NFLIS

NATIONAL FORENSIC LABORATORY INFORMATION SYSTEM

NFLIS-DRUG **2019** ANNUAL REPORT

DRUG

U.S. DEPARTMENT OF JUSTICE
DRUG ENFORCEMENT ADMINISTRATION
DIVERSION CONTROL DIVISION

Contents

DEA is pleased to announce the partnership between NFLIS and the Real-Time Communication Synth-Opioids Network (Synth-Opioids). See Appendix D for details about this exciting partnership.

Cover photograph:

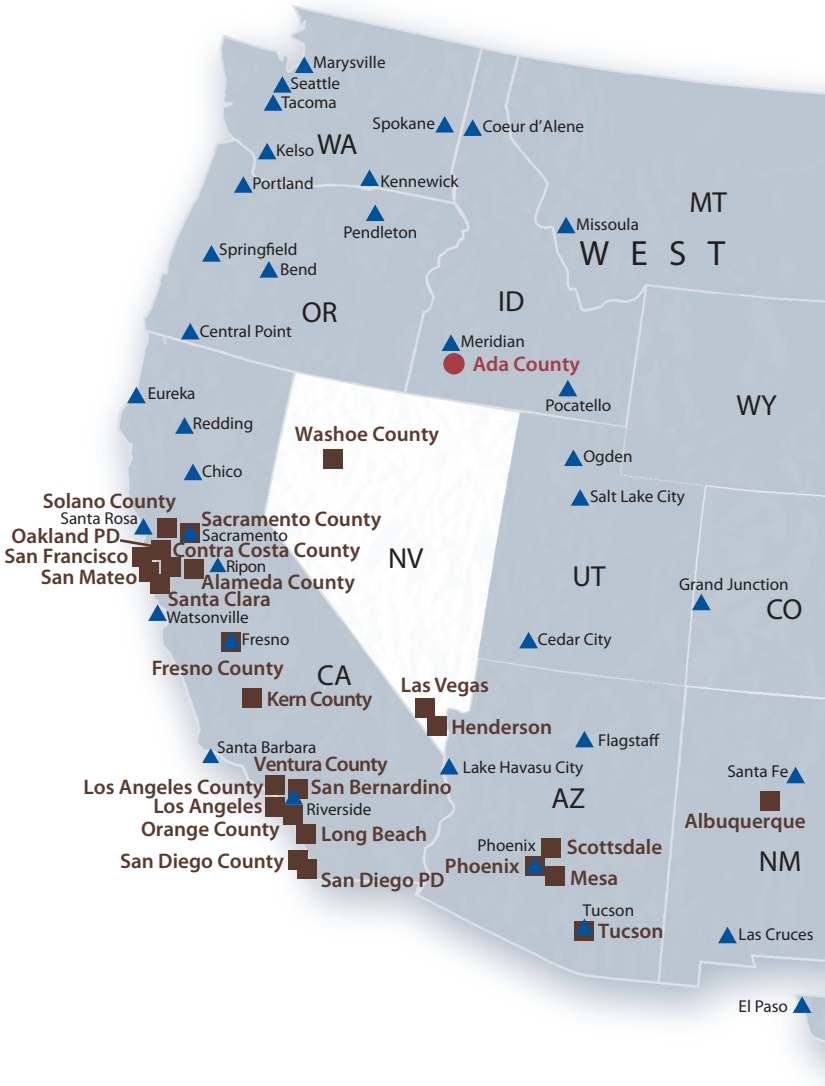
Scientist reaching for test tube

Highlights

- From January 1, 2019, through December 31, 2019, an estimated 866,753 distinct drug cases were submitted to State and local laboratories in the United States and analyzed by March 31, 2020. From these cases, an estimated 1,521,360 drug reports were identified.
- Methamphetamine was the most frequently identified drug (417,867 reports) in 2019, followed by cannabis/THC (282,679 reports), cocaine (209,086 reports), and heroin (127,641 reports).
- Nationally, fentanyl reports dramatically increased from 2014 through 2019. Alprazolam reports substantially increased from 2014 to 2016, followed by decreases through 2019. Oxycodone reports steadily declined from 2011 through 2019. Buprenorphine reports showed an S-shaped trend, with increases from 2006 through 2010 and from 2013 through 2019.* Hydrocodone reports steadily decreased from 2011 through 2019. Amphetamine reports steadily increased from 2007 through 2018, followed by a significant decrease in 2019.
- From 2018 to 2019, reports of fentanyl and buprenorphine increased significantly ($p < .05$), while reports of alprazolam, oxycodone, hydrocodone, and amphetamine decreased significantly.
- Regionally, for fentanyl, the West showed considerable increases from 2015 through 2019, while reports in the Midwest, Northeast, and South substantially increased from 2014 through 2019. For alprazolam, reports in the West increased through 2018, then decreased in 2019, while reports in the Midwest, Northeast, and South increased from 2003 to 2010 and from 2014 through 2016, then decreased from 2017 through 2019. For oxycodone, all four regions showed similar trend lines, with the highest number of reports occurring in 2010 or 2011, then decreasing through 2019. For buprenorphine, reports increased from 2014 through 2018 for all regions; from 2018 to 2019, buprenorphine reports increased in the Midwest and South and decreased slightly in the West and Northeast. For hydrocodone, reports steadily decreased in all regions from 2010 through 2019. For amphetamine, reports in the Midwest, Northeast, and South steadily increased from 2007 through 2015 and 2016, after which reports in the Northeast remained steady through 2019, while reports in the Midwest and South decreased from 2018 to 2019. In the West, amphetamine reports had more variability from 2001 through 2006, followed by a flatter trend line through 2019.
- In 2019, fentanyl accounted for 50% of identified narcotic analgesic reports, while alprazolam accounted for 47% of identified tranquilizer and depressant reports. Among identified synthetic cannabinoids, 5F-MDMB-PICA accounted for 25% of reports, while fluoro-MDMB-PICA, 5F-ADB, and 4F-MDMB-BINACA accounted for another 35% of reports.
- Nationwide, methamphetamine reports increased steadily from 2011 through 2019. Cannabis/THC reports decreased from 2010 through 2019. Cocaine reports substantially decreased from 2007 through 2014, slightly increased from 2015 through 2017, then decreased through 2019. Heroin reports increased from 2007 through 2015, followed by decreases through 2019. Reports of acetyl fentanyl increased from 2013 through 2015, decreased through 2017, then steadily increased through 2019. MDMA reports decreased from 2001 to 2003, increased through 2007, decreased from 2010 to 2013, then gradually increased through 2019.

* Curved trends are sometimes described as U shaped (i.e., decreasing in earlier years and increasing in recent years) and S shaped (i.e., two turns in the trend, roughly increasing-decreasing-increasing or decreasing-increasing-decreasing). See Appendix A for a more detailed methodology discussion.

INTRODUCTION



The National Forensic Laboratory Information System (NFLIS) is a program of the Drug Enforcement Administration (DEA), Diversion Control Division. NFLIS-Drug systematically collects drug identification results and associated information from drug cases submitted to and analyzed by Federal, State, and local forensic laboratories. These laboratories analyze controlled and noncontrolled substances secured in law enforcement operations across the country, making NFLIS-Drug an important resource in monitoring illicit drug use and trafficking, including the diversion of legally manufactured pharmaceuticals into illegal markets. NFLIS-Drug includes information on the specific substance and the characteristics of drug evidence, such as purity, quantity, and drug combinations. NFLIS-Drug data support drug scheduling decisions, inform drug policy, and serve drug enforcement initiatives nationally and in local communities.

NFLIS-Drug is a comprehensive information system that includes data from forensic laboratories that handle the Nation's drug analysis cases. The NFLIS-Drug participation rate, defined as the percentage of the national drug caseload represented by laboratories that have joined NFLIS, is currently more than 98%. NFLIS-Drug includes 50 State systems and 104 local or municipal laboratories/laboratory systems, representing a total of 279 individual laboratories. The NFLIS-Drug database also includes Federal data from DEA and U.S. Customs and Border Protection laboratories.

This publication presents the results of drug cases *submitted* to State and local laboratories from January 1, 2019, through December 31, 2019, that were *analyzed* by March 31, 2020. Data from Federal laboratories for the same period are also included in this publication. The data presented in this publication include *all* drugs mentioned in the laboratories' reported drug items.

Section 1 of this publication presents national and regional estimates for the 25 most frequently identified drugs, as well as national and regional trends from January 2001 through December 2019. Section 2 presents estimates of specific drugs by drug category. All estimates are based on the NEAR approach (National Estimates Based on All Reports).

Sections 3 and 4 present reported data rather than national and regional estimates; all data reported by NFLIS-Drug State and local laboratories are included. Section 3 presents a geographic information system analysis of eutylone and acetyl fentanyl reports by State and by county for selected States. Section 4 presents drugs reported by selected laboratories in cities across the country.

See Appendix A for details on the NEAR approach and Appendix B for a list of NFLIS-Drug participating and reporting laboratories. The benefits and limitations of NFLIS-Drug are presented in Appendix C. Key areas of improvement to NFLIS-Drug include ongoing enhancements to the NFLIS-Drug Data Query System and the addition of the Real-Time Communication Synth-Opioids Network (Synth-Opioids); Appendix D summarizes these enhancement activities and additions.


ME
NORTHEAST
Augusta
Waterbury
VT
NH
Concord
Sudbury
University of MA Medical Center, Worcester
Providence
RI
MA
CT
Hartford
Suffolk County
Westchester County
Nassau County
New York City
Hudson County
Burlington County
Ocean County
Onondaga County
NY
Albany
Niagara County
Erie County
Port Crane
Newburgh
Olean
Wyoming
Yonkers
Union County
Little Falls
Hamilton
NJ
Bethlehem
Philadelphia
Sea Girt
Hammonton
Media
Greensburg
Harrisburg
Pikesville
Baltimore City
Cape May
Baltimore County
Montgomery County
Anne Arundel County
Prince George's County
Berlin
Fairfax
DE
Hagerstown
MD
VA
Richmond
Norfolk
Roanoke
WV
South Charleston
Ashland
Cold Springs
Evansville
Frankfort
Louisville
KY
London
Madisonville
Greensboro
Raleigh/Wake County
Raleigh
NC
Asheville
Knoxville
Nashville
TN
Charlotte-Mecklenburg PD
Spartanburg
Anderson/Oconee
Cleveland
Columbia
Richland County
Charleston
SC
Savannah
Macon
Decatur
Huntsville
Memphis
Tupelo
Batesville
Birmingham
Auburn
Midland
GA
Montgomery
Moultrie
Jacksonville
Tallahassee
Mobile
Gulfport
Pensacola
Orlando
Pinellas County
Tampa
Manatee County
Sarasota County
Fort Myers
FL
Indian River
Palm Beach County
Broward County
Miami-Dade PD
San Juan
PR
Mayagüez
Ponce
Jackson PD
MS
Jackson
Meridian
North LA
LA
Southwest LA
Baton Rouge
St. Tammany Parish
New Orleans
Jefferson Parish
Acadiana
Jefferson County
Houston
Houston
Austin
Bexar County
Harris County
Brazoria County
TX
Waco
Laredo
Corpus Christi
McAllen
Fort Worth
Garland
Dallas
Tyler
Abilene
Midland
Lubbock
Hobbs
Amarillo
Enid
Tulsa
Tahlequah
Edmond
OK
McAlester
Hope
Little Rock
AR
Oakland County
Bridgeport
Sterling Heights
Lorain County
Cuyahoga County
Erie
Detroit
Northville
Lake County
Toledo
Mansfield PD
Richfield
OH
Springfield
Bowling Green
Canton-Stark County
Columbus PD
Columbus
London
Newark PD
Miami Valley
Hamilton County
Indianapolis
Indianapolis-Marion County
Morton
Macon
Springfield
IL
Northern Illinois
DuPage County
Chicago
Rockford
Joliet
Fort Wayne
Lowell
IN
Grayling
MI
East Lansing
Grand Rapids
Milwaukee
Madison
Kenosha County
Wausau
WI
Marquette
Bemidji
MN
ND
Bismarck
SD
Pierre
Rapid City
MIDWEST
St. Paul
Des Moines
IA
Lincoln
NE
Cheyenne
Greely
Denver
Denver
Unified Metro (Englewood)
Colorado Springs
Pueblo
KS
Topeka
Johnson County
Great Bend
Sedgwick County
Pittsburg
Springfield
Carthage
Jefferson City
Park Hills
St. Louis
St. Louis County
MO
Cape Girardeau
Willow Springs
St. Joseph
KCMO Regional
Belleville
St. Charles County
Honolulu
HI
AK
Anchorage
Reporting State Laboratory System
Participating State Laboratory System
(Not Yet Reporting)
No State Laboratory System
Individual State Laboratory
Reporting Local Laboratory
Participating Local Laboratory
(Not Yet Reporting)

Section 1

NATIONAL AND REGIONAL ESTIMATES

This section presents national and regional estimates of drugs *submitted* to State and local laboratories from January through December 2019 that were *analyzed* by March 31, 2020. Trends are presented for selected drugs from 2001 through 2019.

National and regional drug estimates presented in the following section include *all* drug reports mentioned in laboratories' reported drug items. The NEAR approach was used to produce estimates for the Nation and for the U.S. census regions. The NEAR approach uses all NFLIS-Drug reporting laboratories. Appendix A provides a detailed description of the methods used in preparing these estimates.

1.1 Drug Reports

In 2019, a total of 1,521,360 drug reports were identified by State and local forensic laboratories in the United States. This estimate is a decrease of about 5% from the 1,599,428 drug reports identified during 2018. Table 1.1 presents the 25 most frequently identified drugs for the Nation and for each of the U.S. census regions.

The top 25 drugs accounted for 86% of all drugs analyzed in 2019. The majority of all drugs reported in NFLIS-Drug were identified as the top four drugs, with methamphetamine, cannabis/THC, cocaine, and heroin representing 68% of all drug reports. Nationally, 417,867 drug reports were identified as methamphetamine (27%), 282,679 as cannabis/THC (19%), 209,086 as cocaine (14%), and 127,641 as heroin (8%).

In addition, seven narcotic analgesics were among the top 25 drugs: fentanyl (98,954 reports), oxycodone (22,470 reports), buprenorphine (20,552 reports), hydrocodone (12,747 reports), acetyl fentanyl (12,190 reports), tramadol (8,196 reports), and carfentanil (3,288 reports). Four tranquilizers and depressants were included: alprazolam (26,635 reports), clonazepam (7,960 reports), phencyclidine (PCP) (3,979 reports) and etizolam (3,368 reports). There were also three phenethylamines: amphetamine (11,242 reports), MDMA (7,238 reports), and eutylone (5,787 reports). In addition, there was one synthetic cannabinoid: 5F-MDMB-PICA (4,671 reports). The controlled substances ANPP (5,798 reports), psilocin/psilocibin (4,815 reports), and lysergic acid diethylamide (LSD) (4,151 reports) were also included in the top 25 most frequently identified drugs, as were the following noncontrolled substances: naloxone (4,991 reports), cannabidiol (CBD) (3,315 reports), and gabapentin (3,139 reports).

