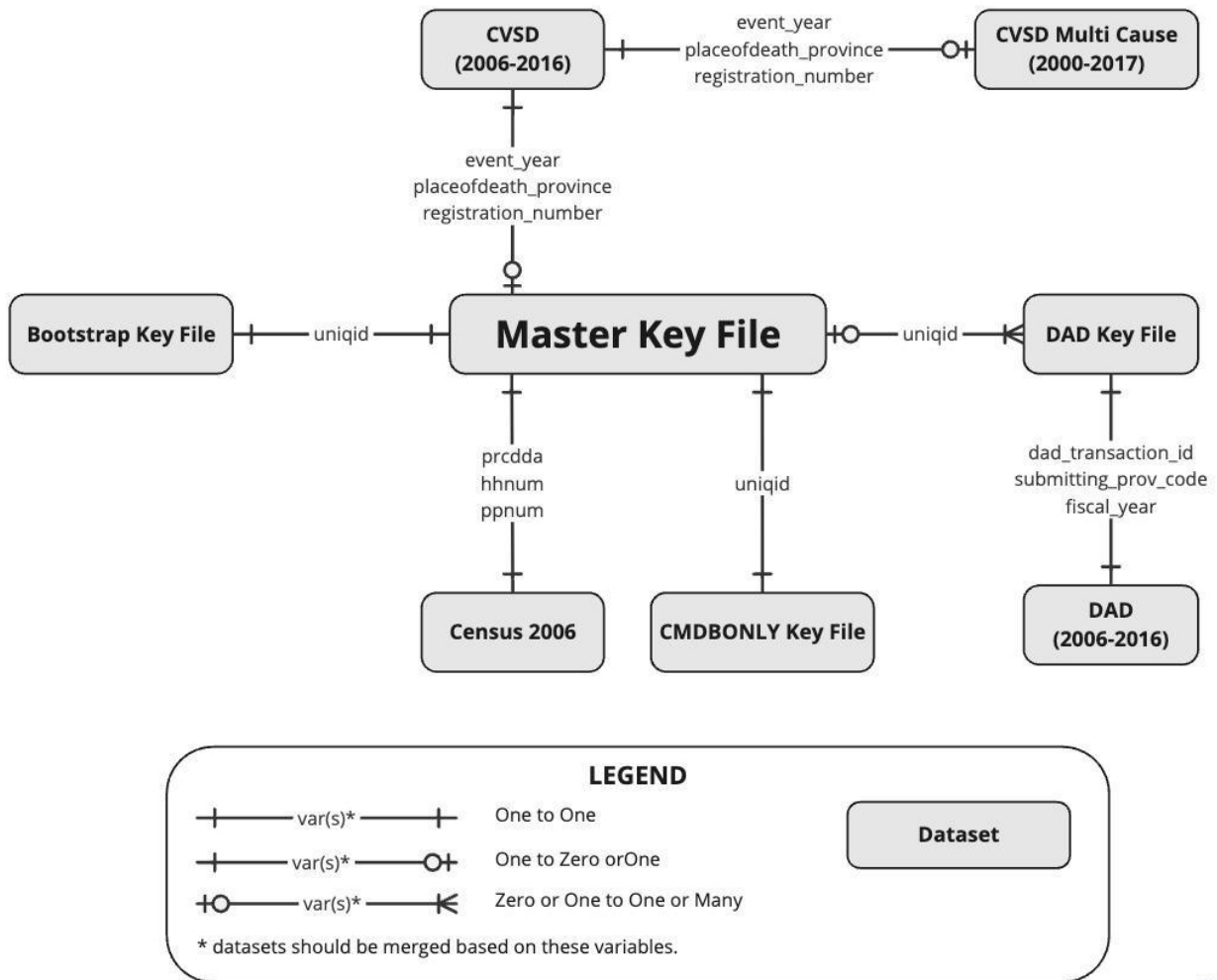


Supplementary Appendices

Appendix 1: Stata do-file
(Download Supplementary Appendix to view)

Appendix 2: CanCHEC 2006 data structure



Note: This figure illustrates the relationship between different datasets available within CanCHEC 2006. The datasets shown in this figure only include those used in the current study and not all CanCHEC 2006 datasets. Data structures of different cycles of CanCHEC are different, and this diagram solely represents the cycle of 2006.



