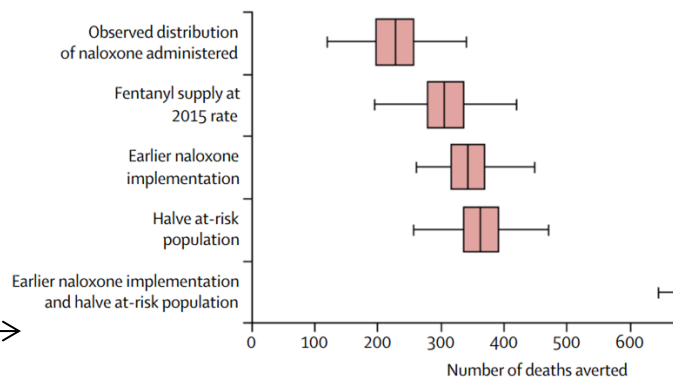
298 deaths were averted by the take-home naloxone program in BC

499 ambulance-attended overdoses and 2,121 illicit drug-related deaths (677 [32%] deaths related to fentanyl) were recorded between 2012 and 2016, mostly since January, 2016. In the same period, 19,074 take-home naloxone kits were distributed.

Authors estimated that 298 deaths (95% credible interval [CrI] 91-474) were averted by the take-home naloxone programme. Of these deaths, 226 (95% CrI 125-340) were averted in 2016.



Total naloxone impact on fentanyl-related deaths (A) Comparison of the number of fentanyl-related deaths between the actual distribution of take-home naloxone kits (baseline) and a counterfactual scenario in which no kits were distributed. Shaded area shows the respective 95% credible interval. (B) Estimated number of fentanyl-related deaths averted during the study period due to distribution of take-home naloxone kits. Dashed lines are the median and 95% credible intervals. (figure adopted from Irvine MA, et al.)³



Clinical toxicology and Drug and Poison Information Centre

Fentanyl urine testing in in rural BC

In a pilot study, “24 participants completed the urine test and first interview. Among them 4 had a positive fentanyl urine test.

Later, 15 clients completed the second questionnaire, 10 of whom reported introducing a behavior change after testing and the remaining 5 indicated being already engaged in harm reduction practices.

All four clients who tested positive completed the second questionnaire; all but one indicated adopting behaviors towards overdose prevention.”⁴

Hospitalization among street-involved youth who use illicit drugs in Vancouver BC

From January 2005 to May 2016, 1,216 youth participated in the study and 373 (31%) reported hospitalization in the previous 6 months.⁵

➤ **The top reported medical reasons for hospital admission were:**

- ✓ Mental illness (38%),
- ✓ Physical trauma (13%),
- ✓ Drug-related issues (13%)

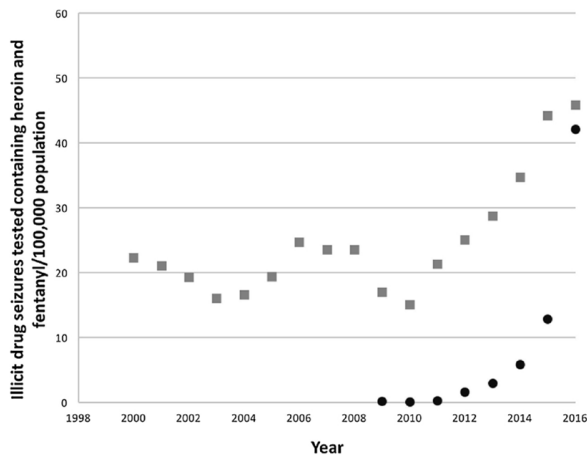
➤ **Factors significantly associated with hospitalization were:**

- ✓ Past diagnosis of a mental illness
- ✓ Frequent cocaine use
- ✓ Non-fatal overdose (AOR = 1.76; 95% CI 1.37-2.25),
- ✓ Homelessness (AOR = 1.40; 95% CI 1.16-1.68) (all p < 0.05).

Fentanyl and heroin contained in seized illicit drugs and overdose-related deaths in BC

Fentanyl is increasingly being found combined with other opioid and non-opioid illicit drugs. Investigators found the following associations:

- ✓ The number of seized fentanyl samples and total overdose deaths ($R^2 = 0.97$)
- ✓ Seized fentanyl and fentanyl-detected overdose deaths ($R^2 = 0.99$),
- ✓ The number of seized heroin samples and total overdose deaths ($R^2 = 0.78$).



Illicit drug seizures tested and containing heroin and fentanyl in British Columbia from 2006 to 2016. *Data obtained from the Health Canada Drug Analysis Service. Circle=fentanyl, square=heroin (figure adopted from Baldwin N, et al.)⁶

Willingness to test urine in BC

Willingness of people who inject drugs for drug checking offered within supervised injection services were studied among 180 subjects.⁷

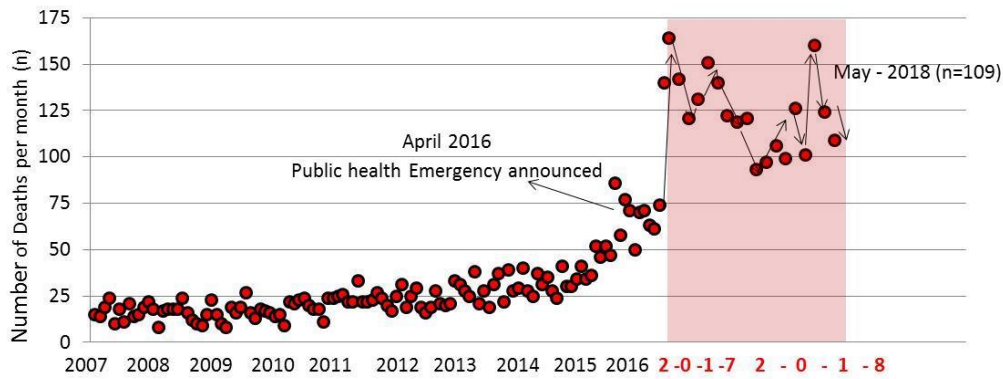
Positive associated with willingness to frequently check drugs at supervised injection services exists for:

- ✓ Female gender (Adjusted Odds Ratio 95% CI = 2.31 (1.20-4.46)),
- ✓ Homelessness (2.36 (1.14-4.86)),
- ✓ Drug dealing (2.16 (1.07-4.33))

References

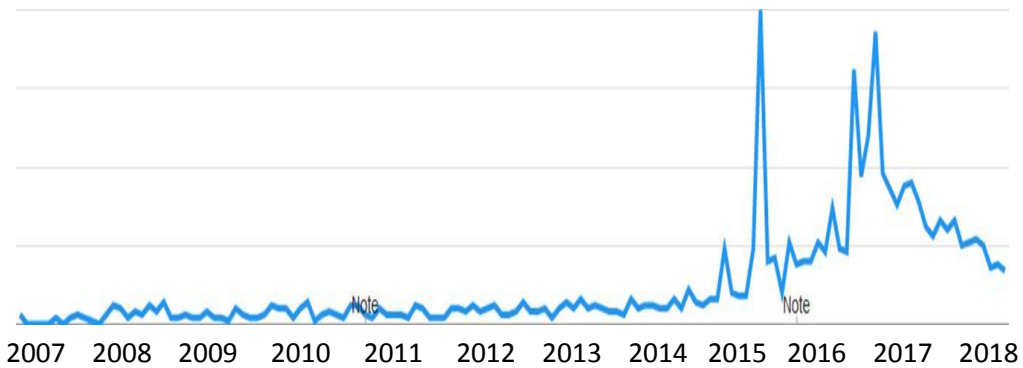
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**BCTOX's Toxicology Surveillance of Drug Overdoses and Forensic Toxicology in BC
 June 2018**



Illicit drug overdose deaths per month in BC (2007 to May, 2018) [Data from BCCoronersService 2018-06-25, last update -BCTOX graph]

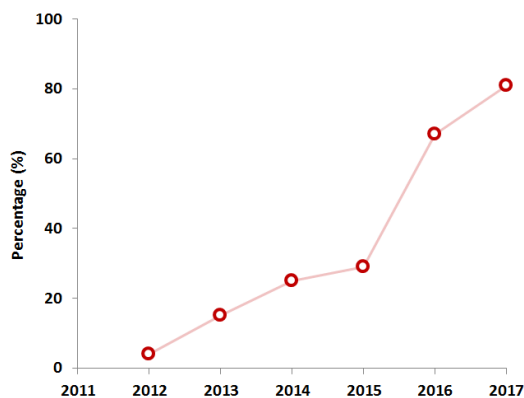
--- The pattern of overdose deaths suggests that the sharp increase in deaths has reached a plateau. (accessed June 27, 2018) [\(Read more\)](#)



Public interest in fentanyl in BC's major cities (Jan 2007 to June 2018 - data from google trends)

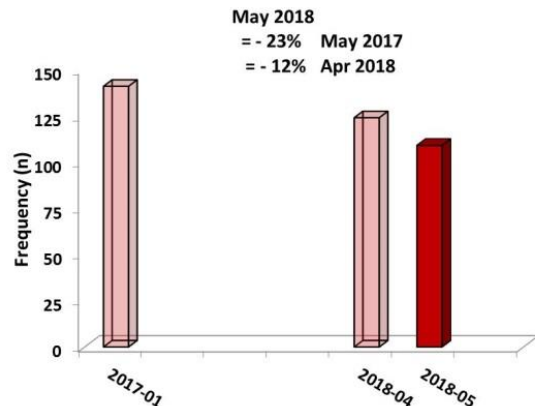
**Fentanyl Detected Illicit Drug Overdose Deaths in BC
 (2012- 2017 July)**

Data from (BC Coroners Service 2017-12-31 -) (accessed Feb 20, 2018)
 [BCTOX graph]



**Estimation of Illicit drug overdose attributed deaths in
 BC in May 2018 (accessed June 27, 2018)**

The number of Illicit drug overdose deaths in May 2018 was 109 (Data from the BC Coroners Service 2018-06-27), which is 23% lower than May 2017, and 12% lower than last month [BCTOX graph]



**Public interest in fentanyl in BC's major cities:
 Cumulative results starting from Aug 2018**

Reza Afshari, Environmental Health Services, BC Centre for Disease Control, BC. Reza.Afshari@bccdc.ca

British Columbia as the ground zero of fentanyl overdose tragedy faced increased number of opioid overdose induced deaths in particular since 2015.¹

Following the increase number of deaths, public health emergency was announced in Apr 14, 2016 in the province. The number of deaths dramatically increased during December 2016.

