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Marijuana

Background

Marijuana is a greenish-gray mixture of the dried, shredded leaves, stems, seeds, and flowers of the hemp plant, *Cannabis sativa*. It is typically smoked in hand-rolled cigarettes (joints), cigars (blunts), pipes, or water pipes (bongs). The active ingredient in marijuana is delta-9-tetrahydrocannabinol (THC), which is responsible for the potency and effects of marijuana intoxication. Over the past two decades, THC levels of marijuana in the United States have increased.

Commercial-grade marijuana contains parts of the marijuana plant such as stems and seeds that are not high quality. Sinsemilla, a higher potency marijuana, contains only the leaves and buds of the unpollinated female cannabis plant, where THC is most concentrated. Marijuana is produced in all 50 States, and the primary foreign sources for marijuana found in the United States are Mexico, Canada, Colombia, and Jamaica.

Prevalence Estimates

Use by General Population

Marijuana is the most commonly used illicit drug. According to the 2002 National Survey on Drug Use and Health (NSDUH), it was used by 75% of current (past month) illicit drug users. Some 55% of current illicit drug users used only marijuana, 20% used marijuana and another illicit drug, and 25% used an illicit drug other than marijuana in the past month.

The 2002 NSDUH also showed that an estimated 40.4% (94.9 million) of Americans age 12 or older had used marijuana or hashish in their lifetime, 11% (25.8 million) had used it in the past year, and 6.2% (14.6 million) had used it in the past month. One-third of the past month users, or 4.8 million persons, reported using marijuana 20 or more days in the past month.

There were an estimated 2.6 million new marijuana users in the United States in 2001. This is similar to the number of new users each year since 1995, but an increase over the number in 1990 (1.6 million). Approximately 67% of the new marijuana users in 2001 were under age 18. This proportion has typically increased since the 1960s, when less than half of initiates were under 18. The average age of marijuana initiates in 2001 was 17.1 years.

According to the 2003 Monitoring the Future Study, use of marijuana among 8th, 10th, and 12th graders has declined significantly from 2001 to 2003. Current (past month) marijuana use decreased 11%, from 16.6% to 14.8%; past year use also decreased 11%, from 27.5% to 24.5%; and lifetime use declined 8.2%, from 35.3% to 32.4%. Approximately 17.5% of 8th graders, 36.4% of 10th graders, and 46.1% of 12th graders surveyed in 2003 reported lifetime marijuana use (see table 1).

Table 1. Percentage of students reporting marijuana use, 2002-2003

Grade	Past Month		Past Year		Lifetime	
	2002	2003	2002	2003	2002	2003
8th grade	8.3	7.5	14.6	12.8	19.2	17.5
10th grade	17.8	17.0	30.3	28.2	38.7	36.4
12th grade	21.5	21.2	36.2	34.9	47.8	46.1

Source: Monitoring the Future Study.

According to the Centers for Disease Control and Prevention's Youth Risk Behavior Surveillance System, 42.4% of high school students surveyed in 2001 had used marijuana during their lifetime. Students in grades 10, 11, and 12 (41.7%, 47.2%, and 51.5%, respectively) were significantly more likely than students in grade 9 (32.7%) to report lifetime marijuana use. About 24% of

students had used marijuana at least once during the 30 days preceding the survey.

According to *Initiation of Marijuana Use: Trends, Patterns, and Implications*, the younger an individual is when he or she first uses marijuana, the more likely that person is to use cocaine and heroin and become drug dependent as an adult. Adults who used marijuana before age 15 were 6 times more likely to be dependent on an illicit drug than adults who first used marijuana at age 21 or older. The report found that among adults age 26 or older who used marijuana before age 15, some 62% reported lifetime cocaine use, 9% reported lifetime heroin use, and 54% reported nonmedical use of psychotherapeutics. By comparison, among marijuana users who reported first smoking the drug after age 20, some 16% used cocaine, 1% used heroin, and 21% used psychotherapeutics nonmedically in their lifetime. Among those who had never used marijuana, 0.6% reported lifetime cocaine use, 0.1% reported lifetime heroin use, and 5.1% reported lifetime nonmedical psychotherapeutic use.