Appendix 3: Substance use case-finding algorithm

Database	Substance use category	Substance use case-finding algorithm ¹	
		Diagnosis ICD-10-CA codes	Diagnosis type
DAD	Alcohol	F10.–, T51.–, E24.4, G31.2, G62.1, G72.1, I42.6, K29.2, K70.–, K85.2, K86.0, O35.4–, O99.3– ² , Q86.0, R78.0, X45, X65, Y15, P04.3	(M), (1), (2), (W), (X), (Y) or (9)
	Opioids	F11.–, T40.0, T40.1, T40.2–, T40.3, T40.4–, T40.6O99.3– ² , P96.1	(M), (1), (2), (W), (X), (Y) or (9)
	Cannabis	F12.–, T40.7, O99.3– ²	(M), (1), (2), (W), (X), (Y) or (9)
	Other CNS depressants	F13.–, T42.3, T42.4, T42.6, T42.7, O99.3– ²	(M), (1), (2), (W), (X), (Y) or (9)
	Cocaine	F14.–, T40.5, O99.3– ²	(M), (1), (2), (W), (X), (Y) or (9)
	Other CNS stimulants	F15.–, T43.6, O99.3– ²	(M), (1), (2), (W), (X), (Y) or (9)
	Unknown and multiple substances	F19.–, T43.8, T43.9, O99.3– ² , X41, X42, X61, X62, Y11, Y12 ³ , O35.5	(M), (1), (2), (W), (X), (Y) or (9)
Other substances ⁴	F16.–, F18.–, F55, T40.8, T40.9, O99.3– ²	(M), (1), (2), (W), (X), (Y) or (9)	
		Underlying cause of death ICD-10-CA codes	Multiple cause of death ICD-10-CA codes
CVSD	Alcohol	F10.–, E24.4, G31.2, G62.1, G72.1, I42.6, K29.2, K70.–, K85.2, K86.0, O35.4–, Q86.0, R78.0, X45, X65, Y15, P04.3 X40-X44, X60-X64, X85, Y10-Y14	– At least one comorbidity is T51.–.
	Opioids	F11.–, P96.1 X41-X44, X61-X64, X85, Y11-Y14	– At least one comorbidity is T40.0 (Opium), T40.1 (Heroin), T40.2 (Natural and semisynthetic opioids), T40.3 (Methadone), T40.4 (Synthetic opioids, other than methadone), or T40.6 (Other and unspecified narcotics).
	Cannabis	F12.– X40-X44, X60-X64, X85, Y10-Y14	– At least one comorbidity is T40.7.
	Other CNS depressants	F13.– X40-X44, X60-X64, X85, Y10-Y14	– At least one comorbidity is T42.3, T42.4, T42.6, T42.7.
	Cocaine	F14.– X40-X44, X60-X64, X85, Y10-Y14	– At least one comorbidity is T40.5
	Other CNS stimulants	F15.– X40-X44, X60-X64, X85 Y10-Y14	– At least one comorbidity is T43.6.
	Unknown and multiple substances	F19.–, X41, X42, X61, X62, Y11, Y12, O35.5 X40-X44, X60-X64, X85, Y10-Y14	– At least one comorbidity is T43.8, T43.9.
Other substances	F16.–, F18.–, F55 X40-X44, X60-X64, X85, Y10-Y14	– At least one comorbidity is T40.8, T40.9.	

Notes: ¹Conditions listed in both columns should be met in order for an event to be considered a SUH event. For more information on the variables and their Operationalisation, please refer to Appendix 4 and do-file. ²Include only if F10–16 or F18–19 as diagnosis type (3) is in the same abstract. ³Include X41, X61 and Y11 if neither T42.– nor T43.– are in the same abstract; include X42, X62 and Y12 if T40.– is not in the same abstract. ⁴Includes hallucinogens, solvents, and abuse of non-dependence-producing substances. DAD: discharge abstract database; CVSD: Canadian vital statistics death database; ICD: international classification of diseases; CNS: central nervous system.

