BRITISH COLUMBIA CENTRE ON **SUBSTANCE USE**

Networking researchers, educators & care providers

A Report on British Columbia's Unregulated Drug Supply

Drug checking trends across British Columbia

January to December 2021

June 2022

Land Acknowledgement

The BC Centre on Substance Use would like to respectfully acknowledge that the land on which we work is the unceded ancestral homelands of the xwmekwey'em (Musqueam), Skwxwú7mesh (Squamish), and sel'ílweta| (Tsleil-Waututh) Nations.

Authors

Alison Knill, MJ
Research Coordinator, British Columbia Centre on Substance Use

Samuel Tobias, MSc
Senior Drug Checking Operational Technician, British Columbia Centre on Substance Use

Jennifer Matthews, MA
Implementation Lead, Drug Checking, British Columbia Centre on Substance Use

Lianping Ti, PhD
Research Scientist, British Columbia Centre on Substance Use*;*
Assistant Professor, Department of Medicine, University of British Columbia

Funding

This report was supported by a Health Canada Substance Use and Addictions Program grant to the BC Centre on Substance Use to implement and evaluate a drug checking pilot in British Columbia (Arrangement #: 1718-HQ-000024). Funding agencies had no role in the research, design, or writing of the report, nor did they have a role in the decision to publish it. Findings reported here should in no way be taken as an endorsement of the specific point-of-care technologies that were used for this study, and the authors declare no conflicts of interest.

Acknowledgements

The authors would like to thank the staff at Health Canada's Drug Analysis Service for generously providing confirmatory testing services.

The authors would like to thank individuals who submitted their drug samples for analysis. We would also like to thank the drug checking technicians and drug checking experts with lived and living experience for their contribution to the drug checking project, as none of this work would be possible without them.

We also would like to thank our funders, partners, and collaborators for their ongoing support to BC's drug checking service:

- Alliance for Collaborative Drug Checking
- ANKORS
- BC Centre for Disease Control
- ASK Wellness
- City of Vancouver
- CRISM
- Fraser Health
- Get Your Drugs Tested
- Health Canada's Drug Analysis Service
- Health Canada's Substance Use and Addictions Program
- Interior Health
- Portland Hotel Society
- Providence Health Care
- Providence Health Care Research Institute
- Provincial Toxicology Centre
- St. Paul's Foundation
- Toronto's Drug Checking Service
- University of British Columbia
- Vancouver Coastal Health
- Vancouver Foundation
- Vancouver Island Drug Checking Project
- Vancouver Island Health Authority

The study was supported by a Health Canada Substance Use and Addictions Program grant to the British Columbia Centre on Substance Use to implement and evaluate a drug checking pilot in British Columbia.

Contact

Learn more about www.drugcheckingbc.ca

For further drug checking-related inquiries, you can reach us at drugchecking@bccsu.ubc.ca

Table of Contents

Purpose of the Report

The purpose of this report is to provide a summary of the substances that were submitted to drug checking in sites across British Columbia, as well as highlight any trends in the unregulated drug supply in 2021. The data is presented both by health authority regions, and by drug category, to provide an in-depth look at how the unregulated drug supply varies between region, and how it changed across the year.

The data presented was collected by technicians at community sites where drug checking is available, using benzodiazepine and fentanyl immunoassay test strips and Fourier-transform infrared (FTIR) spectroscopy. Samples were grouped into the following categories: opioids, stimulants, depressants, psychedelics, other, polysubstance, and unknown.

List of Acronyms and Other Frequently Used Terms

BC:	British Columbia
Buffs:	Inert compounds that are added to the final product to increase size or bulk
Cuts:	Psychoactive or pharmacologically active compounds that mimic or enhance the effects of the main drug in the substance
Down:	Drugs that contain opioids in any amount (i.e., fentanyl, heroin)
DTES:	Vancouver's Downtown Eastside neighbourhood
Expected drugs:	An individual's expectation of what the drug is prior to drug check
FTIR:	Fourier-transform Infrared
GC/MS:	Gas Chromatography/Mass Spectrometry
LC/MS:	Liquid Chromatography/Mass Spectrometry
OPS:	Overdose Prevention Site
Other:	Substances that do not fit into any established drug category
qNMR:	quantitative Nuclear Magnetic Resonance
SCS:	Safe Consumption Sites
Unknown:	All samples where the individual could not identify the expected drug

Tables and Figures

Summary of Key Findings

- The Vancouver Coastal Health region had 12,558 (82.8%) total drug checks completed in 2021 and had the greatest number of drug checks of any health authority region completed each month.
- Opioids were the most checked drug category in 2021, with a total of 6,003 (39.6%) samples checked, with fentanyl and "down" being the most checked drugs (2,638 and 2,465 samples checked, respectively).
- The stimulant drug category had the greatest concordance between the reported expected drug and the drug checking results, with 94.9% of samples meeting expectations.
- Expected heroin samples had the fewest heroin-positive samples in August (31.03%).
- The concentration of fentanyl in samples submitted for drug checking at sites in the Vancouver Downtown Eastside neighborhood was consistently at least 3% higher than the concentration of fentanyl in samples submitted for drug checking at sites outside of the Vancouver Downtown Eastside neighborhood.
- Benzodiazepines were increasingly present in expected-down samples submitted for drug checking throughout the year, from 20.3% in January to 34.4% in December.
- Stimulants such as cocaine, crack cocaine, methamphetamine all matched expectation in over 90% of samples, as confirmed by the FTIR spectrometer.
- Ketamine matched expectation in 92.6% of samples, as confirmed by the FTIR spectrometer.
- Of the opioids, "down" and fentanyl both matched expectation in over 90% of samples, while heroin matched expectation in 49.2% of samples, as confirmed with either a positive fentanyl test strip, or identified by the FTIR spectrometer.
- Alprazolam matched expectation and was confirmed to contain alprazolam in 55% of samples, as confirmed by either a positive benzodiazepine test strip, or the FTIR spectrometer.

Background and Methods

On April 14, 2016, British Columbia declared the overdose crisis a public health emergency, which led to the introduction of harm reduction tools, like take-home naloxone kits and community drug checking services, in response. Many overdose prevention sites (OPS) and supervised consumption sites (SCS) have established drug checking services using a combination of Fourier-transform Infrared (FTIR) spectroscopy, fentanyl test strips, and benzodiazepine test strips.

The FTIR spectrometer can determine the chemical composition of a person's substance by shining an infrared light through the substance to produce an absorption spectrum. Each individual compound has a unique spectrum that can be matched against reference libraries and can be used to determine up to six of the compounds in a given sample. Compared to other spectroscopy or sample analysis methods, the FTIR spectrometer is a cost- and time-effective method and is non-destructive, which allows for samples to be returned to the individual after the analysis is complete. However, the detection limit of the spectrometer is around 5-10%, meaning that compounds must be present in quantities greater than that amount to be detected in the sample.[1]

In comparison, benzodiazepine and fentanyl immunoassay test strips are much more sensitive and are able to detect compounds at a lower threshold than the FTIR spectrometer.[1,2] Fentanyl test strips are able to detect fentanyl, and some fentanyl analogues, while benzodiazepines test strips can detect the presence of a number of different benzodiazepine analogues. Neither of the test strips can determine the amount of fentanyl or benzodiazepines in a sample, and are only determine if the compounds are present. The combination of the FTIR spectrometer and test strip technologies allows for the detection of fentanyl and benzodiazepines at lower concentrations, while also providing individuals with information about what other compounds are present.

From January 1, 2021 through December 31, 2021, there was a total of 15,163 samples submitted for drug checking at point-of-care sites across British Columbia that use both FTIR spectroscopy and immunoassay test strips. Mail-in samples were excluded from the data. Data are reported by health authority region and include sites operating in four of the five regional health authorities – Interior Health, Island Health, Fraser Health, and Vancouver Coastal Health – with the Vancouver Coastal Health region being further separated between the Vancouver Downtown Eastside (DTES) neighbourhood and the surrounding areas. Data in the Island Health Authority region did not include samples collected as part of the University of Victoria drug checking project, which uses different technologies and generates different data. Visit https://substance.uvic.ca for more information on the project.