NSDUH included questions to assess dependence on and abuse of substances based on criteria specified in the *Diagnostic and Statistical Manual of Mental Disorders*. Of the 7.1 million past year users classified with dependence on or abuse of illicit drugs in 2002, approximately 4.3 million were dependent on or abused marijuana. This represents 1.8% of the total population age 12 and older and 60.3% of those classified with illicit drug dependence or abuse. The questions used to assess drug dependence asked about health, emotional problems, attempts to reduce use, tolerance, withdrawal, and other symptoms. The questions on abuse asked about problems at work, home, and school; problems with family and friends; physical danger; and trouble with the law due to substance use.

The NSDUH and Monitoring the Future studies also present information about perceived harms associated with drug use. Data from the 2002 NSDUH indicate that 32% of 12- to 17-year-olds felt that smoking marijuana once a month was a great risk. Results from the 2003 Monitoring the Future Study show that 55% of high school seniors believed it was harmful to smoke marijuana regularly and 27% of seniors felt it was harmful to smoke it occasionally.

Use by Offenders

The National Institute of Justice's Arrestee Drug Abuse Monitoring (ADAM) Program tests urine samples voluntarily collected from arrestees throughout the United States. During 2002, data on adult male arrestees in 36 sites and adult female arrestees in 23 sites were collected. A median of 41.5% of adult male arrestees and 28.4% of adult female arrestees tested positive for marijuana at arrest (see table 2).

Table 2. Arrestee marijuana use, 2002

Type of Discovery	Adult Male	Adult Female
Tested positive for marijuana (median)	41.5%	28.4%
Reported use in past 7 days	37.4	28.3
Reported use in past 30 days	43.7	34.5
Reported use in past year	52.8	44.3

Source: Preliminary Data on Drug Use and Related Matters Among Adult Arrestees and Juvenile Detainees, 2002.

Adult male arrestees who used marijuana in the past year reported using it an average of 10.1 days in the past month. Marijuana was used an average of 8.1 days in the past month among the adult female arrestees who reported past year marijuana use. Among the juvenile male detainees who were tested in five sites during 2002, a median of 57.7% tested positive for marijuana. A median of 32.5% of the juvenile female detainees who were tested in four sites in 2002 tested positive for marijuana.

Another National Institute of Justice report looked at ADAM data from 1987 through 1999 to track the upsurge in marijuana use among youthful adult arrestees. The study found that most ADAM locations have experienced a rapid increase in marijuana use among youthful arrestees, from an average of 25% in 1991 to 57% by 1996. The study concluded that marijuana appears to be the drug of choice among youth coming of age in the 1990s who tend to get in trouble with the law.

In 1997, State and Federal prisoners used marijuana more than any other drug. Some 77% of State prisoners reported lifetime use of marijuana, 39% used it in the month before the offense, and 15% were under its influence at the time of the offense. Among Federal offenders, 65% used marijuana in their lifetime, 30% used it in the month before committing the offense, and 11% were under its influence at the time of the offense.

Data from convicted jail inmates in 1998 indicate that 138,000 of them were under the influence of drugs when they committed their offense. Approximately 18.5% were under the influence of marijuana or hashish; 15.2% were under the influence of cocaine or crack, and 5.6% were under the influence of heroin. Some 37% of convicted jail inmates used marijuana in the month before their offense, while 24% used cocaine, 10% used stimulants, 9% used heroin or opiates, 6% used depressants, 5% used hallucinogens, and 1% used inhalants.

Regional Observations

The most recent version of *Pulse Check: Trends in Drug Abuse* was based on discussions with 78 epidemiologists, ethnographers, law enforcement representatives, and treatment providers from 20 sites across the United States. During the January–June 2002 period, all reporting sites except Honolulu, Memphis, and New Orleans reported marijuana as their most abused drug.