Appendix 4: List of variables in the final derived 2006 CanCHEC cohort

Name of variable in original dataset ¹	Final variable name	Variable label	Notes
Uniqid	uniqid	unique ID (CanCHEC 2006)	Used in linking CanCHEC components based on Appendix 1.
Prcdda	da_06	dissemination area (CanCHEC 2006)	Used in linking CanCHEC components based on Appendix 1.
Hhnum	hhnum	key for household table (CanCHEC 2006)	Used in linking CanCHEC components based on Appendix 1.
Ppnum	ppnum	key for person table (CanCHEC 2006)	Used in linking CanCHEC components based on Appendix 1.
pp_id	pp_id	alternative key for census person table (CanCHEC 2006)	Used in linking CanCHEC components based on Appendix 1.
event_year	year_death	year when death occurred (CanCHEC 2006)	Used in linking CanCHEC components based on Appendix 1.
placeofdeath_province	placeofdeath_province	province where death occurred (CanCHEC 2006)	Used in linking CanCHEC components based on Appendix 1.
registration_number	registration_number	death registration number (CanCHEC 2006)	Used in linking CanCHEC components based on Appendix 1.
canchecw2	w_cohort	CanCHEC 2006 weight (CanCHEC 2006)	CanCHEC 2006 weight.
dad_transaction_id	dad_transaction_id	DAD transaction ID (CanCHEC 2006)	Used in linking CanCHEC components based on Appendix 1.
submitting_prov_code	submitting_prov_code	submitting province code (DAD)	Used in linking CanCHEC components based on Appendix 1.
inst_code	inst_code	institution number (DAD)	Code assigned to a reporting facility by a provincial/ territorial ministry of health identifying the facility and the level of care of the data submitted in DAD.
fiscal_year	year_hosp	fiscal year of hospitalisation (DAD)	The fiscal year of hospitalisation, in DAD.
health_card_prov_code	healthcard_pr	province issuing the health card (DAD)	Province issuing the health card of the patients, recorded in DAD.
patient_postal_code <i>derived variable</i> ²	resdn_pcode_dad age_hosp	patient postal code (DAD) age at the time of hospitalisation (DAD)	Patient postal code recorded in DAD. Age at the time of hospitalisation in year, as recorded in DAD. This derived variable is based on the age_units and age_code variables in DAD.
gender_code	sex_hosp	sex of patient (DAD)	Sex of patient recorded in DAD.
admission_date	admission_date	admission date (DAD)	Admission date in DAD.
discharge_date	discharge_date	discharge date (DAD)	Discharge date in DAD.
diag_cluster_'i'	diag_cluster_'i'	diagnosis cluster 'i' (DAD)	This is a set of 25 variables, referring to the diagnosis cluster of an abstract in DAD. Diagnosis cluster is an alphabetic character which indicates association between diagnoses.
diag_prefix_'i'	diag_prefix_'i'	diagnosis prefix 'i' (DAD)	This is a set of 25 variables, referring to the diagnosis prefix of an abstract in DAD. Diagnosis prefix is a one-character-long code which provides additional information on the ICD code to which it is assigned.
diag_code_'i'	diag_code_'i'	diagnosis code 'i' (DAD)	This is a set of 25 variables, referring to the ICD-10 codes of the diagnosis for a patient record in DAD.
diag_type_'i'	diag_type_'i'	diagnosis type 'i' (DAD)	This is a set of 25 variables, referring to the diagnosis type of an abstract in DAD. Diagnosis type is an alpha or numeric character used to describe the significance of a diagnosis or condition for a patient record in the DAD.