Samples were collected using the FTIR spectrometer, in combination with fentanyl test strips, and benzodiazepine test strips. The samples were analyzed using mixture analysis verified with drug reference libraries. Retrospectively, we applied the Bruker Quantitative Analysis 2 (QUANT 2) to obtain fentanyl quantitative information.[3]

Samples were categorized as opioids, stimulants, depressants, psychedelics, other (drug did not fit into any drug class), polysubstance (drugs from multiple classes are present in one sample), and unknown (the expected substance(s) weren't known to the individual accessing the service prior to analysis). A sample was considered fentanyl- or benzodiazepine-positive if it received a positive result with the FTIR spectrometer and/or the respective immunoassay test strip. "Down" samples were defined as samples expected to contain fentanyl, heroin, fentanyl and heroin, or down (unknown expected opioid).

The results from each of the drug checks provide insight into the unregulated drug supply in the province across the year; in particular, information on the predominant drug categories being submitted for drug checks each month, how many samples are submitted by health authority region, the variance in fentanyl concentrations by region and month, and the presence of benzodiazepines and heroin in the "down" supply.

Please visit www.drugcheckingbc.ca for more information. For an interactive overview of the data that's been collected since 2018, please visit https://drugcheckingbc.ca/dashboard/.

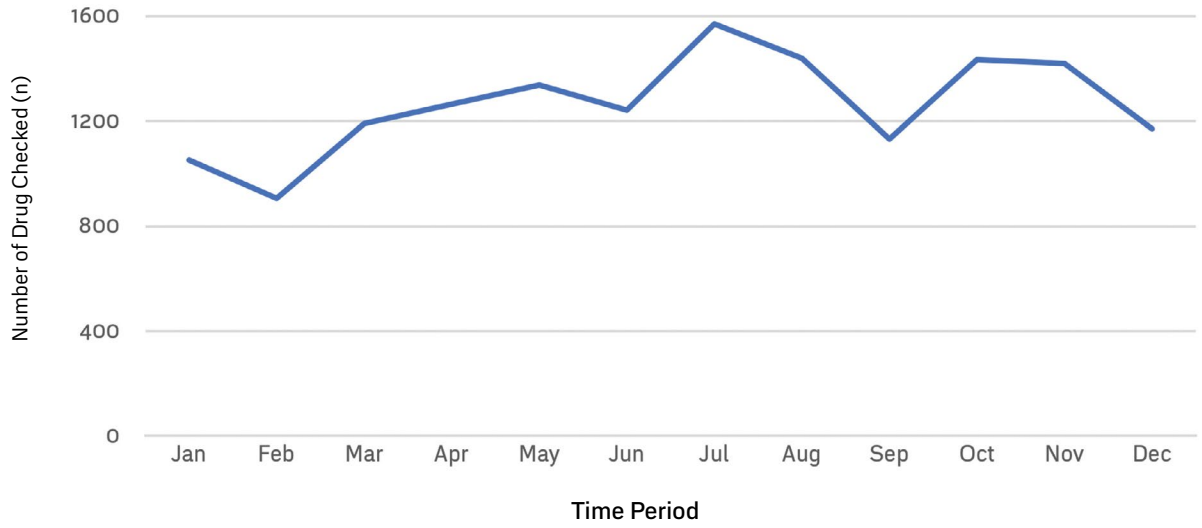
Results

DRUG CHECKING UTILIZATION

A total of 15,163 samples were submitted for drug checking at sites across BC, which were examined by comparing the total number of drug checks completed each month, the total number of samples submitted in each drug category, and the total number of drug checks completed in each health authority region.

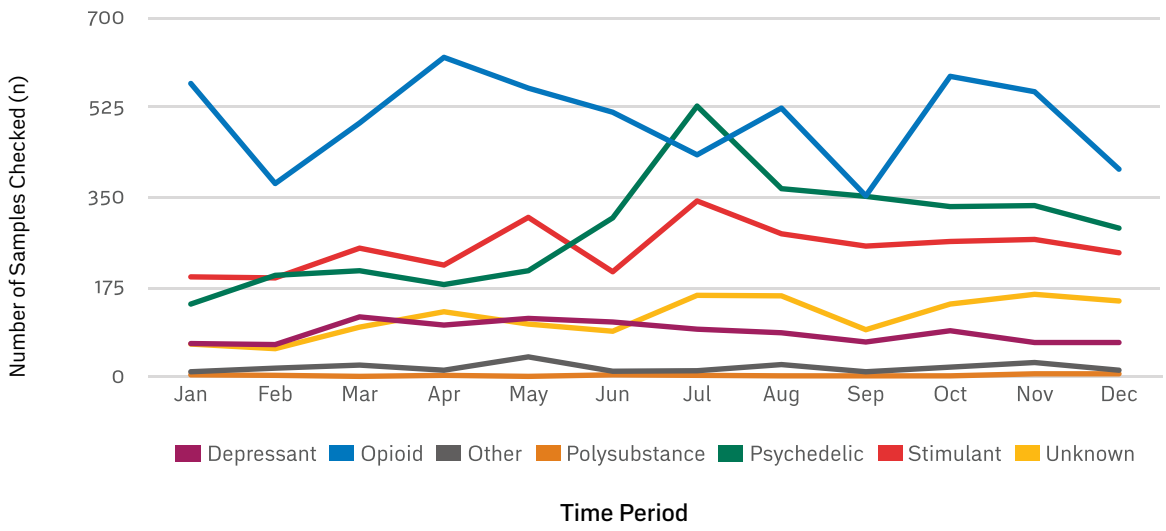
The number of samples checked per month ranged between 906 and 1,571 samples, with February having the fewest number of total drug checks completed during the month, and July having the most (see **Figure 1**).

Figure 1. Total number of samples checked across BC each month in 2021.



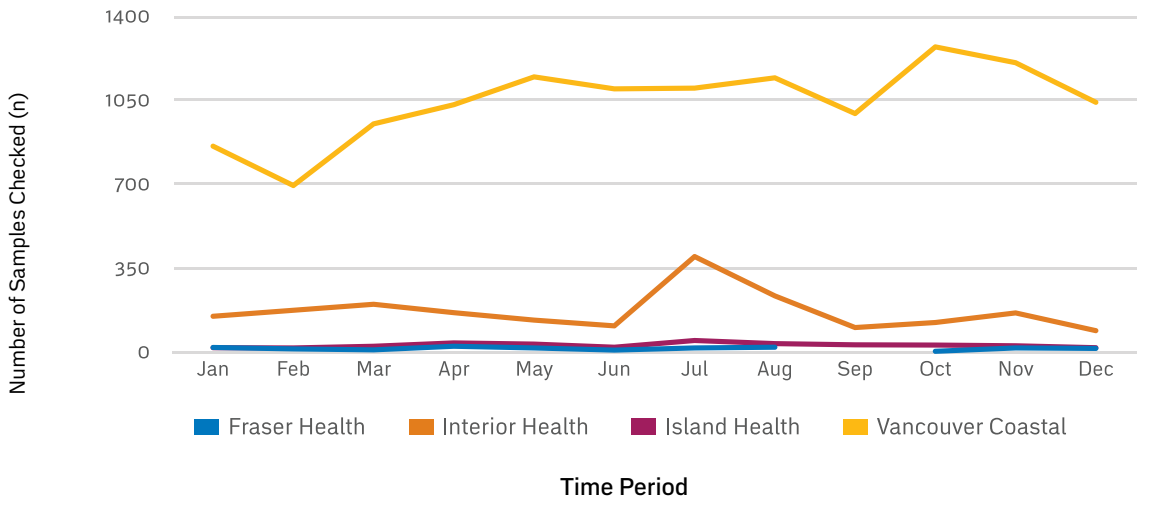
When separated into the different drug categories, opioids comprised the greatest number of samples every month, except in July, with a peak of 623 samples checked in April (see **Figure 2**). Stimulants were the second highest category of drugs checked in January and March through May, and July having the greatest number of stimulants checked in a month with 343 samples. From June onwards, psychedelics surpassed stimulants as the second highest drug category. In July, psychedelics were the predominant drug checked, with 523 samples checked. The Shambhala Music Festival took place and offered drug checking services at their sites in July, which could account for the spike in psychedelic samples (i.e., A, MDA, ketamine, the 2C-B family, DMT, and other related substances) being checked during that month. The frequency of other drug categories checked, including depressants and unknown samples, were consistent throughout the year.

Figure 2. Total number of samples checked per month in each category across BC



When looking at the total number of drug checks between health authority regions each month, the Vancouver Coastal Health region consistently had the most, with 12,558 total samples in 2021, followed by the Interior Health, Island Health, and Fraser Health regions (see **Figure 3**). The Interior Health region saw a spike in samples during July of 400 samples which, consistent with the data shown in **Figure 1** and **Figure 2**, corresponds to the occurrence of the Shambhala Music Festival in the Interior Health region during that month. Sites in the Fraser Health region did not collect any samples during September as services were suspended temporarily.

