



Hospital Stays for Harm Caused by Substance Use Among Youth Age 10 to 24

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Introduction

Youth age 10 to 24 are vulnerable to the impacts of using substances such as cannabis, alcohol, opioids and others. Early use of substances (e.g., before age 14), especially when use is heavy or frequent and left untreated, increases the risk of ongoing harmful substance use, including the probability of lifelong dependence.^{1, 2}

There is limited analysis of indicators of harm caused by substance use among youth — such as emergency department visits and hospitalizations — but studies suggest that harmful substance use is a growing issue for youth in Canada. For example, between 2003 and 2016, youth and young adults experienced the largest increase in emergency department visits attributable to alcohol, and among females, rates were highest among those age 19 to 24, compared with all other age groups.³

Taking a closer look at who is being hospitalized for harm, and for which substances, helps inform efforts to improve access to services for youth. This report provides a Canada-wide snapshot of hospitalizations for harm caused by substance use among youth age 10 to 24 in 2017–2018.

This analysis

This analysis, focused on youth age 10 to 24, is based on the Hospital Stays for Harm Caused by Substance Use indicator produced by the Canadian Institute for Health Information (CIHI). Substances included in the indicator are alcohol, opioids, cannabis, other central nervous system (CNS) depressants (e.g., benzodiazepines), cocaine, other CNS stimulants (e.g., methamphetamine), other substances (e.g., hallucinogens, solvents) and unknown/mixed substances.

As described in the [indicator definition](#), this indicator captures inpatient hospital stays and day surgeries. Types of harm from substance use can include drug or alcohol overdoses, severe withdrawal symptoms, injuries caused by intoxication, chronic conditions such as cirrhosis of the liver, and substance-induced psychosis requiring treatment in a mental health unit. Among youth age 10 to 24, almost 30% of hospitalizations for harm caused by substance use involved care for dependence or withdrawal from a substance, about 15% of stays involved care for substance-induced psychotic disorderⁱ and there were negligible hospitalizations associated with chronic conditions. Harm from more than one substance can be documented per hospitalization, and these harms can be documented as the most responsible diagnosisⁱⁱ or as a comorbidity.ⁱⁱⁱ For approximately 41% of these hospitalizations among youth, harm caused by substance use was documented as the most responsible diagnosis.

i. Includes substance-induced psychotic disorder, amnesic syndrome, and residual and late-onset psychotic disorder.

ii. The single diagnosis or condition that can be described as being most responsible for the patient's stay in hospital. If there is more than one such condition, the one held most responsible for the greatest portion of the length of stay or greatest use of resources (e.g., operating room time, investigative technology) is selected.

iii. Quebec-specific selection methods are outlined in the indicator definition to address differences in data collection for Quebec, as it is not possible to distinguish comorbidities from secondary diagnoses in Quebec data.

To learn more about the development of this indicator and results for all Canadians age 10 and older, read the report [Common Challenges, Shared Priorities: Measuring Access to Home and Community Care and to Mental Health and Addictions Services in Canada, May 2019](#).

Key findings

- 1 out of every 20 hospital stays among youth age 10 to 24 in Canada in 2017–2018 were related to harm caused by substance use.
- Among youth, hospitalization rates for harm caused by substance use increased with age and varied by sex.
- Cannabis-related hospitalizations were more common than hospitalizations for any other known substance, followed by hospitalizations related to alcohol.
- 69% of hospital stays involved care for a concurrent mental health condition — nearly double the proportion observed in adults age 25 and older.
- Hospitalization rates varied by province and territory, and were higher for youth living in lower-income or rural and remote areas.

1 out of every 20 hospital stays among youth in Canada were related to harmful substance use in 2017–2018

In 2017–2018, there were 23,580 hospital stays for harm caused by substance use among youth age 10 to 24. This is the equivalent of 65 youth hospitalized every day in Canada. The national rate of hospital stays for harm caused by substance use among youth was 364 per 100,000 in 2017–2018.^{iv} Overall, these hospital stays accounted for about 1 in 20 (5%) of all hospital stays in Canada for youth age 10 to 24.

17% of youth who were hospitalized for harm caused by substance use were hospitalized more than once for substance use within the same fiscal year. In 2017–2018, a total of 59 youth who were hospitalized for harm caused by substance use died^v in hospital.