This short survey was performed to evaluate the public interest in fentanyl from Aug 2015 to August 2017 among different major cities in BC.²

Google Trends®(GT), an online tracking system of Internet weekly hit-search volumes (Google Inc.) were utilised to extract the data. GT collects, categorizes and connects data to a topic. Characteristics include real world based on search terms in categories of importance, interest by region, interest over time, removed personal information, eliminated repeated searches from the same person over a short period of time, unbiased random samples, and very low volume searches are counted as zero.³

Results are shown in figure 1. As can be seen, following publicizing fentanyl potential to kill among “teenagers” and due to “recreational use” of fentanyl in early August 2015, a dramatic increase in public interest observed. However for 7 months this interest was relatively focused in Vancouver alone (○; figure 1).

Later Surrey, Victoria and Burnaby joined the list of cities in BC in which searches for fentanyl passed 1% of all individual term searches. It is clear by overlapping the number of deaths in BC (----) on the original graph (figure 1) that Kelowna, Kamloops, Richmond and Coquitlam were joined the list of cities coincide with the sharp increase in December 2016.

Fentanyl popularised in searches in Nanaimo, Maple Ridge, Abbotsford, Prince George, North Vancouver and West Minister in the following months.

Public interest in fentanyl- cumulative results starting from Aug 2018

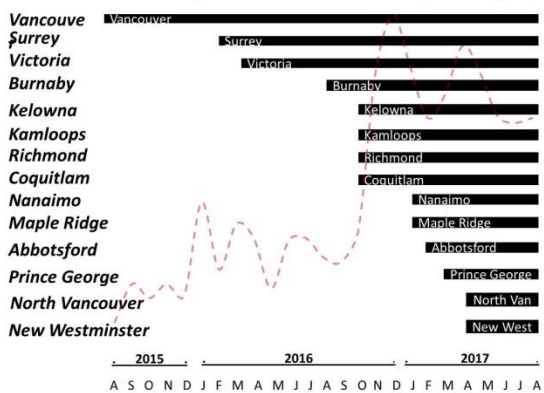


Figure 1. Public interest in fentanyl in BC's major cities: Cumulative results starting from Aug 2018 (data from google trends).
 (----) Number of opioid overdose induced deaths in BC,
 (■) Search interests appeared in google trends. Results are relative to the highest point on the chart for the given region and time.

In addition, public interest in fentanyl gradually declined after a few months. Figure 2 compares the rank of searches in different cities. As can be seen, fentanyl popularity in Vancouver (○), Surrey (—) and Burnaby (—) have declined over this period.

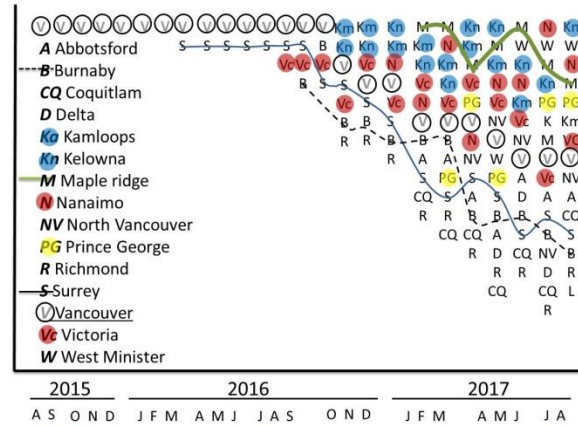


Figure 1. Public interest in fentanyl in BC's major cities: Cumulative results starting from Aug 2018 (data from google trends).

While this pattern may suggest a real sense of security due to declining the number of deaths in a particular geographic area and thus reflective of a real sense of security, it could suggest a diminishing public interest or fatigue in public.

These results have implication for risk management in public health.

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Toxic exposure mediated via FOOD in BC (II) - BCTOX®
June 2018

Selected Toxicological related food recalls in BC¹

Updated 2018-06-28

Dates	Food (Company / Firm)	Reason to recall	
2018-06-05	Notification - Iron Vegan Sprouted Protein brand protein bars recalled due to pieces of metal	Class 2	National
2018-06-15	Food Recall Warning (Allergen) - Mrakovic Meat & Deli brand The Original Mrakovic Burger recalled due to undeclared egg, rye, sesame, soy, and wheat	Class 1	
2018-06-21	Food Recall Warning (Allergen) - JK brand apricot roll recalled due to undeclared sulphites	Class 3	BC
2018-06-20	Food Recall Warning (Allergen) - KFI Premium Quality Foods brand Curry Powder recalled due to undeclared mustard	Class 3	BC

Soil News Update - June 2018

Silica Dust Exposure at the Site C Dam Project results in Peace River Hydro Partners Fine.²

In May, WorkSafeBC fined Peace River Hydro Partners at the Site C dam project in northeast BC \$310,000 for exposure to silica dust at the site.

Following an inspection, it was determined that dust-suppression systems were not in place and occupational exposure testing was not performed.

Furthermore, respirator masks provided to employees were inadequate for the exposure level to dust, indicating a high-risk violation.

Dust containing silica in particular, one of the most common worksite hazards for this industry, can cause a severe lung disease called silicosis as well as lung cancer.

Work was stopped in the tunnel to address safety concerns and establish a satisfactory safety plan, reviewed by WorkSafe BC.²

...

Reference

1. CFIA-06-2018. Food Recall Warnings - High Risk. Government of Canada <http://inspection.gc.ca/about-the-cfia/newsroom/eng/1299073792503/1299076004509> (accessed June 28, 2018).
2. Alaska Highway News. Peace River Hydro Partners fined for failing to control silica exposure [Internet]. 2018 [cited 25 June, 2018]. Available from: <http://www.alaskahighwaynews.ca/site-c/peace-river-hydro-partners-fined-for-failing-to-control-silica-exposure-1.23343974>.

BCTOX's Marine Biotoxins Surveillance System in BC – Data from CFIA

Shifting pattern of biotoxins in west coast Canada

Frequency

Mean (1 SEM) concentrations

Reza Afshari*, Environmental Health Services, BC Centre for Disease Control, BC. Reza.Afshari@bccdc.ca

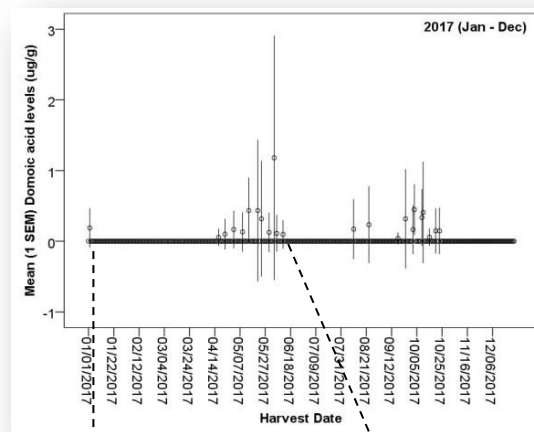
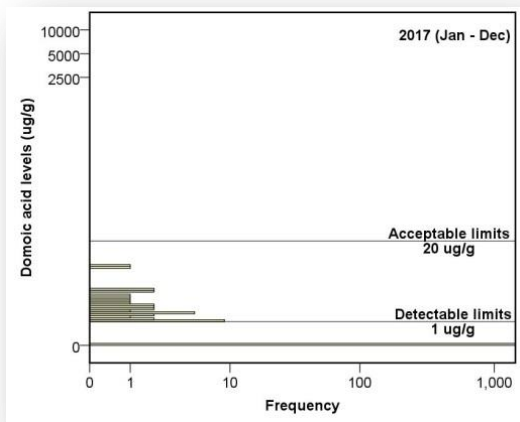
Public health surveillance is “the continuous, systematic collection, analysis and interpretation of health-related data needed for the

planning, implementation, and evaluation of public health practice” according to [WHO](#). BCTOX is hopeful that this initiative will draw attention of public health professionals to changing pattern of marine biotoxins that may cause shellfish poisoning. The graphs could be predictive indices for what are going to come next month!