Table 1.1 NATIONAL AND REGIONAL ESTIMATES FOR THE 25 MOST FREQUENTLY IDENTIFIED DRUGS[1]

Estimated number and percentage of total drug reports submitted to laboratories from January 1, 2019, through December 31, 2019, and analyzed by March 31, 2020

	National		West		Midwest		Northeast		South	
Drug	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Methamphetamine	417,867	27.47%	114,610	47.02%	106,847	28.41%	12,983	4.64%	183,427	29.51%
Cannabis/THC	282,679	18.58%	31,725	13.02%	64,471	17.14%	64,926	23.19%	121,557	19.55%
Cocaine	209,086	13.74%	15,901	6.52%	46,629	12.40%	58,975	21.07%	87,581	14.09%
Heroin	127,641	8.39%	32,785	13.45%	28,812	7.66%	33,678	12.03%	32,367	5.21%
Fentanyl	98,954	6.50%	6,769	2.78%	28,556	7.59%	40,152	14.34%	23,477	3.78%
Alprazolam	26,635	1.75%	3,504	1.44%	6,165	1.64%	3,775	1.35%	13,191	2.12%
Oxycodone	22,470	1.48%	1,880	0.77%	4,943	1.31%	5,121	1.83%	10,526	1.69%
Buprenorphine	20,552	1.35%	1,601	0.66%	4,845	1.29%	4,878	1.74%	9,228	1.48%
Hydrocodone	12,747	0.84%	1,589	0.65%	3,517	0.94%	521	0.19%	7,120	1.15%
Acetyl fentanyl	12,190	0.80%	61	0.03%	4,341	1.15%	5,086	1.82%	2,702	0.43%
Amphetamine	11,242	0.74%	839	0.34%	3,011	0.80%	1,959	0.70%	5,433	0.87%
Tramadol	8,196	0.54%	428	0.18%	2,817	0.75%	1,970	0.70%	2,982	0.48%
Clonazepam	7,960	0.52%	587	0.24%	2,031	0.54%	1,528	0.55%	3,815	0.61%
MDMA	7,238	0.48%	1,942	0.80%	2,506	0.67%	687	0.25%	2,104	0.34%
ANPP	5,798	0.38%	291	0.12%	1,115	0.30%	3,038	1.09%	1,353	0.22%
Eutylone	5,787	0.38%	6	0.00%	481	0.13%	338	0.12%	4,962	0.80%
Naloxone	4,991	0.33%	250	0.10%	705	0.19%	1,373	0.49%	2,664	0.43%
Psilocin/psilocibin	4,815	0.32%	1,553	0.64%	1,551	0.41%	458	0.16%	1,253	0.20%
5F-MDMB-PICA	4,671	0.31%	317	0.13%	858	0.23%	1,440	0.51%	2,056	0.33%
Lysergic acid diethylamide (LSD)	4,151	0.27%	755	0.31%	1,704	0.45%	495	0.18%	1,196	0.19%
Phencyclidine (PCP)	3,979	0.26%	325	0.13%	806	0.21%	1,008	0.36%	1,840	0.30%
Etizolam	3,368	0.22%	295	0.12%	655	0.17%	199	0.07%	2,219	0.36%
Cannabidiol (CBD)	3,315	0.22%	262	0.11%	808	0.21%	201	0.07%	2,043	0.33%
Carfentanil	3,288	0.22%	3	0.00%	3,075	0.82%	100	0.04%	110	0.02%
Gabapentin	3,139	0.21%	161	0.07%	653	0.17%	739	0.26%	1,585	0.26%
Top 25 Total	1,312,758	86.29%	218,435	89.62%	321,902	85.60%	245,628	87.74%	526,792	84.74%
All Other Drug Reports	208,603	13.71%	25,301	10.38%	54,135	14.40%	34,330	12.26%	94,837	15.26%
Total Drug Reports[2]	1,521,360	100.00%	243,736	100.00%	376,037	100.00%	279,958	100.00%	621,629	100.00%

MDMA=3,4-methylenedioxymethamphetamine
ANPP=4-anilino-N-phenethyl-4-piperidine
5F-MDMB-PICA=methyl 2-(1-(5-fluoropentyl)-1H-indole-3-carboxamido)-3,3-dimethylbutanoate

[1] *Sample n's and 95% confidence intervals for all estimates are available on request.*
[2] *Numbers and percentages may not sum to totals because of rounding.*

1.2 Drug Cases Analyzed

Drug analysis results are also reported to NFLIS-Drug at the case level. These case-level data typically describe all drugs identified in a drug-related incident, although a small proportion of laboratories may assign a single case number to all drug submissions related to an entire investigation. Table 1.2 presents national estimates of the top 25 drug-specific cases. This table illustrates the number of cases that contained one or more reports of the specified drug. In 2019, there were 1,171,698 drug-specific cases submitted to and analyzed by State and local forensic laboratories, representing a 6% decrease from the 1,246,559 drug-specific cases in 2018.

Among all drug cases, methamphetamine was the most common drug reported during 2019. Nationally, 37% of drug cases contained one or more reports of methamphetamine, followed by cannabis/THC, which was identified in 23% of all drug cases. About 19% of drug cases contained cocaine, and 11% contained heroin. Fentanyl was reported in 9% of cases, and alprazolam was reported in 3% of cases.

Lethal doses of heroin, carfentanil, and fentanyl

Table 1.2 *National Case Estimates*
Top 25 estimated number of drug-specific cases and their percentage of distinct cases, January 1, 2019, through December 31, 2019

Drug	Number	Percent
Methamphetamine	318,004	36.69%
Cannabis/THC	203,543	23.48%
Cocaine	163,599	18.87%
Heroin	97,778	11.28%
Fentanyl	75,528	8.71%
Alprazolam	23,039	2.66%
Buprenorphine	18,385	2.12%
Oxycodone	18,305	2.11%
Hydrocodone	10,930	1.26%
Amphetamine	9,836	1.13%
Acetyl fentanyl	9,327	1.08%
Clonazepam	7,145	0.82%
Tramadol	7,071	0.82%
MDMA	5,419	0.63%
ANPP	5,349	0.62%
Naloxone	4,837	0.56%
Eutylone	4,221	0.49%
Psilocin/psilocibin	4,085	0.47%
5F-MDMB-PICA	3,580	0.41%
Phencyclidine (PCP)	3,537	0.41%
Lysergic acid diethylamide (LSD)	3,518	0.41%
Carfentanil	3,151	0.36%
Etizolam	2,854	0.33%
Gabapentin	2,779	0.32%
Morphine	2,656	0.31%
Top 25 Total	1,008,477	116.35%
All Other Drugs	163,221	18.83%
Total All Drugs[1]	1,171,698	135.18%[2]

MDMA=3,4-methylenedioxymethamphetamine

ANPP=4-anilino-N-phenethyl-4-piperidine

5F-MDMB-PICA=methyl 2-(1-(5-fluoropentyl)-1H-indole-3-carboxamido)-3,3-dimethylbutanoate

[1] *Numbers and percentages may not sum to totals because of rounding.*

[2] *Multiple drugs can be reported in a single case, so the cumulative percentage exceeds 100%. The estimated national total of distinct case percentages is based on 866,753 distinct cases submitted to State and local laboratories from January 1, 2019, through December 31, 2019, and analyzed by March 31, 2020.*

Drugs Reported by Federal Laboratories

The majority of drug reports presented in this section are from the eight U.S. Drug Enforcement Administration (DEA) laboratories. The data reflect results of substance evidence from drug seizures, undercover drug buys, and other evidence analyzed at DEA laboratories across the country. DEA data include results for drug cases submitted by DEA agents, other Federal law enforcement agencies, and selected local police agencies. Although DEA data capture domestic and international drug cases, the results presented in this section describe only those drugs obtained in the United States. In addition to drug reports from the DEA, reports from seven U.S. Customs and Border Protection (CBP) laboratories are included.

A total of 66,215 drugs were submitted to DEA and CBP laboratories in 2019 and analyzed by March 31, 2020, representing about 4% of the estimated 1.5 million drugs reported by NFLIS-Drug State and local laboratories during this period. In 2019, more than half of the drugs reported by DEA and CBP laboratories were identified as methamphetamine (23%), cocaine (12%), heroin (11%), or fentanyl (9%).

MOST FREQUENTLY REPORTED DRUGS BY FEDERAL LABORATORIES[1]

Number and percentage of drugs submitted to laboratories from January 1, 2019, through December 31, 2019, and analyzed by March 31, 2020

Drug	Number	Percent
Methamphetamine	15,126	22.84%
Cocaine	8,072	12.19%
Heroin	7,007	10.58%
Fentanyl	5,738	8.67%
Cannabis/THC	1,748	2.64%
Tramadol	796	1.20%
Oxycodone	701	1.06%
Acetyl fentanyl	504	0.76%
Xylazine	453	0.68%
ANPP	396	0.60%
All Other Drug Reports	25,674	38.77%
Total Drug Reports	66,215	100.00%[2]

ANPP=4-anilino-N-phenethyl-4-piperidine

[1] *Federal drug reports in this table include 58,779 reports from Drug Enforcement Administration laboratories and 7,436 reports from U.S. Customs and Border Protection laboratories.*

[2] *Numbers and percentages may not sum to totals because of rounding.*

1.3 National and Regional Drug Trends

The remainder of this section presents annual national and regional trends of selected drugs submitted to State and local laboratories during each annual data reference period and analyzed within three months of the end of each period. The trend analyses test the data for the presence of linear and curved trends using statistical methods described in more detail in Appendix A, including the improvement to the covariance estimation in the long-term analysis introduced in 2016. Curved trends are sometimes described as U shaped (i.e., decreasing in earlier years and increasing in recent years) and S shaped (i.e., two turns in the trend, roughly increasing-decreasing-increasing or decreasing-increasing-decreasing). Because the trends are determined through regression modeling, the descriptions of the trends detailed in this section may differ slightly from the plotted lines of estimates featured in Figures 1.1 through 1.16. Estimates include all drug reports identified among the NFLIS laboratories' reported drug items.

National prescription drug trends

Figures 1.1 and 1.2 present national trends for the estimated number of prescription drug reports that were identified as fentanyl, alprazolam, oxycodone, buprenorphine, hydrocodone, and amphetamine. Note that laboratories do not identify whether reports are for prescription drugs that are licitly or illicitly manufactured. Notable results include the following:

- Fentanyl reports remained steady from 2001 to 2005, followed by a noticeable increase in 2006. Fentanyl reports continued to remain steady until dramatic increases occurred from 2014 through 2019.
- Alprazolam reports showed an overall increase from 2003 to 2010, followed by a decrease in reports from 2011 to 2013. Reports greatly increased from 2014 to 2016, then decreased through 2019.

Figure 1.1 National trend estimates for fentanyl, alprazolam, and oxycodone, January 2001–December 2019

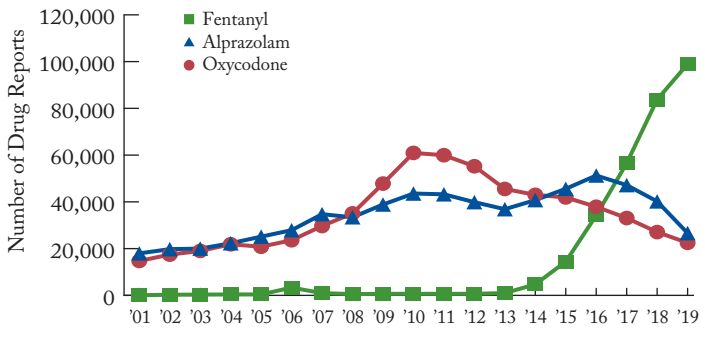
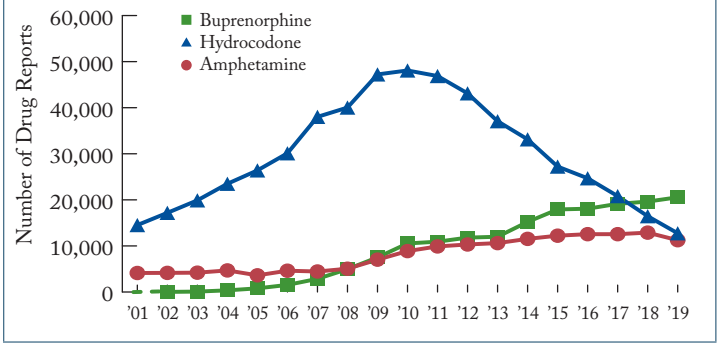


Figure 1.2 National trend estimates for buprenorphine, hydrocodone, and amphetamine, January 2001–December 2019[1]



[1] *A dashed trend line indicates that estimates did not meet the criteria for precision or reliability. See Appendix A for a more detailed methodology discussion.*

- Oxycodone reports showed steady increases from 2001 to 2004, followed by a decrease in 2005. Reports dramatically increased from 2006 to 2010, then showed a steady decline through 2019. The number of oxycodone reports in 2019 was comparable with the number of reports in 2004.
- Buprenorphine reports showed an S-shaped trend. Reports steadily increased from 2006 through 2010 and again from 2013 through 2019.
- Hydrocodone reports had a dramatic increase from 2001 to 2010, followed by a steady decrease through 2019. The number of hydrocodone reports in 2019 was lower than the annual number of reports in 2001.
- Amphetamine reports were steady from 2001 through 2004, followed by a decrease in 2005. Reports then steadily increased from 2007 through 2018, followed by a significant decrease in 2019.

Significance tests were also performed on differences between 2018 and 2019 to identify more recent changes. Across these two periods, reports of fentanyl (from 83,765 to 98,954 reports) and buprenorphine (from 19,621 to 20,552 reports) increased significantly ($p < .05$). Reports of alprazolam (from 40,195 to 26,635 reports), oxycodone (from 27,062 to 22,470 reports), hydrocodone (from 16,452 to 12,747 reports), and amphetamine (from 12,887 to 11,242 reports) decreased significantly.

Other national drug trends

Figures 1.3 and 1.4 present national trends for reports of methamphetamine, cannabis/THC, cocaine, heroin, acetyl fentanyl, and MDMA. Notable results include the following:

- Methamphetamine reports increased from 2001 through 2005, decreased from 2006 through 2010, and increased steadily from 2011 through 2019.
- Cannabis/THC reports decreased from 2001 to 2004, slightly increased from 2005 to 2009, and decreased from 2010 through 2019.
- Cocaine reports gradually increased from 2001 to 2006, then substantially decreased through 2014. Cocaine reports slightly increased from 2015 through 2017, then decreased through 2019.
- Heroin reports decreased from 2001 through 2006, then increased through 2015, followed by decreases through 2019.
- Reports of acetyl fentanyl first appeared in 2013. Acetyl fentanyl reports showed a U-shaped trend from 2013 to 2019; reports increased from 2013 through 2015, decreased through 2017, then steadily increased through 2019.
- MDMA reports decreased from 2001 to 2003, then increased through 2007. A decrease in reports occurred from 2010 to 2013, followed by a gradual increase through 2019.

