The Epidemiology of Drug Abuse

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Abstract

Many Americans use alcohol and recreational drugs. Some will develop substance use disorders that affect a person’s brain and behavior, leading to continued use despite problems caused. We review the epidemiology of addiction in the United States, including changes in use patterns over time, highlighting rates in adolescents and young adults, as well as adults. An overview of the health and societal impacts of substance use is provided alongside the importance of multimodal, evidence-based treatment comprising psychosocial interventions and medication management. The article concludes by exploring the impact of the coronavirus disease 2019 pandemic on people who use drugs and their access to treatment.

Keywords

adolescent health, cannabis, drug abuse, epidemiology, illicit drugs, nicotine, opioids, substance use

Drug use disorders carry a lifetime prevalence of about 10% in the general American population, representing more than 23 million adults who are struggling with problematic drug use. Nearly one-third of Americans adults will meet criteria for alcohol use disorder at some time in their lives, and there are high rates of other co-occurring substance use disorders.1 Despite the well-known deleterious consequences of addiction on physical health, psychology, and quality of life, only a small fraction of people with alcohol or drug use disorders receive any treatment.

In 2017, the US Department of Health and Human Services declared the US opioid epidemic a public health emergency following an increase in opioid overdoses that accounted for more than 42 000 deaths in 2016—a record high—and announced a 5-point strategy to combat the opioid crisis.2 Overdose deaths and health consequences of substance use, particularly use of opioids, continued to rise dramatically as synthetic opioids flooded the illicit drug market, and the stark realities of the risks of untreated substance use were further highlighted by the coronavirus disease 2019 (COVID-19) pandemic, which brought challenges that impacted the health care system and exposed vulnerabilities for those who use these substances.3

Data on alcohol and drug use in the United States come from 3 major sources: the National Survey of Drug Use and Health,1 the National Epidemiologic Survey on Alcohol and Related Conditions,4 and the Monitoring the Future Study.5 Since 1971, the Substance Abuse and Mental Health Services Administration has prepared an annual report that summarizes key findings of the National Survey of Drug Use and Health, providing up-to-date information on “national indicators of substance use and mental health among the civilian, noninstitutionalized population aged 12 or older in the United States.”1 The National Survey of Drug Use and Health provides national and state-level data on the use of tobacco, alcohol, illicit drugs (including nonmedical use of prescription drugs), and mental health in the United States. The primary objectives of the survey, which included ≈70 000 randomly selected Americans in 2019, are to track trends of use, assess the consequences of substance use and addiction, and identify the groups at highest risk for negative consequences of substance use to provide accurate data on the longitudinal patterns of substance use.

The National Epidemiologic Survey on Alcohol and Related Conditions is a nationally representative survey of 46 500 adult Americans, that focuses on data collection regarding alcohol use disorders and their associated disabilities to understand the prevalence, risk factors, health disparities, economic costs, and gene-environment interactions related to alcohol use disorders and their associated disabilities. Finally, the Monitoring the Future Study is a National Institute of
Drug Abuse–funded survey conducted by the University of Michigan of a nationally representative sample of 40,000 to 50,000 eighth-, 10th-, and 12th-grade in-school students in >400 schools nationwide that has measured drug and alcohol use and related attitudes among adolescent students since 1975.  

Historically, the National Survey of Drug Use and Health rates of youth substance use have been lower than those of the Monitoring the Future Study, largely because prevalence rates are reported for the entire 12- to 17-year age group rather than by grade, as in the Monitoring the Future Study. Although over short time periods the Monitoring the Future Study and National Survey of Drug Use and Health have occasionally reported different trends in youth substance use, they have shown very similar long-term trends. Almost all substances, types of use, and frequency of use increase from age 12 onward and peak in young adulthood before gradually decreasing throughout the life span. Periods of significant initiation coincide with early adolescence and transition from late adolescence to early adulthood. 

Nicotine, alcohol, and cannabis are the most widely used substances in America in youth and adult populations, and the majority of the American population uses substances. In the past month, 60.1% of Americans aged ≥12 used a substance, 50.8% drank alcohol, 21.1% used tobacco, and 13% used an illicit substance. We provide a brief overview of substance use trends below and discuss the impact of substance use socially and on the health care system, and explore the effects that the pandemic has had on access to substance use treatment.