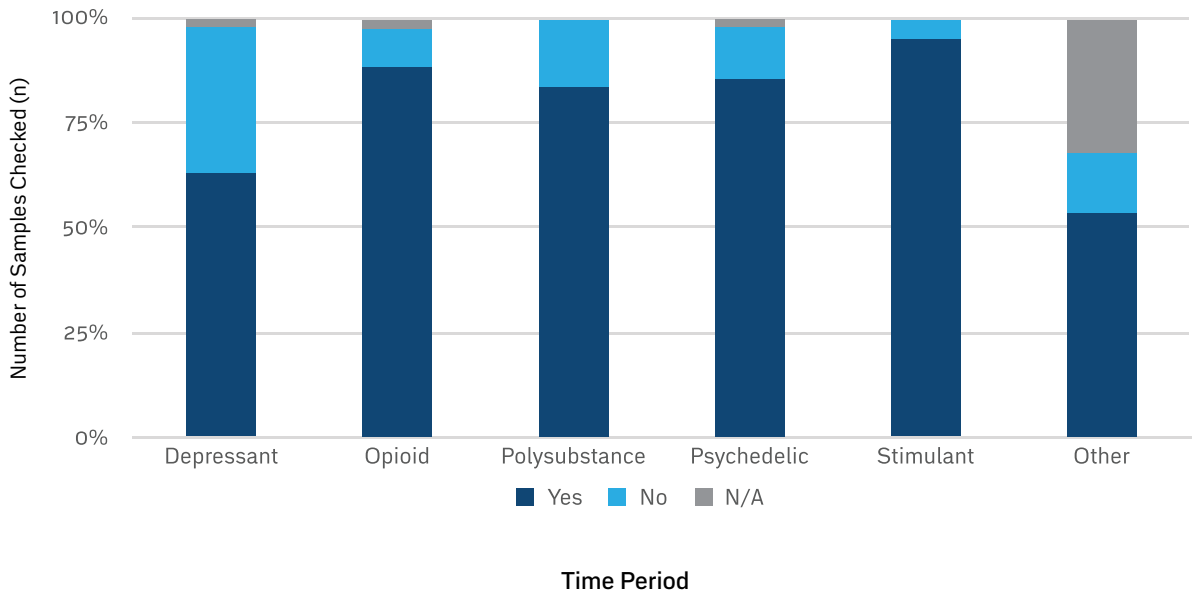
Figure 3. Total number of samples checked per month in each health authority



DRUGS MEETING EXPECTATIONS

The concordance of the expected substance to the drug check results for all of the samples collected in 2021 were examined by drug category (see **Figure 4**). 'N/A' results refer to samples in which the concordance between the expected drug and result could not be determined, for example, if the amount of the active drug is present below the detection threshold of the FTIR spectrometer and an individual refuses the use of a test strip, or the substance is not available in the reference library. Stimulants met expectations most frequently: 94.9% of samples had stimulants present. Opioids were present in an expected-opioid sample 88.3% of the time. Of the depressants, 63.1% of the samples were concordant with the expected substance. In contrast, drugs in the "Other" category had the greatest discordance between expected substance and the drug checking results.

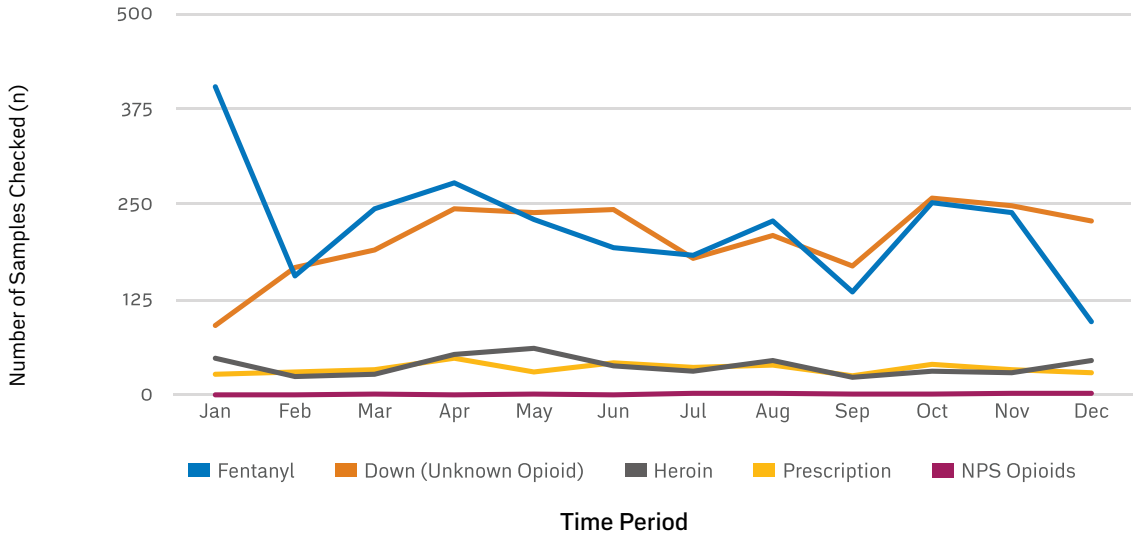
Figure 4. Stacked barplot of the concordance of expected drug present in a sample across the year as a percentage in each drug category



OPIOIDS

A total of 6,003 (39.6%) opioid samples were submitted for drug checking services in 2021. Fentanyl was the most commonly submitted opioid when looking at total samples across the year, with 2,638 total samples (see **Figure 5**). January saw the most fentanyl samples, with 404 samples. Down (samples where the reported expected substance was an "unknown opioid") was the predominant opioid submitted for drug checking in February, May, June, and September through December. Novel psychoactive substance (NPS) opioids, such as carfentanil or isotonitazene, were consistently submitted for drug checking throughout the year, ranging between zero to two samples per month.

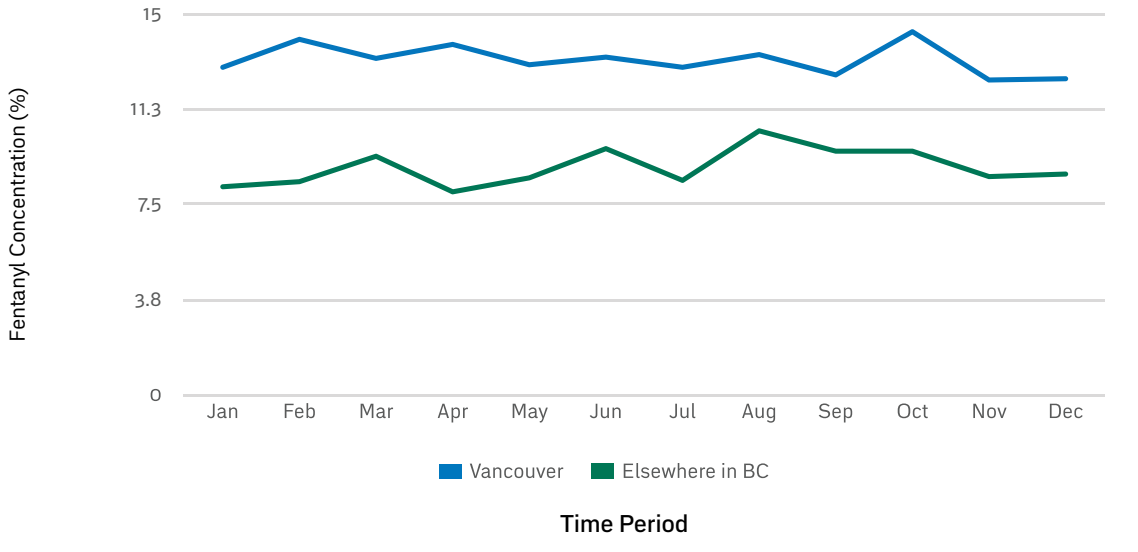
Figure 5. Number of opioid samples by type checked per month across BC



Fentanyl Concentrations

The concentration of fentanyl, measured as a per cent of a given sample, was consistently higher in the Vancouver DTES neighborhood compared to other regions in BC (see **Figure 6**). The monthly median concentration in the Vancouver DTES neighbourhood ranged between a low of 12.4% to a peak of 14.3% throughout the year. In comparison, other regions in BC outside of the Vancouver DTES ranged between 8.0% at the lowest point across the year to a peak of 10.4%. January showed the greatest discrepancy between the Vancouver DTES neighbourhood and sites elsewhere in BC, with a difference of 4.7%.