More recently, from 2018 to 2019, reports of methamphetamine (from 386,272 to 417,867 reports), acetyl fentanyl (from 7,148 to 12,190 reports), and MDMA (from 6,616 to 7,238 reports) increased significantly ($p < .05$), while reports of cannabis/THC (from 344,489 to 282,679 reports), cocaine (from 228,924 to 209,086 reports), and heroin (from 140,818 to 127,641 reports) decreased significantly.

Figure 1.3 National trend estimates for methamphetamine, cannabis/THC, and cocaine, January 2001–December 2019

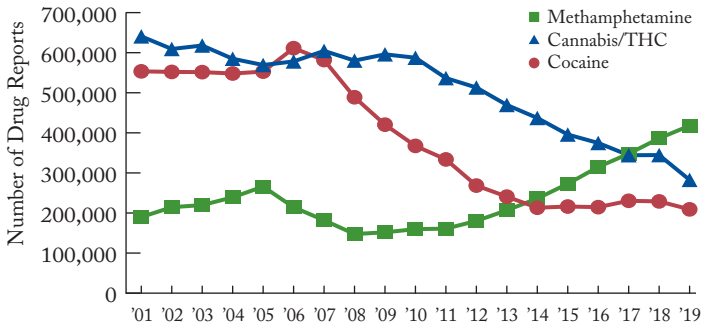
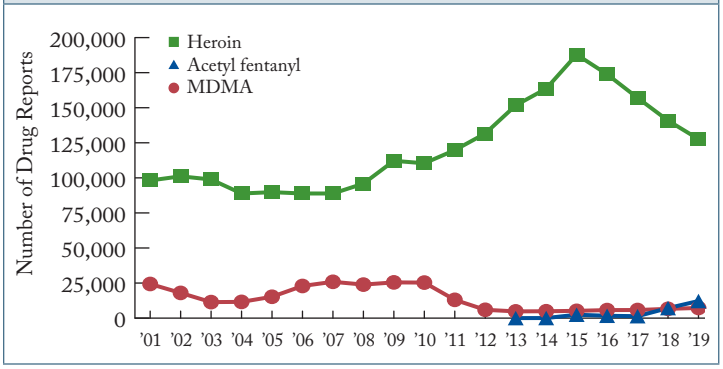


Figure 1.4 National trend estimates for heroin, acetyl fentanyl, and MDMA, January 2001–December 2019



Note: Estimates are not available for acetyl fentanyl for 2001 through 2012 because acetyl fentanyl was first reported to NFLIS in 2013.

Regional prescription drug trends

Figures 1.5 through 1.10 show regional trends per 100,000 persons aged 15 or older for reports of fentanyl, alprazolam, oxycodone, buprenorphine, hydrocodone, and amphetamine from 2001 to 2019. These figures illustrate changes in prescription drugs reported over time, accounting for the population aged 15 years or older in each U.S. census region. Notable trend results include the following:

- For fentanyl, the West showed a gradual increase from 2001 to 2014, followed by considerable increases from 2015 through 2019. Reports remained fairly steady from 2001 through 2013 for the Midwest, Northeast, and South until substantial increases began in 2014 and continued through 2019. The Midwest and Northeast had noticeable increases in 2006 as reflected in the national trend.
- For alprazolam, the West showed an increasing curved trend line through 2018, with a decrease in 2019. The Midwest, Northeast, and South had increasing curved trend lines, with increases from roughly 2003 to 2010, followed by slight decreases through 2013. Increases in reports occurred through 2016, followed by decreases from 2017 through 2019.
- For oxycodone, all four regions showed similar trend lines, with the highest number of reports occurring in 2010 or 2011, then decreasing through 2019. By 2019, the number of reports per 100,000 for the Northeast and South were similar to the numbers in the Midwest.
- For buprenorphine, all regions except the Northeast had S-shaped trends similar to the national trend. The increase in reports slowed for all regions from 2011 to 2013, then continued to increase through 2019 in the Midwest and South, with a small decrease in 2019 for the West and Northeast.
- For hydrocodone, all regions showed considerable increases from 2001 through at least 2009, followed by steady decreases through 2019.
- For amphetamine, reports in the Midwest, Northeast, and South increased steadily from 2007 through 2015 and 2016. The number of reports per 100,000 remained fairly steady from 2017 through 2019 in the Northeast, while the Midwest and South saw a decrease in 2019. Reports in the West were more variable than in other regions from 2001 through 2006, followed by a flatter trend line through 2019.

More recently, from 2018 to 2019, fentanyl reports increased significantly ($p < .05$) in all regions, while alprazolam, oxycodone, and hydrocodone reports decreased significantly in all regions. Buprenorphine reports increased significantly in the Midwest, while amphetamine reports decreased significantly across all regions except the Northeast.

Figure 1.5 Regional trends in fentanyl reported per 100,000 persons aged 15 or older, January 2001–December 2019[1]

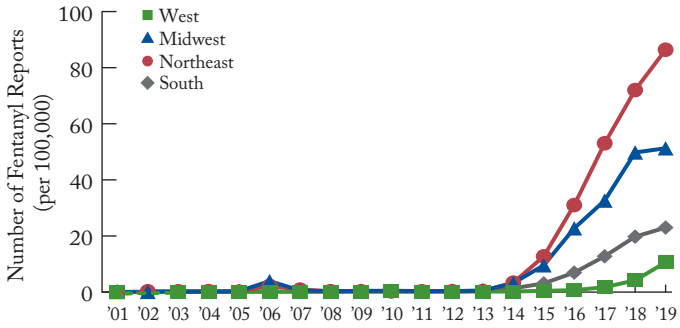


Figure 1.6 Regional trends in alprazolam reported per 100,000 persons aged 15 or older, January 2001–December 2019[1]

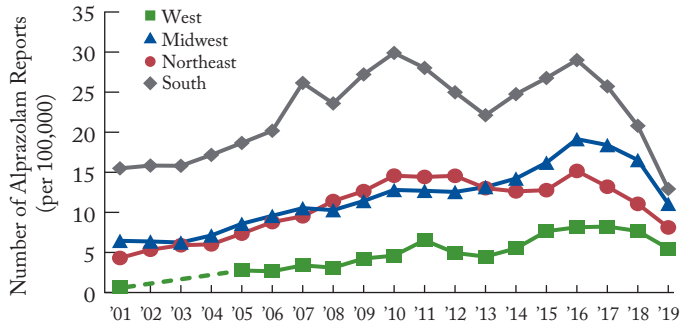
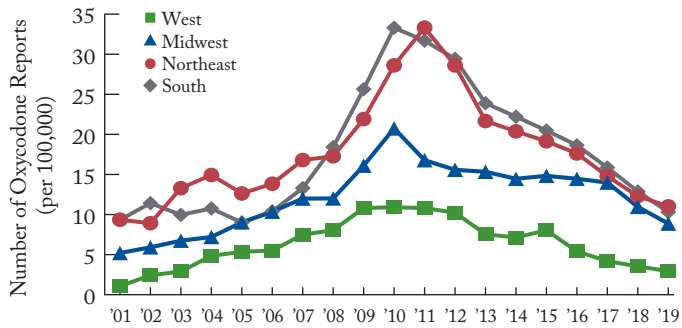


Figure 1.7 Regional trends in oxycodone reported per 100,000 persons aged 15 or older, January 2001–December 2019



Note: U.S. Census 2019 population data by age were not available for this publication. Population data for 2019 were imputed.

[1] *A dashed trend line indicates that estimates did not meet the criteria for precision and reliability. See Appendix A for a more detailed methodology discussion.*

Figure 1.8 Regional trends in buprenorphine reported per 100,000 persons aged 15 or older, January 2001–December 2019[1]

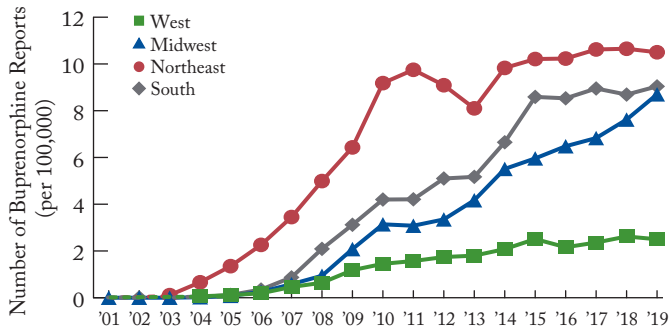


Figure 1.9 Regional trends in hydrocodone reported per 100,000 persons aged 15 or older, January 2001–December 2019

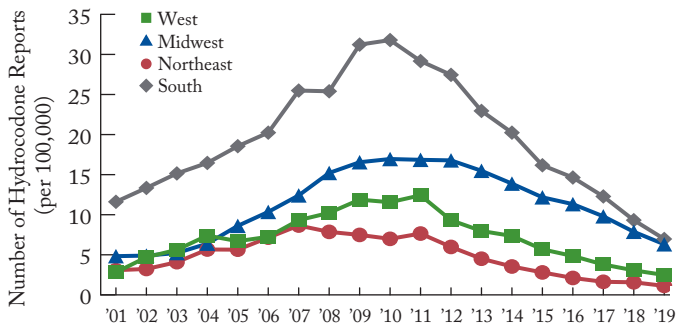
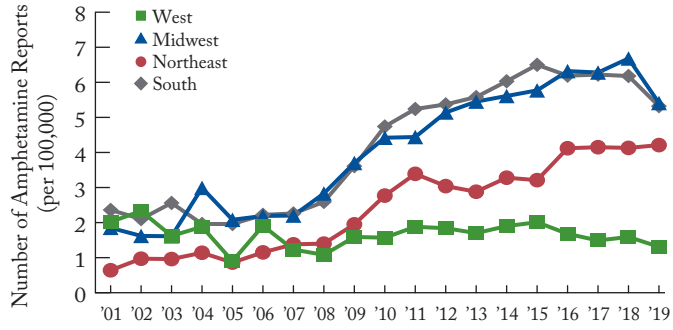


Figure 1.10 Regional trends in amphetamine reported per 100,000 persons aged 15 or older, January 2001–December 2019



Note: U.S. Census 2019 population data by age were not available for this publication. Population data for 2019 were imputed.

[1] *A dashed trend line indicates that estimates did not meet the criteria for precision and reliability. See Appendix A for a more detailed methodology discussion.*

Other regional drug trends

Figures 1.11 through 1.16 present regional trends per 100,000 persons aged 15 or older for methamphetamine, cannabis/THC, cocaine, heroin, acetyl fentanyl, and MDMA reports from 2001 through 2019. Notable trends include the following:

- For methamphetamine, the Northeast had an increasing curved trend line, with higher rates of increase in 2018 and 2019. From 2005 to 2019, the annual number of reports per 100,000 for the West decreased, while reports per 100,000 for the Midwest and South increased. In 2019, the numbers of methamphetamine reports were similar in the West, Midwest, and South, ranging from 179 to 192 reports per 100,000.
- For cannabis/THC, the Northeast had the most considerable periods of increase (2003 to 2008) and decrease (2009 through 2015). The other three regions had more rolling decreasing trend lines from 2001 through 2019.
- For cocaine, all four regions had rolling decreasing trend lines. The Midwest and Northeast had increases from 2001 through 2007, followed by more substantial decreases, until increases occurred from 2015 through 2017 in the Midwest and through 2018 in the Northeast. All regions showed a decrease from 2018 to 2019.
- For heroin, the South and Northeast had steady increases in reports from 2011 through 2015, while the West and Midwest had similar increases in reports from 2008 through 2015. All regions except the West had decreases in reports from 2015 through 2019. The West had an increase in reports from 2017 through 2019.
- Reports of acetyl fentanyl first appeared in 2013. In the Northeast, acetyl fentanyl reports sharply increased from 2014 to 2015, followed by a gradual decline through 2017 and another sharp increase through 2019. The Midwest and South remained fairly steady from 2014 to 2017, with a sharp increase in reports from 2018 to 2019. The annual number of reports per 100,000 for the West increased from 2017 to 2018, then decreased in 2019.
- For MDMA, the trend lines for all four regions showed a decrease from 2001 through 2004, followed by an increase through 2009. The West and Midwest had much steeper increases during this time. The regional trend lines remained flat after 2013, with recent increases through 2019 in the Midwest.

From 2018 to 2019, methamphetamine and MDMA reports increased significantly ($p < .05$) in all regions except the West. Cannabis/THC reports decreased significantly in all regions except the West. Cocaine reports decreased significantly in all regions but the Northeast. Heroin reports decreased significantly in all regions except the West, where reports increased significantly. Acetyl fentanyl reports increased significantly in all regions but the West, where they decreased significantly.