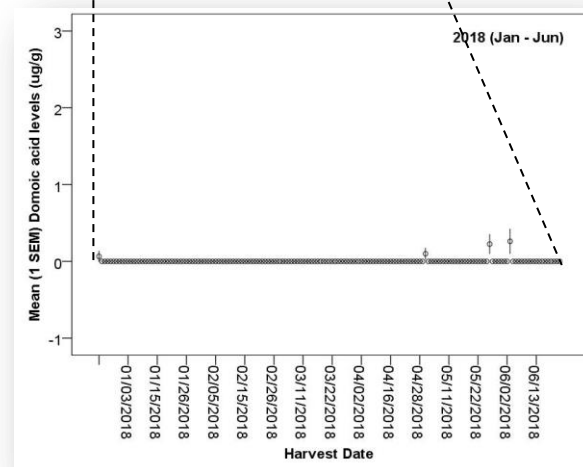
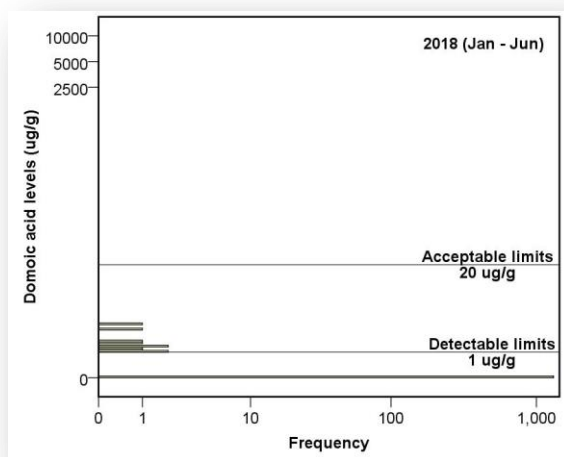
1. Domoic acid

Domoic acid (ug/g) (Amnesic shellfish poisoning (ASP)) among detected shellfish samples in BC (January to December 2017) (n=2 positive cases out of 1088 samples) [These graphs are prepared to imply the trend, and it should be interpreted with caution]

2017 (Jan to Dec)



2018 (Jan to Jun)



Bi weekly marine bio-toxin monitoring in West Coast BC from Jan to May 2018

Below regulatory limits Domoic acid [Amnesic Shellfish Poisoning] are rarely reported. No cases of above regulatory limits were reported. As compared to Jan to May 2017, the values seem to be lower.

BCTOX's Marine Biotoxins Surveillance System in BC – Data from CFIA

Shifting pattern of biotoxins in west coast Canada

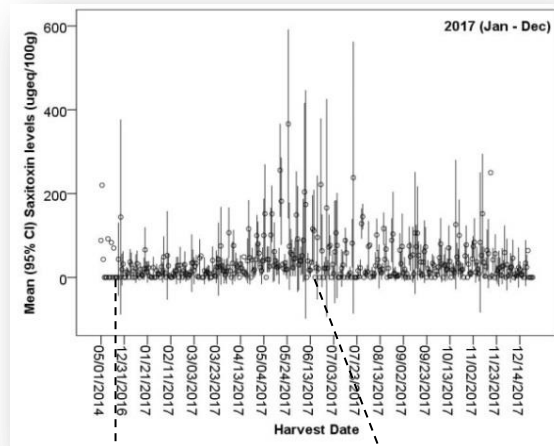
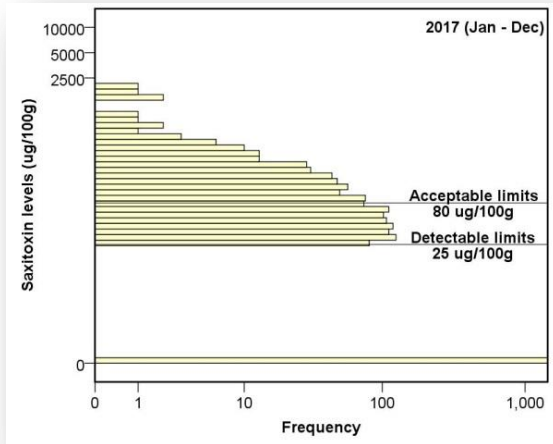
Frequency

Mean (1 SEM) concentrations

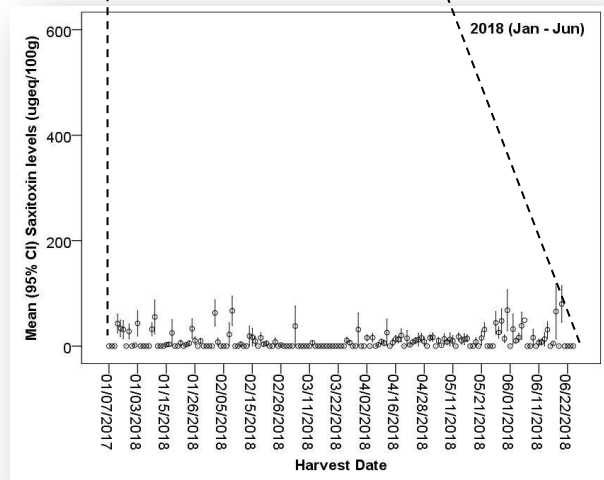
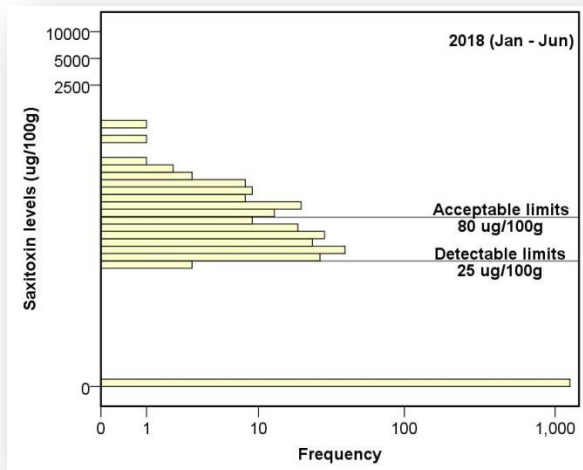
2. Saxitoxin

Saxitoxin (ug/100g) (Paralytic shellfish poisoning (PSP) among detected shellfish samples in BC (January to December 2017) (n=154 detected and 20 above the regulatory limit out of 1181 samples) [These graphs are prepared to imply the trend, and it should be interpreted with caution]

2017 (Jan to Dec)



2018 (Jan to Jun)



Bi weekly marine bio-toxin monitoring in West Coast BC from Jan to May 2018

✓ Above regulatory limits of Saxitoxin [Paralytic shellfish poisoning] concentrations were reported in 2018. The extent of the problem seems to be lower than 2017.

BCTOX's Marine Biotoxins Surveillance System in BC – Data from CFIA

Shifting pattern of biotoxins in west coast Canada

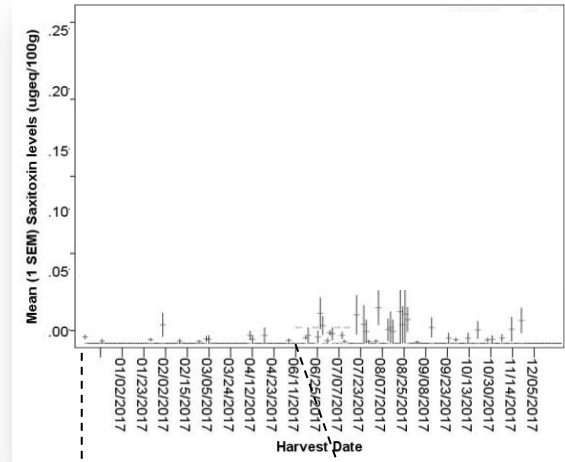
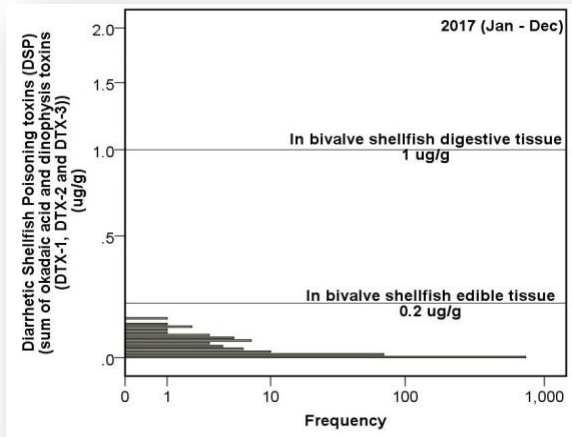
Frequency

Mean (1 SEM) concentrations

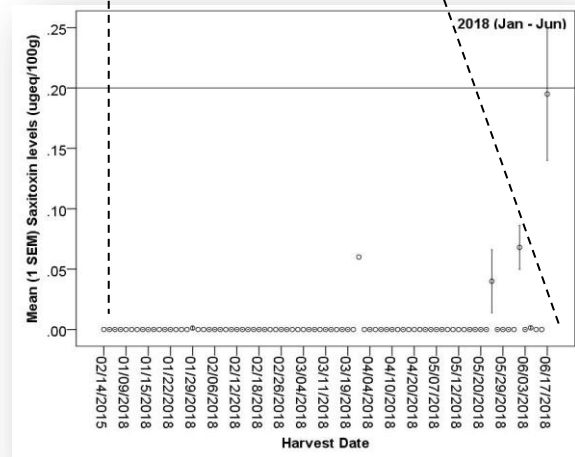
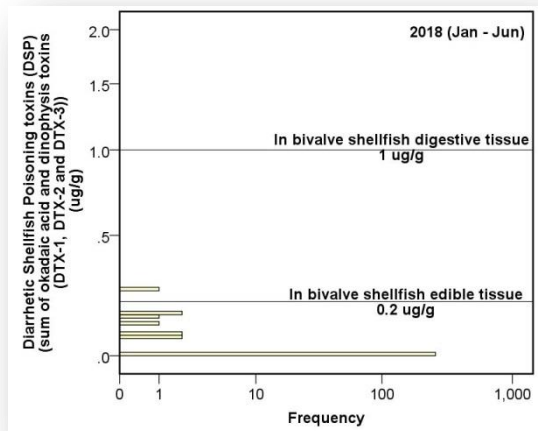
3. Okadaic acid

Okadaic acid (sum of okadaic acid and dinophysis toxins (DTX-1, DTX-2 and DTX-3) (Diarrhetic Shellfish Poisoning toxins (DSP)) among shellfish samples in BC (January to December 2017) (n=114 detected out of 735 sample) [These graphs are prepared to imply the trend, and it should be interpreted with caution]

2017 (Jan to Dec)



2018 (Jan to Jun)



Bi weekly marine bio-toxin monitoring in West Coast BC from Jan to May 2018

✓ **Above** regulatory limits of Okadaic acid and dinophysis toxins [Diarrhetic Shellfish Poisoning] were reported a couple of times. The extent is clearly higher than the last year.