Figure 6. Comparison of fentanyl concentration per month between sites in Vancouver DTES and sites outside of the Vancouver DTES



Fentanyl Adulteration in the Unregulated Drug Supply

Fentanyl was present in non-opioid substances throughout the year, as confirmed by either a positive fentanyl test strip or the FTIR spectrometer (see **Table 1**). The data shown in **Table 1** are drawn from all samples of that expected substance, meaning that the expected substance may not have been confirmed present in the sample. Of the stimulants, "speed" had the highest proportion of fentanyl-positive samples at 14.3%, followed by crack cocaine, with 4.5% of samples confirmed to contain fentanyl. Alprazolam was the most submitted depressant and 4.4% of the samples were fentanyl-positive. MDMA and ketamine, the two most submitted psychedelics in 2021, were both fentanyl-positive in less than 1% of samples. Only one diphenidine sample was submitted in 2021, and was confirmed fentanyl-positive, accounting for the 100% fentanyl-positive rate. Drugs not included in this table had zero samples test positive for fentanyl (e.g., DMT, GHB, amphetamine).

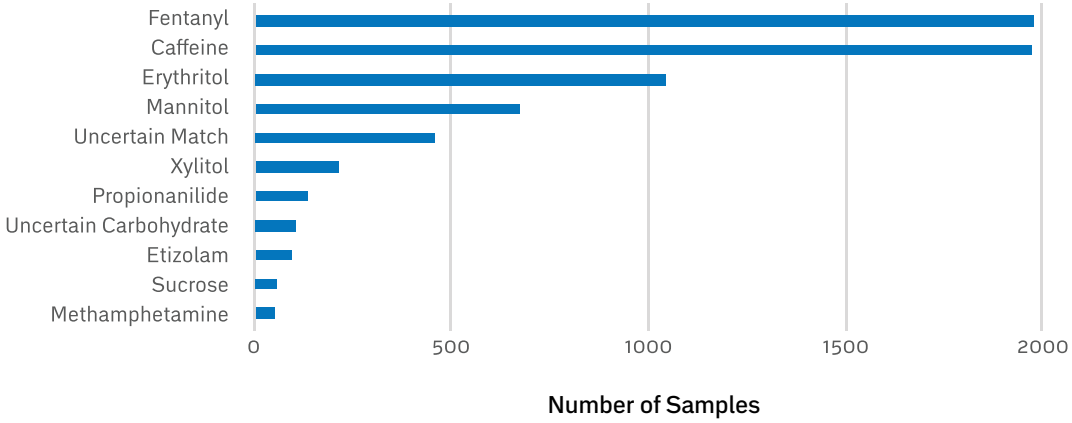
Table 1. Table showing proportion of samples that tested fentanyl-positive for the predominant substances submitted in each category

Category	Substance	Proportion Fentanyl-Positive (%)	Number of submitted samples
Stimulant	Cocaine	0.6	1850
	Crack Cocaine	4.5	242
	Methamphetamine	2.5	807
	Speed	14.3	7
Depressant	Alprazolam	4.4	573
	Clonazepam	3.6	28
	Etizolam	4.2	120
	Flualprazolam	21.7	23
	Flubromazepam	50.0	2
	Lorazepam	8.0	25
	W-18	33.3	3
	Xylazine	20.0	5
Psychedelic	MDMA	0.3	1692
	Ketamine	0.2	1132
	2C-B	2.4	82
	Diphenidine	100	1

Expected-Fentanyl Samples

A total of 2,545 expected-fentanyl samples matched expectation and were confirmed to contain fentanyl with either a positive fentanyl test strip, or by the FTIR spectrometer. Of the 2,545 expected-fentanyl samples that matched expectation, 1,978 samples (77.7%) were confirmed by the FTIR spectrometer to contain fentanyl (see **Figure 7**). Fentanyl was not identified in 100% of the samples by the FTIR spectrometer because fentanyl may have been present in too low of a concentration to be detected by the FTIR spectrometer, but was detected via test strip. The second most identified compound in expected-fentanyl samples was caffeine, a buff, with 1,969 samples (77.4%) confirmed to contain caffeine by FTIR spectroscopy.

Figure 7. Bar graph showing the most common substances found in expected-fentanyl samples that matched expectation, as confirmed by FTIR spectroscopy*

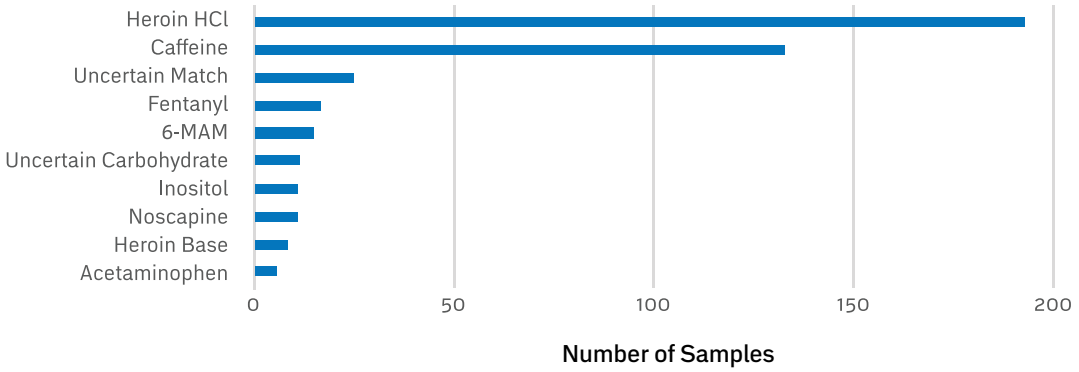


**Other compounds present in fentanyl in <2% of samples include: lactose, inositol, uncertain oil, para-fluorofentanyl, diphenhydramine, heroin, acetoacetanilide, dimethyl sulfone, 4-ANPP, acetaminophen, no library match, flualprazolam, xylazine, glucose, polyethylene glycol, phenacetin, carfentanil, heroin base, microcrystalline cellulose, AMB-FUBINACA, W-19, cocaine base, creatine, flubromazepam, metonitazene, Vitamin C, benzocaine, piperidone, alprazolam, aspirin, cocaine, dimenhydrinate, etodesnitazene, glutamine, lorazepam, magnesium sulfate, nitrazolam, procaine, sorbitol, stearic acid, talc, tramadol, uncertain mineral, uncertain wax*

Expected-Heroin Samples

Of the expected-heroin samples submitted for drug checking, 206 samples matched expectation and were confirmed with the FTIR spectrometer to contain heroin. Heroin was confirmed by the FTIR spectrometer in 202 of the 206 samples (98.1%), and was the most frequently identified compound (see **Figure 8**). The FTIR spectrometer may not have identified heroin in all 206 samples that matched expectation because 6-monoacetylmorphine, a closely related compound was detected instead. Caffeine, a buff, was the second most identified compound with a total of 133 samples (64.6%). A total of 17 expected-heroin samples were identified by the FTIR spectrometer to contain fentanyl, which has a higher potency compared to heroin.[4]

Figure 8. Bar graph showing the most common substances found in expected-heroin samples that met expectation, as confirmed by FTIR spectroscopy*

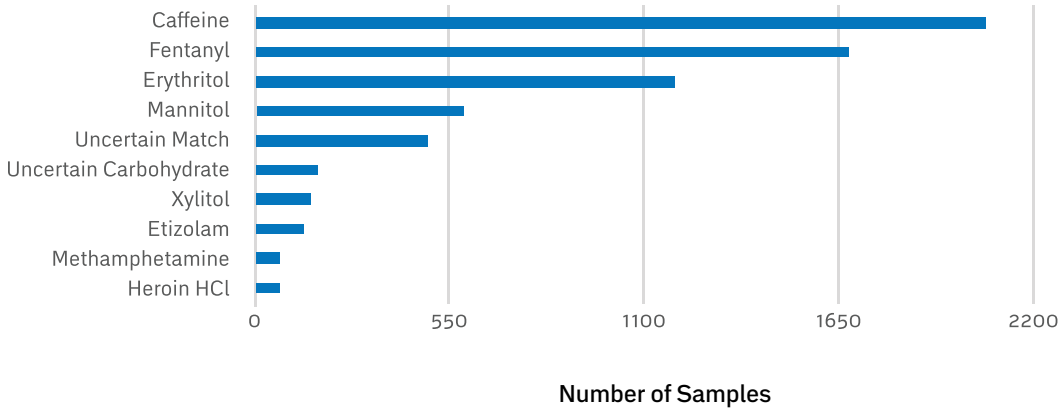


**Other compounds present in heroin in <2% of samples include: mannitol, MDMA, morphine, sucrose, uncertain oil, xylitol, dextromethorphan, erythritol, glutamine, proprionanilide, xylazine*