Effects and Consequences of Use

Marijuana use is associated with numerous detrimental health effects, including frequent respiratory infections, impaired memory and learning, increased heart rate, anxiety, and panic attacks.

Effects on the Brain

Marijuana's effects begin as soon as the drug enters the brain and can last from 1 to 3 hours. As THC enters the brain, it causes the user to feel high by stimulating brain cells to release the chemical dopamine. When the euphoria passes, the user may feel sleepy or depressed and may also get feelings of panic, anxiety, or distrust.

Marijuana affects a person's ability to shift attention from one thing to another and causes damage to short-term memory because of how THC alters the way information is processed by the hippocampus. THC disrupts coordination and balance by binding to parts of the brain that regulate balance, posture, coordination of movement, and reaction time.

Other Effects on the Body

Because marijuana contains irritants and carcinogens, it can promote cancer of the lungs and other parts of the respiratory tract. A study comparing 173 cancer patients and 176 healthy individuals produced strong evidence that smoking marijuana increased the likelihood of developing cancer of the head or neck. The more marijuana that was smoked, the greater the increase in likelihood. Marijuana also produces high levels of an enzyme that converts some hydrocarbons into their carcinogenic form. These levels may accelerate the changes that ultimately produce malignant cells. Additionally, marijuana users typically inhale more deeply and hold their breath longer than tobacco smokers, increasing the lungs' exposure to carcinogenic smoke.

Users who smoke marijuana regularly may experience the same respiratory problems as tobacco smokers, including daily cough and phlegm, symptoms of chronic bronchitis, and frequent chest colds. Continued marijuana use can result in abnormal functioning of lung tissue injured or destroyed by marijuana smoke.

Within a few minutes after smoking marijuana, the user's heart begins to beat more rapidly and may

increase by 20 to 50 beats per minute, or even double. Results of a study released in 2001 indicate that a person's risk of heart attack within the first hour of smoking marijuana is four times the usual risk.

Emergency Department Visits

From 2000 to 2002, there was a significant increase in the number of emergency department (ED) marijuana mentions nationwide reported to the Drug Abuse Warning Network. A drug mention refers to a substance that was recorded (mentioned) during a visit to the ED. Marijuana was mentioned 96,426 times in 2000 and 119,472 times in 2002, a 24% increase. Since 1995, the number of ED marijuana mentions has increased 164%.

In approximately 45,000 of the cases in which marijuana was mentioned in 2002, the patient reported going to the ED because of an unexpected reaction to the drug. More than 22,000 reported an overdose as the reason for the ED visit (see table 3).

Table 3. Episode Characteristics of ED Marijuana Episodes, 2000–2002

Characteristic	2000	2001	2002
Drug use motive			
Psychic effects	36,970	38,694	39,901
Dependence	30,762	33,817	34,302
Suicide	11,454	14,130	13,753
Other	615	1,258	1,060
Unknown	16,626	22,612	—
Reason for ED contact			
Unexpected reaction	31,218	36,626	45,223
Overdose	18,722	22,469	22,533
Chronic effects	8,620	9,834	10,583
Withdrawal	1,401	1,840	1,419
Seeking detoxification	14,109	14,580	13,917
Accident/injury	5,632	6,130	6,731
Other	10,521	12,242	11,986
Unknown reason	6,202	6,791	7,081

Source: Emergency Department Trends From the Drug Abuse Warning Network.

Drugged Driving

While alcohol is the predominant substance found in fatal automobile crashes, marijuana is the second most frequently found substance in drivers. Alcohol and marijuana are also frequently found together, resulting in a dramatic decrease in driving performance and spike in impairment levels.

According to a National Highway Traffic Safety Administration Study, a moderate dose of marijuana can impair driving performance. The study also found the effects of a low dose of marijuana combined with

alcohol were markedly greater than for either drug alone. Driving performance was measured by reaction time, visual search frequency, and the ability to perceive and/or respond to changes in the velocity of other vehicles.