Figure 1.11 Regional trends in methamphetamine reported per 100,000 persons aged 15 or older, January 2001–December 2019[1]

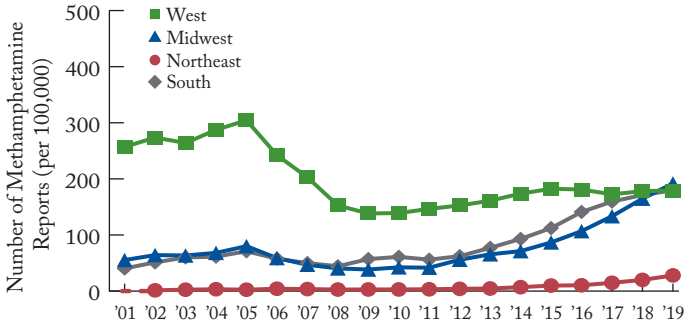


Figure 1.12 Regional trends in cannabis/THC reported per 100,000 persons aged 15 or older, January 2001–December 2019

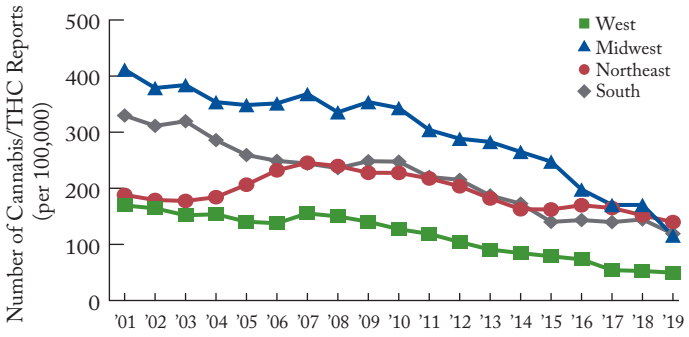


Figure 1.13 Regional trends in cocaine reported per 100,000 persons aged 15 or older, January 2001–December 2019

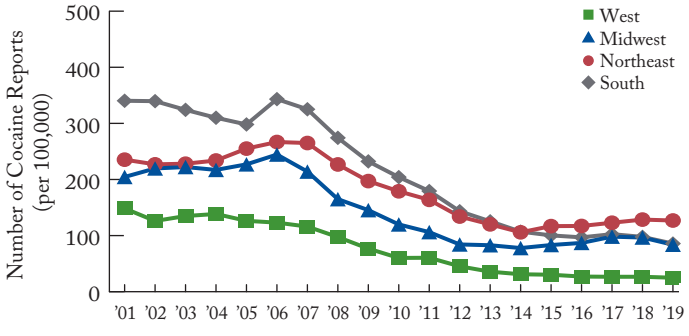


Figure 1.14 Regional trends in heroin reported per 100,000 persons aged 15 or older, January 2001–December 2019

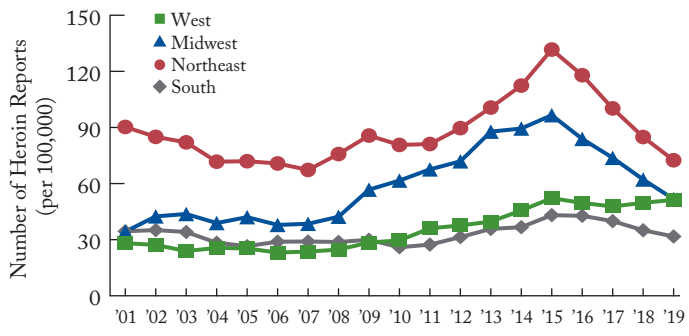


Figure 1.15 Regional trends in acetyl fentanyl reported per 100,000 persons aged 15 or older, January 2001–December 2019

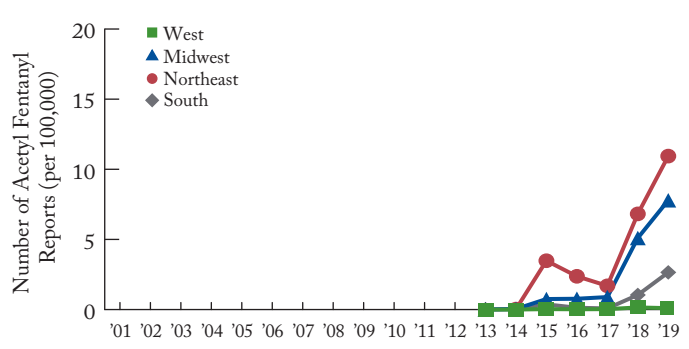
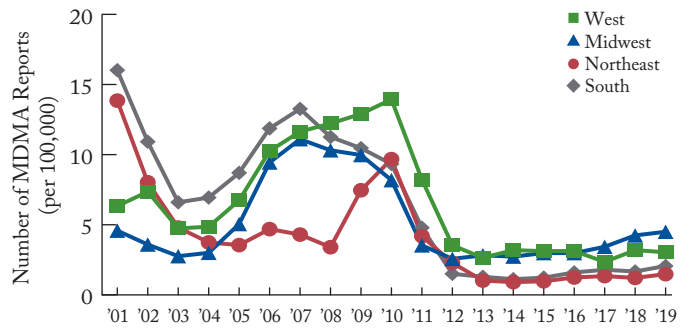


Figure 1.16 Regional trends in MDMA reported per 100,000 persons aged 15 or older, January 2001–December 2019



MDMA=3,4-methylenedioxymethamphetamine

Note: U.S. Census 2019 population data by age were not available for this publication. Population data for 2019 were imputed. Estimates are not available for acetyl fentanyl for 2001 through 2012 because acetyl fentanyl was first reported to NFLIS in 2013.

[1] *A dashed trend line indicates that estimates did not meet the criteria for precision or reliability. See Appendix A for a more detailed methodology discussion.*

Section 2

MAJOR DRUG CATEGORIES

Section 2 presents national and regional estimates of specific drugs by drug category using the NEAR approach (see Appendix A for a description of the methodology). All drugs mentioned in laboratories' drug items are included. An estimated 1,521,360 drugs were submitted to State and local laboratories during 2019 and were analyzed by March 31, 2020.

2.1 Narcotic Analgesics

From 2017 to 2018, drug overdose deaths decreased by 4.1% in the United States. Of drug overdose deaths in 2018, 69.5% involved an opioid. More than two-thirds of opioid-related deaths involved synthetic opioids. From 2017 to 2018, rates of opioid-related deaths decreased slightly from 14.9 to 14.6 per 100,000 population. Rates of prescription opioid–related deaths also decreased, from 5.2 to 4.5 per 100,000 population. During this same time, however, death rates related to synthetic opioids increased from 9.0 to 9.9 per 100,000 population.[i]

A total of 198,929 narcotic analgesic reports were identified by NFLIS-Drug laboratories in 2019, representing 13% of all drug reports (Table 2.1). Fentanyl (50%) accounted for one-half of narcotic analgesic reports, while oxycodone (11%), buprenorphine (10%), hydrocodone (6%), and acetyl fentanyl (6%) together accounted for one-third of the reports. Other narcotic analgesics reported included tramadol (4%) and ANPP (3%). The types of narcotic analgesics reported varied considerably by region (Figure 2.1). In comparison with reports from other regions in the country, the Northeast reported the highest percentage of fentanyl (63%), followed by the Midwest and West (50% and 48%, respectively). The South and West reported the highest percentages of oxycodone (16% and 13%, respectively), buprenorphine (14% and 11%, respectively), and hydrocodone (11% each).

Table 2.1 ***Narcotic Analgesics***
Number and percentage of narcotic analgesic reports in the United States, 2019[1]

Narcotic Analgesic Reports	Number	Percent
Fentanyl	98,954	49.74%
Oxycodone	22,470	11.30%
Buprenorphine	20,552	10.33%
Hydrocodone	12,747	6.41%
Acetyl fentanyl	12,190	6.13%
Tramadol	8,196	4.12%
ANPP[2]	5,798	2.91%
Carfentanil	3,288	1.65%
Morphine	3,003	1.51%
Codeine	2,210	1.11%
Valeryl fentanyl	2,042	1.03%
Methadone	1,839	0.92%
Hydromorphone	1,582	0.80%
Oxymorphone	565	0.28%
Fluoroisobutyryl fentanyl	436	0.22%
Other narcotic analgesics	3,056	1.54%
Total Narcotic Analgesic Reports[3]	198,929	100.00%
Total Drug Reports	1,521,360	

Table 2.1 Notes:

ANPP=4-anilino-N-phenethyl-4-piperidine

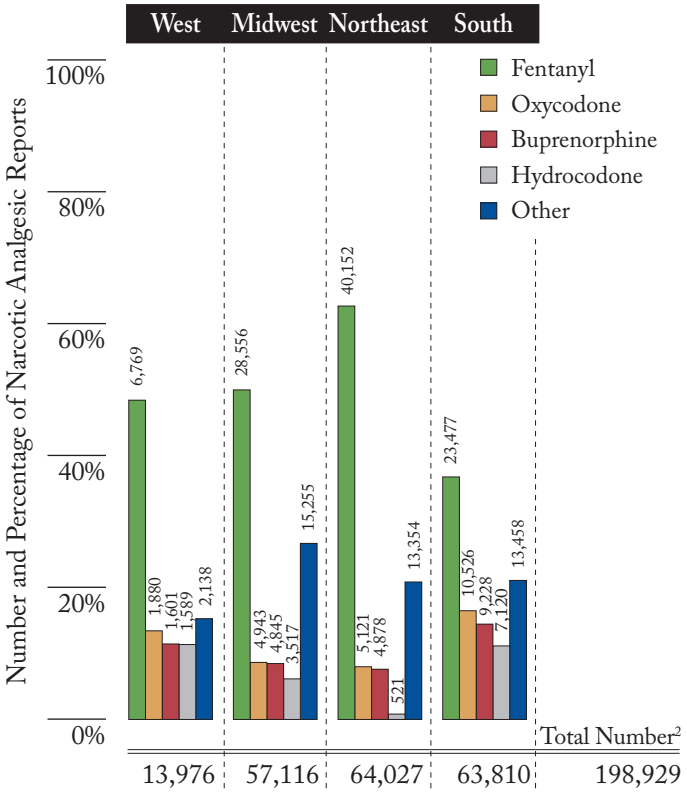
[1] Includes drug reports submitted to laboratories from January 1, 2019, through December 31, 2019, that were analyzed by March 31, 2020.

[2] Because of the interest in fentanyl and fentanyl-related compounds, ANPP, an immediate precursor of fentanyl and not a narcotic analgesic, is shown in Table 2.1.

[3] Numbers and percentages may not sum to totals because of rounding.

[i] Wilson, N., Kariisa, M., Seth, P., Smith, H., & Davis, N. L. (2020). Drug and opioid-involved overdose deaths — United States, 2017–2018. *Morbidity and Mortality Weekly Report, 69*(11), 290–297. https://doi.org/10.15585/mmwr.mm6911a4

Figure 2.1 Distribution of narcotic analgesic reports within region, 2019[1]



2.2 *Tranquilizers and Depressants*

Tranquilizers and depressants are prescribed to induce sleep, relieve anxiety and muscle spasms, and prevent seizures. Early depressants included barbiturates. Although benzodiazepines were developed to replace barbiturates, they still produce many of the same side effects, including tolerance and dependence. The only legal way to obtain benzodiazepines is through prescription. However, many users can obtain benzodiazepines by getting prescriptions from several doctors, forging prescriptions, or buying the drugs illicitly. Alprazolam and clonazepam are the two most frequently encountered benzodiazepines on the illicit market.[ii]

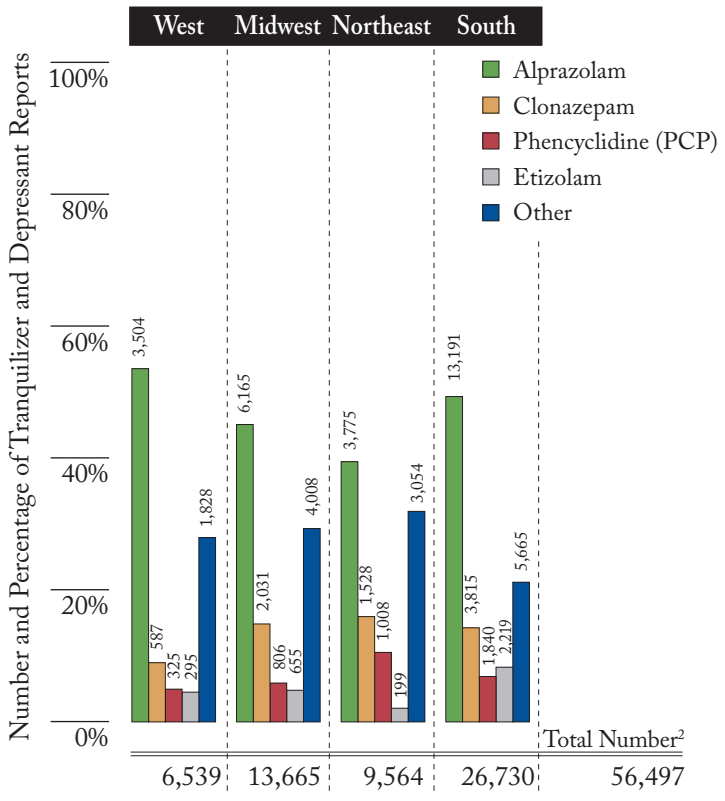
Approximately 4% of all drug reports in 2019, or 56,497 reports, were identified by NFLIS-Drug laboratories as tranquilizers and depressants (Table 2.2). Alprazolam accounted for 47% of reported tranquilizers and depressants. Approximately 14% of tranquilizers and depressants were identified as clonazepam. Alprazolam was identified in more than one-half of the tranquilizers and depressants reported in the West (54%), in almost one-half in the South (49%) and Midwest (45%), and in more than one-third in the Northeast (39%) (Figure 2.2). Clonazepam accounted for 16% of the tranquilizers and depressants identified in the Northeast and for 15% of these substances identified in the Midwest. The Northeast reported the highest percentage of phencyclidine (PCP) (11%), while the South reported the highest percentage of etizolam (8%).

[ii] U.S. Department of Justice. (2020, April 14). *Drugs of abuse: A DEA resource guide, 2020 edition.* Retrieved from https://www.dea.gov/sites/default/files/2020-04/Drugs%20of%20Abuse%202020-Web%20Version-508%20compliant-4-24-20_0.pdf

Table 2.2 ***Tranquilizers and Depressants***
Number and percentage of tranquilizer and depressant reports in the United States, 2019[1]

Tranquilizer and Depressant Reports	Number	Percent
Alprazolam	26,635	47.14%
Clonazepam	7,960	14.09%
Phencyclidine (PCP)	3,979	7.04%
Etizolam	3,368	5.96%
Ketamine	2,771	4.90%
Diazepam	2,643	4.68%
Flualprazolam	1,811	3.21%
Lorazepam	1,554	2.75%
Carisoprodol	1,001	1.77%
Zolpidem	761	1.35%
Cyclobenzaprine	754	1.34%
Clonazolam	680	1.20%
Hydroxyzine	336	0.60%
Flubromazolam	335	0.59%
Pregabalin	324	0.57%
Other tranquilizers and depressants	1,584	2.80%
Total Tranquilizer and Depressant Reports[2]	56,497	100.00%
Total Drug Reports	1,521,360	

Figure 2.2 Distribution of tranquilizer and depressant reports within region, 2019[1]



[1] *Includes drug reports submitted to laboratories from January 1, 2019, through December 31, 2019, that were analyzed by March 31, 2020.*

[2] *Numbers and percentages may not sum to totals because of rounding.*

2.3 Anabolic Steroids

Anabolic steroids, also known as "Arnolds," "Juice," "Roids," and "Stackers," are synthetic versions of the male hormone testosterone that are used to promote muscle growth, enhance athletic performance, and improve physical appearance. Steroids are often abused at doses 10 to 100 times higher than medically approved. Although most illicit steroids are smuggled into the United States from other countries, they are also illegally diverted via theft or inappropriate prescribing.[iii]

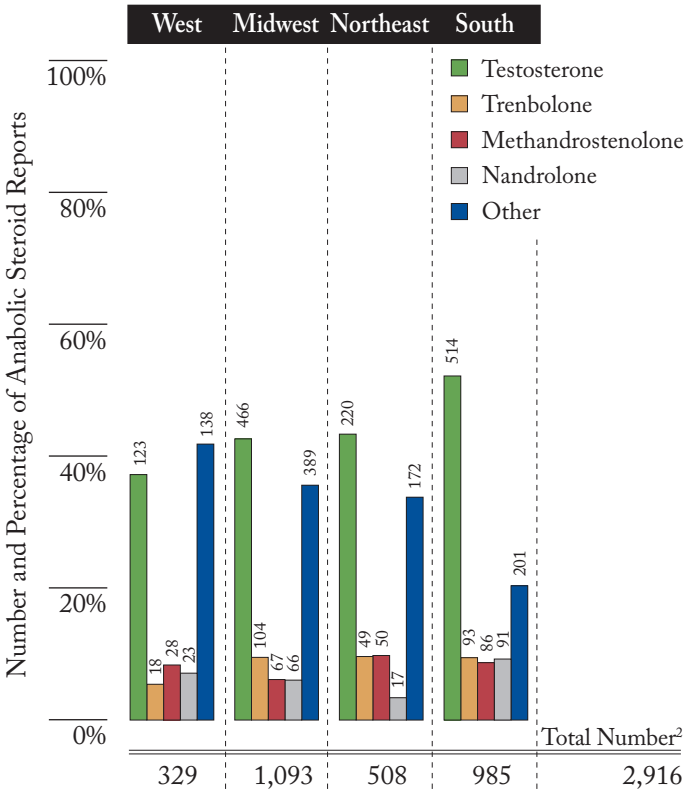
During 2019, a total of 2,916 drug reports were identified by NFLIS-Drug laboratories as anabolic steroids (Table 2.3), representing less than 1% of all drug reports. The most commonly identified anabolic steroid was testosterone (45%), followed by trenbolone (9%), methandrostenolone (8%), nandrolone (7%), and stanozolol (6%). Testosterone accounted for 52% of anabolic steroids reported in the South, 43% each in the Midwest and Northeast, and 37% in the West (Figure 2.3). The Midwest and Northeast reported the highest percentages of trenbolone (10% each), the Northeast reported the highest percentage of methandrostenolone (10%), and the South reported the highest percentage of nandrolone (9%).

