

Youth Volatile Solvent Abuse

FAQs



*This Youth Volatile Solvent Abuse (VSA) FAQ was prepared by Dr. Colleen Anne Dell, Senior Research Associate and Academic Liaison, and Tara Beauchamp, Consultant, Research and Policy Division, Canadian Centre on Substance Abuse (CCSA). It is intended to provide current, objective and empirically-based information to guide the discussion on youth volatile solvent abuse in Canada.**

What are volatile solvents?

- Volatile solvents are a large and diverse group of chemical compounds contained in hundreds of household and industrial products.
 - A solvent is a chemical in a liquid or semi-solid state that dissolves other substances (for example, nail polish remover).
 - “Volatile” refers to the rapid evaporation of chemicals when exposed to air. Volatile solvents often abused by youth include paint thinner, glue, gasoline, paint, correcting fluid and felt-tip markers.
- Aerosol and spray cans often contain a liquefied-gas propellant that acts as a solvent to dissolve the contents of the can so that they can be sprayed. Propellants can also be abused.
- Products that use propellants include hairspray, spray paint, spray deodorants, cooking sprays and computer cleaner dusters (which contain only a liquefied-gas propellant).

What is volatile solvent abuse?

- Volatile solvent abuse (VSA) is the deliberate inhalation of fumes or vapours for their intoxicating and mind-altering effects.¹
- VSA is frequently referred to as inhalant abuse. This can be confusing because the term inhalant can refer to a number of other toxic substances that are not solvents (mainly anaesthetics[†] and nitrates[‡]).²

* The authors would like to thank Dr. Grant Charles and Debra Dell for their constructive comments on an earlier version of this document. Any errors or omissions are solely the responsibility of CCSA.

[†] Anaesthetics such as nitrous oxide (laughing gas) and ether are used in medical and dental practices. Nitrous oxide is the propellant in whipped topping products.

[‡] Nitrates are typically found in room deodorizers and video head cleaner, and are referred to by such street terms as “locker room”, “poppers” and “climax”. Nitrates are commonly sold in stores that cater to drug users (head shops) and are typically used by males for sexual enhancement.

- Terms such as inhalant abuse, solvent abuse and volatile substance misuse are used interchangeably and vary by country. VSA is used in this FAQ because solvents are the products most commonly abused by youth. They are typically inhaled.

How are volatile solvents abused?

- The most common ways to inhale volatile solvents include³

Sniffing: Users inhale solvents directly from a container through the nose and mouth. Less commonly they may heat the solvent to increase the evaporation rate. This is particularly dangerous because most solvents are highly flammable.

Huffing: Users soak material, such as a shirt sleeve or a sock, in a solvent and place it over their nose and mouth or right into their mouth to inhale the fumes.

Bagging: Users inhale a concentration of fumes from a bag that is placed over the mouth and nose or over the head.

- Fumes can also be inhaled in small, enclosed spaces such as a closet, bathroom or vehicle. There have also been reports of users soaking a mattress or blanket in a solvent and wrapping themselves in it.
- Aerosol propellants are typically sprayed right into the mouth or into a balloon or bag and then inhaled.
- In rare cases, users may drink* or inject solvents. Some products such as hairspray can contain alcohol or other intoxicants.

What happens when volatile solvents are inhaled?

- Volatile solvents are quickly absorbed into the blood stream through the lungs and travel to the brain and other organs. The effect is almost immediate and short-lived (the acute effects last only a few minutes).
- At first the user will feel excited, typically experiencing euphoria, light-headedness, distorted vision and sense of space, impulsiveness and lack of inhibition. VSA can also produce vivid hallucinations.
- Physical symptoms may include ataxia (the inability to coordinate muscle movement), nausea and vomiting, dizziness and flushing.
- Once the brief high passes, the chemicals in solvents act much like a depressant as they slow down the body's central nervous system. The user will start to feel "down", drowsy and physically ill.
- Experienced users inhale periodically (for example, every 30 minutes) to maintain a high and avoid the unpleasant after effects.

How are volatile solvent abusers classified?

- Three general categories of use are commonly referred to:⁴

Experimental: Youth who try solvents once or twice or use them intermittently. They usually use out of curiosity, as a fad or under peer pressure.

Recreational: Users who abuse solvents periodically (for example, on weekends at parties, usually in a group setting). These users may resort to solvents because they do not have access to more sophisticated drugs.⁵

* This is termed non-potable substance abuse.

Habitual: Youth who use solvents on a regular basis. They continue their use because they enjoy the effects and it is often a way to cope with difficult life circumstances. In Canada, habitual use is most frequent among disenfranchised youth.

Who uses volatile solvents and to what extent?

- Volatile solvents are often the first mood-altering substance used by children and youth because they are generally readily available, inexpensive and easy to conceal.⁶

Canadian rates of VSA

- In the 2004 *Canadian Addiction Survey*, 1.9% of males 15 years and older and 0.7% of females reported use of an inhalant in their lifetime⁷—an increase from 1.2% and 0.3% respectively in 1994.⁸
- In the 2004 study, the majority of individuals (67%) reported first using inhalants between 12 and 16 years of age. Thirteen percent used before the age of 12 and 19% at age 17 or older.⁹
- Canadian secondary school surveys similarly indicate that the majority of youth who abuse solvents are between the ages of 10 and 17, with peak use between 12 and 15.¹⁰
- The surveys also show that there is not a large difference in rates of VSA between girls and boys, use decreases as grade increases, the majority of youth are experimental users, and there is variation across the country in trends over the past decade.¹¹
- Research and practice have indicated higher rates of VSA among street youth, inner city youth, and some First Nations and Inuit youth living in select rural and remote areas of the country. A 2004 Toronto study found that 10% of street youth had inhaled solvents within the past month.¹² A 2003 report from Pauingassi First Nation in Manitoba concluded that half of the children under 18 and living on reserve abused solvents.¹³
- VSA among First Nations and Inuit youth in select communities has been linked to high rates of poverty, boredom, loss of self-respect, unemployment, family breakdown and poor social and economic structures.¹⁴ These issues are rooted in the historic impact of residential schooling, systemic racism and discrimination, and multi-generational losses of land, language and culture.
- The current rate of VSA among Canada's Aboriginal youth as a whole is not known. The media seems to depict the rate as higher in comparison to the rest of Canada. This may partly be a result of a well-played 1993 media clip of Innu youth in Davis Inlet, Newfoundland getting high on gasoline.