Hospitalizations are only the tip of the iceberg when it comes to estimating harm caused by substance use. This hospitalization indicator does not capture treatments or deaths that occur outside of inpatient hospital stays (e.g., visits to addiction centres, primary care clinics or emergency departments; fatal overdoses in the community). For every 1 hospital stay reported in this analysis, there were approximately 5 visits to emergency departments as a result of substance use.⁴

iv. Hospitalization rates are standardized by the direct method using the 2011 Canadian population and calculated for 2017–2018 using a blended average methodology (i.e., records from the current fiscal year from all jurisdictions outside of Quebec and records from the previous fiscal year from Quebec are blended to calculate national results), as described in CIHI's [General Methodology Notes](#).

v. Death due to any cause.

Hospitalization rates increased with age and varied by sex

As shown in Figure 1, rates of substance-related hospital stays increased with age in 2017–2018, which is consistent with patterns of substance use according to self-reported surveys. For example, 8% of students in grades 7 to 9 compared with 40% of students in grades 10 to 12 reported drinking 5 or more drinks on 1 occasion within the previous year.⁵

Among females, rates of hospitalization for harm caused by substance use rise steeply between the ages of 12 and 16, peaking in the mid-20s. Among males, rates of hospitalization rise throughout the teen years and continue to rise into the early 30s.⁶

Figure 1 shows that hospitalization rates were higher among females compared with males for youth age 12 to 16. This is despite survey data that shows students of both sexes in grades 7 to 12 (i.e., age 12 to 18) report similar rates of high-risk drinking and cannabis use⁷ and that males have significantly higher rates of other illicit^{vi} substance use than females.⁸

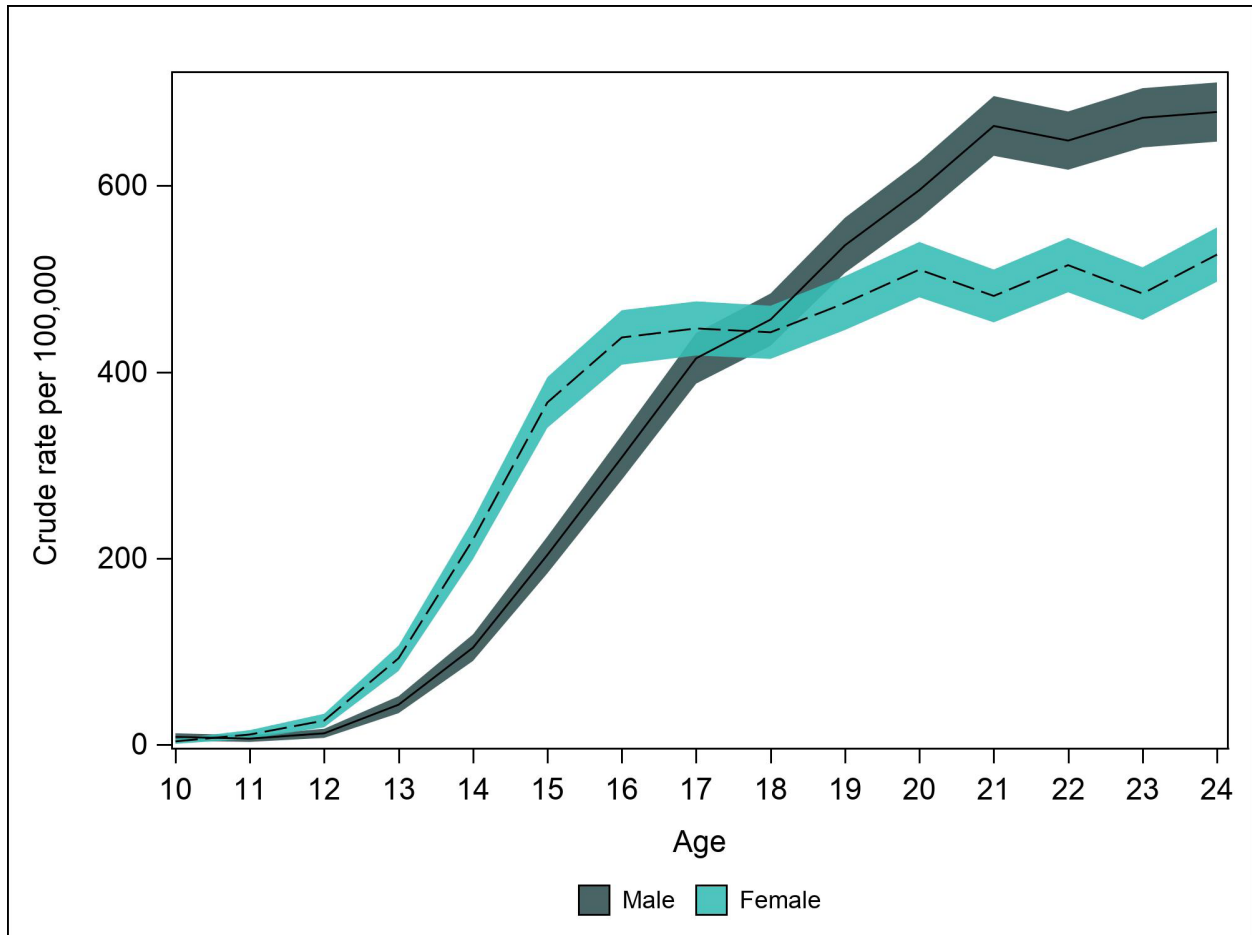
For youth age 19 and older, males have higher hospitalization rates than females for harm caused by substance use. This is consistent with higher rates of cannabis use (36% versus 27% for use in the past 12 months) and other illicit substance use (12% versus 6%) among males than females age 18 to 24 (2017 Canadian Tobacco, Alcohol and Drugs Survey estimates provided by Health Canada).^{vii}