Table 2.3 *Anabolic Steroids*
Number and percentage of anabolic steroid reports in the United States, 2019[1]

Anabolic Steroid Reports	Number	Percent
Testosterone	1,324	45.39%
Trenbolone	264	9.06%
Methandrostenolone	230	7.90%
Nandrolone	198	6.79%
Stanozolol	177	6.06%
Oxandrolone	153	5.26%
Boldenone	123	4.22%
Oxymetholone	95	3.27%
Drostanolone	60	2.07%
Mesterolone	40	1.36%
Methasterone	32	1.11%
Dehydrochloromethyltestosterone	23	0.79%
Methyltestosterone	18	0.60%
Mestanolone	17	0.57%
Methenolone	13	0.43%
Other steroids	149	5.11%
Total Anabolic Steroid Reports[2]	2,916	100.00%
Total Drug Reports	1,521,360	

[iii] U.S. Department of Justice. (2020, April 14). *Drugs of abuse: A DEA resource guide, 2020 edition.* Retrieved from https://www.dea.gov/sites/default/files/2020-04/Drugs%20of%20Abuse%202020-Web%20Version-508%20compliant-4-24-20_0.pdf

Figure 2.3 Distribution of anabolic steroid reports within region, 2019[1]



[1] *Includes drug reports submitted to laboratories from January 1, 2019, through December 31, 2019, that were analyzed by March 31, 2020.*

[2] *Numbers and percentages may not sum to totals because of rounding.*

2.4 Phenethylamines

Phenethylamines are synthetic drugs that are ingested for their stimulant and hallucinogenic effects on the central nervous system. They are obtained from illicit sources typically as a pill or powder but are also available in liquid form, laced on edible products, or soaked on blotter paper. Ingesting even a small amount of a phenethylamine can cause seizures, heart failure, and death.[iv]

NFLIS-Drug laboratories identified 452,075 phenethylamine reports in 2019, representing 30% of all drug reports (Table 2.4). Of these, 92% were identified as methamphetamine. Among the other phenethylamine reports, 2% were identified as amphetamine and 2% as MDMA. Methamphetamine accounted for 97% of phenethylamine reports in the West, 93% in the Midwest, 91% in the South, and 74% in the Northeast (Figure 2.4). The Northeast reported the highest percentages of amphetamine (11%) and MDMA (4%), while the Northeast and South reported the highest percentages of eutylone (2% each).

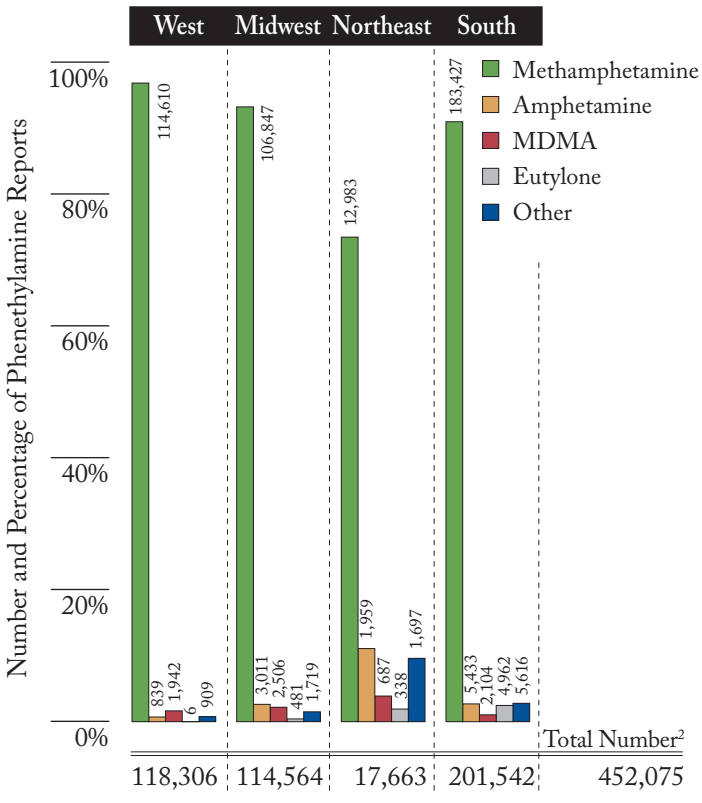
Crystal methamphetamine

Table 2.4 ***Phenethylamines***
Number and percentage of phenethylamine reports in the United States, 2019[1]

Phenethylamine Reports	Number	Percent
Methamphetamine	417,867	92.43%
Amphetamine	11,242	2.49%
MDMA	7,238	1.60%
Eutylone	5,787	1.28%
N-Ethylpentylone	1,776	0.39%
Lisdexamfetamine	1,292	0.29%
MDA	1,074	0.24%
Benzphetamine	952	0.21%
BMDP	681	0.15%
alpha-PiHP	481	0.11%
Phentermine	422	0.09%
N-Butylpentylone	258	0.06%
alpha-PHP	233	0.05%
Butylpentylone	176	0.04%
2C-B	145	0.03%
Other phenethylamines	2,451	0.54%
Total Phenethylamine Reports[2]	452,075	100.00%
Total Drug Reports	1,521,360	

MDMA=3,4-methylenedioxymethamphetamine
MDA=3,4-methylenedioxyamphetamine
BMDP=3,4-methylenedioxy-N-benzylcathinone
alpha-PiHP=alpha-pyrrolidinoisohexanophenone
alpha-PHP=alpha-pyrrolidinohexanophenone
2C-B=4-bromo-2,5-dimethoxyphenethylamine

Figure 2.4 Distribution of phenethylamine reports within region, 2019[1]



[1] Includes drug reports submitted to laboratories from January 1, 2019, through December 31, 2019, that were analyzed by March 31, 2020.

[2] Numbers and percentages may not sum to totals because of rounding.

[iv] U.S. Department of Justice, Drug Enforcement Administration. (2018, July). *About synthetic drugs.* Retrieved from https://www.deadiversion.usdoj.gov/synthetic_drugs/about_sd.html

2.5 Synthetic Cannabinoids

Synthetic cannabinoids are a large family of compounds that are similar to THC. However, these chemicals are not naturally occurring and instead are created in a laboratory. Also known as "Spice," "K2," "Dream," "Smoke," and "Fire," synthetic cannabinoids are sold in convenience stores, smoke and tobacco shops, and online as herbal incense products. They are typically found in powder form or are dissolved in a solvent and sprayed on plant material comprising the "herbal incense" products.[v]

A total of 18,772 synthetic cannabinoid reports were identified during 2019, accounting for about 1% of all drugs reported (Table 2.5). The most commonly identified synthetic cannabinoid was 5F-MDMB-PICA (25%), followed by fluoro-MDMB-PICA (13%), 5F-ADB (11%), and 4F-MDMB-BINACA (11%). Specifically, 5F-MDMB-PICA accounted for 53% of synthetic cannabinoid reports in the West and 45% in the Northeast (Figure 2.5). The Northeast and South reported the highest percentages of fluoro-MDMB-PICA (16% each), whereas the Midwest reported the highest percentages of 5F-ADB (18%) and 4F-MDMB-BINACA (19%).

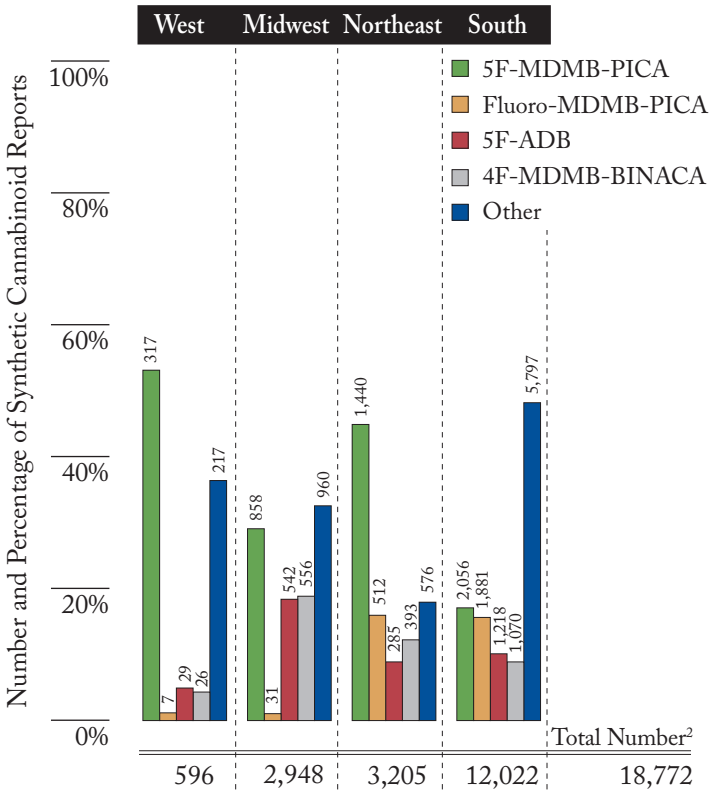
Table 2.5 ***Synthetic Cannabinoids***
Number and percentage of synthetic cannabinoid reports in the United States, 2019[1]

Synthetic Cannabinoid Reports	Number	Percent
5F-MDMB-PICA	4,671	24.88%
Fluoro-MDMB-PICA	2,431	12.95%
5F-ADB	2,075	11.06%
4F-MDMB-BINACA	2,044	10.89%
FUB-AMB	1,170	6.23%
MDMB-4en-PINACA	1,029	5.48%
Fluoro-MDMB-BINACA	994	5.30%
FUB-144	300	1.60%
MMB-FUBICA	263	1.40%
ADB-FUBINACA	122	0.65%
Fluoro-ADB	103	0.55%
APP-BINACA	88	0.47%
5F-EDMB-PINACA	68	0.36%
4-CN-CUMYL-BUTINACA	64	0.34%
Fluoro-EDMB-PINACA	49	0.26%
Other synthetic cannabinoids	3,301	17.59%
Total Synthetic Cannabinoid Reports[2]	18,772	100.00%
Total Drug Reports	1,521,360	

[1] *Includes drug reports submitted to laboratories from January 1, 2019, through December 31, 2019, that were analyzed by March 31, 2020.*

[2] *Numbers and percentages may not sum to totals because of rounding.*

Figure 2.5 Distribution of synthetic cannabinoid reports within region, 2019[1]



5F-MDMB-PICA=methyl 2-(1-(5-fluoropentyl)-1H-indole-3-carboxamido)-3,3-dimethylbutanoate

5F-ADB=methyl 2-(1-(5-fluoropentyl)-1H-indazole-3-carboxamido)-3,3-dimethylbutanoate

4F-MDMB-BINACA=methyl 2-(1-(4-fluorobutyl)-1H-indazole-3-carboxamido)-3,3-dimethylbutanoate

FUB-AMB=methyl 2-(1-(4-fluorobenzyl)-1H-indazole-3-carboxamido)-3-methylbutanoate

MDMB-4en-PINACA=methyl 3,3-dimethyl-2-(1-(pent-4-en-1-yl)-1H-indazole-3-carboxamido)butanoate

FUB-144=(1-(4-fluorobenzyl)-1H-indol-3-yl) (2,2,3,3-tetramethylcyclopropyl) methanone

MMB-FUBICA=methyl 2-(1-(4-fluorobenzyl)-1H-indole-3-carboxamido)-3-methylbutanoate

ADB-FUBINACA=N-(1-amino-3,3-dimethyl-1-oxobutan-2-yl)-1-(4-fluorobenzyl)-1H-indazole-3-carboxamide

APP-BINACA=N-(1-amino-1-oxo-3-phenylpropan-2-yl)-1-butyl-1H-indazole-3-carboxamide

5F-EDMB-PINACA=ethyl 2-(1-(5-fluoropentyl)-1H-indazole-3-carboxamido)-3,3-dimethylbutanoate

4-CN-CUMYL-BUTINACA=1-(4-cyanobutyl)-N-(2-phenylpropan-2-yl)-1H-indazole-3-carboxamide

[v] National Institute on Drug Abuse. (2020, July 24). *Synthetic cannabinoids (K2/Spice) DrugFacts.* Retrieved from https://www.drugabuse.gov/publications/drugfacts/synthetic-cannabinoids-k2spice

Section 3

GIS ANALYSIS: ACETYL FENTANYL AND EUTYLONE COMPARISONS, BY LOCATION, 2017 AND 2019

One of the unique features of NFLIS-Drug is the ability to analyze and monitor, by the county of origin, variation in drugs reported by laboratories. By using geographic information system (GIS) analyses, NFLIS-Drug can provide information on drug seizure locations.

This section presents data at the State and county levels for the percentage of drug reports identified as acetyl fentanyl and eutylone at two time points—2017 and 2019. In 2019, both drugs appeared in the NFLIS-Drug list of the top 25 most frequently identified drugs. Acetyl fentanyl was the 5th most frequently reported narcotic analgesic and the 10th most frequently reported drug. Eutylone was the 4th most frequently reported phenethylamine and the 16th most frequently reported drug.