BCTOX's Marine Biotoxins Surveillance System in BC – Data from CFIA

Shifting pattern of biotoxins in west coast Canada

Frequency

Mean (1 SEM) concentrations

4. Other Marine Biotoxins Cyanobacterial toxins

No report of cyanobacterial toxins were detected in media until 29th of June 2018 in BC.

BCTOXScope (CYANOScope)

BCTOX publishes your pictures of cyanobacteria found in BC your sample with your name.

Take and email your image(s) to BCTOX@yahoo.com

--- If not sure that it is cyanobacteria, it is ok, upload it please!

Make sure to write date, geographical area and other relevant information.

Examples



[Photo](#)



[Photo](#)

Decision Tree for Drinking Water: Cyanobacterial Toxins – Step Descriptions (No information is available online from BC)

STEP A: STEP A: Initial screening for suspected blooms: Examine the water for one or more of total nitrogen and phosphorus. Check for bloom formation.

STEP B: If yes to any of: nitrogen (N)>658 µg/L; phosphorus (P)> 26µg/L; an N:P ratio < 23; changes in secchi depth; or blooms observed, go to Step C. If no, return to Step A.

STEP C: Sample the raw water. Use a portable field kit to test for the presence of microcystins.

STEP D: If the presence of microcystins is detected (>1.0µg/L) with a field test kit, go to step E, and alert the health authority of a potential issue. If microcystins are absent, return to step A.

STEP E: Use a portable test kit to test the treated water supply for microcystins.

STEP F: If the portable test kit indicates microcystins are present (>1.0µg/L) in the treated water, send a sample to the lab for confirmation and immediately notify the health authority.

STEP G: If the lab results indicate the seasonal MAC of 1.5µg/L has been exceeded, immediately contact the health authority for consultation and decision making.

Azaspiracid and analogues (No information is available online from BC)

Brevetoxin and analogues (No information is available online from BC)

Cyclic imines (No information is available online from BC)

Palytoxin and analogues (No information is available online from BC)

Pectenotoxin (No information is available online from BC)

Tetrodotoxin and analogues (No information is available online from BC)

Yessotoxin and analogues (No information is available online from BC)

Others

Coral

--- Toxic coral in aquarium sends Quebec family to hospital - Zoanthid corals can be toxic, be aware when handling them. ([Global News](#))¹



Zoanthid coral, the green type seen in this photo, is a common feature of saltwater aquariums. But these organisms can also contain palytoxin, which a Gatineau, Que., family blame for a sudden wave of illness that swept their home on the weekend. (Stu Mills) (Picture adopted from [CBCNews](#))²

References:

1. GlobalNews. Toxic coral in aquarium sends Quebec family to hospital. <https://globalnews.ca/video/4175960/toxic-coral-in-aquarium-sends-quebec-family-to-hospital> 2018-04-29.
2. CBCNews-2018-04-25. Toxic coral in home aquarium blamed for making Gatineau family sick. <http://www.cbc.ca/news/canada/ottawa/toxic-coral-blamed-for-sickening-gatineau-family-1.4633810>.

BCTOX's Public Interest in Toxicology Surveillance System in BC

Shifting public interest in Fentanyl – June 2013 – to June 2018

Reza Afshari*, Environmental Health Services, BC Centre for Disease Control, BC. Reza.Afshari@bccdc.ca

Public health surveillance is “the continuous, systematic collection, analysis and interpretation of health-related data needed for the planning, implementation, and evaluation of public health practice” according to [WHO](http://www.who.int). The graphs could be predictive indices for what are going to come next month! Surging in public interest have been “co-inside” with popularizing the related news and also “lagged” as confirmatory indices. In addition, in three occasions, public interest was different from the number of deaths (see the graph). Do these mean that public interest is a “predictor index” as well?

BCTOX is reporting the trends of public interest (Public-&-Professional searches) for major toxicology related issues in BC as a new surveillance system using google trends as surrogates of public attitude.

BCTOX is hopeful that this initiative will draw attention of public health professionals to changing pattern of Public interest in toxicology related issues.

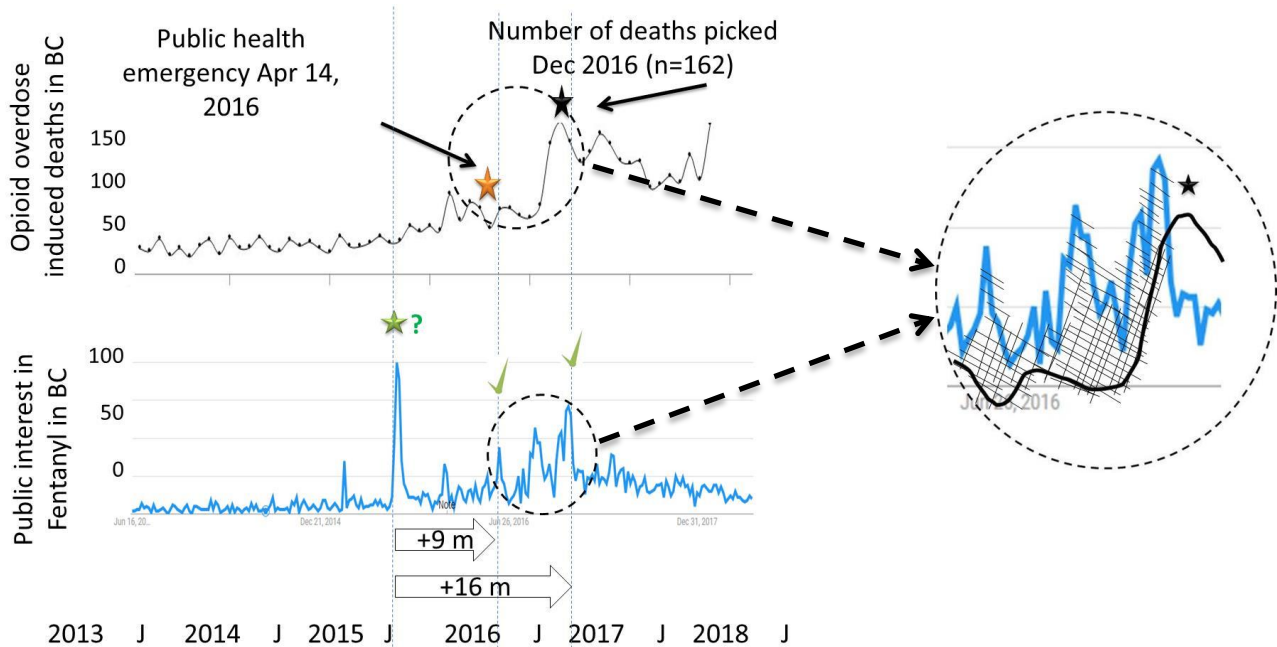


Figure 1. Shifting public interest (June 2013 to June 2018) as compared to the number of opioid overdose induced deaths in the same period in British Columbia. * Data points (obtained from Google Trends) are relative to the maximum search in two week periods.

✓ **Trends in public interest in fentanyl**

- Public interest in fentanyl has increased dramatically and with fluctuations since mid-2015.
- The pattern is relatively and consistently downward since early 2017.
- “Prior” to the sharp increase in the number of deaths in December 2017, public interest increased (superimposed and magnified in the right).

✓ **Peaks in public interest in fentanyl**

- A sharp increase of public interest in fentanyl in late Jul & early Aug 2015
- Public health emergency Apr 14, 2016
- Number of deaths picked Dec 2016 (n=162)

✓ **What were the potential reasons for a sharp increase of public interest in fentanyl observed in late Jul & early Aug 2015 in BC (16 months prior to the sharp increase in the number of deaths in December 2017)?**

According to BCTOX focus group:

- Reports of deaths in “teenagers” and due to “recreational use” of fentanyl was popularised that time.
- Media started reporting on “middle class people dying of overdoses in Vancouver”. --- The population at risk has widened.
- ✓ **Why the pattern of the number of opioid induced deaths (rather stable) and public interest (downward) are not similar in 2017 and 2018?**

(A) Real sense of security

- ✓ Similar to bond yields in economy, public is predicting that the probability or severity of opioid overdose epidemic is declining

In terms of risk management;

- ✓ This is good news!
- ✓ Risk management strategies are working
- ✓ --- We have to wait to see if their perception is correct

(B) False sense of security

- ✓ Public incorrectly lean to believe the probability or severity of the risk have been initially oversold to them
- ✓ Public believes the risk exists but is no longer concerns them (they are not the population at risk)
- ✓ Media reports on the issue is no longer attractive (public lost interest, fatigue), etc.

In terms of risk management

- ✓ Public engagement strategies should be modified, wider range of external stakeholders should be focused, certain population at higher risk to be targeted, publicizing well known figures who are affected with fentanyl according to the BCTOX focus group.

BCTOX’s Public Interest in Toxicology Surveillance System in BC
Shifting public interest in Cannabis – June 2013 – to June 2018

BCTOX is reporting the trends of public interest (Public-&-Professional searches) for major toxicology related issues in BC as a new surveillance system using google trends as surrogates of public attitude.