Differences in hospitalization rates between males and females among youth may be related to patterns and types of substance use, as well as differences in physiology, concurrent mental health conditions or treatment outcomes. For example, females may be more vulnerable to harm from alcohol use due to physiology and reduced ability to metabolize alcohol.⁹ This is consistent with the lower-risk drinking guidelines for women.¹⁰ As shown later in this analysis, compared with males, females who were hospitalized for harm caused by substance use were more likely to have received care for concurrent mood, behavioural, and trauma- and stressor-related disorders, but less likely to have received care for schizophrenia and other psychosis. 1 study suggests that among youth age 12 to 17 who have concurrent substance use and mental health disorders, treatment outcomes are poorer for females than for males.¹¹

vi. Defined as using at least one of the following in a 12-month period: amphetamines (speed, ice, meth); MDMA (ecstasy, E, X); hallucinogens (LSD or acid, PCP, magic mushrooms, mesc) and salvia (divine sage, magic mint, sally D); heroin (smack, junk, crank); or cocaine (crack, blow, snow).

vii. While our results show similar hospitalization rates for harm caused by alcohol between males and females age 18 to 24, survey data suggests that heavy drinking may be more common among males of this age (41% versus 35%). Heavy drinking is defined as 4 or more drinks (females) or 5 or more drinks (males) at least once a month for the past 12 months (2017 Canadian Tobacco, Alcohol and Drugs Survey estimates provided by Health Canada).

Figure 1 Hospitalization rates for harm caused by substance use among youth, by age and sex, Canada, 2017–2018



Note

The coloured bar around each line shows the 95% confidence interval (CI). Rates with CIs that do not overlap are considered to be statistically different, as described in CIHI’s [General Methodology Notes](#).

Sources

Hospital Morbidity Database, Ontario Mental Health Reporting System and National Ambulatory Care Reporting System (day surgery records), 2017–2018, Canadian Institute for Health Information.

Cannabis and alcohol most common substances associated with hospital stays among youth

In 2017–2018, cannabis-related hospital stays were more common than hospitalizations for any other substance. This was true for both sexes (see Table 2b in the [data tables](#)) and across all age groups (Figure 2). Cannabis was also the first or second most common substance associated with hospital stays in Canada across all provinces and territories (Figure 3).

Overall, cannabis was documented in nearly 40% (n = 9,089) of hospitalizations for harm caused by substance use among youth age 10 to 24. Alcohol was the second most commonly documented known substance in this age group, associated with 26% of hospital stays.

In comparison, among those age 25 and older, cannabis was associated with only 11% of hospital stays for harm caused by substance use and alcohol was associated with 58%.