According to estimates derived from the U.S. Census Bureau and Monitoring the Future data, approximately 600,000 of the nearly 4 million U.S. high school seniors drive under the influence of marijuana. Approximately 38,000 seniors reported that they had crashed while driving under the influence of marijuana in 2001.

Marijuana and School/Work Performance

Studies have shown a correlation between cannabis use and various education performance measures. For example, a study by the National Drug and Alcohol Research Center showed lower grade point averages, less satisfaction with school, negative attitudes towards school, and increased rates of school absenteeism among marijuana users.

In another study, researchers compared marijuana smoking and nonsmoking 12th graders' scores on standardized tests of verbal and mathematical skills. Although all of the students had scored equally well when tested in the 4th grade, heavy marijuana smokers (those who used marijuana seven or more times per week) scored significantly lower in 12th grade than nonsmokers.

Workers who smoke marijuana have been shown to have more problems on the job than their nonsmoking coworkers. Several studies have associated workers' marijuana use with increased tardiness, absences, accidents, workers' compensation claims, and job turnover.

Marijuana and Pregnancy

Research has shown that infants exposed to marijuana in utero display altered responses to visual stimuli and increased tremulousness, which may indicate problems with neurological development. Other studies have shown that during infancy and preschool years, marijuana-exposed children have more behavioral problems than nonexposed children. Research also shows that marijuana-exposed children perform visual perception, language comprehension, sustained attention, and memory tasks more poorly when compared with unexposed children.

Withdrawal

Long-term marijuana users trying to quit using the drug may experience cravings and other withdrawal symptoms and often report irritability, difficulty sleeping, and anxiety. The users also display increased aggression on psychological tests, peaking approximately a week after last smoking marijuana.

Health effects of marijuana use

Acute (present during intoxication)

- ◆ Impairs short-term memory.
- ◆ Impairs attention, judgment, and other cognitive functions.
- ◆ Impairs coordination, balance, and reaction time.
- ◆ Increases heart rate.

Persistent (lasting longer than intoxication, but may not be permanent)

- ◆ Impairs memory.
- ◆ Impairs learning skills.

Long-term (cumulative, potentially permanent effects of chronic abuse)

- ◆ Can lead to addiction.
- ◆ Increases risk of chronic cough, bronchitis, and emphysema.
- ◆ Increases risk of cancer of the head, neck, and lungs.

Source: Marijuana Abuse Research Report.

Availability

Approximately 55% of youth ages 12 to 17 surveyed in 2002 felt that it would be fairly or very easy to obtain marijuana. Some 56.7% of those who used marijuana in 2002 reported that they got the drug for free or shared someone else's marijuana. Nearly 40% of marijuana users bought the drug. About 79% of marijuana users who bought the drug and 81.8% who obtained the drug for free got it from a friend.

The Monitoring the Future Study also tracks trends in availability of drugs to youth. From the time the study began in 1975 to 2003, between 83% and 90% of every senior class have said that they could obtain marijuana fairly or very easily.

All but one of the 40 Pulse Check law enforcement and epidemiologic/ethnographic sources consider marijuana widely available in their communities. The exception is Chicago, where the law enforcement source considers the drug somewhat available.

Production and Trafficking

According to responses to the 2001 National Drug Threat Survey, State and local law enforcement agencies from all 50 States, Puerto Rico, and Guam reported the presence of indoor and outdoor cannabis cultivation in their jurisdictions. Hydroponic operations, in which cannabis plants are grown without soil but with liquid nutrients, were identified in every State and Puerto Rico. The cultivation of cannabis indoors continues to increase across the United States because of aggressive outdoor eradication programs and drought conditions. Indoor operations enable growers to better conceal their operations and control the growing environment.

The primary foreign sources for marijuana in the United States are Mexico, Canada, Colombia, and Jamaica. During 2002, Mexico produced about 7,900 metric tons and Colombia produced 4,000 metric tons of marijuana.