Compounds in the "Down" Supply

A total of 2,465 "down" samples that were submitted in 2021, and 2,361 samples (95.8%) matched expectation and were confirmed to contain opioids by either a positive fentanyl test strip, or with the FTIR spectrometer. Of the compounds 2,361 samples, fentanyl was the opioid present in the greatest number of samples, with 49.3% of samples containing fentanyl, as confirmed with the FTIR spectrometer (see **Figure 9**). Caffeine (2,065 samples; 87.5%) and erythritol (1,189 samples; 50.4%), were the two most common non-opioid compounds confirmed by the FTIR spectrometer, both of which are commonly used as buffs in opioids.[5]

Figure 9. Bar graph showing the most common substances found in expected-"down" samples that met expectation, as confirmed by FTIR spectroscopy*

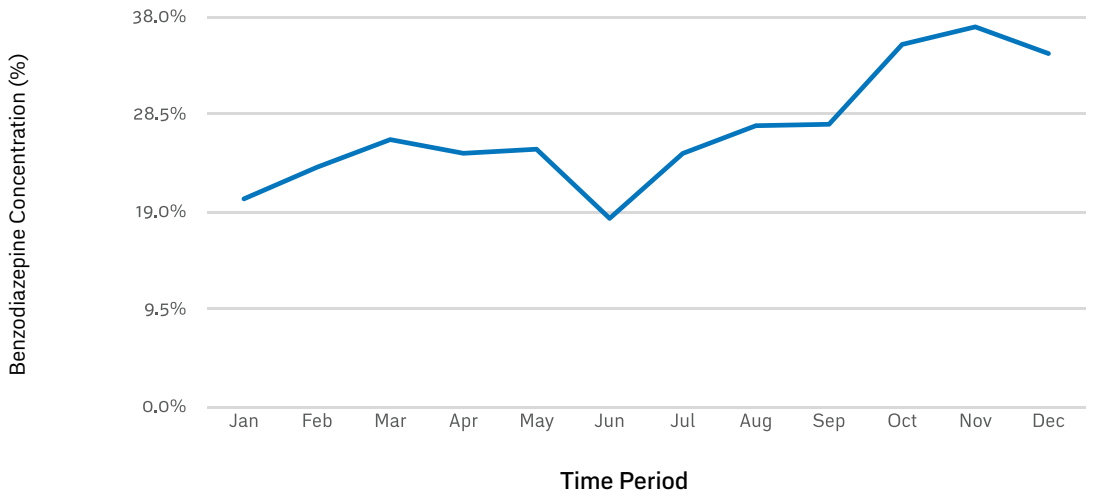


**Other compounds present in "down" in <2% of samples include: propionanilide, sucrose, inositol, para-fluorofentanyl, xylazine, diphenhydramine, dimethyl sulfone, lactose, noscapine, flualprazolam, polyethylene glycol, phenacetin, uncertain oil, acetaminophen, heroin base, 4-ANPP, benzocaine, Vitamin C, 4-Anilino-1-Boc-piperidine, cocaine base, flubromazepam, MDMA, metonitazene, dextromethorphan, glucose, no library match, 6-MAM, acetoacetanilide, carfentanil, furanyl UF-17, MDMC, piperidone, uncertain salt, AMB-FUBINACA, calcium carbonate, citric acid, cocaine, dicalcium phosphate, GHB, glutamine, ibuprofen, ketamine, microcrystalline cellulose, morphine, opium, sodium bicarbonate, sodium isocarbonate, sorbitol, taurine, W-19*

Benzodiazepine Adulteration of the "Down" Supply

There was an upward trend when examining the percentage of "down" samples submitted across BC that contained a benzodiazepine each month, as confirmed by a positive benzodiazepine test strip, or the FTIR spectrometer (see **Figure 10**). In November, 37.0% of "down" samples contained benzodiazepines, the highest percentage in a given month. June had the least number of benzodiazepine-positive "down" samples, with 18.4% of the samples shown to contain benzodiazepines.

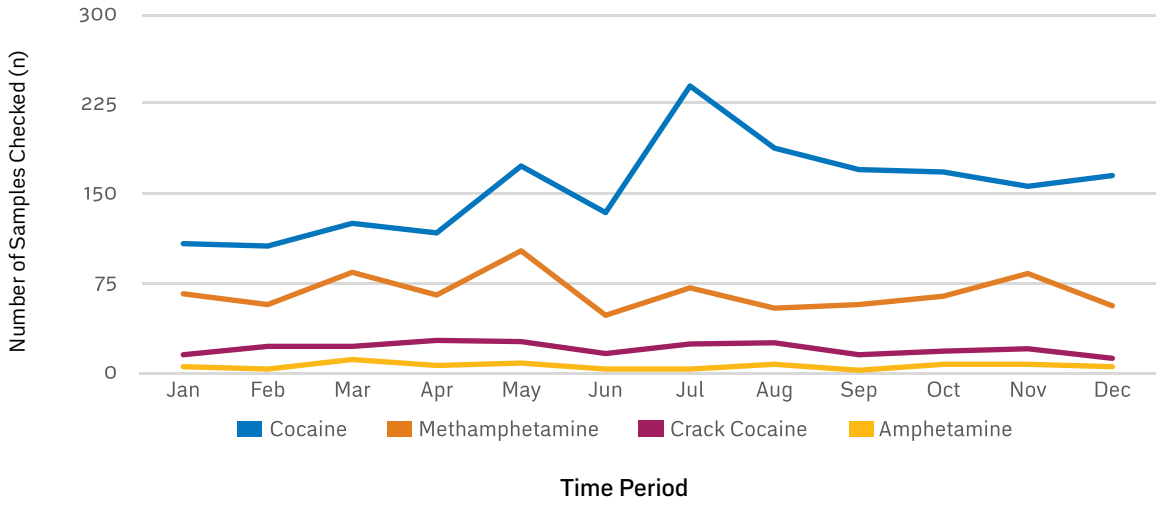
Figure 10. Percentage of "down" samples per month that contained a benzodiazepine across BC



STIMULANTS

Stimulants were the third most submitted drug category in 2021, with a total of 3,024 (19.9%) samples submitted for drug checking. Cocaine had a total of 1,850 samples (61.2% of stimulant samples) submitted and was the most checked stimulant across the entire year (see **Figure 11**). Methamphetamine was the second most checked stimulant throughout the year, with a total of 807 (26.7%) samples submitted, and a peak in May with 102 samples submitted that month.

Figure 11. Number of stimulant samples by type checked per month across BC*

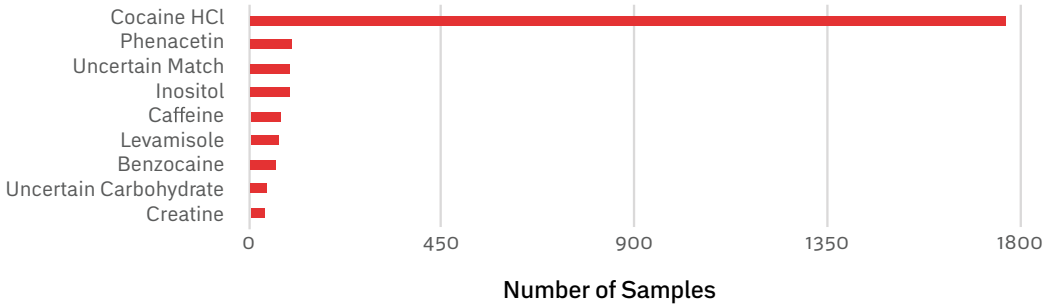


**Other stimulants checked that make up less than <1% of samples include: 3-MMC, 4-MMC, methylphenidate, "speed", 3-FPM, 2-FMA, pseudoephedrine, N-ethylpentedrone, N-isobutylhexedrone, NM-2-AI, phenylpiracetam, 4-FMA, N-ethylhexedrone, eutylone, lisdexamfetamine*

Common Compounds Found in Stimulants

Of the 1,850 expected-cocaine samples submitted to drug checking, 1,767 (95.5%) met expectation and were confirmed by FTIR spectroscopy to contain cocaine. The second most commonly detected compound in expected-cocaine samples that met expectation was phenacetin (102 samples; 6%), a cutting agent (see **Figure 12**).