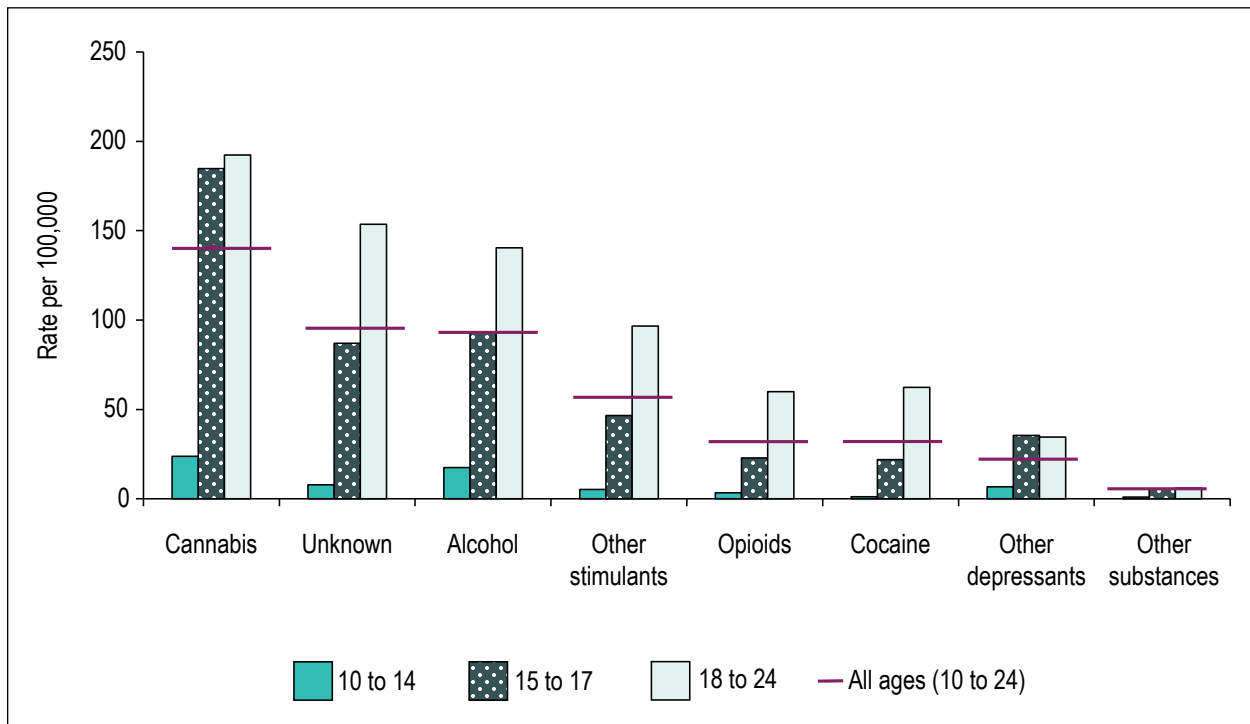
Hospitalizations can be attributed to 1 or more substance types. In 2017–2018, at least^{viii} 26% (n = 6,222) of all hospital stays for harm caused by substance use among youth documented 2 or more substances. Cannabis and alcohol were documented simultaneously for 7% (n = 1,605) of all hospitalizations. In comparison, cannabis was documented as the only known substance in 22% (n = 5,207) of all hospitalizations for harm caused by substance use.

A high proportion (27%) of hospital stays were related to unknown/mixed substances.^{ix} This may suggest a need for improved physician documentation or local discharge abstract coding practices. CIHI works with the jurisdictions and others on an ongoing basis to understand and improve documentation and coding practices. It is important to note that substance use, as well as other concurrent mental health conditions (as described in the next section), may have been under-reported in hospital records due to stigma or under-diagnosis.¹²

viii. This does not include hospitalizations for unknown/mixed substances.

ix. “Unknown” is the term used for unidentified (possibly mixed) substances. Among all hospitalizations for harm caused by substance use among youth, 22% had a documented “unknown/mixed” diagnosis code without any known substances also being documented. 5% documented an “unknown/mixed” code together with a known substance code (e.g., for alcohol).

Figure 2 Hospitalization rates for harm caused by substance use among youth, by substance type and age, Canada, 2017–2018



Notes

The rate for all ages (10 to 24) is the age-standardized rate per 100,000 population.

Rates are not mutually exclusive; more than one substance can be documented per hospitalization.

“Unknown” is the term used for unidentified (possibly mixed) substances.

Some examples of other stimulants include methamphetamine, caffeine and prescription stimulants. Other depressants include benzodiazepines and sleeping pills. Other substances include hallucinogens and solvents.