The following graphs show the proxy frequency of searches for the keywords from Feb 2017 to Jan 2018. Each variable is compared with itself (the highest frequency of searches over a two week period in 2017 serves as the baseline (highest)). As just the trends (but not the actual numbers) are important and feasible, no values are given for the vertical axis.

In summary public interest, estimated from the relative number of searches from June 2004 to June 2018 in “Cannabis” in BC is constantly increasing since 2014. However, public interest in fentanyl increased and then decreased since 2017, and for “Heroin” and “Cocaine” remained rather stable.

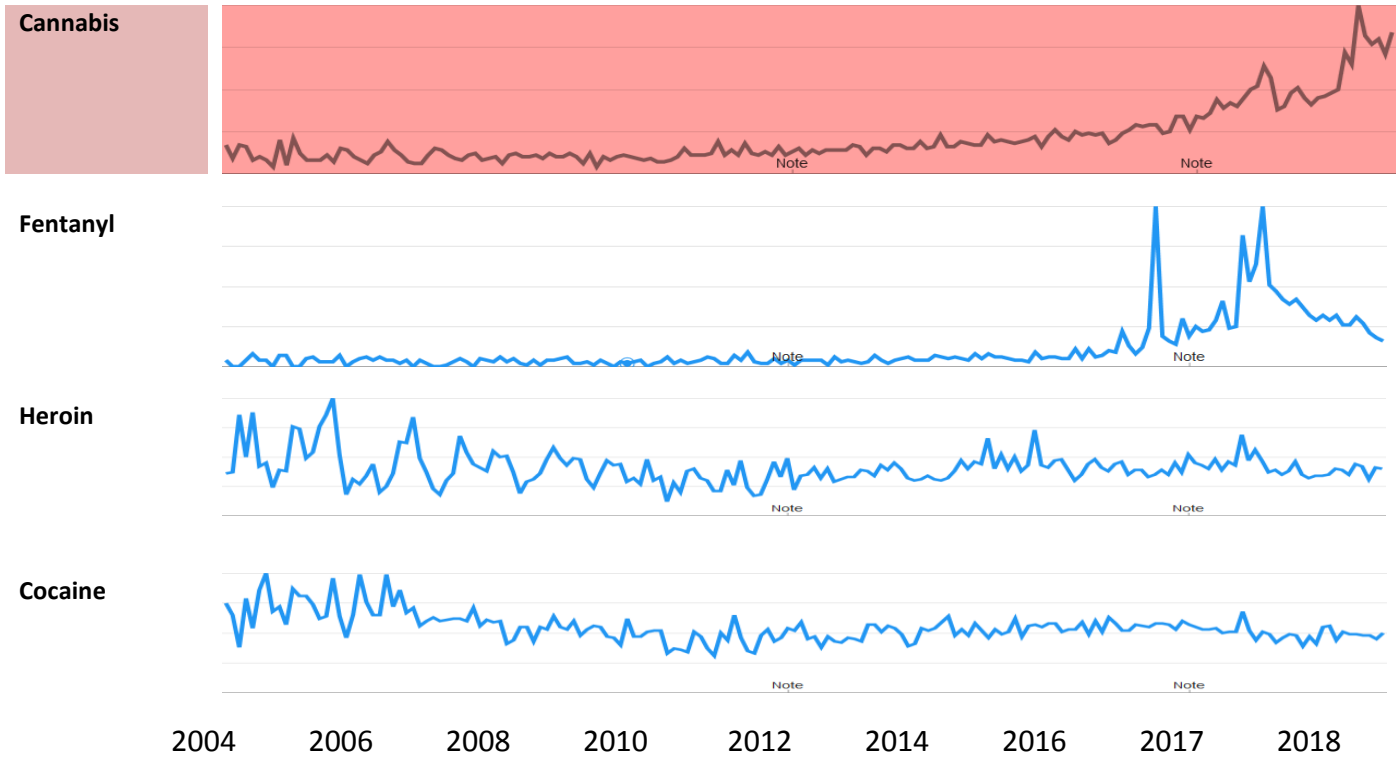
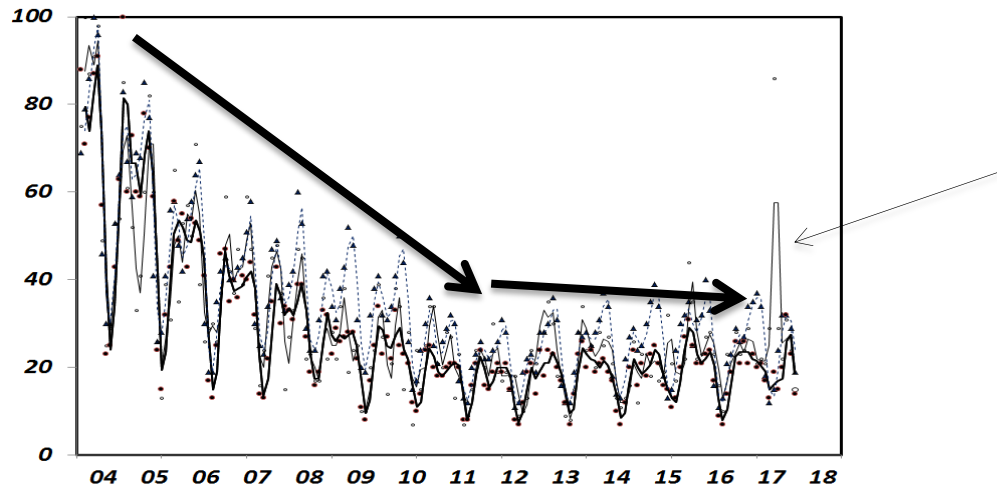


Figure 2. Pattern of public interest, estimated from the relative number of searches from June 2004 to June 2018 (data from Google Trends).

BCTOX's Public Interest in Toxicology Surveillance System in BC
 Shifting public interest in Air pollution– 2004 to June 2018

Air pollution



Pattern of public interest, estimated from the relative number of searches from 2004 to 2017, a comparison of British Columbia (—○—), Canada (—●—) and United States (—▲—).

*** --- Vertical axis are a relative popularity search ranges from 0 (less than 1%) to 100 (highest volume of searches) in the period of study for individual geographical regions. No absolute numbers are given. Three separate graphs are superimposed. Trend of each one should be compared by the maximum of the same one.

--- **Why the public interest in air pollution has declined (Downward trend)?**

(A) Real sense of security

- ✓ Air quality has improved in general.
 - Risk management strategies are working

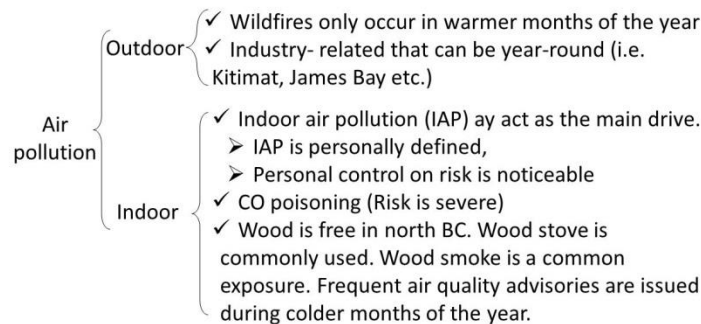
(B) False sense of security

- ✓ Public incorrectly lean to believe the probability or severity of the risk has been initially oversold to them or is no longer high
- ✓ Public believes the risk exists but is no longer concerns them (they are not the population at risk)
- ✓ Media reports on the issue is no longer attractive (lost interest, fatigue)
 - Air pollution in general isn't personally defined
 - Personal control on risk management is limited (individual cannot take effective actions)
 - Public perception of risk, with the exception of critical days e.g. forest wildfires is not acute or tangible, and is not dramatic.
 - ...

(C) Methodological design problem

--- **Seasonality**

Searches for air pollution are consistently more popular in colder months of the year. [?!]

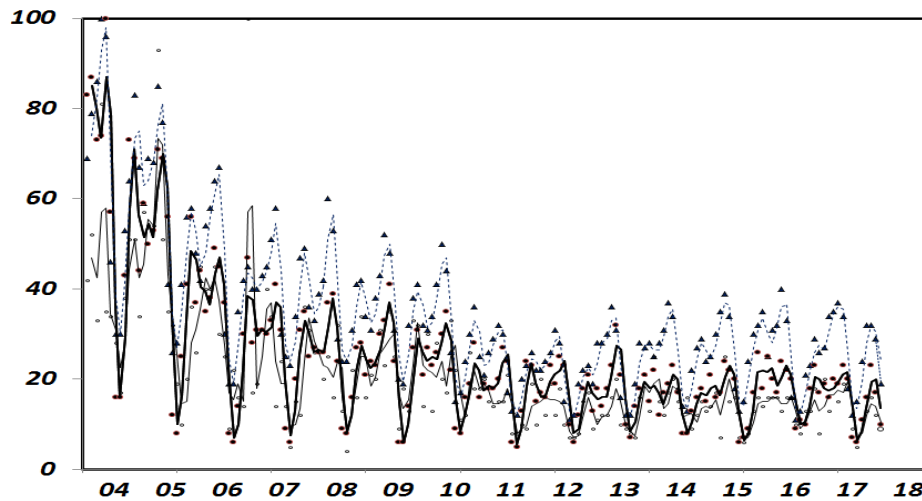


--- **Anomaly**

Summer of 2017 co-insides with the worst wildfire in BC.

BCTOX's Public Interest in Toxicology Surveillance System in BC
Shifting public interest in Water pollution/contamination – 2004 to June 2018

Water pollution/contamination



Pattern of public interest, estimated from the relative number of searches from 2004 to 2017, a comparison of British Columbia (—○—), Canada (---●---) and United States (----▲----).