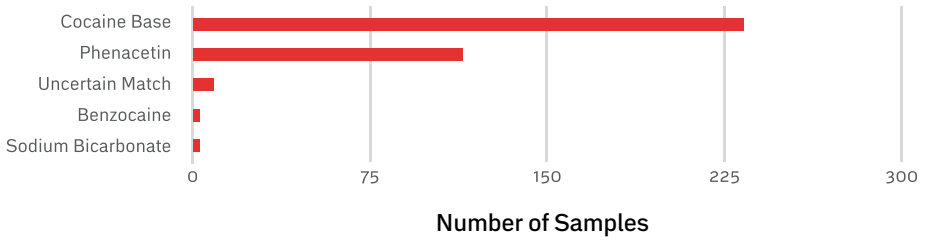
Figure 12. Bar graph showing the most common substances found in expected-cocaine samples that met expectation, as confirmed by FTIR spectroscopy*



**Other compounds present in cocaine in <2% of samples include: procaine, glutamine, methamphetamine, uncertain oil, cocaine base, talc, mannitol, ketamine, glucose, acetaminophen, boric acid, lactose, MDMA, dimethyl sulfone, lidocaine, sodium bicarbonate, sucrose, calcium carbonate, ephedrine, glucosamine sulfate, magnesium citrate, pyridoxine, xylitol*

A total of 242 expected-crack cocaine samples were submitted for drug checking and of those samples, 96.3% (233 samples) met expectation and contained cocaine base. Within the 233 samples that met expectation, the next most common compound detected was phenacetin, a cutting compound, with 114 samples (48.9%) (see **Figure 13)**.

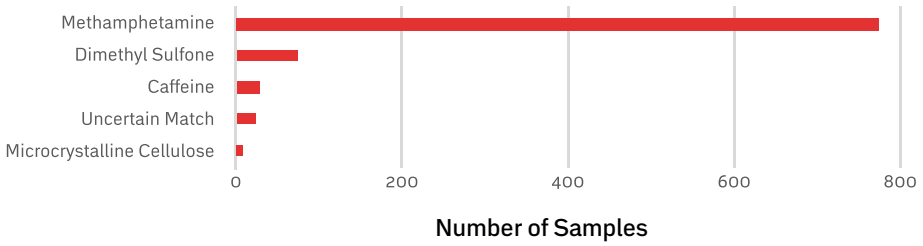
Figure 13. Bar graph showing the most common substances found in expected-crack cocaine samples that met expectation, as confirmed by FTIR spectroscopy*



**Other compounds present in crack cocaine in <1% of samples include: cocaine HCl, etizolam, uncertain carbohydrate, uncertain oil*

In 2021, 807 expected-methamphetamine samples were submitted to drug checking, and 774 samples (95.9%) matched expectation and were confirmed to contain methamphetamine by FTIR spectroscopy. Dimethyl sulfone, a compound used to cut methamphetamine, was the second most detected compound of the 774 samples that matched expectation (74 samples; 9.6%) (see **Figure 14**).

Figure 14. Bar graph showing the most common substances found in expected-methamphetamine samples, as confirmed by FTIR spectroscopy*

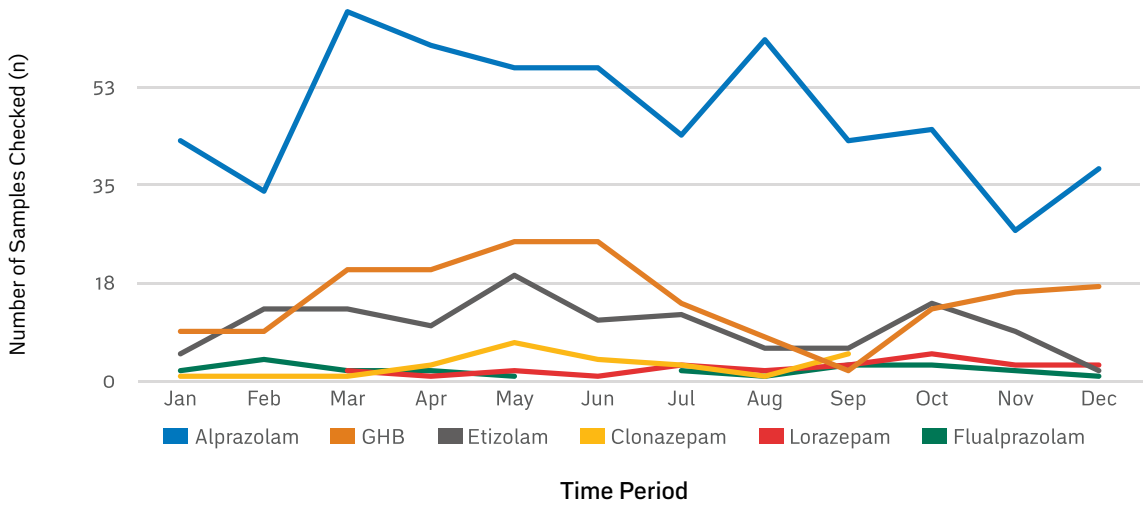


**Other compounds present in methamphetamine in <1% of samples include: phenethylamine, uncertain oil, water, uncertain salt, cocaine, dicalcium phosphate, erythritol, cocaine base, fentanyl or analog, isopropylbenzylamine, ketamine, lactose, magnesium sulfate, mannitol, no library match, sucrose, taurine, uncertain carbohydrate, xylitol*

DEPRESSANTS

There was a total of 1,038 samples submitted for drug checking within the depressants category across BC in 2021. Alprazolam had 573 total samples submitted for drug checking, with a peak of 66 samples in March, and was consistently the most submitted depressant for drug checking in 2021 (see **Figure 15**). GHB was the second most checked drug in the depressant category in March through August, and peaked in May and June with 25 samples both months. GHB was then the least checked drug in September, with two samples submitted for drug checking that month.

Figure 15. Number of depressant samples by type checked per month across BC*

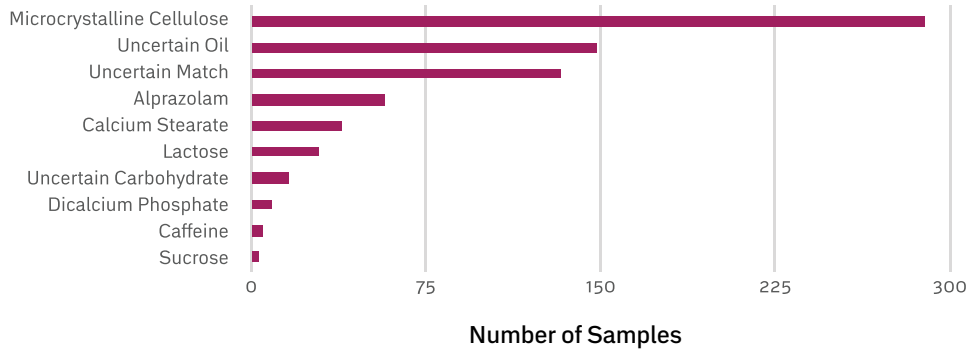


**Other depressants checked that make up less than <1% of samples include: zopiclone, diazepam, pregabalin, xylazine, flubrazolam, GBL, W-18, bromazolam, fluclotizolam, flubromazepam, clonazolam, methaqualone, pagoclone, trazadone, carisoprodol, 4-fluorophenibut, clonidine, diclazepam, phenibut, MEAI, pyrazolam, 3-hydroxyphenazepam, baclofen, gabapentin, norflurazepam, flubrotizolam, nitrazolam*

Expected-Alprazolam Samples

A total of 573 expected-alprazolam samples were submitted for drug checking and 315 (55.0%) of the samples met expectation, as confirmed by FTIR spectroscopy or by benzodiazepine test strips (i.e., a benzodiazepine was present). The FTIR spectrometer confirmed alprazolam was present in 57 of the 315 samples (see **Figure 16**). The FTIR did not identify alprazolam in all 315 samples potentially due to the low dosage of alprazolam, and when in pill form, may be below the detection threshold. Additionally, benzodiazepine test strips detect the presence of benzodiazepines in general and are not specific to alprazolam, meaning that the test strips could have been detecting alternative benzodiazepines. The most frequently present compound was microcrystalline cellulose, a buff, with 289 samples (91.7%), as confirmed by FTIR spectroscopy.