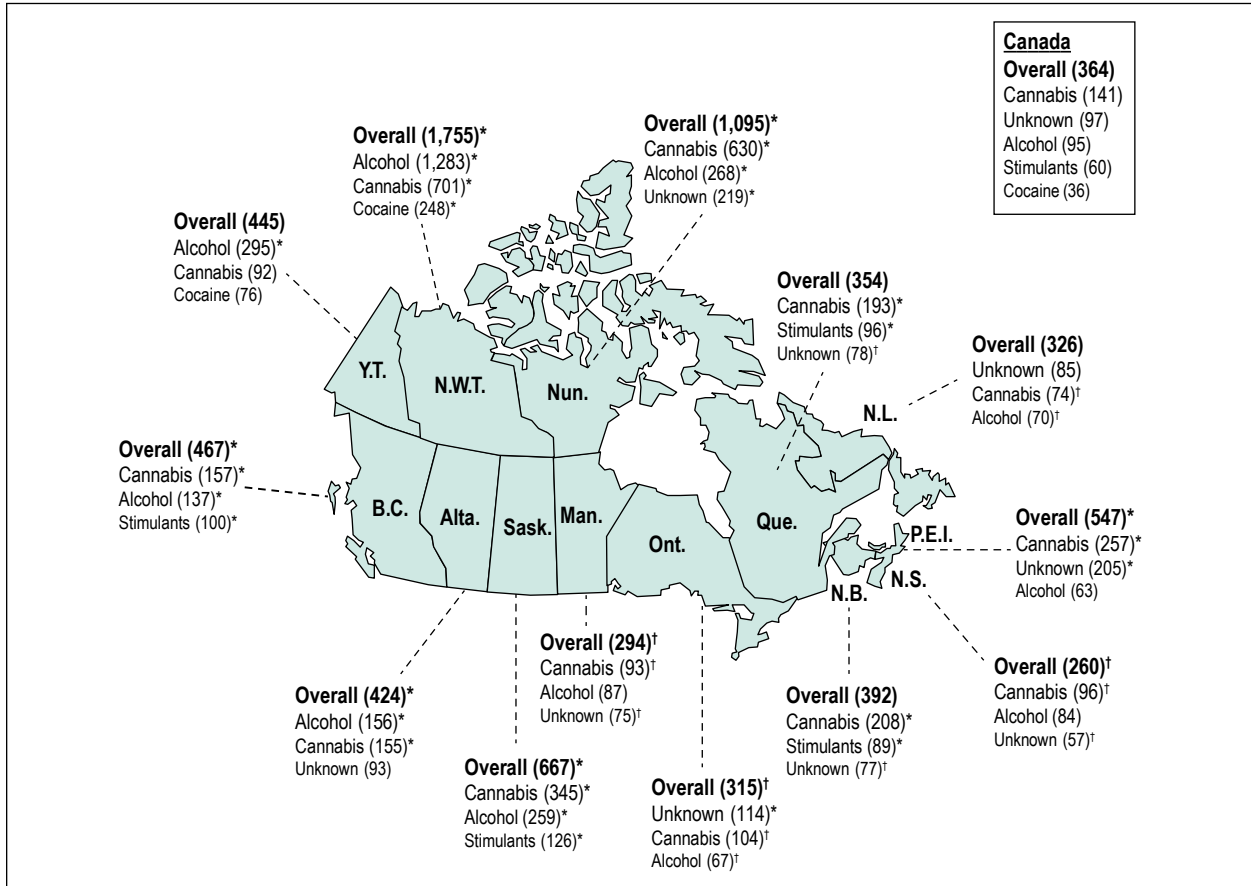
Sources

Hospital Morbidity Database, Ontario Mental Health Reporting System and National Ambulatory Care Reporting System (day surgery records), 2017–2018, Canadian Institute for Health Information.

Differences by age (see Figure 2)

- Across all age groups, among hospitalizations for known substances, hospital stays related to cannabis were most common, followed by stays for alcohol.
- Hospitalization rates increased by age for all substance types, with the exception of cannabis and other depressants. For these substances, rates were similar for youth age 15 to 17 and youth age 18 to 24, even though those in the younger age group were much less likely to use cannabis. Only 14% of those age 15 to 17 self-reported using cannabis in the last year, compared with 31% of those age 18 to 24 (2017 Canadian Tobacco, Alcohol and Drugs Survey estimates provided by Health Canada).

Figure 3 Hospitalization rates for harm caused by substance use among youth per 100,000 population, overall and by most common substances, by province and territory, Canada, 2017–2018



Notes

* Age-standardized hospitalization rate is **higher** than the national age-standardized hospitalization rate for this substance type.

† Age-standardized hospitalization rate is **lower** than the national age-standardized hospitalization rate for this substance type.

Rates are not mutually exclusive; more than one substance can be documented per hospitalization.

Comparisons of provincial and territorial hospitalization rates with national rates are described in CIHI's [General Methodology Notes](#).

“Unknown” is the term used for unidentified (possibly mixed) substances.

Some examples of other stimulants include methamphetamine, caffeine and prescription stimulants. Other depressants include benzodiazepines and sleeping pills. Other substances include hallucinogens and solvents.