--- Vertical axis are a relative popularity search ranges from 0 (less than 1%) to 100 (highest volume of searches) in the period of study for individual geographical regions. No absolute numbers are given. Three separate graphs are superimposed. Trend of each one should be compared by the maximum of the same one.

Why the public interest in water pollution has declined (Downward trend)?

(A) Real sense of security

- ✓ Water quality has improved in general.
 - Risk management strategies are working

(B) False sense of security

- ✓ Impact of water pollution is not personally defined
- ✓ Personal control on risk management is limited
- ✓ Public perception of risk is not dramatic.
- ✓ Risk is not acute or tangible.
- ✓ Public believes the risk exists but is no longer concerns them (they are not the population at risk)
- ✓ Media reports on the issue is no longer attractive (lost interest, fatigue)
- ✓ ...

(C) Methodological design (?)

- ✓ Concerns are mostly related to communities with sub-standard drinking water treatment systems using surface water and their inability to deal with turbidity during the freshet.

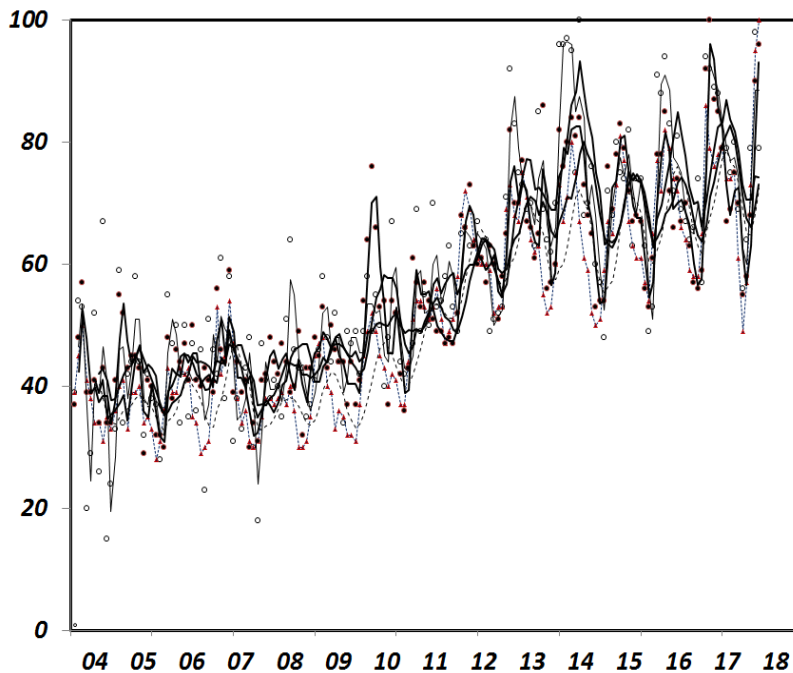
--- **Seasonality**

- ✓ Searches for water pollution is consistently more popular in warmer months of the year.
- ✓ Water as a whole (quantity, quality and contamination is more of an issue in summer)

--- **Anomaly**

- ✓ US in recent years have shown a relatively more interest in water pollution. --- Could be the impact of Flint Water Crisis

BCTOX's Public Interest in Toxicology Surveillance System in BC
Shifting public interest in Food poisoning – 2004 to June 2018



Pattern of public interest, estimated from the relative number of searches from 2004 to 2017, a comparison of British Columbia (—○—), Canada (—●—) and United States (---▲---).

--- Vertical axis are a relative popularity search ranges from 0 (less than 1%) to 100 (highest volume of searches) in the period of study for individual geographical regions. No absolute numbers are given. Three separate graphs are superimposed. Trend of each one should be compared by the maximum of the same one.

Why the public interest in Food poisoning has increased (upward trend)?

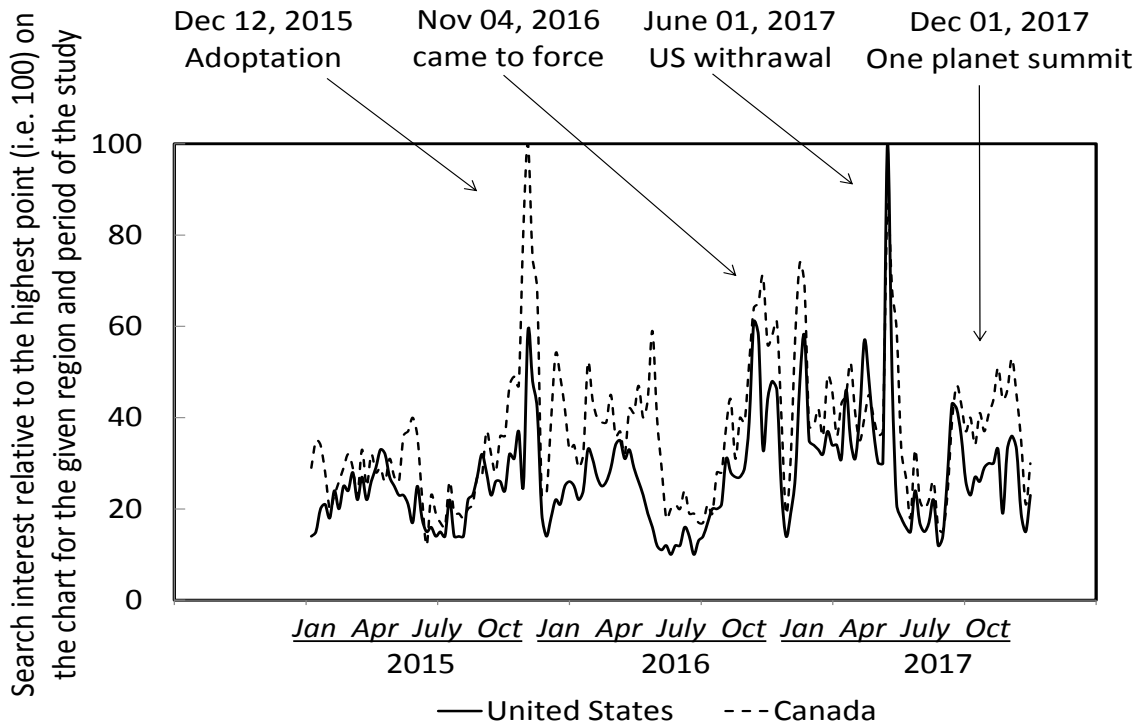
Real sense of insecurity, & outrage OR False sense of outrage

- ✓ Food poisoning has (?) increased.
- ✓ Case findings are increased (--- self limited)
- ✓ Public has developed a greater awareness of food in general
- ✓ Risk management strategies are (?) working
- ✓ More Media driven, and reports has increased. Trendy foods & certain food diets (organic, ready to eat) are more publicised (popularity of the TV shows e.g. MasterChef)
- ✓ Internet has made it easier to find out about outbreaks
- ✓ Food poisonings tend to be quite specific, food recalls are more publicized
- ✓ Impact of food poisoning is personally defined with a higher personal control on risk management (suing the food companies as an incentive)
- ✓ Public perception of risk is acute and dramatic
- ✓ Public believes the risk exists and concerns them (they are the population at risk)
- ✓ Media reports including food recalls on the issue is attractive, evolving and new (avoiding public fatigue) ...

Methodological design (?)

BCTOX's Public Interest in Toxicology Surveillance System in BC
 Shifting public interest in Climate change – 2015 to June 2017

Climate change



Pattern of public interest, estimated from the relative number of searches from 2004 to 2017, a comparison Canada () and United States ().

--- Vertical axis are a relative popularity search ranges from 0 (less than 1%) to 100 (highest volume of searches) in the period of study for individual geographical regions. No absolute numbers are given. --- Three separate graphs are superimposed. Trend of each one should be compared by the maximum of the same one.

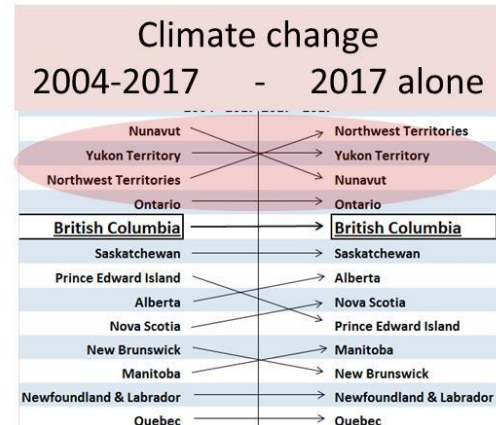
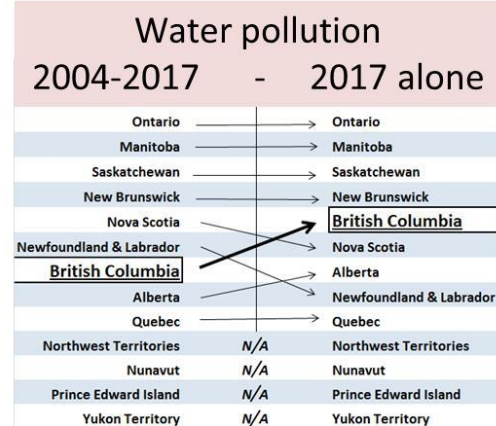
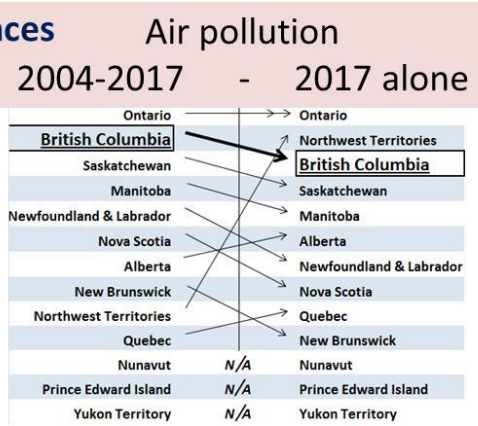
Pattern of interest Despite major political changes, no consistent longitudinal shift for public engagement with climate change was observed.