U.S. rates of VSA

- In the 2004 *Monitoring the Future* survey, past-year rates of inhalant abuse varied from 9.6% in Grade 8 to 4.2% in Grade 12.¹⁵
- Rates in 2004 were down from their peak in 1995 for all students except those in Grade 8 where the rate increased by 1.9% from 7.7% in 2002.¹⁶
- In 2004, close to one in five Grade 8 students reported having tried inhaling a volatile solvent at least once in their lives.¹⁷
- In the 2004 *National Survey on Drug Use and Health*, more than one third of individuals 12 and older reporting inhalant use in the past year were first-time users.¹⁸
- According to the *Drug Abuse Warning Network*, emergency department mentions of inhalants in 2002 increased 187%, from 522 in 2001 to 1,496 in 2002—a return to 2000 levels.¹⁹

International rates of VSA

- Among 40 countries providing lifetime rates of VSA in the past 10 years, 16 reported rates lower than 5%, 15 reported rates of between 5% and 10%, and 10 reported rates of 10% to 20%.²⁰
- The 2005 *World Drug Report** found that inhalant use had increased in 11 countries in 2003—fewer than in 2002, but slightly more than in 2001.²¹
- Youth in developed nations generally report using volatile solvents because of peer pressure, curiosity, experimentation and defiance. Youth in underdeveloped nations are more likely to use solvents as a coping mechanism, often to suppress hunger and escape impoverishment.²²

What are the risk factors associated with becoming a volatile solvent abuser?

- VSA can occur within any young population, but certain factors put youth at greater risk for abusing substances, including solvents. These include

Economic status: Economic deprivation and its consequences put individuals at greater risk for VSA.²³

Ethnicity/race: Geographic and social isolation, inequality and discrimination associated with ethnicity/race can contribute to an increased likelihood of VSA.²⁴

Family history: Young people who come from dysfunctional, violent, neglectful and chaotic family backgrounds are at greater risk of VSA.²⁵

Gender: Recent studies report increasing similarity in the rate of VSA among males and females. Where gender differences exist, higher VSA rates and sustained and chronic use are more common among males.²⁶

Peer influence: A young person's proximity to solvent abusers and deviant peer networks can increase the risk of VSA.²⁷

- A 2004 Alberta study focusing on risk and protective factors among substance-using youth found that 12.0% of youth identified as “vulnerable and risk-exposed” (that is, having few protective factors and many risk factors) used inhalants one or more times in the past year.²⁸

What are the social and physical health effects of VSA?

- The social effects of VSA for youth are similar to those for other substances, including poor academic performance²⁹, emotional challenges (for example, mood swings, depression, low self-esteem)³⁰, and problematic behaviour, including delinquency and crime.³¹
- The physical effects of VSA depend on both the product and the individual. This includes the type of product, the amount and how it is used, and on the health of individual users, their expectations, and their use of other substances.
- The physical effects of VSA are highly unpredictable and potentially deadly even for first-time users.³² Some of the most hazardous immediate effects of VSA include

Sudden heart failure: Known as “sudden sniffing death”, this is one of the most common causes of death by solvents and occurs when a rush of adrenaline from extra exertion while intoxicated (for example, fright or running) causes the heart to skip out of rhythm and stop beating.³³

* All age groups.

Suicide/risk-taking behaviour: Impaired judgment and feelings of invincibility can lead to aggression towards one self and others and to dangerous behaviour.³⁴

Asphyxiation/suffocation: Asphyxiation most frequently occurs when a plastic bag is used to inhale solvents and blocks the passage of air to the user's nose and mouth.³⁵

Overdose: Mixing solvents with other drugs, especially central nervous system depressants such as alcohol, sleeping pills and tranquillizers, increases the possibility of overdose.³⁶

Frostbite and burns: The freezing properties of many solvents can cause minor frostbite to the lips and tongue or even fatal freezing of air passages. Burns also pose a risk because solvent fumes are often flammable.³⁷

- The following acute or short-term physical health effects of VSA occur during use—even first-time use—or immediately after the euphoric state has subsided and intoxication has worn off. They generally pass within a few hours.³⁸
 - abdominal pains
 - amnesia
 - depression
 - diarrhea
 - fatigue/sleepiness
 - headache/hangover
 - inattentiveness
 - irritability
 - lack coordination
 - loss of appetite
 - nausea/vomiting
 - rapid or irregular heartbeat

- The following chronic or long-term physical health effects are associated with prolonged abuse of volatile solvents.³⁹ It is not clear whether certain effects such as brain damage are reversible.⁴⁰
 - anxiety, excitability, irritability, restlessness
 - bone marrow and blood damage (some solvents have been linked to leukemia)
 - central nervous system/brain damage
 - chronic nose bleeds
 - damage to the heart and lungs
 - drying of the mucus membrane around the nostrils and mouth, causing the user to sneeze, cough, wheeze or salivate
 - hearing loss
 - liver and kidney damage
 - nerve cells (affecting balance, for example) and muscle damage
 - short-term memory loss
 - sleep problems
 - spasms of the arms and legs
 - throat and ear infection
 - weight loss, weakness and low energy

- VSA has been associated with multiple drug use⁴¹ and according to the “gateway” theory* may lead to the use of other drugs⁴² such as cocaine, and drug practices⁴³ such as intravenous drug use.
- Prenatal solvent exposure can also pose physical health concerns and may affect the developing fetus.⁴⁴
- Clinical studies of children born to mothers who abuse solvents, particularly those such as gasoline that contain toluene, show symptoms resembling fetal alcohol syndrome (FAS)⁴⁵. This has been referred to as fetal solvent syndrome⁴⁶; however there is a need for further study.⁴⁷
- Studies have also associated reduced birth weight, withdrawal symptoms, delayed development, behavioural abnormalities and central nervous system dysfunction, smaller head size, facial defects and reduced muscle tone with prenatal exposure to solvents.⁴⁸

* “An alternative explanation to the gateway theory is that opportunities to use drugs and individual inclination to engage in risky behaviour determine risk of progression to hard drug use.” (Canadian Centre on Substance Abuse (2005). *Cannabis FAQs*. Ottawa: Canadian Centre on Substance Abuse).