Sources

Hospital Morbidity Database, Ontario Mental Health Reporting System and National Ambulatory Care Reporting System (day surgery records), 2017–2018, Canadian Institute for Health Information.

For more information by jurisdiction, see the [data tables](#).

7 out of 10 hospital stays for harm caused by substance use among youth involved care for a concurrent mental health condition

Mental health conditions and harmful substance use have a complex interrelationship.¹³ Unmanaged mental health problems may lead to self-medication with substances; conversely, substance use may cause or exacerbate mental health conditions.^{13, 14} Among a sample of over 2,300 Canadian youth age 12 to 24 who were in contact with services (e.g., mental health and addictions, education, housing, outreach), 38% screened positive for both substance and mental health disorders.¹⁵

As shown in the table below, 69% of hospital stays for harm caused by substance use among youth age 10 to 24 involved care for a concurrent mental health condition, with notable differences by sex. Overall, the proportion of hospitalizations for harm caused by substance use with concurrent mental health conditions was slightly higher among females. By condition, females had a higher proportion of mood, behavioural, and trauma- and stressor-related disorders; males had a higher proportion of schizophrenia and other psychotic disorders.

The proportion of hospitalizations with concurrent mental health conditions decreased with age, ranging from 77% for youth age 10 to 14 to 67% for those age 18 to 24. The overall proportion among youth age 10 to 24 was nearly double what was observed in adults age 25 and older who were hospitalized for harm caused by substance use (38% received treatment for concurrent mental health conditions).

The proportion of hospital stays involving care for a concurrent mental health condition also varied by substance among youth age 10 to 24, ranging from 49% for opioid-related stays to 81% for hospitalizations associated with cannabis. The association between cannabis use and the occurrence of schizophrenia and psychosis has been widely reported in the literature.¹⁶⁻¹⁸

Table Percentage of hospital stays for harm caused by substance use among youth involving care for a concurrent mental health condition, by sex, Canada, 2017–2018

Mental health condition	Both sexes	Females	Males
All mental health disorders	69%	72%	66%
Schizophrenia, delusional and non-organic psychotic disorders	18%	9%	26%
Mood/affective disorders	24%	28%	20%
Anxiety disorders	12%	14%	10%
Selected disorders of adult personality and behaviour*	16%	21%	12%
Neurodevelopmental disorders	11%	9%	13%
Trauma- and stressor-related disorders	13%	17%	9%
Other disorders†	12%	17%	7%

Notes

* While it is possible to diagnose personality disorders in youth, this practice can cause harm by labelling those who are still developing, thereby exacerbating the distress and stigma they already experience.^{19, 20} For the purposes of this report, current coding practices make it difficult to disentangle personality disorders from behavioural disorders in hospital discharge records.

† Other disorders include somatic symptom and related disorders; obsessive–compulsive and related disorders; dissociative disorders; sexual and gender-related disorders; feeding and eating disorders; sleep–wake disorders; disruptive, impulse-control and conduct disorders; and other mental disorders.

Percentages are not mutually exclusive, as more than one mental health diagnosis can be documented per hospitalization.

Sources

Hospital Morbidity Database, Ontario Mental Health Reporting System and National Ambulatory Care Reporting System (day surgery records), 2017–2018, Canadian Institute for Health Information.

Differences by sex (see table above)

- Among youth hospitalized for harm caused by substance use, a higher proportion of females than males received care for a mental health condition.
- Mood/affective disorders were more commonly documented among females than males.
- Schizophrenia and other psychotic disorders were more commonly documented among males than females.

Hospitalization rates higher for youth living in lower-income neighbourhoods or rural and remote areas

While harmful substance use can impact all Canadian youth, those living in lower-income neighbourhoods or more rural and remote areas may face additional challenges — including barriers to accessing treatment services. Almost 15% of Canadians age 15 and older with a mental health or substance-use disorder reported not obtaining mental health services because they could not afford the financial cost.²¹ According to a study carried out in Alberta between 2005 and 2010, rates of not receiving mental health services were greater among post-secondary students on income support programs compared with those not receiving financial support.²² Furthermore, the results of a 2017 study of youth services addressing substance use in Ontario revealed that there was a perceived lack of services, particularly in non-urban areas, among service providers, youth and family members.²³

Our analysis found that hospitalization rates for youth living in the lowest-income neighbourhoods were 2 times higher when compared with rates for those living in the highest-income neighbourhoods (see Table 4 in the [data tables](#)). This pattern of higher hospitalization rates among youth living in lower-income neighbourhoods was observed for all substance types, with the exception of other substances (data not shown).