Nicotine
Smoking in adolescents has declined through 2019 following a peak in the mid-1990s. The percentage of students reporting any cigarette smoking in the prior 20 days has fallen 84% to 89%, and there have been substantial reductions in the initiation of cigarette use and increases in the perceived risks of smoking. Offsetting these positive nicotine reduction trends was the dramatic increase in vaping by adolescents. Nicotine vaping doubled, and cannabis vaping rose 2- to 3-fold between 2015 and 2017. Vaping represented one of the most common forms of adolescent substance use in 2019.  

Though older demographics have also had increases in the use of noncombustible tobacco via vaping devices, adults were more likely to solely use combustible tobacco compared to younger ages: 68.5% of adult smokers aged ≥26 used cigarettes exclusively. Adults aged 18 to 25 and ≥26 have also had overall reduced percentages of cigarette use, now 17.5% and 18.3% in 2019 compared to 40.8% and 25.2% in 2002.  

Alcohol
Paralleling reductions in adolescent smoking, the Monitoring the Future Study survey found that alcohol use by teens has dropped dramatically over roughly the past 3 decades. The prevalence of binge drinking dropped by almost one-third at the lowest point in 1992. Nine percent of youth aged 12 to 17 used alcohol, increasing to 55.1% of young adults by age 18 to 25.  

The National Survey of Drug Use and Health identified an alcohol use disorder prevalence of 1.7% among 12- to 17-year-olds, increasing to 9.3% by age 18 to 25, and the National Epidemiologic Survey on Alcohol and Related Conditions found an overall lifetime prevalence of alcohol use disorder in 8% of adolescents.  

This trend was echoed with large increases in alcohol use disorder rates in the past decade, with 13.9% of adults meeting alcohol use disorder criteria for the past year and 29% with a lifetime alcohol use disorder diagnosis. 

Cannabis and Other Illicit Drugs
For the purposes of this article, cannabis will be referred to as an illicit substance throughout the article. This reflects the illegal nature of the use of and possession of cannabis under federal law for any purpose, by way of the Controlled Substances Act of 1970, despite the current availability of medical cannabis and recreational cannabis in several US states. 

According the National Survey of Drug Use and Health, in 2019, 57.2 million people aged ≥12 used illicit drugs in the past year. This represents an increase in percentage of people using illicit drugs, increasing from 17.8% in 2015 to 20.8% in 2019. The most commonly used illicit drug in the past year was marijuana, which was used by 48.2 million people, and increasing rates of cannabis use in adults aged ≥26 appears to be a driver for the noted trend of overall increase in illicit drug use. Adolescents aged 12 to 17 had similar estimates of illicit substance use in 2019 compared to 2015 and 2018, with 17.2% of this age demographic using illicit drugs in the past year. 

According to the National Survey of Drug Use and Health, 1 in 8 adolescents were past-year cannabis users in 2018. The Monitoring the Future Study shows increasing daily marijuana prevalence for all 3 grades, reaching 1.3%, 4.8%, and 6.4%, respectively, which is the highest daily marijuana level since 1991, with substantial increases in marijuana vaping; 17.5% of people aged ≥12 were past-year cannabis users, an increase from 11% in 2002. The legalization of marijuana, first in Colorado and Washington, and now in 11 states, 2 territories, and the District of Columbia, coincided with an average daily initiation of cannabis use in 3300 adolescents aged 12 to 17 between 2002 and 2016.  

Adults aged 18 to 25 and ≥26 had increases in cannabis use to 35.4% and 15.2% in 2019, compared
to 28.8% and 7% in 2002. Generally, rates of cannabis use disorder were increased overall, with the highest estimate in the 18- to 25-year-old group at 5.8%.