- As with other substances of abuse, it is difficult to distinguish the effects of prenatal solvent exposure from factors such as nutrition, prenatal care, the use of other substances and other influences on health.

Can youth become dependent on volatile solvents?

- As the body becomes accustomed to repeated or prolonged volatile solvent use, youth may need to use more and more often to achieve the desired effects.
- Solvent abusers risk developing psychological dependence, which is a compulsive need or craving to continue use, and physical dependence when the body adapts to the presence of solvents.⁴⁹
- Withdrawal from VSA generally occurs within 24 hours after stopping use, but may take longer. More research is required in this area.⁵⁰
- Some of the more common symptoms of VSA withdrawal include
 - headaches
 - irritability
 - lethargy
 - nausea
 - psychomotor retardation
 - sleep disturbances
 - attention problems
- More significant withdrawal symptoms—usually among chronic solvent abusers—can include delirium tremens (confusion, hallucinations, and severe nervous system over-activity) and muscular cramps.⁵¹

How big is the demand for treatment and what kinds of treatment are offered?

- According to the 2005 *World Drug Report*,⁵² North America has the highest rate of inhalant treatment admissions (18%), followed by Eastern Europe (5%), Africa and South America (4%), Australia/New Zealand and Asia (2%) and Western Europe (1%).⁵³
- National VSA treatment data are not available in Canada, but select sources indicate that
 - 0.5% of males and 0.5% of females (youth and adults) in provincially funded addictions programs in Ontario in 1999-2000 listed glue and other inhalants as problem substances.⁵⁴
 - Among adolescents admitted to treatment centres in Calgary operated by the Alberta Alcohol and Drug Abuse Commission in 2002-2003, fewer than one percent presented for solvents.⁵⁵ This rate was higher in Edmonton treatment centres (1.7%).⁵⁶
 - More than 5% of youth clients seen by the Addictions Foundation of Manitoba in 2003-2004 reported using solvents at some time. This was an increase from previous years.⁵⁷
- Some clinicians and researchers think that residential treatment can help individuals who have special needs or require intensive programming.⁵⁸ Others believe that residential treatment programs for VSA rarely succeed because of the difficulty of treating solvent abusers.⁵⁹ More research is needed.⁶⁰
- Components of VSA treatment commonly include
 - detoxification⁶¹
 - assessing physical, cognitive and neurological impacts⁶²
 - building new strengths (for example, increasing cultural self-identity, developing social and emotional skills)⁶³
 - focusing on personal/family issues⁶⁴
 - assisting with community reintegration⁶⁵
 - personal motivation⁶⁶
 - providing proper training and education to front-line workers⁶⁷

- Eight residential solvent abuse treatment centres have been established for First Nations and Inuit youth in Canada with links through the national Youth Solvent Addiction Committee (YSAC).⁶⁸
- Every year, about 360 young people between 12 and 26 years of age (60% female, 40% male) receive treatment at these centres.⁶⁹
- A 2005 study carried out by YSAC and the Canadian Centre on Substance Abuse (CCSA) found that important aspects of residential treatment programs include location, attention to culture, and staff characteristics, including humility, humour and honesty.⁷⁰
- There is a history of outpatient treatment and culturally-based bush programs for solvent abusers in Canada.
- Among general substance abuse treatment facilities that include programs for solvent abusers are the Behavioural Health Foundation in Manitoba and the Last Door Recovery Centre in British Columbia.
- A harm reduction approach to VSA is difficult due to its serious health risks. Some suggest that harm-reduction strategies should be offered alongside abstinence-based ones.⁷¹
- A known attempt to reduce the risk of exposure to hepatitis C through the sharing of rags by solvent abusers has been the distribution of absorbent pads in areas where users are known to congregate.

What is being done to prevent VSA?

- VSA prevention efforts are comparable to those targeting youth alcohol and drug use in general. Specific efforts to prevent VSA have mainly focused on community interventions and education aimed at youth and retailers who sell products containing solvents. These include
 - Wide dissemination of information on VSA to healthcare workers, educators, media representatives, retailers, the community, parents, youth and children.⁷²
 - Peer programs and recreational activities for children and youth.⁷³
 - Modification or elimination of problematic volatile solvent products or warning labels and controlled sales.⁷⁴
 - Early intervention and education.⁷⁵
 - Raising awareness of VSA health hazards and related harm at an age-appropriate level.⁷⁶
 - Choosing safer household products, such as non-toxic cleaners.
 - Parents and caregivers of youth serving as healthy role models; having open communication with youth.⁷⁷
- A 2003 study of First Nations communities in Saskatchewan concluded that community outreach and prevention efforts reduced cases of youth solvent abuse and gave communities a sense of being able to deal with VSA.⁷⁸
- The national Youth Solvent Addiction Committee (YSAC) has developed a prevention manual and other materials designed for working with children and youth from kindergarten to secondary school.⁷⁹
- In 2002, the Manitoba Non-Potable Alcohol and Inhalant Abuse Committee launched a website at www.inhalants.ca to provide resources and target abuse of inhalants and non-beverage alcohol.
- Various prevention videos are available through Health Canada, First Nations and Inuit Health Branch.
- In 2005, CCSA and YSAC co-sponsored a poster contest for young Canadians who were invited to design a solvent abuse prevention poster. The winning poster identified a strong self-identity as a shield against VSA.

What is the current legislation governing VSA in Canada and elsewhere?