The GIS data presented here are based on information provided to NFLIS-Drug forensic laboratories by the submitting law enforcement agencies (Figures 3.1 to 3.8). The information submitted by law enforcement includes the ZIP Code or county of origin associated with the drug seizure incident or the name of the submitting law enforcement agency. When a ZIP Code or county of origin is unavailable, the drug seizure or incident is assigned to the same county as the submitting law enforcement agency. If the submitting agency is unknown, the seizure or incident is assigned to the county in which the laboratory completing the analyses is located.

It is important to note that these data may not include all drug items seized at the State and county levels. Instead, these data represent only those drugs that were submitted to and analyzed by NFLIS-Drug forensic laboratories. In addition, some laboratories in several States are not currently reporting data to NFLIS-Drug, and their absence may affect the relative distribution of drugs seized and analyzed. Nevertheless, these data can serve as an important source for identifying abuse and trafficking trends and patterns across and within States.

Figure 3.1 Percentage of total drug reports identified as acetyl fentanyl, by State, 2017[1]

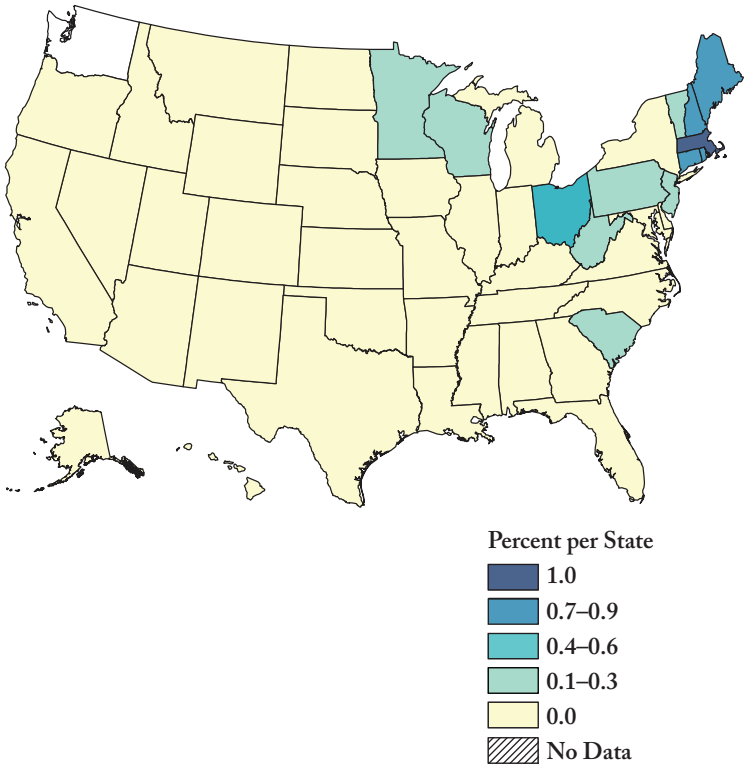


Figure 3.2 Percentage of total drug reports identified as acetyl fentanyl, by State, 2019[1]

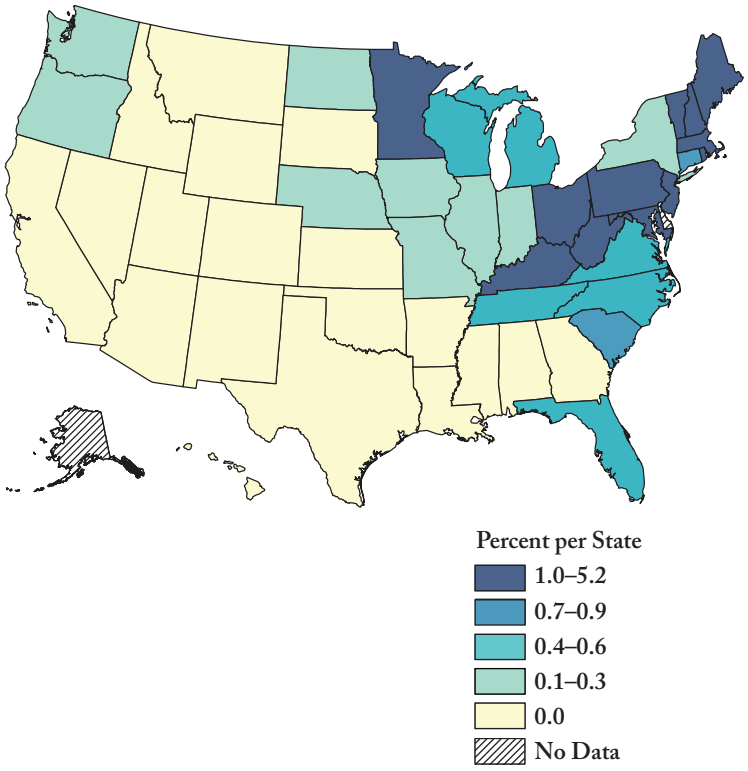


Figure 3.3 Percentage of total drug reports identified as eutylone, by State, 2017[1]

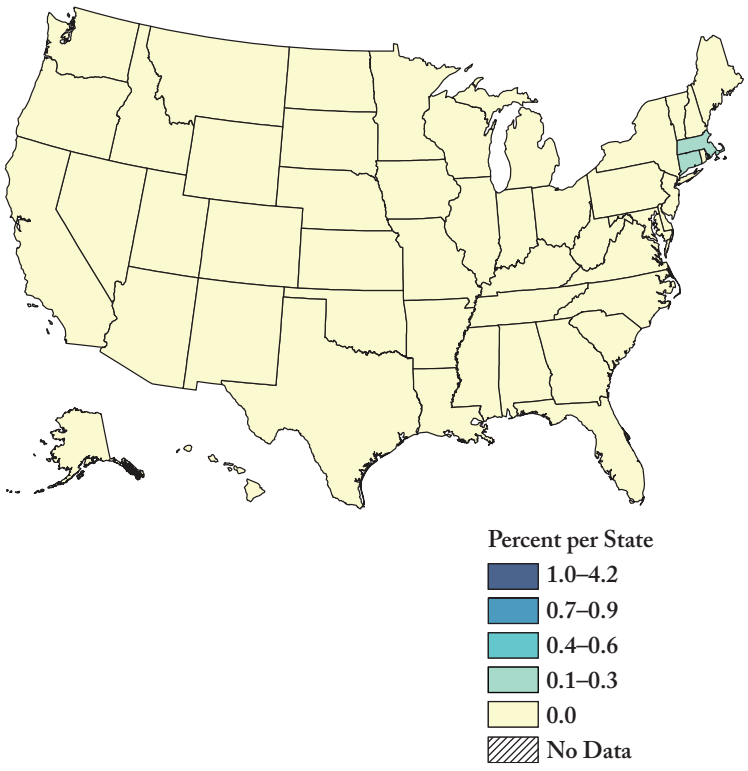
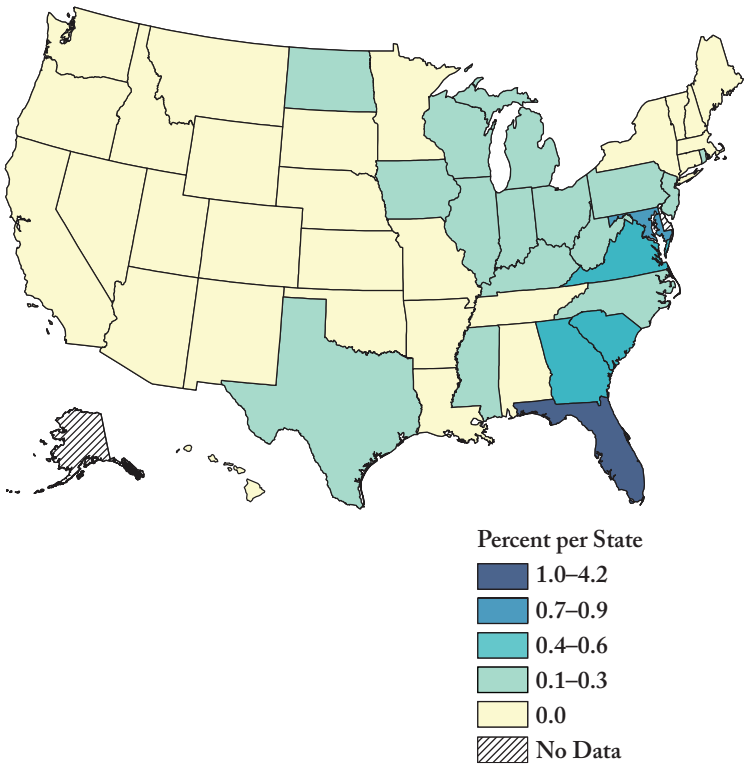
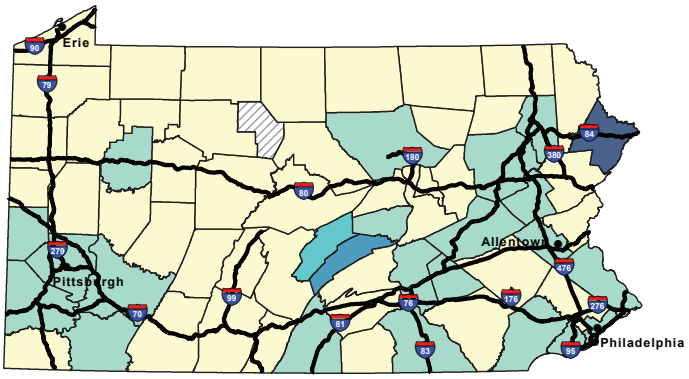


Figure 3.4 Percentage of total drug reports identified as eutylone, by State, 2019[1]



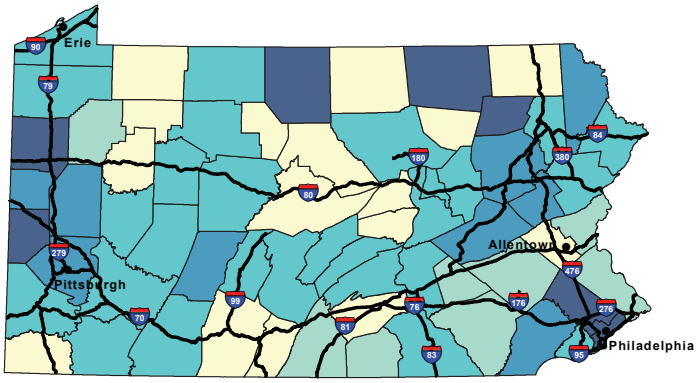
[1] *Includes drugs submitted to State and local laboratories during the calendar year that were analyzed within three months of the reporting period.*

Figure 3.5 Percentage of total drug reports identified as acetyl fentanyl in Pennsylvania, by county, 2017[1]



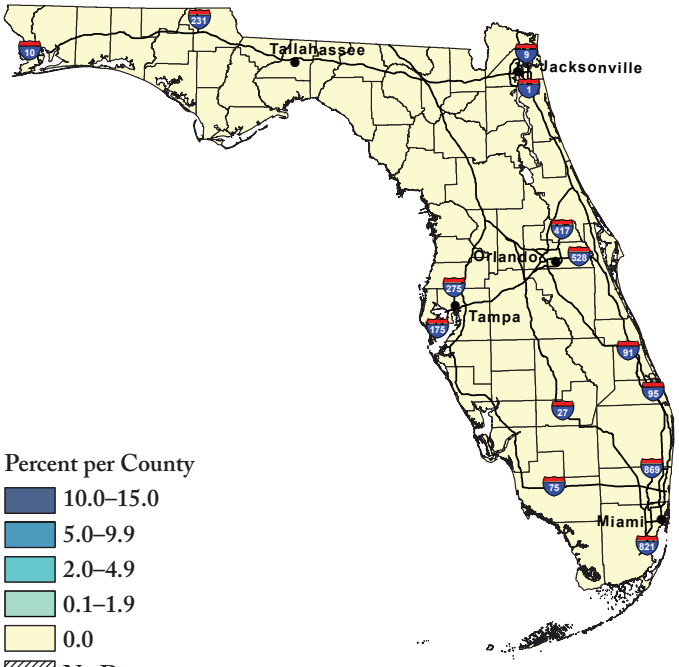
Percent per County
- 3.0–3.4
- 2.0–2.9
- 1.0–1.9
- 0.1–0.9
- 0.0
- No Data

Figure 3.6 Percentage of total drug reports identified as acetyl fentanyl in Pennsylvania, by county, 2019[1]



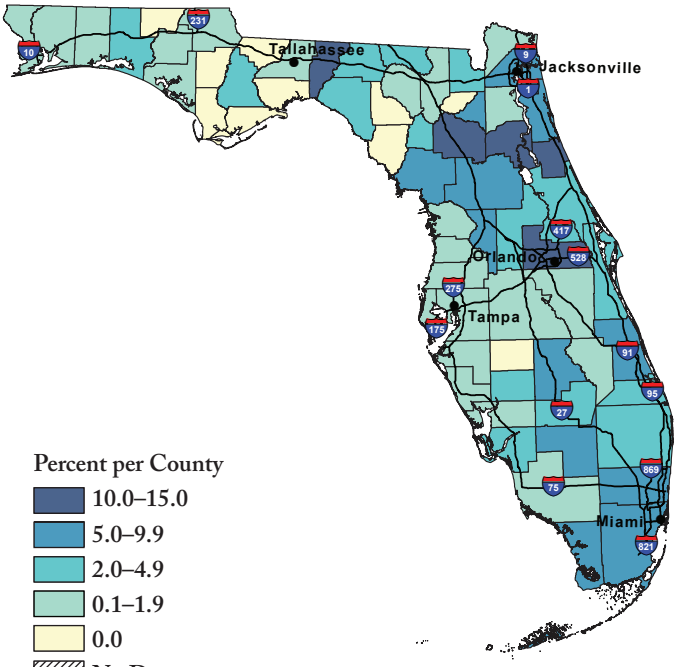
Percent per County
- 3.0–4.6
- 2.0–2.9
- 1.0–1.9
- 0.1–1.9
- 0.0
- No Data

Figure 3.7 Percentage of total drug reports identified as eutylone in Florida, by county, 2017[1]



Percent per County
- 10.0–15.0
- 5.0–9.9
- 2.0–4.9
- 0.1–1.9
- 0.0
- No Data

Figure 3.8 Percentage of total drug reports identified as eutylone in Florida, by county, 2019[1]



Percent per County
- 10.0–15.0
- 5.0–9.9
- 2.0–4.9
- 0.1–1.9
- 0.0
- No Data

[1] *Includes drugs submitted to State and local laboratories during the calendar year that were analyzed within three months of the reporting period.*