Prescription pain relievers were the second most common type of illicit drug use in the past year, misused by 9.7 million people. Rates of prescription opioid use in adolescents were recorded at the lowest level that they have been since the initiation of the Monitoring the Future Study survey in 1975, and adolescent heroin use similarly was at a 5-year low in 2019.5

Adult diagnoses of opioid use disorders decreased 0.3% from 2018 to 2019,1 following an almost doubled prevalence of heroin use and heroin use disorder between 2002 and 2018.5 Prescription opioid volume peaked in 2011, and prescriptions have declined 60% since this time, after a sharp increase in the mid to late 1990s. Nonmedical opioid use also started to increase rapidly after 2002, as have rates of emergency room visits for nonmedical opioid use, neonatal abstinence syndrome, and all opioid use disorder treatment admissions.8 In 2019, 5.7 million Americans were estimated to use heroin at some point in their lives, 3.8 million people reported misuse of a prescription opioid, and 1.6 million Americans met criteria for opioid use disorder.1 Roughly 10% to 20% of adults prescribed opioids for noncancer pain developed an opioid use disorder compared to half of heroin-using adults developing opioid use disorder. Most prescription opioids were obtained from friends or relatives, and two-thirds of illicit opioid users initiated use of prescription opioids first.

More than 70% of global drug related deaths are attributable to opioids, and 30% of deaths are caused by overdose. Between 2010 and 2018, the number of opioid overdose deaths increased in the US by 120% and 2/3 of opioid related overdose deaths in 2018 involved synthetic opioids, such as fentanyl. Although overall drug overdose deaths decreased 4% between 2017 and 2018, with reductions in prescription opioid and heroin related deaths by 13.5% and 4%,9 respectively, synthetic opioid deaths (except methadone) rose another 10%.10

The National Comorbidity Survey–Adolescent Supplement found an overall lifetime substance use disorder prevalence of 11.7% of adolescents. Between 2014 and 2019, drug use other than marijuana decreased significantly for 10th and 12th graders. In 2019, 12% to 19% of high school students had used illicit drugs in their lifetime. According to the National Survey of Drug Use and Health, 12.5% of adolescents were using cannabis, 2.7% using inhalants, 1.5% to 2.8% using prescription-type drugs nonmedically (including prescription opioids and psychostimulants), 1.5% using hallucinogens, 0.4% using cocaine, and 0.1% using heroin, and many using multiple substances.1 Notably, polysubstance use may affect a majority of the substance using population. Seventy-one percent of people aged ≥12 with a past-year substance use disorder also had a past-year alcohol use disorder, and 40.7% had another illicit drug use disorder. Cannabis use disorder represents roughly half of the past-year illicit drug use disorder in adults with concurrent alcohol use disorder.1

Impact on Society

The consequences of substance use are multifold, complex, and so comprehensive that the impacts can be difficult to stratify. Substance use can affect physical health, emotional well-being, familial and other relationships, education and career attainment, financial and criminal involvement, and spiritual health. It is impossible to untangle the effects of systemic racism in the health care system and health status of minoritized communities, and individuals with substance use disorders and mental health diagnoses are particularly stigmatized. Further complicating the matter is the bidirectional nature of the impact of substance use: socioeconomic inequalities may exacerbate the consequences of substance use, and drug and alcohol use and the psychosocial and environment consequences may increase vulnerability to inequalities in social determinants of health.

Significant community effects of substance use include poverty, violence, and income inequality. Individuals from these disadvantaged communities may have lower levels of educational attainment, lower levels of stable employment, and higher exposure to adverse life events and stressors including childhood maltreatment and interpersonal violence, further perpetuating the cycles of marginalization and increasing risk factors associated with development of substance use disorders.11 Although women and some minoritized communities (Indigenous, Black, LGBTQ, etc) may have lower prevalence of substance use disorders, they are particularly vulnerable to the societal and psychological consequences of alcohol and drug use,11 with almost 90% of women experiencing concurrent mental health diagnoses and almost 70% experiencing interpersonal violence in their most recent intimate relationship in the past year.12 Up to 55% of incarcerated individuals have reported that they were under the influence at the time of their offense, and almost 20% of federal inmates report that the offense they committed occurred in an effort to secure money for substances.13