Canada

- Currently the possession and use of volatile solvents are not prohibited under Canadian federal law, and provincial and municipal laws are rare. Those that do exist include
 - The Alberta Public Health Act prohibits inhalant use and the provision by any means of products for the purpose of inhaling.⁸⁰
 - The Saskatchewan Safer Communities and Neighbourhoods Act has the power to shut down residential or commercial properties where volatile solvents are sold or consumed.⁸¹
 - The Manitoba Safer Communities and Neighbourhoods Act has powers similar to the Saskatchewan Safer Communities and Neighbourhoods Act.⁸²
 - The Manitoba Minors Intoxicating Substance Control Act forbids those under the age of 18 to consume intoxicants and makes it unlawful for anyone to provide a person under 18 with a substance if there is reason to believe the person will use that substance as an intoxicant.⁸³
- In January, 2005, federal, provincial and territorial Ministers of Justice approved a recommendation of the national working group on drug issues calling for the creation of a specific offence for trafficking inhalants.⁸⁴
- Less formal attempts have also been made to reduce VSA in Canada.
 - Some manufacturers and retailers voluntarily limit access to their products.⁸⁵
 - Bylaws on some First Nations reserves ban alcohol and illegal substances, including items that are known to be used for inhaling.
- In 1996, a Winnipeg judge ordered a young, pregnant Aboriginal woman to enter a mandatory treatment program for her solvent abuse. Careful consideration must be given to the gender-specific implications of VSA-related legislation, including the possibility that it may cause pregnant, substance-using women to avoid the health care system.

Examples of international action

- Approximately 40 U.S. states have outlawed the inhalation of toxic substances. Treatment options are available in some but not all of the states.⁸⁶
- Under the Intoxicating Substances Supply Act in England and Wales, it is illegal for retailers to provide a person under the age of 18 with a substance that the supplier suspects will be used as an intoxicant.⁸⁷
- Under Scottish Common Law, it is an offence to supply volatile solvents to another person if there is reason to believe the person will inhale them.⁸⁸
- In Australia, The Queensland Government Safe Places Legislation restricts the selling of volatile solvents in cases where the seller suspects the purchaser is going to misuse the substance.⁸⁹

Endnotes

-
- ¹ National Drug Abuse Information Centre. (1988). Deaths due to volatile solvent abuse. *Stat Update, Number 8*.
- ² **Beauvais, F.** (1997). Volatile substance abuse: Trends and patterns. *Substance Use and Misuse*. 32(12-13): 1829-1834.
- ³ **Anderson, C. & Loomis, G.** (2003). Recognition and prevention of inhalant abuse. *American Family Physician*. 68(5): 869-874; **Gaulier, J., Tonny, V., Faict, T., Sayer, H., Marquet, P. & Lachatre, G.** (2003). Analytical aspects of volatile substance abuse (VSA). *Journal of Forensic Sciences*. 48(4): 880-882; **McGarvey, E. & Clavet, G.** (1999). Adolescent inhalant abuse: Environments of use. *American Journal of Drug and Alcohol Abuse*. 25(4): 731-742.
- ⁴ **Carroll, A., Houghton, S. & Odgers, P.** (1998). Volatile solvent use among western Australian adolescents. *Adolescence*. 33(132): 877-889; **Sandover, R., Houghton, S. & O'Donoghue, T.** (1997). Harm minimization strategies utilized by incarcerated Aboriginal volatile substance users. *Addiction Research*. 5(2): 113-136.
- ⁵ **Beauvais, F.** (1997).
- ⁶ **Basu, D., Jhirwal, O., Singh, J., Kumar, S., & Mattoo, S.** (2004). Inhalant abuse by adolescents: A new challenge for Indian physicians. *Indian Journal of Medical Sciences*. 58(6): 245-249; **Wille, S. & Lambert, W.** (2004) Volatile substance abuse: Post mortem diagnosis. *Forensic Science International*. 142(2-3): 135-156; **Dewey, S.**(2002). Huffing: What parents should know about inhalant abuse. *Reclaiming Children and Youth*. 11(3): 150-151.
- ⁷ **Adlaf, E., Begin, P. & Sawka, E.** (2005). *Canadian Addiction Survey (CAS): A National Survey of Canadians' Use of Alcohol and Other Drugs. Prevalence of Use and Related Harms. Detailed Report*. Ottawa: Canadian Centre on Substance Abuse – unpublished data runs.
- ⁸ Canadian Centre on Substance Abuse & Centre for Addiction and Mental Health (1999). *Canadian Profile. Alcohol, Tobacco and Other Drugs*. Ottawa: Canadian Centre on Substance Abuse.
- ⁹ **Adlaf, E., Begin, P. & Sawka, E.** (2005).
- ¹⁰ The McCreary Centre Society (2004). *Healthy Youth Development. Highlights from the 2003 Adolescent Health Survey III*. Vancouver: The McCreary Centre Society; Alberta Alcohol and Drug Abuse Commission (2003). *The Alberta Youth Experience Survey 2002. The Use and Abuse of Illicit Drugs Among Alberta Youth*. Edmonton: AADAC; **Patton, D., MacKay, T. & Broszeit, B.** (2005). *Alcohol and Other Drug Use by Manitoba Students*. Winnipeg: AFM; **Adlaf, E. & Paglia, A.** (2003). *Drug Use Among Ontario Students 1977-2003. Detailed OSDUS Findings*. Toronto: Centre for Addiction and Mental Health; **Perron, B. & Loiselle, J.** (2003). *Enquete quebecoise sur le tabagisme chez lese eleves du secondaire (2002). Ou en sont les juenes face au tabac, a l'alcool, aux drogues et au jeu?* Montreal: Institute de la Statistique du Quebec; **Van Til, L. & Poulin, C.** (2002). *P.E.I. Student Drug Use Survey 2002. Highlights Report*. P.E.I.: Department of Health and Social Services; **Poulin, C.** (2002). *Nova Scotia Student Drug Use Survey 2002. Highlights Report*. Nova Scotia: Department of Health, Addictions Services; **Liu, J., Jones, B., Grobe, C., Balrom, C. & Poulin, C.** (2002). *New Brunswick Student Drug Use Survey 2002. Highlights Report*. New Brunswick: Department of Health and Wellness; **Barcelo, A., Jones, B. & Grobe, C.** (1998). *Provincial Student Drug Use Survey. Highlights 1998*. New Brunswick: New Brunswick Department of Health and Community Services; Yukon Women's Directorate (2001). *A Cappella North 2 Survey, 2001 Bulletin 5 – Alcohol and Drugs*. Whitehorse: Yukon Women's Directorate; **Poulin, C., Martin, D. & Murray, M.** (2005). *Newfoundland and Labrador Student Drug Use 2003. (Island Portion Only). Summary Report*. NS: Dalhousie University.
- ¹¹ The McCreary Centre Society (2004); Alberta Alcohol and Drug Abuse Commission (2003); **Patton, D., MacKay, T. & Broszeit, B.** (2005); **Adlaf, E. & Paglia, A.** (2003); **Perron, B. & Loiselle, J.** (2003); **Van Til, L. & Poulin, C.** (2002); **Poulin, C.** (2002); **Liu, J., Jones, B., Grobe, C., Balrom, C. & Poulin, C.** (2002); **Barcelo, A., Jones, B. & Grobe, C.** (1998); Yukon Women's Directorate (2001); **Poulin, C., Martin, D. & Murray, M.** (2005).
- ¹² **Goodman, D.** (2004). "Youthlink Inner City. Hepatitis C Support program". Final report. Toronto: 2004 Toronto CAS, in Research Group on Drug Use (2004). *Drug Use in Toronto*. Ontario: Toronto Public Health.
- ¹³ 2003 Pauingassi First Nation report on solvent abuse. (Manitoba Office of the Children's Advocate). Sourced in Winnipeg Free Press, Wednesday, August 24., 2005. "Manitoba's sniff crisis has given birth to a tragic trend... Babies that smell like gas". D. O'Brien. pp. A1-A2.