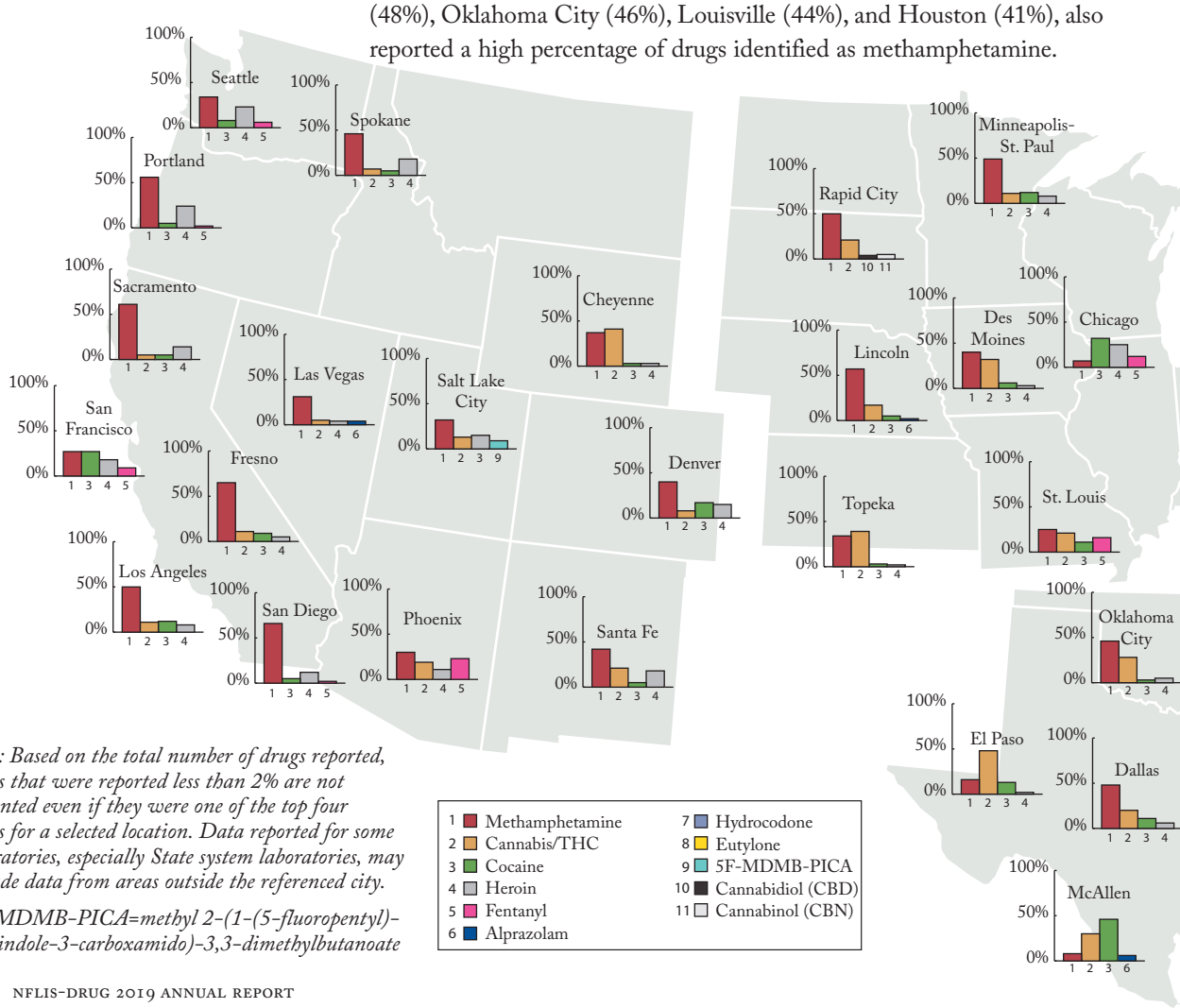
Section 4

DRUGS IDENTIFIED BY LABORATORIES IN SELECTED U.S. CITIES

NFLIS-Drug can be used to monitor drugs reported by forensic laboratories across the country, including laboratories in large U.S. cities. This section presents drug analysis results of all drugs submitted to State and local laboratories during 2019 and analyzed by March 31, 2020.

This section presents data for the four most common drugs reported by NFLIS-Drug laboratories in selected cities. The laboratories representing selected cities are presented in the summary table on the next page. The following results highlight geographic differences in the types of drugs abused and trafficked, such as the higher levels of methamphetamine reporting on the West Coast and cocaine reporting on the East Coast.

Nationally, 27% of all drugs in NFLIS-Drug were identified as methamphetamine (Table 1.1). The highest percentages of methamphetamine were reported by laboratories representing cities in the West and Midwest, including San Diego (66%), Fresno (65%), Sacramento (61%), Lincoln (57%), Portland (56%), Los Angeles (50%), Rapid City (50%), Minneapolis-St. Paul (49%), Spokane (46%), and Santa Fe (42%). Cities in the South, such as Atlanta (49%), Dallas (48%), Oklahoma City (46%), Louisville (44%), and Houston (41%), also reported a high percentage of drugs identified as methamphetamine.



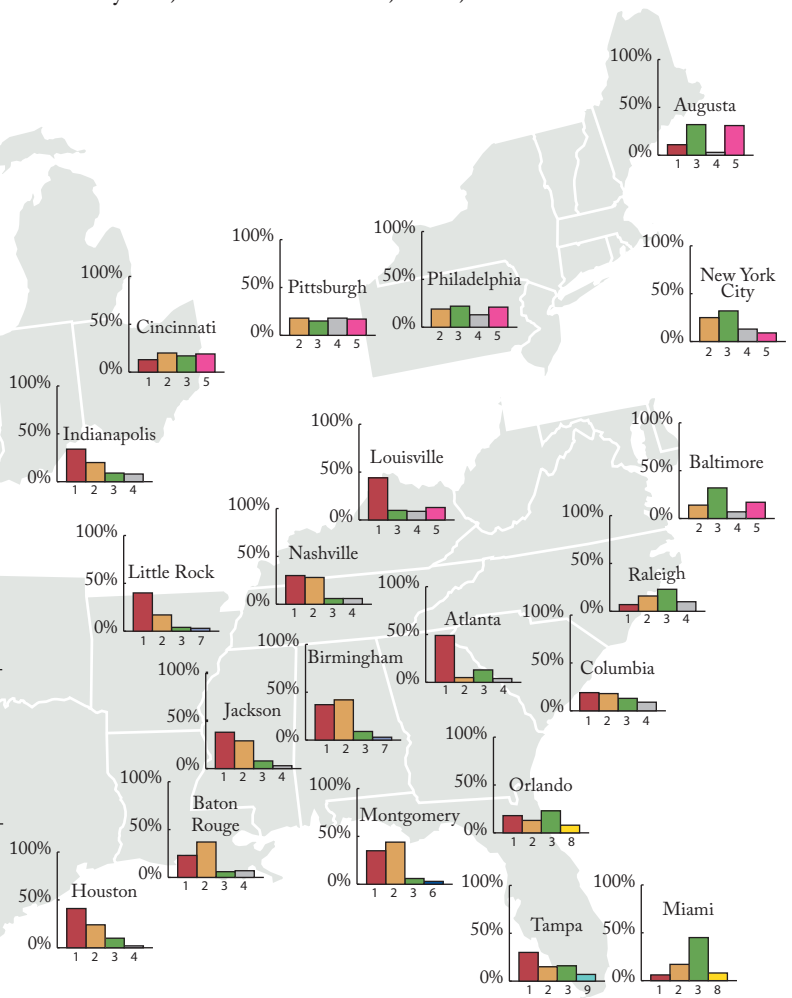
Note: Based on the total number of drugs reported, drugs that were reported less than 2% are not presented even if they were one of the top four drugs for a selected location. Data reported for some laboratories, especially State system laboratories, may include data from areas outside the referenced city.

5F-MDMB-PICA=methyl 2-(1-(5-fluoropentyl)-1H-indole-3-carboxamido)-3,3-dimethylbutanoate

Overall, the highest percentages of cocaine were reported by laboratories representing cities in the South and Northeast, such as McAllen (46%), Miami (45%), Augusta (32%), Baltimore (32%), New York City (32%), Raleigh (23%), Orlando (23%), Philadelphia (22%), Tampa (16%), and Pittsburgh (15%). Cities in the West, such as San Francisco (27%) and Denver (17%), and in the Midwest, such as Chicago (32%) and Cincinnati (17%), also reported high percentages of cocaine. Nationally, 14% of drugs in NFLIS-Drug were identified as cocaine.

The highest percentages of heroin were reported by laboratories representing the Midwest city of Chicago (25%); the Western cities of Portland (24%), Seattle (23%), Spokane (18%), Santa Fe (18%), San Francisco (18%), Denver (15%), Salt Lake City (15%), Sacramento (14%), San Diego (12%), and Phoenix (11%); the Northeast cities of Pittsburgh (18%), New York City (13%), and Philadelphia (13%); and the Southern city of Raleigh (10%). Nationally, 8% of all drugs in NFLIS-Drug were identified as heroin.

Among controlled prescription drugs, Augusta (31%), Phoenix (23%), Philadelphia (21%), and Cincinnati (19%) reported the highest percentages of fentanyl. Nationally, 7% of drugs in NFLIS-Drug were identified as fentanyl. McAllen (6%) and Las Vegas (4%) reported the highest percentages of alprazolam. Nationally, 2% of drugs in NFLIS-Drug were identified as alprazolam. Little Rock (3%) and Birmingham (3%) reported the highest percentages of hydrocodone, while Miami (8%) and Orlando (8%) reported the highest percentages of eutylone, Salt Lake City (9%) and Tampa (7%) reported the highest percentages of 5F-MDMB-PICA, and Rapid City reported the highest percentages of cannabinol (CBN) (5%) and cannabidiol (CBD) (4%). Nationally, less than 1% of drugs were identified as hydrocodone, eutylone, 5F-MDMB-PICA, CBN, or CBD.



Selected Laboratories
Atlanta (Georgia State Bureau of Investigation—Decatur Laboratory)
Augusta (Maine Department of Health and Human Services)
Baltimore (Baltimore City Police Department)
Baton Rouge (Louisiana State Police)
Birmingham (Alabama Department of Forensic Sciences—Birmingham Laboratory)
Cheyenne (Wyoming State Crime Laboratory)
Chicago (Illinois State Police—Chicago Laboratory)
Cincinnati (Hamilton County Coroner's Office)
Columbia (South Carolina Law Enforcement Division—Columbia Laboratory)
Dallas (Texas Department of Public Safety—Garland Laboratory)
Denver (Denver Police Department Crime Laboratory)
Des Moines (Iowa Division of Criminal Investigations)
El Paso (Texas Department of Public Safety—El Paso Laboratory)
Fresno (California Department of Justice—Fresno Laboratory and Fresno County Sheriff's Forensic Laboratory)
Houston (Texas Department of Public Safety—Houston Laboratory and Harris County Institute of Forensic Sciences Crime Laboratory)
Indianapolis (Indianapolis-Marion County Forensic Laboratory and Indiana State Police—Indianapolis Laboratory)
Jackson (Mississippi Department of Public Safety—Jackson Laboratory and Jackson Police Department Crime Laboratory)
Las Vegas (Las Vegas Metropolitan Police Crime Laboratory)
Lincoln (Nebraska State Patrol Criminalistics Laboratory—Lincoln Laboratory)
Little Rock (Arkansas State Crime Laboratory)
Los Angeles (Los Angeles Police Department and Los Angeles County Sheriff's Department)
Louisville (Kentucky State Police—Louisville Laboratory)
McAllen (Texas Department of Public Safety—McAllen Laboratory)
Miami (Miami-Dade Police Department Crime Laboratory)
Minneapolis-St. Paul (Minnesota Bureau of Criminal Apprehension—Minneapolis Laboratory)
Montgomery (Alabama Department of Forensic Sciences—Montgomery Laboratory)
Nashville (Tennessee Bureau of Investigation—Nashville Laboratory)
New York City (New York City Police Department Crime Laboratory)
Oklahoma City (Oklahoma State Bureau of Investigation—Edmond Laboratory)
Orlando (Florida Department of Law Enforcement—Orlando Laboratory)
Philadelphia (Philadelphia Police Department Forensic Science Laboratory)
Phoenix (Phoenix Police Department)
Pittsburgh (Allegheny Office of the Medical Examiner Forensic Laboratory)
Portland (Oregon State Police Forensic Services Division—Portland Laboratory)
Rapid City (Rapid City Police Department)
Raleigh (North Carolina State Bureau of Investigation—Raleigh Laboratory and Raleigh/Wake City-County Bureau of Identification)
Sacramento (Sacramento County District Attorney's Office)
Salt Lake City (Utah Department of Public Safety—Salt Lake City State Crime Laboratory)
San Diego (San Diego Police Department)
San Francisco (San Francisco Police Department)
Santa Fe (New Mexico Department of Public Safety—Santa Fe Laboratory)
Seattle (Washington State Patrol—Seattle Laboratory)
Spokane (Washington State Patrol—Spokane Laboratory)
St. Louis (St. Louis Police Department)
Tampa (Florida Department of Law Enforcement—Tampa Laboratory)
Topeka (Kansas Bureau of Investigation—Topeka Laboratory)

Appendix A STATISTICAL METHODOLOGY

Overview

Since 2001, NFLIS-Drug publications have included national and regional estimates for the number of drug reports and drug cases analyzed by State and local forensic laboratories in the United States. This appendix discusses the methods used for producing these estimates, including sample selection, weighting, imputation, and trend analysis procedures. RTI International, under contract to the DEA, began implementing NFLIS-Drug in 1997. Results from a 1998 survey (updated in 2002, 2004, 2008, 2013, and 2019) provided laboratory-specific information, including annual caseloads, which was used to establish a national sampling frame of all known State and local forensic laboratories that routinely perform drug chemistry analyses. A probability proportional to size (PPS) sample was drawn on the basis of annual cases analyzed per laboratory, resulting in a NFLIS-Drug national sample of 29 State laboratory systems and 31 local or municipal laboratories, and a total of 168 individual laboratories (see Appendix B for a list of sampled NFLIS-Drug laboratories).

Estimates appearing in this publication are based on cases and items *submitted* to laboratories between January 1, 2019, and December 31, 2019, and *analyzed* by March 31, 2020. Analysis has shown that approximately 95% of cases submitted during an annual period are analyzed within three months of the end of the annual period (not including the approximately 30% of cases that are never analyzed).