Figure 16. Bar graph showing the most common substances found in expected-alprazolam samples that matched expectation, as confirmed by FTIR spectroscopy*

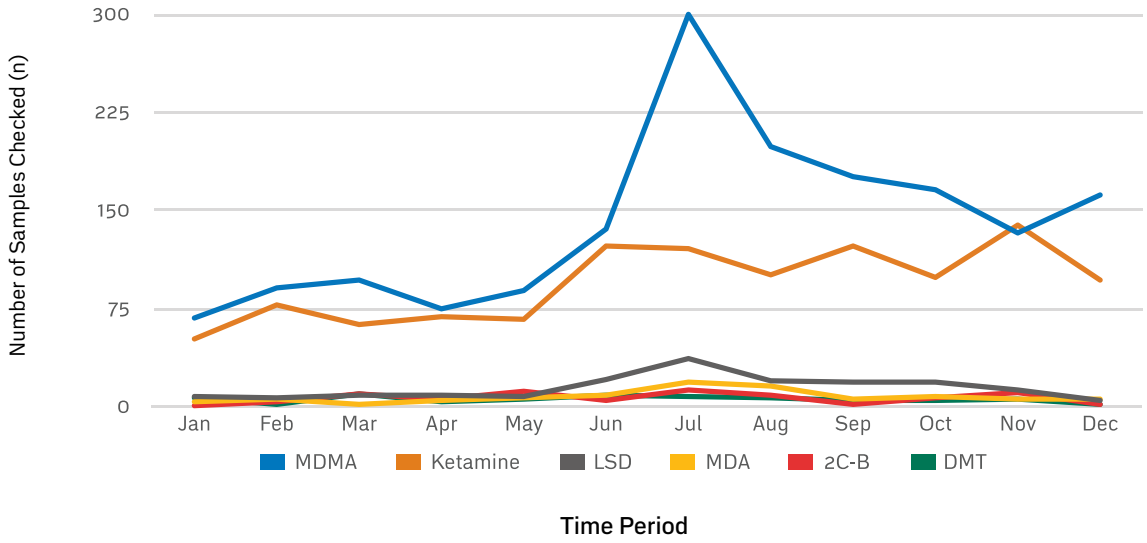


**Other compounds present in alprazolam in <1% of samples include: glucose, magnesium sulfate, no library match, sodium sulfate*

PSYCHEDELICS

There was a total of 3,447 (22.7%) samples submitted for drug checking in the psychedelic category and was the second most-checked drug category in 2021. MDMA was the predominant psychedelic, with a total of 1,692 samples submitted across the year, and a peak in July of 300 samples that month (see **Figure 17**). Ketamine was consistently the second most checked psychedelic throughout the year, except in November when it was the predominant psychedelic with 139 samples submitted that month.

Figure 17. Number of psychedelic samples by type checked per month across BC*

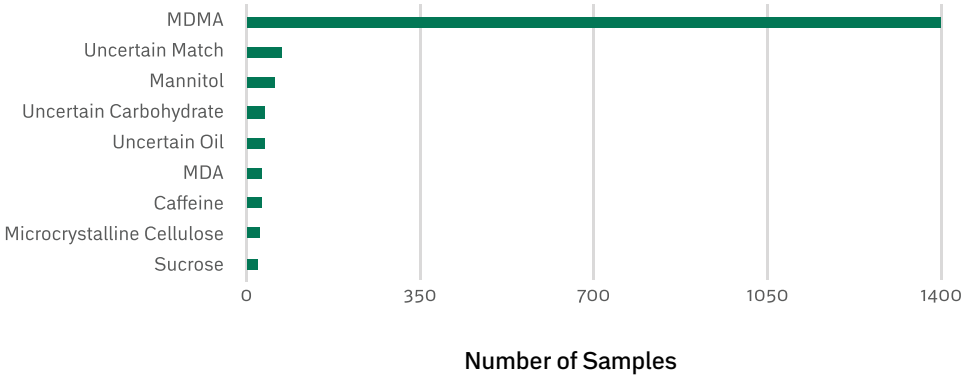


**Other psychedelics checked that make up less than <1% of samples include: 5-MeO-DMT, 4-AcO-DMT, 4-HO-MET, CBD, mushroom and derivatives, 5-MeO-DiPT, cannabis and derivatives, O-PCE, methallylescaline, mescaline, MXE, THC, 5-MeO-MiPT, MDA and MDMA, 4-HO-MiPT, 4-AcO-MET, ibogaine, 2C-B-FLY, MXiPr, 2C-E, 5-MAPB, DPT, 2C-Family, tiletamine, 2-FDCK, 4-PrO-DMT, DXME, LSD and MDMA, HXE, BOD, 2C-T-7, ALD-52, PiPT, DXM, MET, 3-MeO-PCE, diphenidine, 25I-NBOMe, DOM, 2C-P, 4-HO-MALT, ketamine and MDMA, 2C-T-2, 5-MeO-MALT, DCK, 4-HO-DiPT, 4-HO-PiPT, MALT, 3-FEA, 5-MeO-PiPT, 4C-D, 6-APB*

Common Compounds Found in Psychedelics

Of the expected-MDMA samples submitted for drug checking, a total of 1400 samples met expectation and were confirmed by FTIR spectroscopy to contain MDMA (see **Figure 18**). The second most common substance within expected-MDMA samples was uncertain matches (69 samples; 4.9%). Uncertain matches are due to a signal being present that cannot be distinguished as a unique substance; therefore the technician is unable to confirm a potential component in the sample is present. Uncertain matches may be caused by signal noise and in fact there is no additional component present. The next most common compound that could be identified in expected-MDMA samples was mannitol, a sugar used as a buff, which was present in 59 samples.

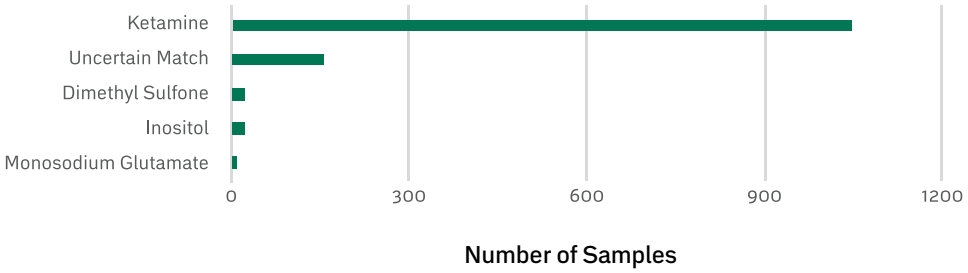
Figure 18. Bar graph showing the most common substances found in expected-MDMA samples that matched expectation, as confirmed by FTIR spectroscopy*



**Other compounds present in MDMA in <1% of samples include: dimethyl sulfone, inositol, lactose, dicalcium phosphate, methylamine, calcium stearate, creatine, ketamine, methamphetamine, procaine, acetaminophen, cocaine, phenacetin, polyethylene glycol, amphetamine, benzocaine, boric acid, glucosamine sulfate, glucose, heliomethylamine, safrole, TFMPP, Vitamin C*

A total of 1,132 expected-ketamine samples were submitted to drug checking and 1,045 of those samples (92.3%) were confirmed by FTIR to contain ketamine. Within the 1,045 samples that matched expectation and contained ketamine, the second most common component was an uncertain match (156 samples; 14.9%) (see **Figure 19**). Dimethyl sulfone, a cutting agent, was present in 23 of the samples (2.2%) and was the third most common compound present in expected-MDMA samples, as confirmed by FTIR spectroscopy.

Figure 19. Bar graph showing the most common substances found in expected-ketamine samples that matched expectation, as confirmed by FTIR spectroscopy*



**Other compounds present in ketamine in <1% of samples include: methamphetamine, uncertain carbohydrate, ketamine base, cocaine, magnesium sulfate, uncertain oil, benzocaine, etizolam, uncertain salt, caffeine, calcium stearate, creatine, mannitol, methylamine, sodium sulfate, taurine, deschloroketamine, isopropylbenzylamine, lidocaine, MDA, MDMA, sildenafil*

Limitations

The data presented provides insight into the unregulated drug supply in BC, but may not be fully representative of the supply at-large. Drug checking services are limited by the number of sites and operating hours available for people to access, and the data only captures information on the substances brought in to drug checking, creating potential for selection bias.

As previously outlined, the FTIR spectrometer has a detection threshold of 5%, which limits the compounds that are able to be detected in a given sample. The spectrometer can detect up to five compounds in a given sample, including any cuts or buffs that have been added to the drug, which means that not all compounds may be detected in samples with greater than five compounds present. Analysis is also reliant on whether a given compound is in the reference library to compare to.