The rate of hospitalizations was 1.7 times higher among youth living in rural and remote areas compared with the rate for those living in urban areas. Higher hospitalization rates for youth living in rural and remote areas were observed for nearly all substance types, with the exception of other depressants and other substances (data not shown).

In addition to having higher rates of hospitalization for harm caused by substance use, youth living in lower-income neighbourhoods and in rural and remote areas also have higher rates of hospitalization and poorer outcomes for other health conditions, such as asthma²⁴ and diabetes.²⁵

Methods used to calculate hospitalization rates by neighbourhood income and urban versus rural and remote are described in [Measuring Health Inequalities: A Toolkit — Area-Level Equity Stratifiers Using PCCF and PCCF+](#). To learn more about measuring health inequalities at CIHI, visit [our online toolkit](#).

Informing prevention and treatment strategies

This analysis sheds light on the characteristics of youth who are experiencing harmful substance use, as well as the substances that lead to harm. This in turn can inform the development and implementation of targeted prevention and treatment strategies.

Our findings show that cannabis followed by alcohol account for the majority of hospital stays for harm caused by substance use among youth in Canada. The results also highlight the need to focus attention on youth who experience harm caused by substance use and have concurrent mental health conditions, as well as those who live in lower-income or rural and remote areas.

[*The Chief Public Health Officer's Report on the State of Public Health in Canada, 2018: Preventing Problematic Substance Use in Youth*](#) provides a summary of interventions to prevent or reduce problematic substance use among youth in Canada. These include approaches to promote wellness and other protective factors, reduce risks and harms, and improve access to quality mental health and support services. The report also highlights that particular attention should be paid to the determinants of health, such as poverty and lack of access to safe and affordable housing, which increase the risk of harmful substance use among youth.

Improving access to comprehensive and high-quality mental health and addictions services is a priority for governments, service providers, youth and family members.^{6, 12, 23} The continuum of care for youth experiencing harm due to substance use consists of screening, assessment, treatment, recovery and relapse prevention. A stepped care treatment approach is recommended and typically begins with a brief intervention to encourage healthier choices. This is followed by withdrawal management and medication-assisted therapy for some substances, and psychotherapeutic interventions, such as cognitive behavioural therapy and multidimensional family therapy, to maintain benefits and support long-term recovery.^{26, 27}

Treatment of substance-use disorders is most effective when interventions are initiated early, engage families and account for potential concurrent mental health conditions.¹³ For youth who experience substance-use disorders and concurrent mental health conditions, treatment should be integrated, coordinated and comprehensive, ensuring that both conditions are treated simultaneously.^{14, 28} Continuity of care during transitions from pediatric to adult mental health services should also be ensured.^{23, 29, 30}

Youth in Canada have called for youth-friendly mental health services that are “appealing, unintimidating, and accessible.”²³ More research is needed to develop and evaluate treatments for concurrent substance use and mental health disorders among youth.^{13, 26, 31}

Conclusion

This analysis focuses on youth age 10 to 24 and is based on CIHI's Hospital Stays for Harm Caused by Substance Use indicator. Our results found that 1 out of every 20 hospital stays among youth age 10 to 24 in Canada in 2017–2018 were related to harm caused by substance use. These hospitalization rates increased with age and varied by sex.

Our findings reveal that cannabis followed by alcohol account for the majority of hospital stays for harm caused by substance use among youth in Canada. The results also highlight the need to focus attention on youth who experience harm caused by substance use and have concurrent mental health conditions, as well as those who live in lower-income or rural and remote areas.

This analysis contributes to a better understanding of harm caused by substance use among Canadian youth. Providing better services to prevent and treat harmful substance use in this priority population is critical for reducing harms associated with substance use in Canada overall. Moving forward, this analysis can inform the federal, provincial and territorial governments as they work together to improve access to mental health and addictions services.

Appendix: Text alternatives for figures

Figure 1: Hospitalization rates for harm caused by substance use among youth, by age and sex, Canada, 2017–2018

Age (years)	Crude rate per 100,000 for males	Lower confidence interval for male rate	Upper confidence interval for male rate	Crude rate per 100,000 for females	Lower confidence interval for female rate	Upper confidence interval for female rate
10	8	4	12	4	1	6
11	7	3	10	11	6	16
12	12	7	17	26	19	33
13	43	34	52	93	79	106
14	104	90	118	220	199	241
15	204	184	224	367	340	394
16	308	284	332	437	408	466
17	415	388	442	447	418	476
18	456	428	484	443	414	471
19	536	506	566	474	445	503
20	595	564	626	510	480	540
21	664	632	696	482	453	510
22	648	617	680	515	486	544
23	673	641	705	484	456	512
24	679	647	711	526	497	555

Note

Rates with confidence intervals that do not overlap are considered to be statistically different, as described in CIHI's [General Methodology Notes](#).