Seasonality Graphical data display seasonal no consistent variations in the search queries for climate change.

BCTOX's Public Interest in Toxicology Surveillance System in BC
 Shifting public interest in Different provinces – 2015 to June 2017

Climate change

Provinces



Relatively speaking BC residents among other provinces are:

- ✓ More concern of
 - Air pollution
 - Food poisoning
- ✓ Moderate concern of
 - Water pollution
 - Climate change

Northern territories

- ✓ Climate change was relatively more important in Northern territories including Nunavut, Yukon Territory and Northwest Territories

BCTOX's Toxicology Surveillance in BC

Shifting public interest - Fentanyl, Heroin, Cocaine and Cannabis - 2017 alone

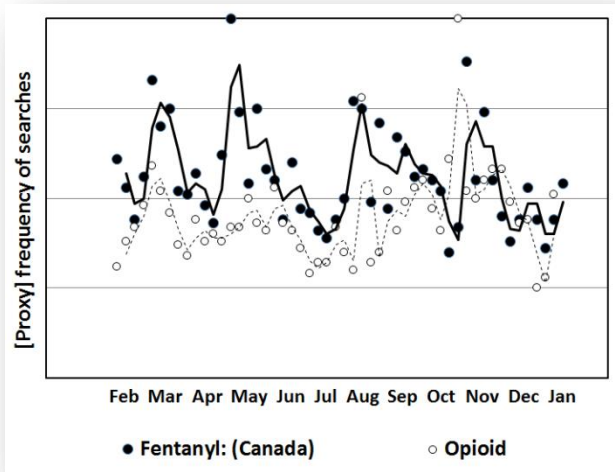
BCTOX is reporting the trends of public interest (Public-&Professional searches) for major toxicology related issues in BC as a new surveillance system using google trends as surrogates of public attitude. The following graphs show the proxy frequency of searches for the keywords from Feb 2017 to Jan 2018. Each variable is compared with itself (the highest frequency of searches over a two week period in 2017 serves as the baseline (highest)). As just the trends (but not the actual numbers) are important and feasible, no values are given for the vertical axis. --- For clarity of the message, the regression lines are presented as moving averages with period of 2.

As can be seen, the public relative interests in "fentanyl" as compared to search term "opioids" are similarly shifted in both Canada and BC (figure A -1 and A-2)[left side].

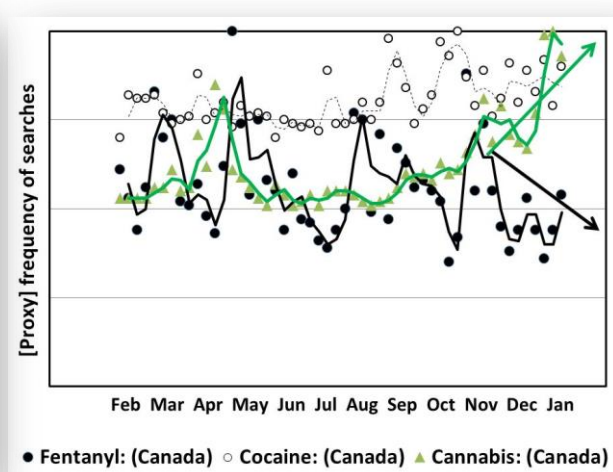
These findings are also not consistent when fentanyl searches are compared to "cannabis" and "cocaine" (figure B-1 and B-2)[right side]. This is despite the fact that fentanyl overdose induced deaths have remained relatively high, and as we are approaching the cannabis legalization.

This finding has public health relevance in the province. Measures should be taken to keep engaged public (or avoid social fatigue) regarding the relative importance of "fentanyl" and in the influence of the process of Cannabis legalization.

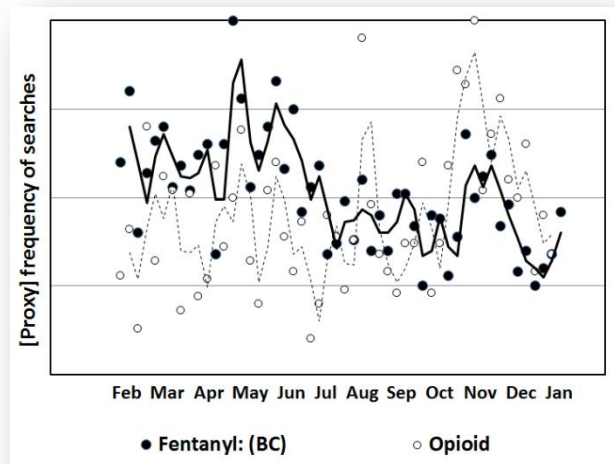
--- Public searches for "furanyl fentanyl (Fu-F)" (less potent) and carfentanyl (more potent) analogs of fentanyl were not included.



A-1. Canada

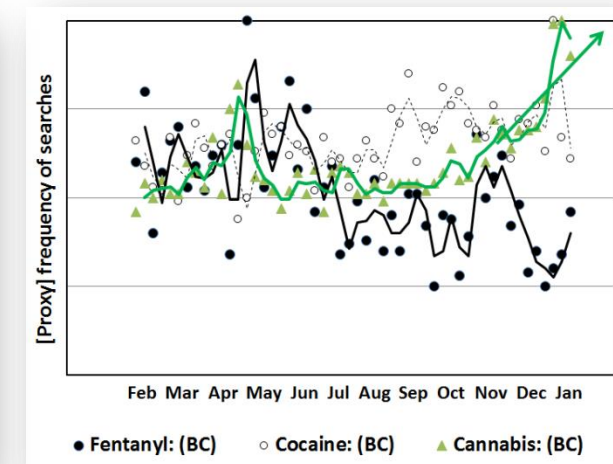


B-1. Canada



A-2. British Columbia

"Fentanyl" public searches as compared to "opioids" as a whole (Past 12 month to Jan 22, 2018)



B-2. British Columbia

"Fentanyl" public searches as compared to "Cannabis" and "Cocaine" (Past 12 month to Jan 22, 2018)

BCTOX's Toxicology Surveillance in BC

Shifting public interest - CO, Mushroom, Plant, bites, and air, water, soil and food poisoning or pollution – 2017 alone

Figure C shows that public was more concern of carbon monoxide poisoning during colder months of the year.

Figure D suggests that public searches start earlier for plant poisoning as compared to bites and stings followed by mushroom. "Plant" and Mushroom" was used as surrogates for "plant poisoning" and "mushroom poisoning".

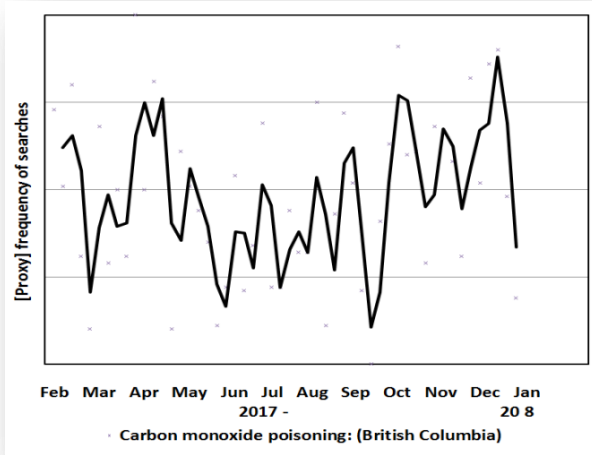


Fig C. Public interest in carbon monoxide poisoning during the past 12 months) (frequency of searches from Feb 2017 to Jan 2018)

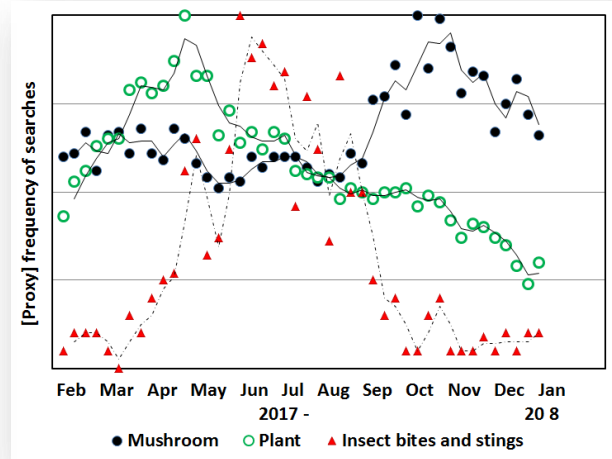
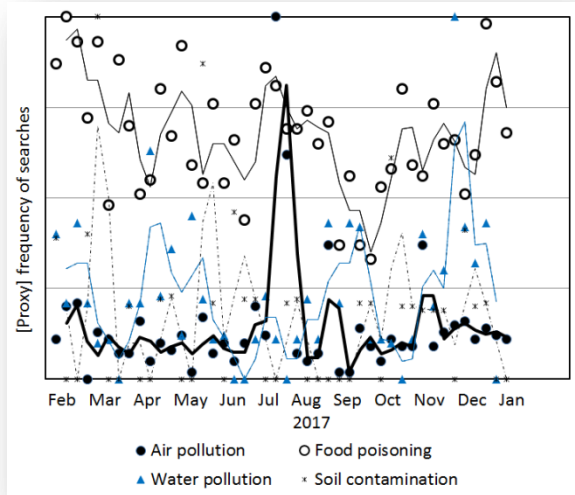


Fig D. Public interest in "Bites or stings" as compared to "plants" and "mushroom" (frequency of searches from Feb 2017 to Jan 2018)



The pattern of public interest for "air pollution" was disrupted in July and August, which coincide with forest wildfires (figure E).