Illicit drug use has well-known deleterious effects, but tobacco and alcohol have the highest impacts on human health globally. One in 5 deaths globally is attributable to substance use.14 Smoking is the largest overall contributor to premature death and is a key factor for respiratory and cerebrovascular disease,
leading causes of morbidity and mortality in the United States.\textsuperscript{15} Alcohol contributes to 5\% of disability-adjusted life years. Compare this to the impact of illicit drugs on global disease burden: All combined, illicit drugs add 1.4\% disability-adjusted life years.\textsuperscript{16}

Further stratifying disability-adjusted life years attributable to alcohol consumption worldwide, 40\% of impact is due to injuries, and about 50\% is due to noncommunicable and mental health conditions.\textsuperscript{17} One in 4 adults with serious mental illness (bipolar affective disorder or psychotic spectrum illness) also have a co-occurring substance use disorder; and 40\% of drug and alcohol users will be diagnosed with mental illness with high rates of depression and anxiety, which may be treatment resistant.\textsuperscript{18} Alcohol and illicit drug use are well known to increase rates of premature death from diseases and injury including suicide, transmissible infectious diseases, and liver disease. Injection drug use is the second-leading cause of transmission of HIV (following unprotected sex) and is correlated with 30\% of AIDS cases.\textsuperscript{19} Nearly 75\% of new hepatitis C infections occur through injection drug use and sharing of needles and other equipment needed for injection.\textsuperscript{19} Both drugs of abuse and infections such as HIV and hepatitis C virus affect almost every organ system in the body; a comprehensive review of the medical and mental health consequences of substance review is beyond the scope of this article.

Health impacts may be direct or indirect. As many as 10\% of drivers report engaging in impaired driving each year.\textsuperscript{18} Cannabis use is associated with a 9.5-times increased risk of driving accidents, and use of amphetamines or multiple substances can increase the risk 5- to 30-fold. Alcohol in combination with other substances carries a risk of getting seriously injured or killed that is 20 to 200 times greater than average.\textsuperscript{13} Other risky behaviors associated with impaired judgment can include sharing of drug paraphernalia, impulsive and erratic use patterns, and unprotected sex. Substance use during pregnancy can result in health effects to the baby, such as fetal alcohol spectrum disorder and neonatal abstinence syndrome, which has increased in proportion to the opioid epidemic.\textsuperscript{20}

Accounting for the global cost of substance use worldwide is challenging, with estimates varying based on access to treatment and geographic differences. In the United States, the economic cost of drug abuse is estimated to be $193 billion dollars annually, which includes health care costs, loss of productivity, and criminal justice costs.\textsuperscript{21} Another $223 billion is devoted annually to excessive alcohol use,\textsuperscript{22} and smoking-related illness accounts for almost $300 billion dollars per year.\textsuperscript{23} Of the 4.6 billion drug-related emergency department visits in 2009, 50\% are attributed to adverse reactions from pharmaceuticals taken, half of which are related to drug use, and have increased over time.\textsuperscript{24}

Access to Treatment

Despite high rates of expenditure on consequences of substance use treatment, only a small minority of people who use drugs access addiction treatment. Current estimates show that about 10\% of Americans whose drug or alcohol use reaches the level of a diagnosable substance use disorder receive any type of specialty treatment.\textsuperscript{18} White men have the highest likelihood of receiving evidence-based treatment for any substance use disorder.\textsuperscript{25} In comparison, many vulnerable populations are less likely to be screened or treated for substance use disorder. Women with opioid use disorder are less likely to access treatment, to be prescribed buprenorphine, methadone, or naltrexone, and are 3 times less likely to receive naloxone after overdose. Pregnant women are particularly disadvantaged due to the fear of the possible legal consequences of seeking treatment for substance use while pregnant, as well as being more likely to suffer from provider discrimination.\textsuperscript{26} Despite similar rates of substance use in pregnancy, Black women may be 10 times more likely to be reported to child protective services and poor women may also be more likely to be reported. Black patients may be less likely to receive treatment for opioid use disorder in primary care settings and generally have lower odds of completion of treatment.\textsuperscript{27} In the correctional system, medication for opioid use disorder is an infrequent treatment consideration; former inmates possess an almost 13-fold increased risk of death compared to demographic matches in the first 2 weeks after release.\textsuperscript{28} Comparing to adults, youth aged <25 years receive one-tenth the treatment for opioid use disorder, almost 70\% receive no treatment within 30 days after incident opioid overdose, and <2\% of adolescents and young adults receive 1 of the 3 US Food and Drug Administration–approved medications (naltrexone, methadone, buprenorphine) for opioid use disorder.\textsuperscript{29}

These are disheartening statistics, especially given the effectiveness of substance use treatment. Notably, treatment is associated with reduced all-cause and drug-related mortality, reduced morbidity with lower rates of viral transmission, decreased complications from intravenous drug use, increased retention in treatment, and improved general health and well-being, and is also associated with reductions in drug-related crime.