-
- ¹⁴ Kaweionnehta Human Resource Group (1993). *First Nations and Inuit Community Youth Solvent Abuse Survey and Study*. Ottawa: National Native Alcohol and Drug Abuse Program/Addictions and Community-Funded Programs.
- ¹⁵ NIDA Research Report Series– Inhalant Abuse. Available at: <http://www.nida.nih.gov/ResearchReports/Inhalants/Inhalants.html>. (Date last accessed Nov 1, 2005).
- ¹⁶ NIDA Research Report Series– Inhalant Abuse.
- ¹⁷ **Johnston, L., O'Malley, P., Bachman, J. & Schulenberg, J.** (2005). *Monitoring the Future. National Results on Adolescent Drug Use*. MD: National Institute on Drug Abuse.
- ¹⁸ CAESAR fax, September 12, 2005, Vol. 14, Issue 37 (Rev.). *More than One-Third of Persons Who Used OxyContin, LSD, and Inhalants in the Past Year Were First Time Users*.
- ¹⁹ NIDA Info Facts—High School and Youth trends.
- ²⁰ United Nations (2004). *World Youth Report 2003: The Global Situation of Young People*. United Nations: Department of Economic and Social Affairs; NIDA Research Monograph 148 (1995). Eds. **Kozel, N., Sloboda, Z. & De La Rosa, M.** *Epidemiology of Inhalant Abuse: An International Perspective*. MD: National Institute on Drug Abuse.
- ²¹ United Nations (2005). *2005 World Drug Report*. United Nations: Office on Drugs and Crime.
- ²² Re-Solv: The Society for the Prevention of Solvent and Volatile Substance Abuse. *Fact Sheet: An International Perspective*. Available at: <http://www.re-solv.org/>. (Date last accessed Oct 29, 2005).
- ²³ **Wille, S. & Lambert, W.** (2004); **Kurtzman, T., Otsuka, K. & Wahl, R.** (2001). Inhalant abuse by adolescents. *Journal of Adolescent Health*. 28(3): 170-180; **Dinwiddie, S.** (1994). Abuse of inhalants: A review. *Addiction*. 89(8): 925-939.
- ²⁴ **Bellhouse, R., Johnston, G. & Fuller, A.** (2000) *A Report on Volatile Solvent Use in Victoria*. Queensland: Crime and Misconduct Division.
- ²⁵ **Coleman, H., Charles, G. & Collins, J.** (2001). Inhalant use by Canadian Aboriginal youth. *Journal of Child and Adolescent Substance Abuse*. 10(3): 1-20; **Fendrich, M., Mackesy- Amity, M., Wilsar, J. & Goldstein, P.** (1997). Childhood abuse and the use of inhalants: Differences by degree of use. *American Journal of Public Health*. 87(5): 765-769; **Sakai, J., Hall, A., Mikulich-Gilbertson, S. & Crowley, T.** (2004). Inhalant use, abuse, and dependence among adolescents in the United States. *Journal of the American Academy of Child and Adolescent Psychiatry*. 43(9): 1080-1088; **Ho, W., To, E, Chan, E. & King W.** (1998) Burn injuries during paint thinner sniffing. *Burns*. 24(8): 757-759; **Mosher, C., Rotolo, T., Phillips, D., Krupski, A. & Stark, K.** (2004) Minority adolescents and substance use risk/protective factors: A focus on inhalant use. *Adolescence*. 39:489-502; **Howard, M., Walker, R., Walker, P., Cottler, L. & Compton, W.** (1999). Inhalant use among urban American Indian youth. *Addiction*. 94(1): 83-95; **Simpson, D.** (1997). A longitudinal study of inhalant use: Implications for treatment and prevention. *Substance Use and Misuse*. 32(12-13): 1889-1894.
- ²⁶ **Corbett, J., Akhtar, P., Currie, D. & Currie, C.** (2005); **Patton, D., MacKay, T. & Broszeit, B.** (2005); **Hibell, B., Andersson, B., Thoruddur, B. Salme, A., Balakireva, O., Kokkevi, A., & Morgan, M.** (2004); **Mosher, C., Rotolo, T., Phillips, D., Krupski, A. & Stark, K.** (2004); **White, V. & Hayman, J.** (2004); **Adlaf, E. & Paglia, A.** (2003); **Dell, C. & Garabedian, K.** (2003). *CCENDU 2002 National Report. Drug Trends and the CCENDU Network*. Ottawa: Canadian Centre on Substance Abuse; *Australian Secondary Students' Use of Over-the-counter and Illicit Substance in 2002*. Monograph Series no. 56. Australia: Australian Government Department of Health and Ageing; **Van Til, L. & Poulin, C.** (2002); National Institutes on Health (200?). *National Institute on Drug Abuse Research Report Series. Inhalant Abuse*. U.S. Department of Health and Human Services; NIDA Research Report Series– Inhalant Abuse; **Howard, M., Walker, R., Walker, P., Cottler, L. & Compton, W.** (1999).
- ²⁷ **Beauvais, F. Wayman, J., Jumper-Thurman, P., Plested, B. & Helm, H.** (2002). Inhalant abuse among American Indian, Mexican American, and non-Latino white adolescents. *The American Journal of Drug and Alcohol Abuse*. 28(1): 171-187; **Kikuchi, A. & Wada, K.** (2003). Factors associated with volatile solvent use among junior high school students in Kanto Japan. *Addiction*. 98(6): 771-784.
- ²⁸ **Dyer, A.** (2004). *Patterns of Exposure to Risk and Protection for Substance and Gambling Use and Abuse. The Alberta Youth Experiences Survey, 2002*. Alberta: Alberta Alcohol and Drug Abuse Commission.
- ²⁹ **Basu, D., Jhirwal, O., Singh, J., Kumar, S., & Mattoo, S.** (2004); **Mosher, C., Rotolo, T., Phillips, D., Krupski, A. & Stark, K.** (2004); **Bennett, M., Walters, S., Miller, J. & Woodall, W.** (2000). Relationship of early inhalant use to