While the fentanyl and benzodiazepine immunoassay strips have a higher sensitivity, they are not able to determine the concentration of a substance in a sample. Additionally, fentanyl immunoassay strips are validated for detecting fentanyl in a sample, but may not detect all fentanyl analogues. Some analogues, like carfentanil, are highly potent and can cause overdoses in low quantities, making it important to be able to detect strong analogues reliably.[6,7] Benzodiazepine test strips are also validated and sensitive to some analogues, but not all of them.[8,9] Of note, etizolam was the third most checked drug in the depressant category and, while structurally similar to benzodiazepines, it is a thienotriazolodiazepine derivative. Benzodiazepine test strips have been found to still detect etizolam, but to a lower sensitivity compared to benzodiazepines like alprazolam.[10]

Conclusion

The data collected from drug checking partner sites across BC provides insight into how the unregulated drug supply differed between health authority regions and how it changed over time. The Vancouver Coastal Health region consistently had more drug checks completed each month and saw a higher concentration of fentanyl in samples when comparing the Vancouver DTES neighbourhood, a sub-region of Vancouver Coastal Health, to elsewhere in BC. The difference in fentanyl concentration between regions has serious implications because individuals who switch from using a drug supply from elsewhere in BC, to a supply from the Vancouver DTES neighbourhood may not be expecting the higher fentanyl concentration, thereby increasing their risk of overdose.

Opioids were the predominant drug category checked throughout the year, with the exception of July when psychedelics saw a large spike. Past research has found that psychedelics comprise the majority of samples completed at drug checking services at music festivals, which suggests that the large increase in only psychedelic samples during July may be due to the return of the Shambhala Music Festival.[11] July also had the highest number of samples checked in a given month, suggesting that drug checking sites at music festival settings are greatly utilized and a needed harm reduction resource.

Cocaine, crack cocaine, methamphetamine, ketamine, "down", and fentanyl all matched expectation in over 90% of samples, as determined either with the FTIR spectrometer, or with a relevant positive immunoassay strip. Within opioid and benzodiazepine samples, the FTIR spectrometer was not able to identify the expected compound (i.e., fentanyl, alprazolam, etc.) in 100% of the samples that matched expectation potentially due to the lower detection threshold compared to immunoassay strips. Conversely, the test strips have lower specificity, which means that the samples may have tested positive and matched expectation in containing opioids or benzodiazepines, but the test strips could have been detecting an analogue instead.

While opioid samples generally met expectations, with 88.3% of samples having the expected drug present, they were also shown to have many other drugs or non-psychoactive compounds. In particular, benzodiazepines were one substance that became progressively present in "down" samples throughout 2021. Additionally, heroin was consistently present in less than 8% of samples, continuing the trend of decreasing heroin prevalence in the unregulated drug supply from previous years.[12]

The unregulated opioid supply, already saturated with fentanyl, has been increasingly adulterated with benzodiazepines,[13,14] which can greatly increase the risk of overdose due to both substances having sedation effects.[13,14,15] The adulteration of benzodiazepines in the drug supply is evident in the data collected from "down" samples, as there was upward trend of benzodiazepine presence, increasing from 20.3% to 34.4% of "down" samples testing positive for benzodiazepines across the year. Drug checking services are an important part of harm reduction, particularly with increasing adulteration of the drug supply, as individuals are able to get information on whether their drugs contain benzodiazepines, or other potent adulterants.

The FTIR spectrometer and immunoassay strips offer valuable insight into the unregulated drug supply. People who use drug checking services are able to receive valuable information about what is in their drugs to make informed decisions on how they use their drugs. Furthermore, data on drug checking results collected at these sites gives public health important information to understand trends and better respond to novel substances appearing in the drug market. To further evaluate the role of drug checking services in harm reduction, future studies should evaluate whether the increase in benzodiazepine presence in the drug supply has led to more people seeking out drug checking services. Additionally, future research could examine community awareness of drug checking sites across geographic regions.

References

1. McCrae K, Tobias S, Grant C, et al. Assessing the limit of detection of Fourier-transform infrared spectroscopy and immunoassay strips for fentanyl in a real-world setting. *Drug Alcohol Rev.* 2020;39(1):98-102. doi:10.1111/dar.13004

2. Ti L, Tobias S, Lysyshyn M, et al. Detecting fentanyl using point-of-care drug checking technologies: A validation study. *Drug Alcohol Depend*. 2020;212:108006. doi:10.1016/j.drugalcdep.2020.108006

3. Tobias S, Ti L. *An assessment of two point-of-care fentanyl quantification methods using Fourier-transform infrared spectroscopy.* BC Centre on Substance Use. 2021;1-10. https://drugcheckingbc.ca/wp-content/uploads/sites/2/2021/03/Quantification-Methods-Report-Feb-2021.pdf

4. Armenian P, Vo KT, Barr-Walker J, Lynch KL. Fentanyl, fentanyl analogs and novel synthetic opioids: a comprehensive review. *Neuropharmacology.* 2018;134:121-132. doi:10.1016/j.neuropharm.2017.10.016

5. British Columbia Centre on Substance Use. *March 2020 Drug Checking in British Columbia.* BC Centre on Substance Use. 2020;1-3. https://www.bccsu.ca/wp-content/uploads/2020/04/Drug_Checking_BC_Mar_20.pdf

6. Isbister GK, O'Regan L, Sibbritt D, et al. Alprazolam is relatively more toxic than other benzodiazepines in overdose. *Br J Clin Pharmacol*. 2004;58(1):88-95. doi:10.1111/j.1365-2125.2004.02089.x

7. Suzuki J, El-Haddad S. A review: Fentanyl and non-pharmaceutical fentanyls. *Drug Alcohol Depend*. 2017;171:107-116. doi:10.1016/j.drugalcdep.2016.11.033.

8. Tobias S, Grant CJ, Laing R, et al. Time-series Analysis of Fentanyl Concentration in the Unregulated Opioid Drug Supply in a Canadian Setting. *Am J Epidemiol.* 2022;191(2):241-247. doi:10.1093/aje/kwab129

9. Green TC, Park JN, Gilbert M, et al. An assessment of the limits of detection, sensitivity and specificity of three devices for public health-based drug checking of fentanyl in street-acquired samples. *Int J Drug* Policy. 2020;77:102661. doi:10.1016/j.drugpo.2020.102661

10. Shapiro A, Sim D, Wu H, et al. *Detection of etizolam, flualprazolam, and flubromazolam by benzodiazepine-specific lateral flow immunoassay test strips.* BC Centre on Substance Use. 2020;1-13. https://drugcheckingbc.ca/wp-content/uploads/sites/2/2020/07/BenzoTestStrip_Report.pdf

11. McCrae K, Tobias S, Tupper K, et al. Drug checking services at music festivals and events in a Canadian Setting. *Drug Alcohol Depend.* 2019;205:107589. doi:10.1016/j.drugalcdep.2019.107589

12. Long V, Tobias S, Lysyshyn M, et al. *A Report on British Columbia's Unregulated Drug Supply: Results from British Columbia's Community Drug Checking Service, June 2018 – December 2019.* BC Centre on Substance Use. 2020;1-35. https://drugcheckingbc.ca/wp-content/uploads/sites/2/2020/12/BCCSU_BCs_Drug_Checking_Results_Report.pdf

13. Tupper KW, McCrae K, Garber I, et al. Initial results of a drug checking pilot program to detect fentanyl adulteration in a Canadian setting. *Drug Alcohol Depend.* 2018;190:242-245. doi:10.1016/j.drugalcdep.2018.06.020

14. BC Coroners Service. *Illicit Drug Toxicity: Type of Drug Data to January 31, 2022.* Ministry of Public Safety and Solicitor General. 2022. https://www2.gov.bc.ca/gov/content/life-events/death/coroners-service/statistical-reports

15. Sun EC, Dixit A, Humphreys K, et al. Association between concurrent use of prescription opioids and benzodiazepines and overdose: retrospective analysis. *BMJ*. 2017;356:j760. doi:10.1136/bmj.j760

BC Centre on Substance Use (BCCSU)

400-1045 Howe St,
Vancouver, BC
V6Z 2A9 Canada

Phone: (778) 945-7616
Fax: (604) 428-5183
Email: inquiries@bccsu.ubc.ca

For media enquiries or to set up an interview with someone from the BCCSU, please contact Kevin Hollett, Communications Lead, at kevin.hollett@bccsu.ubc.ca or (778) 918-1537.

www.bccsu.ca