Fig E. "Air pollution" as compared to other routes of exposure to contaminants (frequency of searches from Feb 2017 to Jan 2018)

Lessens

- ✓ Public is often interested in
- ✓ What is associated with acute illnesses,
- ✓ What could be serious or lethal,
- ✓ What is personally defined and individual can take action*,
- ✓ New news (Media coverage is related to sensations. Food recall or outbreak is still something you can make it a sensation, but not air and water contamination that are old news),

* Food has multiple sources, you can select which one you will eat and with more information you may get safer food. Air and water are from single sources.

Popularising the Science of Toxicology by Reza Afshari

Andrée expedition to the North Pole and his crews' mysterious death

Reza Afshari*, Environmental Health Services, BC Centre for Disease Control, BC. Reza.Afshari@bccdc.ca

Solve the mystery:

- What is the possible toxicology related reason for his death?

Take a guess (or confirm the given diagnosis), and email in your response to be entered into the BCTOX drawing for a \$20 gift card (Deadline: June 20, 2018).

--- There is no right or wrong answer for this competition. You may select a given diagnosis or provide a new one.

- If you send just a diagnosis, you will be entered once.
- If you send the justification of your diagnosis, you will be entered twice.

Salomon August Andrée

Salomon August Andrée (1854 - 1897) was a Swedish scientist and aviation engineer that attempted to reach the North Pole by hydrogen balloon. His unsuccessful expeditions lead to the death of himself and two crew members.

His life was full of ups and downs, with a final eye-catching story shortly before his passing. He was first employed as a janitor, and subsequently moved towards being promoted to serve as a proud patriot and liberal member of the Stockholm city council. He supported feminism and believed that women's liberty is an inevitable consequence of technical progress.

He has written several inspiring and thought provoking articles. His skills and expansive inspirational mood even acted as an aid to convince Alfred Nobel and King Oscar II to fund his expedition to the North Pole, a noble and magnificent achievement in itself. His ultimate portrayal should have been as a man that defies all odds as it is alleged that three quarters of the mere 1,000 people that have tried to reach the North Pole in the late 1800s died in vein, while the rest failed.¹

The cold waters and icy lands near the North Pole were enough of a dangerous feat, let alone his accompanied attempt towards a novel travel method: Flight. Even today, the idea seems to be extraordinary and captivating. During his time it would have been "OPG!" as my daughter would say to express her surprise.

Andrée's expedition

SA Andrée, Knut Frænkel (engineer), and Nils Strindberg (photographer) began their journey to the North Pole via hydrogen balloon on July 11, 1897; this expedition would last a short 3 days. They landed due to mechanical failure, powerful winds, and the freezing of their balloon when heavy rains turned to ice.

At his death, SA Andrée was only 43 years old; Knut and Nils were 27 and 25, respectively. Nils was newly engaged to Anna Albertina Constantia Charlier.² It was reported that folk on the ground had spotted an early landing of their balloon less than 3 days after their departure. The balloon finally disappeared into the clouds.

Imagine what a feat it would have been for these men to return to Stockholm shortly, and empty handed, after the alleged expedition of their life. Would these honourable and determined men felt ashamed?

They were neither to take their bad luck as a failure nor to quit their journey as they never have done before. Instead, they continued their expedition on icy land, doubling their risk. Andrée's diary notes, which have been successfully preserved in the freezing temperature of the White Island, reveals many hardships, some as far as hunting polar bears for food. Their journey ended in about 3 months. By then, the polar night had begun, portraying 4 months of constant darkness. They were bugged down, simply surviving on tinned and dried foods.



S. A. Andrée and one of his crew with crashed balloon on the pack ice
(Photo [original] by Nils Strindberg, 1897 that was recovered in 1930)

For several decades his disappearance was subject to mystery and wide speculation until 1930, due to the discovery of a Norwegian Bratvaag Expedition. In 1930 the photographer's body was found buried amongst the rocks, while SA Andrée and his engineer were uncovered in a tent on White Island. He, later, was granted a funeral with great honor and a speech by King Gustav V. An enticing finding by the Norwegian group details paraffin particles in their stove, alongside plenty of matches.²

Cause(s) of Andrée's death

The real reason for their death is unclear, and perhaps unlikely to ever be known, however, speculation ranges from suicide with opium, hypothermia and freezing³, fatigue and dehydration, drowning in the case of the photographer, Vitamin deficiency and scurvy, microbial and parasitic causes, and toxic exposures including botulism and carbon monoxide poisoning.⁴

By their final days, the men knew their faith was sealed. However, considering suicide as the cause of death for these brave men who defied the odds is nearly unimaginable. In their era, suicide was considered, not only an unforgivable sin, but also a treachery to the crown across Europe.

- **Trichinellosis**

SA Andrée's diary notes indicate digestive problems, illness and exhaustion in all three men. Parasitic infections such as Trichinellosis¹ sourced from eating raw or undercooked Polar bear meats have been proposed as a possible cause of death. Though, Trichinellosis is not as a rapid killer as is presented in all three cases on this expedition. Thus, in my view, it is highly unlikely to be the sole cause of death.

- **Hypothermia**

Hypothermia is the first thought the surfaces when reading Andrée's diary and it is a logical possibility.^{5,3}

- **Scurvy**

Scurvy or severe vitamin C deficiency was a major cause of death until the 17th century in sailors. However, the simultaneous death of 3 cases due to Vitamin C deficiency over two months is highly unlikely. Additionally, noticeable clinical findings of scurvy were not documented in these cases.

¹ Trichinella larva lives in muscle tissue of different types of animals including bears. It is caused by roundworms (i.e. Trichinella) and lead to invasion of the intestines and lead to abdominal pain, vomiting and diarrhea at early stages. Later larvae migrates to muscles and causes inflammation with pain and swelling and skin rash.

➤ **Vitamin A poisoning**

Vitamin A poisoning has also been discussed as the cause of their death. Allegedly the men were ingesting the livers of polar bears and seal, which are known to contain high volumes of Vitamin A. However it is highly unlikely that the dose required for lethality occurred in all three of the cases, simultaneously.

➤ **Lead poisoning**

Andrée brought food packed in lead solder cans that may have contaminated his food. In the 1980s, when lead content on the longitudinal axis of his nail was measured, readings ranged from 27 to 486 ppm, with an average of 65 ppm.⁴ Based on my experience on occupational lead poisoning and individuals using narcotics tainted with lead whom additionally have high blood lead levels, this toxicity seems to be an unlikely cause of death. It is true that severe lead poisoning could be lethal, but reaching that point requires long-term exposure to elevated lead levels, both of which are not the case for this example.

➤ **Carbon monoxide (CO) poisoning**

Similarities between clinical findings of CO poisoning including fatigue, nausea and vomiting and recorded symptoms of these cases lead to a rise of CO poisoning theories as the main cause of death. Cooking inside their small tent, which was presumably covered in ice, may have led to CO poisoning.

However, as one of his companions was buried, and the two others passed in the tent, it is unlikely that CO poisoning from a failed heating process inside the tent would be the cause of death. Generally, all cases that sleep in closed quarters exposed to high levels of CO pass away fairly simultaneously, without knowledge of the process, making burying one another fairly unlikely.

➤ **Botulism**

Botulism as the cause of death was proposed by Mark Personne.⁴ There are several reasons that imply botulism within this story.

Circumstances and food

Three previously healthy persons who die more or less at the same time bring poisonings, including botulism, as the cause of death to the top. As canned food and paraffin were found amongst their belongings, their death could be related to food poisoning.

Botulism was more common in the 19th century, when this disease was more lethal as botulism antitoxins were not available. Foods contaminated with *Clostridium botulinum* spores that are improperly preserved in low-oxygen conditions will germinate and produce the Botulism toxin. Pickled fish with poor salinity or acidity, smoked, and improperly canned foods are main sources of food botulism.^{6 7 8} It is plausible that Andree team's food was not properly prepared or preserved.

Clinical findings

Botulism is associated with weakness, blurred vision, dry mouth, gastrointestinal problems and with a rather descending paralysis; it is difficult for the patients to open their eyes, and as the disease gradually progresses, muscles responsible for breathing begin to lose their function, often leading to death. Patients are aware to the last second. I personally recall one of my patients with botulism over 10 years ago, being intubated, unable to breathe – merely having the ability to lightly wave when I visited him in the mornings^{6 9}--- He survived in case you are curious!

It is difficult to portray Andree's clinical findings in his last days. However, we know that he was fully aware in his final moments, writing on October 3rd; "fortunately, the weather is beautiful and we could work at speed. Nobody had lost the courage. With such comrades, one should be able to figure out under any circumstances."¹⁰

SA Andree's diary notes also indicate digestive problems, weakness and fatigue in all three men. These symptoms are consistent with botulism. Documented clinical findings, while being fully alert resembles botulism.



Botulism induced Ptosis (drooping of the upper eyelid due to paralysis), personal photo with permission.

It is not possible to give a diagnosis with a high level of confidence; however, if it were a toxicological reason behind their death, I would have put my money on botulism! This disease alone, or in combination with other problems and hardships related to their trip, may explain their tragic ending.

**Andrée expedition to the North Pole
and his crews' mysterious death - Question**

What do you think? What could be the potential cause of death for SA Andree and his crew?

Take a guess, and email back your response to be entered in the BCTOX drawing for \$20 gift card. --- There is no right or wrong answer for this competition. You may select a given diagnosis or provide a new one.

(Deadline July 20, 2018)

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