Appendix 4: Continued

Name of variable in original dataset ¹	Final variable name	Variable label	Notes
total_los_days	total_los_days	total length of stay (DAD)	This is the total length of stay as recorded in DAD.
acute_los_days	acute_los_days	acute length of stay (DAD)	This is the acute length of stay in hospital as recorded in DAD.
alc_los_days	alc_los_days	alternative level of care length of stay (DAD)	This is the alternative level of care length of stay in hospital, as recorded in DAD.
sex	sex_death	sex of deceased (CVSD)	This variable indicates the sex of the deceased as available in CVSD.
<i>derived variable</i>	age_death	age of deceased (CVSD)	This is the age of the deceased in year. This variable is derived from the age_value and age_code variables in CVSD.
residence_province_3 digit	resdn_pr_cvsd	usual residence of deceased: province (CVSD)	This is the usual residence of the deceased (province) available in CVSD.
residence_postalcode	resdn_pcode_cvsd	usual residence of deceased: postal code (CVSD)	This is the usual residence of the deceased (postal code) available in CVSD.
death_cause_4digits	icd_underly_cause	ICD for underlying cause of death (CVSD)	This variable contains the ICD-10 codes of the underlying cause of death available in CVSD.
ra_mc_'i'	icd_contr_cause_'i'	ICD for contributing cause of death 'i' (CVSD)	This is a set of 20 variables that refer to the ICD-10 codes of the contributing causes of death. These variables are available in the Multi Cause datasets associated with CVSD.
age	age_cens	age (census 2006)	Refers to the age at last birthday (as of the census reference date, May 16, 2006). This variable is derived from Date of birth.
cma	cma_cens	census metropolitan area or census agglomeration of current residence (2006)	Area consisting of one or more neighbouring municipalities situated around a major urban core. A census metropolitan area must have a total population of at least 100,000 of which 50,000 or more live in the urban core. A census agglomeration must have an urban core population of at least 10,000.
sex	sex_cens	sex (census 2006)	Refers to the gender of the respondent in Census 2006.
<i>derived variable</i>	hhatinc_adj	household after-tax income adjusted for household size (census 2006)	The after-tax income of a household is the sum of the after-tax incomes of all members of that household, adjusted for the household size. This variable is derived from the household after-tax income (hhinc_at) and household size (nunits) variables in Census 2006.
fsaname	fsa_cens	forward sortation area (census 2006)	The first three characters of the postal code identify the forward sortation area (FSA). FSAs are associated with a postal facility from which mail delivery originates. The average number of households served by an FSA is approximately 8,000, but the number can range from zero to more than 60,000 households.
pcd	cd_cens	census division of current residence (census 2006)	This is the census division of current residence in census 2006.
pcsd	csd_cens	census subdivision of current residence (census 2006)	This is the census subdivision of current residence in Census 2006.

Continued.

Appendix 4: Continued

Name of variable in original dataset ¹	Final variable name	Variable label	Notes
pop	pop_csd	population size group of current census subdivision of residence (census 2006)	This is the population size group of the current census subdivision of residence in Census 2006.
pr	pr_cens	province or territory of current residence (census 2006)	This is the province variable in Census 2006, referring to the province or territory of current residence of the respondent.
runindfg	rufg	rural, urban classification (census 2006)	This is the "ruindfg" variable in Census 2006, referring to the 2006 rural or urban classification of the CSD where the person usually resided on May 16, 2005, one year prior to Census Day.
rusize	rusize	rural/urban size code (census 2006)	This is the rural/urban size code variable in Census 2006.
compw2	w_cens	composite weight (perswt + occwtp -1) (census 2006)	This is the Composite Weight (PERSWT + OCCWTP-1) variable in Census (compw2).
<i>derived variable</i>	edu	education (census 2006)	This derived variable is based on the "Highest certificate, diploma or degree" variable (hcdd) in Census 2006.
nocsbrd	occ	labour market activities : occupation broad categories (census 2006)	This is the Broad National Occupational Classification variable in Census 2006.
<i>derived variable</i>	race	ethnicity (census 2006)	This derived variable is based on the Visible minority variable (dvismin) in Census 2006.
<i>derived variable</i>	emp	employment status (census 2006)	This derived variable is based on the Labour force activity variable (lf71) in Census 2006.
<i>derived variable</i>	resdn_sk_dad_p	resident of Saskatchewan based on DAD	This variable indicates that if a cohort member was identified as a resident of Saskatchewan based on DAD.
<i>derived variable</i>	resdn_sk_cvsd_p	resident of Saskatchewan based on CVSD	This variable indicates that if a cohort member was identified as a resident of Saskatchewan based on CVSD.
<i>derived variable</i>	resdn_sk_cens_p	resident of Saskatchewan based on census 2006	This variable indicates that if a cohort member was identified as a resident of Saskatchewan based on census 2006.
<i>derived variable</i>	resdn_sk_p	person residing in SK at some point between 2006 and 2016	This variable indicates that if a cohort member was identified as a person residing in Saskatchewan at some point between 2006 and 2016, based on DAD or CVSD or Census 2006.
<i>derived variable</i>	hosp_e	hospitalisation event	This variable indicates a hospitalisation event due to any reason.
<i>derived variable</i>	hosp_p	hospitalised person	This variable indicates if a person was hospitalised at least once, between 2006 and 2016, due to any reason.
<i>derived variable</i>	death_e	death event	This variable indicates a death event.
<i>derived variable</i>	death_p	deceased person	This variable indicates if a person died between 2006 and 2016.
<i>derived variable</i>	hosp_alc_e	hospitalisation event due to alcohol	This variable indicates a hospitalisation event due to alcohol.
<i>derived variable</i>	hosp_opi_e	hospitalisation event due to opioid	This variable indicates a hospitalisation event due to opioid.
<i>derived variable</i>	hosp_can_e	hospitalisation event due to cannabis	This variable indicates a hospitalisation event due to cannabis.
<i>derived variable</i>	hosp_cnsdep_e	hospitalisation event due to other CNS depressants	This variable indicates a hospitalisation event due to other CNS depressants.