Sources

Hospital Morbidity Database, Ontario Mental Health Reporting System and National Ambulatory Care Reporting System (day surgery records), 2017–2018, Canadian Institute for Health Information.

Figure 2: Hospitalization rates for harm caused by substance use among youth, by substance type and age, Canada, 2017–2018

Substance	Crude rate per 100,000 for youth age 10 to 14	Crude rate per 100,000 for youth age 15 to 17	Crude rate per 100,000 for youth age 18 to 24	Age-standardized rate per 100,000 for youth of all ages (10 to 24)
Cannabis	24	185	192	141
Unknown	8	87	154	97
Alcohol	18	93	141	95
Other stimulants	5	47	97	60
Opioids	3	23	60	36
Cocaine	1	22	62	36
Other depressants	7	36	35	27
Other substances	1	6	6	4

Notes

Rates are not mutually exclusive; more than one substance can be documented per hospitalization.

“Unknown” is the term used for unidentified (possibly mixed) substances.

Some examples of other stimulants include methamphetamine, caffeine and prescription stimulants. Other depressants include benzodiazepines and sleeping pills. Other substances include hallucinogens and solvents.

Sources

Hospital Morbidity Database, Ontario Mental Health Reporting System and National Ambulatory Care Reporting System (day surgery records), 2017–2018, Canadian Institute for Health Information.

Figure 3: Hospitalization rates for harm caused by substance use among youth per 100,000 population, overall and by most common substances, by province and territory, Canada, 2017–2018

Jurisdiction	Overall age-standardized rate	First substance (age-standardized rate)	Second substance (age-standardized rate)	Third substance (age-standardized rate)
Canada [‡]	364	Cannabis (141)	Unknown (97)	Alcohol (95)
Newfoundland and Labrador	326	Unknown (85)	Cannabis (74) [†]	Alcohol (70) [†]
Prince Edward Island	547*	Cannabis (257)*	Unknown (205)*	Alcohol (63)
Nova Scotia	260 [†]	Cannabis (96) [†]	Alcohol (84)	Unknown (57) [†]
New Brunswick	392	Cannabis (208)*	Other stimulants (89)*	Unknown (77) [†]
Quebec	354	Cannabis (193)*	Other stimulants (96)*	Unknown (78) [†]
Ontario	315 [†]	Unknown (114)*	Cannabis (104) [†]	Alcohol (67) [†]
Manitoba	294 [†]	Cannabis (93) [†]	Alcohol (87)	Unknown (75) [†]
Saskatchewan	667*	Cannabis (345)*	Alcohol (259)*	Other stimulants (126)*
Alberta	424*	Alcohol (156)*	Cannabis (155)*	Unknown (93)
British Columbia	467*	Cannabis (157)*	Alcohol (137)*	Other stimulants (100)*
Yukon	445	Alcohol (295)*	Cannabis (92)	Cocaine (76)
Northwest Territories	1,755*	Alcohol (1,283)*	Cannabis (701)*	Cocaine (248)*
Nunavut	1,095*	Cannabis (630)*	Alcohol (268)*	Unknown (219)*

Notes

* Age-standardized hospitalization rate is **higher** than the national age-standardized hospitalization rate for this substance type.

† Age-standardized hospitalization rate is **lower** than the national age-standardized hospitalization rate for this substance type.

‡ The fourth substance for Canada is stimulants, with a rate of 60. The fifth substance for Canada is cocaine, with a rate of 36.

Rates are not mutually exclusive; more than one substance can be documented per hospitalization.

Comparisons of provincial and territorial hospitalization rates with national rates are described in CIHI's [General Methodology Notes](#).

“Unknown” is the term used for unidentified (possibly mixed) substances.

Some examples of other stimulants include methamphetamine, caffeine and prescription stimulants. Other depressants include benzodiazepines and sleeping pills. Other substances include hallucinogens and solvents.

Sources

Hospital Morbidity Database, Ontario Mental Health Reporting System and National Ambulatory Care Reporting System (day surgery records), 2017–2018, Canadian Institute for Health Information.

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