-
- substance use in college students. *Journal of Substance Abuse*. 12(3): 227-240; **Ballard, M.** (1998). Inhalant abuse: A call for attention. *Journal of Addictions and Offender Counselling*. 19(1): 28-32; **Carroll, A., Houghton, S. & Odgers, P.** (1998).
- ³⁰ **Mosher, C., Rotolo, T., Phillips, D., Krupski, A. & Stark, K.** (2004); **Wu, L., Pilowsky, D., & Schlenger, W.** (2004); **Brouette, T. & Anton, R.** (2001). Clinical review of inhalants. *American Journal on Addictions*. 10(1): 79-94; **Coleman, H., Charles, G. & Collins, J.** (2001); **Kurtzman, T., Otsuka, K. & Wahl, R.** (2001); **Howard, M., Walker, R., Walker, P., Cottler, L. & Compton, W.** (1999) **Ballard, M.** (1998); **Marelich, G.** (1997). Volatile substance abuse. *Clinical Reviews in Allergy and Immunology*. 15(3): 271-289.
- ³¹ **Mosher, C., Rotolo, T., Phillips, D., Krupski, A. & Stark, K.** (2004); **White, V. & Hayman, J.** (2004); **Wu, L., Pilowsky, D., & Schlenger, W.** (2004); **Cairney, S., Maruff, P., Burns, C., & Currie, B.** (2002). The neurobehavioral consequences of petrol (gasoline) sniffing. *Neuroscience and Bio-behavioral Reviews*. 26(1): 81-89; **Carroll, A., Houghton, S. & Odgers, P.** (1998). Volatile solvent use among western Australian adolescents. *Adolescence*. 33(132): 877-889.
- ³² Canadian Health Network. *What is sniffing/inhalant abuse and how does it affect your health?* Available at: <http://www.canadian-health-network.ca/servlet/ContentServer?cid=1009539&pagename=CHN-RCS%2FCHNResource%2FFAQCHNResourceTemplate&c=CHNResource&lang=En>. (Date last accessed Oct 29, 2005); Inhalant Abuse Prevention. Available at: <http://www.soe.vcu.edu/csc/inhalantabuseprevention.htm>. (Date last accessed Oct 29, 2005); **Dell, D.** (March, 2005). *Inhalant Abuse Prevention: Building Community Capacity to Deal with this Deadly Epidemic*. Youth Solvent Addiction Committee (YSAC) International Inhalant Forum: Partnering for Progress; **Beauvais, F. Wayman, J., Jumper-Thurman, P., Plested, B. & Helm, H.** (2002).
- ³³ **Wille, S. & Lambert, W.** (2004); **Ballard, M.** (1998).
- ³⁴ **Carroll, A., Houghton, S. & Odgers, P.** (1998); **Garriot, J.** (1997). Death among inhalant abusers. *Substance Use and Misuse*. 32(12-13): 1871-1876.
- ³⁵ **Kurtzman, T., Otsuka, K., & Wahl, R.** (2001).
- ³⁶ Canadian Health Network. (Date last accessed Oct 29, 2005); **Clark, S.** (1994) *Chronic Solvent/Inhalant Abuse: Medical Considerations in Recovery*. Alberta: Alberta Alcohol and Drug Abuse Commission.
- ³⁷ **Albright, J., Lebovitz, B., Lipson, R. & Luft, J.** (1999); **Janezic, T.** (1997). Burns following petrol sniffing. *Burns*. 23(1): 78-80; **Ho, W., To, E., Chan, E., & King, W.** (1998). Burn injuries during paint thinner sniffing. *Burns*. 24(8): 757-759.
- ³⁸ **Cairney, S., Maruff, P., Burns, C. & Currie, B.** (2002); **Kurtzman, T., Otsuka, K. & Wahl, R.** (2001).
- ³⁹ **Basu, D., Jhirwal, O., Singh, J., Kumar, S., & Mattoo, S.** (2004); **Dewey, S.** (2002). Huffing: What parents should know about inhalant abuse. *Reclaiming Children and Youth*. 11(3): 150-151; The Alberta Alcohol and Drug Abuse Commission (AADAC). *Solvents/inhalants: Beyond the ABC's*. Available at: http://corp.aadac.com/other_drugs/the_basics_about_other_drugs/solvents_and_inhalants_beyond_abcs.asp (Date last accessed Oct 29, 2005).
- ⁴⁰ The Alberta Alcohol and Drug Abuse Commission (AADAC). *Solvents/inhalants: Beyond the ABC's*. Available at: http://corp.aadac.com/other_drugs/the_basics_about_other_drugs/solvents_and_inhalants_beyond_abcs.asp (Date last accessed Oct 29, 2005); Re-Solv. (Date last accessed Oct 29, 2005); Youth Solvent Addiction Committee (2004). *Positive Messages Build Positive Minds: Inhalant Abuse Prevention Curriculum Manual. Second Edition*. Canada: Youth Solvent Addiction Committee.
- ⁴¹ **Sakai, J., Hall, A., Mikulich-Gilbertson, S. & Crowley, T.** (2004); **Coleman, H., Charles, G., & Collins, J.** (2001); **Marelich, G.** (1997).
- ⁴² **Brouette, T. & Anton, R.** (2001); **Maxwell, J.** (2001). Deaths related to the inhalation of volatile substances in Texas: 1988-1998. *American Journal of Drug and Alcohol Abuse*. 27(4): 689-697; **Bennett, M., Walters, S., Miller, J. & Woodall, W.** (2000).
- ⁴³ **Mosher, C., Rotolo, T., Phillips, D., Krupski, A. & Stark, K.** (2004); **Wu, L., Pilowsky, D., & Schlenger, W.** (2004); **Bennett, M., Walters, S., Miller, J., & Woodall, W.** (2000).
- ⁴⁴ **Anderson, C. & Loomis, G.** (2003); **Dodd, J.** (2001). Petrol sniffing in a pregnant Aboriginal population: A review of maternal and neonatal outcomes. *The Australian and New Zealand Journal of Obstetrics and Gynaecology*. 41(4): 420-423.
- ⁴⁵ **Brouette, T. & Anton, R.** (2001). Clinical review of inhalants. *American Journal on Addictions*. 10(1): 79-94; **Dodd, J.** (2001).
- ⁴⁶ **Stevens, K.** (2005). *Winnipeg 2004 CCENDU Report*. Manitoba: Addictions Foundation of Manitoba.