Continued.

Appendix 4: Continued

Name of variable in original dataset ¹	Final variable name	Variable label	Notes
<i>derived variable</i>	hosp_coc_e	hospitalisation event due to cocaine	This variable indicates a hospitalisation event due to cocaine.
<i>derived variable</i>	hosp_cnsstim_e	hospitalisation event due to other CNS stimulants	This variable indicates a hospitalisation event due to other CNS stimulants.
<i>derived variable</i>	hosp_unkmult_e	hospitalisation event due to unknown and multiple substances	This variable indicates a hospitalisation event due to unknown and multiple substances.
<i>derived variable</i>	hosp_other_e	hospitalisation event due to other substances	This variable indicates a hospitalisation event due to other substances.
<i>derived variable</i>	hosp_su_e	hospitalisation event due to substance use	This variable indicates a hospitalisation event due to substance use.
<i>derived variable</i>	hosp_alc_p	person hospitalised due to alcohol	This variable indicates if a person was hospitalised at least once due to alcohol, between 2006 and 2016.
<i>derived variable</i>	hosp_opi_p	person hospitalised due to opioids	This variable indicates if a person was hospitalised at least once due to opioids, between 2006 and 2016.
<i>derived variable</i>	hosp_can_p	person hospitalised due to cannabis	This variable indicates if a person was hospitalised at least once due to cannabis, between 2006 and 2016.
<i>derived variable</i>	hosp_cnsdep_p	person hospitalised due to other CNS depressants	This variable indicates if a person was hospitalised at least once due to other CNS depressants, between 2006 and 2016.
<i>derived variable</i>	hosp_coc_p	person hospitalised due to cocaine	This variable indicates if a person was hospitalised at least once due to cocaine, between 2006 and 2016.
<i>derived variable</i>	hosp_cnsstim_p	person hospitalised due to other CNS stimulants	This variable indicates if a person was hospitalised at least once due to other CNS stimulants, between 2006 and 2016.
<i>derived variable</i>	hosp_unkmult_p	person hospitalised due to unknown and multiple substances	This variable indicates if a person was hospitalised at least once due to unknown and multiple substances, between 2006 and 2016.
<i>derived variable</i>	hosp_other_p	person hospitalised due to other substances	This variable indicates if a person was hospitalised at least once due to other substances, between 2006 and 2016.
<i>derived variable</i>	hosp_su_p	person hospitalised due to substance use	This variable indicates if a person was hospitalised at least once due to substance use, between 2006 and 2016.
<i>derived variable</i>	death_alc_e	death event due to alcohol	This variable indicates a death event due to alcohol.
<i>derived variable</i>	death_opi_e	death event due to opioids	This variable indicates a death event due to opioids.
<i>derived variable</i>	death_can_e	death event due to cannabis	This variable indicates a death event due to cannabis.
<i>derived variable</i>	death_cnsdep_e	death event due to other CNS depressants	This variable indicates a death event due to other CNS depressants.
<i>derived variable</i>	death_coc_e	death event due to cocaine	This variable indicates a death event due to cocaine.
<i>derived variable</i>	death_cnsstim_e	death event due to other CNS stimulants	This variable indicates a death event due to other CNS stimulants.
<i>derived variable</i>	death_unkmult_e	death event due to unknown and multiple substances	This variable indicates a death event due to unknown and multiple substances.
<i>derived variable</i>	death_other_e	death event due to other substances	This variable indicates a death event due to other substances.

Continued.