Nonpharmacologic methods for smoking cessation including brief advice, counseling, and behavioral strategies carry effect sizes from 1.38 to 1.88 relative to placebo. Nicotine replacement therapy increases the likelihood of quitting 1.25 to 2.02 times, bupropion 1.64 times, and varenicline 2.24 times. Combination
treatment is also effective, with increased quit rates that are almost doubled. Research shows that up to one-third of patients will either abstain or substantially reduce their alcohol use in the year after a single treatment event, and an additional 1 in 10 will use alcohol moderately and without problems. Treatment for alcohol use disorder can comprise engagement in 12-Step or other mutual support groups (eg. Alcoholics Anonymous), cognitive-behavioral therapy, motivational interviewing, or other psychotherapeutic interventions, as well as pharmacologic agents for relapse prevention. Mutual support groups have been demonstrated to be at least as effective as manualized treatments such as cognitive-behavioral therapy or motivational interviewing.

Medications for opioid use disorder decrease the risk of overdose death from 50% to 80%. A Lancet article showed that maintenance treatment with buprenorphine was associated with 75% abstinence in participants at 1 year with no associated deaths, compared to a 20% mortality and 0% abstinence at 1 year when buprenorphine was used for detoxification purposes only. These are crucial considerations when contextualized with high rates of relapse (≈40% to 60%) and are comparable to other chronic health disorders such as diabetes, hypertension, and asthma, which have much higher rates of treatment.

For some drugs of abuse, replacement agonist treatment or specific pharmacologic agents have not been identified to be effective. This highlights the value of psychosocial treatment engagement and the development of a sober community as integral components of treatment. The effectiveness of counseling, motivational interviewing, cognitive-behavioral therapy, and 12-step groups have been demonstrated to have a positive effect for cannabis reduction and stimulant use. Contingency management has been demonstrated to be a cost-effective intervention with a strong evidence base and promotes abstinence from many substances including alcohol, marijuana, cocaine, opioids, and so on. Most recently, contingency management has been applied to treat illicit stimulant use disorders. Some clinical trials have shown reductions in drug use that persists for 12 to 18 months after completion of treatment, though these results have not been consistent across all studies, and longer-term effects are needed.

Services for the treatment of drug and alcohol use have been delivered separately from mental health and other medical services, though embedded treatment options are increasing. It should be noted that only half of American adults who have concurrent substance use disorder and psychiatric illness receive appropriate treatment. Few facilities are able to provide integrated treatment, though there are global efforts to improve access to concurrent treatment.

Impact of COVID-19
Population-level survey data has not yet been published to reflect the impact of the COVID-19 global pandemic on substance use trends and in fact data collection may have been prematurely stopped. For example, the Monitoring the Future study received completed survey results from 11 800 US students, representing only about 25% of the typical data collected annually. Early data from North America, however, reported increased substance use of all types, with 13.3% of people increasing or initiating substance use to cope with COVID-related stress. Online alcohol sales were increased with larger pack sizes. Canadian data revealed that ≈25% of Canadians self-reported increased alcohol use due to schedule changes, boredom, and stress, and 12% described excessive alcohol consumption when drinking (≥4 drinks for women, and ≥5 for men on occasion). More women than men had increased their alcohol use and were engaging in alcohol binges. Similar results were found in a US survey, with 20% of respondents reporting that their own or family substance use had increased since the start of the pandemic. There was an initial increase in online cannabis sales showing an increase in the first 3 months of 2020; although sales stabilized in April 2020, rates of online sales were still higher than pre-COVID national averages. Research has demonstrated increases in urine samples that are positive for methamphetamine, cocaine, and fentanyl and varying combinations. A nationwide sample of half a million urine drug tests showed that nonprescribed fentanyl use was up 32%, methamphetamine use increased by 13%, heroin was up 13%, and cocaine use increased by 10%. Though synthetic opioids appear to be the primary driver for increases in overdose deaths, overdose deaths involving stimulants also increased 26% to 34%.