-
- ⁴⁷ Tenenbein, M. (November 2005). *Fetal and Neonatal Effects of Inhalant Abuse*. National Institute on Drug Abuse/Fogarty International Center, Inhalant Abuse Among Children and Adolescents: Consultation on Building an International Research Agenda.
- ⁴⁸ **Anderson, C. & Loomis, G.** (2003); **Brouette, T. & Anton, R.** (2001); **Dodd, J.** (2001).
- ⁴⁹ MyDr.com: For a Healthy Australia. *Inhalants: Tolerance, dependence and treatment*. Available at: <http://www.mydr.com.au/default.asp?article=2998>. (Date last accessed Oct 29, 2005); **Patton, D., MacKay, T. & Broszeit, B.** (2005).
- ⁵⁰ (November 2005). *Fetal and Neonatal Effects of Inhalant Abuse*. National Institute on Drug Abuse/Fogarty International Center, Inhalant Abuse Among Children and Adolescents: Consultation on Building an International Research Agenda.
- ⁵¹ **Basu, D., Jhirwal, O., Singh, J., Kumar, S., & Mattoo, S.** (2004); **Keriotis, A., & Upadhyaya, H.** (2000). Inhalant dependence and withdrawal symptoms. *Journal of The American Academy of Child and Adolescent Psychiatry*. 39(6): 679-680.
- ⁵² United Nations (2005). *2005 World Drug Report*. United Nations: Office on Drugs and Crime.
- ⁵³ CESAR fax, Aug 1, 2005. Vol. 14, Issue 31 (Rev.). *UN Report Illustrates Global Differences in Drug Abuse*. University of Maryland.
- ⁵⁴ **Rush, B.** (2002). *Client Characteristics & Patterns of Service Utilization within Ontario's Specialized Addiction Treatment Agencies: A Provincial Report from DATIS*. Ontario: Centre for Addiction and Mental Health.
- ⁵⁵ **James, D.** (2003). *Canadian Community Epidemiology Network on Drug Use: Calgary Summary*. Alberta: Alberta Alcohol and Drug Abuse Commission.
- ⁵⁶ **Wild, C., Curtis, M. & Pazderka-Robinson, H.** (2003). *Drug Use in Edmonton: 2001-2002. A CCENDU Report*. Alberta: University of Alberta, Addiction and Mental Health Research Laboratory.
- ⁵⁷ **Stevens, K.** (2005).
- ⁵⁸ **Jumper-Thurman, P. & Beauvais, F.** (1997). Treatment of volatile solvent abusers. *Substance Use and Misuse*. 32 (12/13): 1883-1888; **Dell, C., Dell, D. & Hopkins, C.** (2005). *Resiliency and holistic inhalant abuse treatment*. The Journal of Aboriginal Health. 2(1): 3-12.
- ⁵⁹ Substance Abuse and Mental Health Services Administration (SAMHSA) (2003). *Substance Abuse Treatment Advisory. Breaking News for the Treatment Field*. U.S.: Centre for Substance Abuse Treatment. 3(1); **Dinwiddie, S.** (1994). Abuse of inhalants: A review. *Addiction*. 89:925-939; **Beauvais, F.** (1990). *Inhalant abuse among Sioux Indians*. Be Medicine Department of Anthropology. Unpublished Manuscript.
- ⁶⁰ **Dell, C., Ogorbne, A., Begin, P., Roberta, G., Ayotte, D. & Dell, D.** (2003). *Youth Residential Solvent Treatment Program Design: An Examination of the Role of Program Length and Length of Client Stay*. Ottawa: Canadian Centre on Substance Abuse.
- ⁶¹ **Basu, D., Jhirwal, O., Singh, J., Kumar, S. & Mattoo, S.** (2004); Anonymous (2003). Inhalant abuse treatment and prevention. *Public Health Reports*. 118: 276.
- ⁶² **Basu, D., Jhirwal, O.P., Singh, J., Kumar, S. & Mattoo, S.** (2004); **Dell, D.** (March, 2005).
- ⁶³ Re-Solv. (Date last accessed Oct 29, 2005); **Basu, D., Jhirwal, O., Singh, J., Kumar, S. & Mattoo, S.** (2004); **Brouette, T. & Anton, R.** (2001).
- ⁶⁴ Re-Solv. (Date last accessed Oct 29, 2005); **Basu, D., Jhirwal, O., Singh, J., Kumar, S. & Mattoo, S.** (2004).
- ⁶⁵ **Basu, D., Jhirwal, O., Singh, J., Kumar, S. & Mattoo, S.** (2004); **MacLean, S. & D'Abbs, P.** (2002). Petrol sniffing in Aboriginal communities: A review of interventions. *Drug and Alcohol Review*. 21(1): 65-72.
- ⁶⁶ **Coleman, H., Charles, G. & Collins, J.** (2001); **Dell, C. Dell, D. & Hopkins, C.** (2005).
- ⁶⁷ **Basu, D., Jhirwal, O., Singh, J., Kumar, S. & Mattoo, S.** (2004); **Beauvais, F. Wayman, J., Jumper-Thurman, P., Plested, B. & Helm, H.** (2002).
- ⁶⁸ Youth Solvent Addiction Committee. Available at: <http://www.members.shaw.ca/ysac/> (Date last accessed Oct 29, 2005).
- ⁶⁹ Youth Solvent Addiction Committee. (Date last accessed Oct 29, 2005).
- ⁷⁰ **Dell, C. & Graves, G.** (2005). *Designing a Tool to Measure the Impact of Client Length of Stay on Treatment Outcome: Overview*. Ottawa: Canadian Centre on Substance Abuse. Summary available at: <http://www.ccsa.ca/NR/rdonlyres/7B49ADE0-C77F-4B2C-AA08-E6F053C2095A/0/ccsa0111382005.pdf>.