The Royal Canadian Mounted Police estimates that 800 metric tons of cannabis are produced annually in Canada. Some 214 metric tons were produced in Jamaica in 1997 (the most recent data available).

Most marijuana shipments from Mexico enter the United States through Arizona, California, and Texas. Marijuana from Colombia and Jamaica is typically shipped through the Caribbean to the eastern and southeastern sections of the United States by air and sea. Marijuana from Canada is usually smuggled into the country via commercial and private vehicles, couriers on foot, or by sea or waterways using small boats and fishing vessels.

Price and Potency

The price of marijuana varies widely. According to the U.S. Drug Enforcement Administration (DEA), the national price per pound in 2001 ranged from \$70 to \$1,200 for commercial-grade marijuana and from \$600 to \$4,000 for sinsemilla. The wide range in prices reflects variables such as potency, quantities purchased, purchase frequencies, buyer-seller relationships, transportation costs, and proximity to supply sources. U.S. marijuana users spent approximately \$10.5 billion on marijuana in 2000, compared to \$15 billion in 1990. Although more marijuana was consumed in 2000, the price decreased from 1990 to 2000, resulting in a decrease in the total amount spent on the drug.

Marijuana potency as characterized by THC content is rising. According to data from the Marijuana Potency Monitoring Project, the average potency of samples of all cannabis types increased from 3% in 1991 to 5.2% in 2001. The potency of commercial-grade marijuana increased from 3.1% to 5% during the same period. In the late 1970s and early 1980s, commercial-grade marijuana THC levels were under 2%. The concentration of THC in sinsemilla was about 6% in the late 1970s and early 1980s, and averaged more than 9% in 2001.

Enforcement

Arrests

During FY 2002, DEA made 5,502 marijuana-related arrests, representing 18.6% of the total drug arrests made by the agency during the year. Agencies participating in DEA's Domestic Cannabis Eradication/Suppression Program made 8,247 arrests in 2002. This program is a joint Federal and State effort in which DEA contributes funding, training, equipment, and investigative and aircraft resources to participating States to eradicate domestically cultivated marijuana. According to the Federal Bureau of Investigation (FBI), of the estimated 1,538,813 State and local arrests for drug abuse violations in 2002, about 5.4% were for marijuana sale/manufacturing and 39.9% were for possession.

Seizures

In 2002, approximately 2,412,365 pounds of marijuana were seized and reported in the Federal-wide Drug Seizure System (FDSS), down from 2,674,826 pounds seized in 2001, and 2,614,746 pounds seized in 2000. FDSS comprises information about drug seizures made within the jurisdiction of the United States by DEA, the FBI, and U.S. Customs and Border Protection, as well as maritime seizures made by the U.S. Coast Guard. FDSS eliminates duplicate reporting of seizures involving more than one Federal agency.

The number of cannabis plants seized on national forest land more than doubled from 1997 to 2001. In 1997, the U.S. Forest Service reported the seizure of 316,013 plants. By 2001, 719,985 plants were seized.

More than 3.3 million cultivated marijuana plants were seized in 2002 as a result of DEA's Domestic Cannabis Eradication/Suppression Program. Most seizures took place in California where nearly 1.3 million plants were seized.

Adjudication

During FY 2001, some 8,000 convicted Federal drug offenders had committed an offense involving marijuana. Of these offenders, 7,758 were convicted of committing a trafficking offense, while 186 were convicted of marijuana possession. Marijuana trafficking convictions represented 33% of all drug trafficking offenses, and marijuana possession convictions accounted for 48.4% of all drug possession convictions in Federal courts during FY 2001. The median amount of marijuana involved in Federal marijuana trafficking convictions was 59,000 grams, or 2,081 ounces. The median amount of marijuana involved in Federal possession convictions was 37.5 grams, or 1.3 ounces.