Appendix 4: Continued

Name of variable in original dataset ¹	Final variable name	Variable label	Notes
<i>derived variable</i>	death_su_e	death event due to substance use	This variable indicates a death event due to substance use.
<i>derived variable</i>	death_alc_p	person died due to alcohol	This variable indicates a person who died due to alcohol, between 2006 and 2016.
<i>derived variable</i>	death_opi_p	person died due to opioids	This variable indicates a person who died due to opioids, between 2006 and 2016.
<i>derived variable</i>	death_can_p	person died due to cannabis	This variable indicates a person who died due to cannabis, between 2006 and 2016.
<i>derived variable</i>	death_cnsdep_p	person died due to other CNS depressants	This variable indicates a person who died due to other CNS depressants, between 2006 and 2016.
<i>derived variable</i>	death_coc_p	person died due to cocaine	This variable indicates a person who died due to cocaine, between 2006 and 2016.
<i>derived variable</i>	death_cnsstim_p	person died due to other CNS stimulants	This variable indicates a person who died due to other CNS stimulants, between 2006 and 2016.
<i>derived variable</i>	death_unkmult_p	person died due to unknown and multiple substances	This variable indicates a person who died due to unknown and multiple substances, between 2006 and 2016.
<i>derived variable</i>	death_other_p	person died due to other substances	This variable indicates a person who died due to other substances, between 2006 and 2016.
<i>derived variable</i>	death_su_p	person died due to substance use	person died due to substance use
<i>derived variable</i>	pesuh	person who experienced substance use harm	Person who experienced substance use harm between 2006 and 2016. Substance use harm is defined as hospitalisation or death due to substance use.

Notes: ¹All variables are listed in lower case, independent of how they are saved in the original dataset. ²A *derived variable* is a variable that is generated or recoded using variables in CanCHEC 2006. DAD: discharge abstract database; CVSD: Canadian vital statistics death database; CanCHEC: Canadian census health and environment cohorts; CNS: central nervous system; CSD: census subdivision; ICD: international classification of diseases.

Appendix 5: Rate of people who experienced substance use harm per 100,000 in Saskatchewan weighted to CanCHEC 2006

Year	Substance use harm category, rate per 100,000 (SE)							
	Alcohol	Opioids	Cannabis	Other CNS depressants	Cocaine	Other CNS stimulants	Unknown/multiple substances	Other substances ¹
2006	149.2 (9.81)	19.5 (3.53)	21.0 (3.42)	20.0 (3.62)	13.0 (2.70)	7.0 (2.00)	33.5 (3.91)	3.0 (1.30)
2007	152.3 (9.58)	20.6 (3.38)	28.1 (4.13)	18.1 (3.40)	17.6 (3.59)	3.0 (1.02)	43.2 (5.10)	2.5 (1.00)
2008	174.1 (9.74)	17.2 (2.79)	24.3 (3.16)	20.2 (3.34)	21.3 (4.15)	7.0 (1.86)	45.5 (5.38)	1.0 (0.34)
2009	186.6 (10.56)	31.1 (4.25)	28.0 (3.63)	15.3 (2.80)	25.0 (4.38)	6.1 (1.92)	39.8 (5.13)	2.5 (0.98)
2010	173.7 (9.77)	31.9 (4.30)	27.2 (3.64)	20.0 (3.37)	18.0 (3.98)	4.6 (1.83)	33.9 (4.36)	2.6 (1.19)
2011	185.0 (10.84)	33.7 (4.40)	38.3 (5.11)	24.9 (4.11)	16.1 (3.37)	5.7 (1.67)	42.0 (4.99)	2.1 (1.16)
2012	193.9 (10.28)	33.5 (4.61)	31.9 (4.71)	24.0 (3.99)	15.7 (2.80)	4.7 (1.60)	42.9 (4.46)	2.6 (1.25)
2013	182.1 (10.34)	30.6 (4.24)	37.5 (4.54)	19.0 (3.29)	12.7 (2.61)	11.0 (2.85)	44.3 (4.81)	2.6 (1.23)
2014	207.7 (11.42)	42.6 (5.86)	52.2 (6.25)	23.4 (4.18)	21.3 (3.75)	17.4 (3.50)	44.2 (5.89)	2.1 (1.01)
2015	203.8 (11.84)	60.8 (6.61)	55.4 (5.65)	21.5 (3.76)	24.2 (4.17)	28.8 (4.30)	60.2 (6.53)	2.2 (1.01)
2016	230.9 (12.39)	61.9 (6.63)	95.6 (7.39)	33.1 (4.25)	30.4 (3.76)	44.1 (6.06)	47.3 (5.47)	2.2 (0.93)

Notes: ¹Other substances include hallucinogens, solvents, abuse of non-dependence-producing substances. SE: Standard Error.