-
- ⁷¹ MacLean, S. (2005). It might be a scummy-arsed drug but it's a sick buzz: chroming and pleasure. *Contemporary Drug Problems*. 32: 295-318.
- ⁷² Canadian Paediatrics Society. *Inhalant Abuse*. Available at: <http://www.cps.ca/english/statements/II/ii97-01.htm> (Date last accessed Nov 1, 2005); Anderson, C. & Loomis, G. (2003); Marelich, G. (1997).
- ⁷³ Dell, D. (March, 2005); Kikuchi, A. & Wada, K. (2003).
- ⁷⁴ World Health Organization (1999). *Volatile Solvents Abuse. A Global Overview*. World Health Organization.
- ⁷⁵ Dell, D. (March, 2005); Beauvais, F. Wayman, J., Jumper-Thurman, P., Plested, B. & Helm. H. (2002); Ballard, M. (1998).
- ⁷⁶ Dell, D. (March, 2005); Beauvais, F. Wayman, J., Jumper-Thurman, P., Plested, B. & Helm. H. (2002); MacLean, S. & D'Abbs, P. (2002).
- ⁷⁷ Dell, C. & Huff, S. (November 2005). *Parents Be Aware: Sniffing Kills*. Ottawa: Canadian Health Network. Available at: <http://www.canadian-health-network.ca/servlet/ContentServer?cid=1130518313213&pagename=CHN-RCS/CHNResource/CHNResourcePageTemplate&c=CHNResource>. (Date last accessed January 9, 2006).
- ⁷⁸ McMahon, R. (2003). *Community Outreach Review*. Saskatchewan: White Buffalo Treatment Centre.
- ⁷⁹ Youth Solvent Addiction Committee (2004).
- ⁸⁰ Alberta Alcohol and Drug Abuse Commission (AADAC). *Solvents/Inhalants: Beyond the ABC's*. Available at: http://corp.aadac.com/other_drugs/the_basics_about_other_drugs/solvents_and_inhalants_beyond_abcs.asp#WhoUsesSolventsInhalants. (Date last accessed Oct 29, 2005); Alberta Government: http://www.qp.gov.ab.ca/documents/Acts/P37.cfm?fm_isbn+0779726952. (Date last accessed Nov 3, 2005).
- ⁸¹ Saskatchewan Justice. *Safer Communities and Neighbourhoods Act*. Available at: <http://www.saskjustice.gov.sk.ca/safercommunities/default.shtml>; <http://www.canlii.org/sk/laws/sta/s-0.1/20050913/whole.html>. (Date last accessed Oct 29, 2005).
- ⁸² Canadian Legal Information Institute. *Safer Communities and Neighbourhoods Act*. Available at: <http://www.canlii.org/mb/laws/sta/s-5/20050510/whole.html>. (Date last accessed Oct 29, 2005).
- ⁸³ Canadian Legal Information Institute. *Minors Intoxicating Substances Control Act*. Available at: <http://www.canlii.org/mb/laws/sta/m-197/20050510/whole.html>. (Date last accessed Oct 29, 2005).
- ⁸⁴ Canadian Intergovernmental Conference Secretariat (CISC). *News Release: Federal-provincial-territorial Meeting of Ministers Responsible for Justice Address Key Justice System Issues*. Available at: http://www.scics.gc.ca/cinfo05/830838004_e.htm. (Date last accessed Oct 29, 2005).
- ⁸⁵ Addiction Research Foundation (1991). *Facts About Inhalants*. Ontario: Addiction Research Foundation. (Currently, Centre for Addiction and Mental Health).
- ⁸⁶ Billings Gazette. *153 New Wyoming Laws Take Effect Today*. Available at: <http://www.billingsgazette.com/index.php?display=rednews/2005/07/01/build/wyoming/30-new-laws.inc>. (Date last accessed Oct 29, 2005).
- ⁸⁷ KFx. *Volatile Substances*. Available at: <http://www.ixion.demon.co.uk/volatile%20substances.htm>. (Date last accessed Oct 29, 2005).
- ⁸⁸ KFx. (Date last accessed Oct 29, 2005).
- ⁸⁹ Polson, M. (March, 2005). *Volatile Substance Misuse in Mount Isa: Community Solutions to a Community Identified Issue*. Youth Solvent Addiction Committee (YSAC) International Inhalant Forum: Partnering for Progress.

The Canadian Centre on Substance Abuse (CCSA), Canada's national addictions agency, was established in 1988 by an Act of Parliament. CCSA provides a national focus for efforts to reduce health, social and economic harm associated with substance abuse and addictions.

For further information, please write:

Canadian Centre on Substance Abuse
Suite 300, 75 Albert St., Ottawa, ON K1P 5E7
Tel.: (613) 235-4048; fax (613) 235-8101. Visit our website at www.ccsa.ca



ISBN 1-896323-84-7

Copyright © 2006—Canadian Centre on Substance Abuse. All rights reserved

Prepared by the Canadian Centre on Substance Abuse