A total of 924,700 persons were convicted of a felony in State courts in 2000. Marijuana trafficking convictions made up 2.7% of the total, and marijuana possession convictions represented 3.7% of the total.

Corrections

Among all Federal drug offenders receiving a prison sentence, those charged with marijuana offenses received the shortest ones. The average sentence received by Federal marijuana offenders in FY 2001 was 38 months, compared to 115 months for crack cocaine offenders, 88.5 months for methamphetamine offenders, 77 months for powder cocaine offenders, 63.4 months for heroin offenders, and 41.1 months for those who committed offenses involving other drugs.

According to a 1997 Bureau of Justice Statistics survey of Federal and State prisoners, approximately 19% of Federal and 13% of State drug offenders were incarcerated for a marijuana offense.

Treatment

The number of admissions to drug and alcohol treatment in the United States increased from 1,527,930 in 1992 to 1,739,796 in 2001. The number of admissions for primary marijuana abuse (255,394 admissions) accounted for 14.7% of the total admissions in 2001. This was up from 1992 when there were 92,414 marijuana admissions, or 6% of the year's admissions.

About 40% of those treated for primary marijuana abuse during 2001 were between ages 15 and 19 at admission. For all admissions to treatment (all illicit drugs and alcohol), this age group accounted for 11% of admissions (see table 4).

Table 4. Age at admission to treatment, 2001

Age (in Years)	All Admissions	Marijuana/Hashish
Younger than 15	1.6%	6.1%
15 to 19	10.8	40.2
15 to 17	6.8	28.9
18 to 19	4.1	11.2
20 to 24	12.3	21.6
25 to 29	11.3	11.3
30 to 34	14.6	7.9
35 to 39	17.1	6.2
40 to 44	14.9	4.0
45 to 49	9.3	1.8
50 to 54	4.6	0.7
55 to 59	1.9	0.2
60 to 64	0.9	0.1
65 and older	0.6	<0.05
Average age at admission	33.9 years	23.1 years

Source: Treatment Episode Data Set.

More than half of the drug-related treatment admissions involving individuals under the age of 15 (55.0%) and more than half of those ages 15 to 19 (54.1%) were treated for primary marijuana abuse. Among the marijuana/hashish admissions with data available (255,394), more than 25% of those admitted began using marijuana at age 12 or younger (see table 5).

Some 56.8% of the marijuana admissions to treatment in 2001 were referred through the criminal justice system. Other sources for referral treatment included individual referred self (17.5%), substance abuse provider (5.9%), other health care provider (4.9%), school (4.2%), employer/employee assistance program (1.2%), and other community referrals (9.5%).

Other Issues

Marijuana remains a Schedule I substance under the Controlled Substances Act. Schedule I drugs are

Table 5. Age at first use, 2001

Age (in Years)	Admissions to Treatment	
	All Admissions	Marijuana/Hashish
12 or younger	15.2%	25.7%
13 to 14	16.7	30.5
15 to 16	21.2	24.5
17 to 18	15.8	11.2
19 to 20	7.7	3.5
21 to 25	10.8	3.0
26 to 30	5.9	0.9
Older than 30	6.8	0.7

Source: Treatment Episode Data Set.

classified as having a high potential for abuse, no currently accepted medical use in treatment in the United States, and a lack of accepted safety for use of the drug under medical supervision.

A 1999 Institute of Medicine report found that marijuana is not a modern medicine and expressed concern about patients smoking it because that was deemed a harmful drug-delivery system. Marinol (dronabinol), a capsule that contains THC and is taken orally, was approved by the U.S. Food and Drug Administration (FDA) in 1985 for the treatment of nausea and vomiting associated with cancer chemotherapy. In 1992, FDA approved the marketing of Marinol for the treatment of anorexia associated with weight loss in AIDS patients. FDA has also approved nabilone, a substance chemically related to marijuana. This drug is used to prevent the nausea and vomiting that may occur after cancer treatments when other medicines are unsuccessful. Marinol and nabilone are available in the United States by prescription.

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