Despite a decrease in total opioid prescribing of 16% at the peak of shutdowns in April 2020, data show record highs in overdose deaths, with a 17.59% increase in suspected overdoses following the enactment of stay-at-home orders and 50% elevation in overdose deaths in the initial months of the pandemic, doubling baseline rates from 2018 to 2019. These alarming rates of overdose deaths have persisted in North America throughout the pandemic, and 2020 showed the highest number of recorded overdose deaths ever recorded in a 12-month period with 81 000 overdose deaths. Notably, though Black Americans have a comparatively lower prevalence of opioid use, there has been a disproportionate increase in the rate of opioid-related deaths.

Some public health measures to mitigate the spread of COVID-19, such as border closures, have impacted the availability and access to illicit drug supply. Clinic closures reduced access to appropriate treatment.
and availability of harm reduction services, and these changes alongside the increasing toxicity of the available drug supply has contributed to the alarming increase in overdose deaths since the pandemic began. People who use drugs have experienced drastic reductions in visits to safe consumption sites where available. For example, across Canada there has been an overall reduced capacity for accessing harm reduction services; in British Columbia, Canada, there was a 60% decrease in monthly visits to overdose prevention sites and safe consumption sites between February 2020 and April 2020 with persistently low levels in July 2020.39 Thirty-four percent of survey respondents described changes in treatment or recovery services due to the pandemic, and 15% reported inability to access needed services.47 Social isolation and limited access to detoxification and treatment centers have contributed to additional psychological distress and pushed substance users to explore alternative drug supplies such as through illegal online marketplaces.

Many agencies, including the National Institute of Drug Abuse, raised concerns about the unique vulnerability to COVID-19 infection of people who use drugs and have substance use disorders. Alcohol and other drugs of abuse, including opioids and methamphetamines, may affect respiratory and pulmonary health. Individuals with substance use disorders are disproportionally marginalized and minoritized with higher rates of homelessness and incarceration relative to the general population, possibly exposing people to environments placing them in close-contact environments and increasing the risk for infection. People who use drugs may have underlying medical conditions that put them at increased risk for severe illness from COVID-19 and may have untreated or brittle medical conditions. Practically speaking, social distancing measures prevent use of harm reduction strategies such as using with others and ensuring that other participants have access to a naloxone kit for possible emergency use.

Nevertheless, there have been some positive shifts in access to addiction services in the pandemic. This includes lower barrier access to medications for opioid use disorder, such as removal of the previous requirement for in-person consultation to access methadone or buprenorphine treatment. Similarly, current advocacy efforts to “X the X-waiver” are hopeful initiatives to increase rates of prescribers and improve access for patients, modeled on positive experiences from countries such as France and Canada.48 These shifts have been made possible due to increased reliance on virtual treatment, which may allow patients in remote communities to access experienced health care providers and reduce wait times. Of course, more research will be needed to explore the long-term impact of some of these changes, particularly to limit effects on the poor, marginalized, and most vulnerable populations.

Conclusions

While there have been marked decreases in the smoking of tobacco and alcohol use among adolescents, the use of vaping nicotine and cannabis and the general use of cannabis has increased. While opioid use is second in prevalence to cannabis use, opioid use is especially risky, accounting for a vast majority of drug-related deaths. Even so, there are decreases in the number of opioid prescriptions being filled. The impact of using substances of abuse extends beyond the major health impact these substances have on the users. The impact extends to their families and many others in their communities, and these negative consequences are concentrated in underresourced communities. While treatments for substance use disorders are available, only a small percentage are receiving treatment, with access issues for underresourced communities. The COVID-19 pandemic has made it harder for patients to access safer places to use drugs and to access treatment, while at the same time border closures and other measures have made some available illicit products more dangerous.

Conflicts of Interest

The author declares no conflicts of interest.

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