Since 2011, the estimation procedures have accounted for multiple drugs per item. For each drug item (or exhibit) analyzed by a laboratory in the NFLIS-Drug program, up to three drugs were reported to NFLIS and counted in the estimation process. A further enhancement to account for multiple drugs per item was introduced in 2017 for the 2016 Annual Report. All drugs reported in an item are now counted in the estimation process. This change ensures that the estimates will take into consideration all reported substances, including emerging drugs of interest that may typically be reported as the fourth or fifth drug within an item. This change was implemented in the 2016 data processing cycle and for future years. Although this change could not be applied to reporting periods before 2016, the 2016 data showed that 99.97% of drug reports are captured in the first, second, or third drug report for any item; therefore, no statistical adjustments were deemed necessary to maintain the trend with prior years.

Currently, laboratories representing more than 98% of the national drug caseload participate in NFLIS-Drug, with about 97% of the national caseload reported for the current reporting period. Because of the continued high level of reporting among laboratories, the NEAR (National Estimates Based on All Reports) method, which has strong statistical advantages for producing national and regional estimates, continues to be implemented.

NEAR Methodology

In NFLIS-Drug publications before 2011, data reported by nonsampled laboratories were not used in national or regional estimates.[vi] However, as the number of nonsampled laboratories reporting to NFLIS-Drug increased,[vii] it began to make sense to consider ways to utilize the data they submitted. Under NEAR, the "volunteer" laboratories (i.e., the reporting nonsampled laboratories) represent themselves and are no longer represented by the reporting sampled laboratories. The volunteer laboratories are assigned weights of one; hence, the weights of the sampled and responding laboratories are appropriately adjusted downward. The outcome is that the estimates are more precise, especially for recent years, which include a large number of volunteer laboratories. More precision allows for more power to detect trends and fewer suppressed estimates in Tables 1.1 and 1.2 of the NFLIS-Drug Annual and Midyear Reports.

NEAR imputations and adjusting for missing monthly data in reporting laboratories

Because of technical and other reporting issues, some laboratories do not report data for every month during a given reporting period, resulting in missing monthly data. If a laboratory reports fewer than six months of data for the annual estimates (fewer than three months for the semiannual estimates), it is considered nonreporting, and its reported data are not included in the estimates. Otherwise, imputations are performed separately by drug for laboratories that are missing monthly data, using drug-specific proportions generated from laboratories that are reporting all months of data. This imputation method is used for cases, items, and drug-specific reports and accounts for the typical month-to-month variation and the size of the laboratory requiring imputation. The general idea is to use the nonmissing months to assess the size of the laboratory requiring imputation and then to apply the seasonal pattern exhibited by all laboratories with no missing data. Imputations of monthly case counts are created using the following ratio (r_L):

$$r_L = \frac{\sum_{m \in R_L} c_{L,m}}{\sum_{m \in R_L} c_{.,m}},$$

where

R_L = set of all nonmissing months in laboratory L,
$c_{L,m}$ = case count for laboratory L in month m, and
$c_{.,m}$ = mean case counts for all laboratories reporting complete data.

[vi] The case and item loads for the nonsampled laboratories were used in calculating the weights.

[vii] In the current reporting period, for example, out of 114 nonsampled laboratories and laboratory systems, 87 (or 76%) reported.

Monthly item counts are imputed for each laboratory using an estimated item-to-case ratio (s_L) for nonmissing monthly item counts within the laboratory. The imputed value for the missing monthly number of items in each laboratory is calculated by multiplying $c_{L,m}$ by s_L.

$$s_L = \frac{\sum_{m \in R_L} i_{L,m}}{\sum_{m \in R_L} c_{L,m}},$$

where

R_L = set of all nonmissing months in laboratory L,
$i_{L,m}$ = item count for laboratory L in month m, and
$c_{L,m}$ = case count for laboratory L in month m.

Drug-specific case and report counts are imputed using the same imputation techniques presented above for the case and item counts. The total drug, item, and case counts are calculated by aggregating the laboratory and laboratory system counts for those with complete reporting and those that require imputation.

NEAR imputations and drug report-level adjustments

Most forensic laboratories classify and report case-level analyses consistently in terms of the number of vials of a particular pill. A small number, however, do not produce drug report-level counts in the same way as those submitted by the vast majority. Instead, they report as items the count of the individual pills themselves. Laboratories that consider items in this manner also consider drug report-level counts in this same manner. Drug report-to-case ratios for each drug are produced for the similarly sized laboratories, and these drug-specific ratios are then used to adjust the drug report counts for the relevant laboratories.

NEAR weighting procedures

Each NFLIS-Drug reporting laboratory is assigned a weight to be used in calculating design-consistent, nonresponse-adjusted estimates. Two weights are created: one for estimating cases and one for estimating drug reports. The weight used for case estimation is based on the caseload for every laboratory in the NFLIS-Drug population, and the weight used for drug reports' estimation is based on the item load for every laboratory in the NFLIS-Drug population. For reporting laboratories, the caseload and item load used in weighting are the reported totals. For nonreporting laboratories, the caseload and item load used in weighting are based on completion-based data obtained from an updated laboratory survey administered in 2019, or, in some cases, via direct communication with laboratories or other external sources.

When the NFLIS-Drug sample was originally drawn, State systems (and the multilaboratory local systems known to exist) were treated as a single laboratory; so, if a State system was selected, all laboratories in the system were selected. The sampling frame of laboratories was divided into four strata by two stratifiers: (1) type of laboratory (State system or municipal or county laboratory) and (2) determination of "certainty" laboratory status. The criteria used in selecting the certainty laboratories included (1) size, (2) region, (3) geographical location, and (4) other special considerations (e.g., strategic importance of the laboratory). To ensure that the NFLIS-Drug sample had strong regional representation, U.S. census regions were used as the geographical divisions to guide the selection of certainty laboratories and systems. Some large laboratories were automatically part of the original NFLIS-Drug sample because they were deemed critically important to the calculation of reliable estimates.

Each weight has two components, the design weight and the nonresponse adjustment factor, the product of which is the final weight used in estimation. After imputation, the final item weight is based on the item count, and the final case weight is based on the case count of each laboratory or laboratory system. The final weights are used to calculate national and regional estimates. The first component, the design weight, is based on the proportion of the caseload and item load of the NFLIS-Drug universe[viii] represented by the individual laboratory or laboratory system. This step takes advantage of the original PPS sample design and provides precise estimates as long as the drug-specific case and report counts are correlated with the overall caseload and item load.[ix]

During the weighting process, laboratories are further categorized into 16 strata by region (Northeast, Midwest, South, and West), in addition to type of laboratory (State system or municipal or county laboratory) and certainty status, which were both used in defining the sampling strata. For noncertainty reporting laboratories in the sample (and reporting laboratories in the certainty strata with nonreporting laboratories), the design-based weight for each laboratory is calculated as follows:

$$\text{Design Weight}_i = A/(B \times \text{Case [item] Count for Laboratory or Laboratory System } i),$$

where

i = ith laboratory or laboratory system;
A = sum of the case (item) counts for all of the laboratories and laboratory systems (sampled and nonsampled) within a specific stratum, excluding certainty strata and the volunteer stratum; and
B = number of sampled laboratories and laboratory systems within the same stratum, excluding certainty strata and the volunteer stratum.

[viii] See the Introduction of this publication for a description of the NFLIS-Drug universe.

[ix] Lohr, S. L. (2010). *Sampling: Design and analysis* (2nd ed., pp. 231–234). Boston, MA: Brooks/Cole.

Certainty laboratories are assigned a design weight of one.[x]

The second component, the nonresponse adjustment factor, adjusts the weights of the reporting and sampled laboratories to account for the nonreporting and sampled laboratories. The nonresponse (*NR*) adjustment, for certainty and noncertainty laboratories, is calculated as follows:

$$NR_j = C/D,$$

where

j = stratum;

C = number of sampled laboratories and laboratory systems in the stratum, excluding the volunteer stratum; and

D = number of laboratories and laboratory systems in the stratum that are sampled and reporting.

Because volunteer laboratories represent only themselves, they are automatically assigned a final weight of one.

NEAR estimation

The estimates in this publication are the weighted sum of the counts from each laboratory. The weighting procedures make the estimates more precise by assigning large weights to small laboratories and small weights to large laboratories.[xi] Because most of the values being estimated tend to be related to laboratory size, the product of the weight and the value to be estimated tend to be relatively stable across laboratories, resulting in precise estimates.

A finite population correction is also applied to account for the high sampling rate. In a sample-based design, the sampling fraction, which is used to create the weights, equals the number of sampled laboratories divided by the number of laboratories in the NFLIS-Drug universe. Under NEAR, the sampling fraction equals the number of sampled laboratories divided by the sum of the number of sampled laboratories and the number of nonreporting, nonsampled laboratories. Volunteer laboratories are not included in the sampling fraction calculation. Thus, the NEAR approach makes the sampling rate even higher because volunteer laboratories do not count as nonsampled laboratories.

Suppression of Unreliable Estimates

For some drugs, such as cannabis/THC and cocaine, thousands of reports occur annually, allowing for reliable national prevalence estimates to be computed. For other drugs, reliable and precise estimates cannot be computed because of a combination of low report counts and substantial variability in report counts between laboratories. Thus, a suppression rule was established.

Precision and reliability of estimates are evaluated using the relative standard error (RSE), which is the ratio between the standard error of an estimate and the estimate. Drug estimates with an RSE > 50% are suppressed and not shown in the tables.

Statistical Techniques for Trend Analysis

Two types of analyses to compare estimates across years are used. The first is called *prior-year comparisons* and compares national and regional estimates from January 2018 through December 2018 with those from January 2019 through December 2019. The second is called *long-term trends* and examines trends in the annual national and regional estimates from January 2001 through December 2019. The long-term trends method described below was implemented beginning with the 2012 Midyear Report. The new method offers the ability to identify linear and curved trends, unlike the method used in previous NFLIS-Drug publications. Both types of trend analyses are described below. For the region-level prior-year comparisons and long-term trends, the estimated drug reports are standardized to the most recent regional population totals for persons aged 15 years or older.

Prior-year comparisons

For selected drugs, the prior-year comparisons statistically compare estimates in Table 1.1 of this publication with estimates in Table 1.1 of the 2018 Annual Report. The specific test examines whether the difference between any two estimates is significantly different from zero. A standard t test is completed using the statistic,

$$t_{df} = \frac{a\hat{T}_{2019} - b\hat{T}_{2018}}{\sqrt{a^2 \operatorname{var}(\hat{T}_{2019}) + b^2 \operatorname{var}(\hat{T}_{2018}) - 2ab \operatorname{cov}(\hat{T}_{2018}, \hat{T}_{2019})}},$$

where

df = appropriate degrees of freedom (number of laboratories minus number of strata);

$\hat{T}_{2019}$ = estimated total number of reports for the given drug for January 2019 through December 2019;

$\hat{T}_{2018}$ = estimated total number of reports for the given drug for January 2018 through December 2018;

$\operatorname{var}(\hat{T}_{2019})$ = variance of $\hat{T}_{2019}$;

$\operatorname{var}(\hat{T}_{2018})$ = variance of $\hat{T}_{2018}$; and

$\operatorname{cov}(\hat{T}_{2018}, \hat{T}_{2019})$ = covariance between $\hat{T}_{2018}$ and $\hat{T}_{2019}$.

For the national prior-year comparisons, $a = b = 1$. For the regional prior-year comparisons, a = 100,000 divided by the regional population total for 2019, and b = 100,000 divided by the regional population total for 2018.

The percentile of the test statistic in the t distribution determines whether the prior-year comparison is statistically significant (a two-tailed test at $\alpha = .05$).

[x] With respect to the design weight, reporting laboratories and laboratory systems in certainty strata with nonreporting laboratories and laboratory systems are treated the same way as reporting noncertainty sampled laboratories and laboratory systems. This is done to reduce the variance; otherwise, all reporting laboratories and laboratory systems in these strata would get the same weight regardless of their size.

[xi] See footnote ix.

Long-term trends

A long-term trend analysis is performed on the January 2001 through December 2019 annual national estimates of totals and regional estimates of rates for selected drug reports. Acetyl fentanyl was introduced in the 2019 Midyear Report as one of the selected drugs of interest. Acetyl fentanyl was first reported in NFLIS in 2013; therefore, the long-term trend analysis for this drug is restricted to January 2013 through December 2019. The models allow for randomness in the totals and rates due to the sample and the population. That is, for the vector of time period totals over that time,

$$\mathbf{Y}^T \equiv (Y_1, Y_2, \ldots, Y_{19}),$$

and for the estimates,

$$\hat{\mathbf{Y}}^T \equiv (\hat{Y}_1, \hat{Y}_2, \ldots, \hat{Y}_{19}),$$

the regression model is

$$\hat{\mathbf{Y}} = \mathbf{X}\beta + \eta + \varepsilon,$$

where

$\eta = \hat{\mathbf{Y}} - \mathbf{Y}$ is a 19 × 1 vector of errors due to the probability sample, and

ε = 19 × 1 vector of errors due to the underlying model.

Randomness due to the sample exists because only a sample of all eligible laboratories has been randomly selected to be included. Randomness due to the population exists because many factors that can be viewed as random contribute to the specific total reported by a laboratory in a time period. For example, not all drug seizures that could have been made were actually made, and there may have been some reporting errors. If rates (per 100,000 persons aged 15 years or older) and not totals are of interest, the above model can be applied to $\hat{\mathbf{Y}}^* = c\hat{\mathbf{Y}}$, where c equals 100,000 divided by the 15-or-older regional population size as given by the U.S. Census Bureau.

The regression model used to perform the analysis is

$$Y_t = \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \cdots + \alpha_m t^m + \varepsilon_t \qquad t = 1, \ldots, T,$$

where

Y_t = the population total value, considered to be a realization of the underlying model; and

ε_t = one of a set of 19 independent normal variates with a mean of zero and a variance of σ^2.

The model allows for a variety of trend types, depending on the maximal polynomial degree of the analysis, such as the following: linear (straight line; $m = 1$), quadratic (U-shaped; $m = 2$), cubic (S-shaped; $m = 3$), quartic (higher-order shape; $m = 4$), and quintic (higher-order shape; $m = 5$). Because it is a model for Y_t but the sample estimates $\hat{Y}_t$ differ by the sampling error, estimation was performed by restricted maximum likelihood (REML), allowing for the two sources of error.

To implement the regression model, point estimates of totals $\hat{Y}_t$ and their standard errors are obtained for all 19 annual periods beginning with the period from January to December 2001 and ending with the period from January to December 2019. Sampling standard errors are estimated as the full sampling variance-covariance matrix $\mathbf{S}$ over these 19 time periods. The $\mathbf{S}$ matrix contains variances in totals at any time period and covariances in totals between any two time periods, thus giving a very general modeling of the sampling variance structure. The variance-covariance matrix of the totals is then $V[\hat{\mathbf{Y}}] = \sigma^2 \boldsymbol{I} + \mathbf{S}$, where $\boldsymbol{I}$ is the identity matrix.

Before the 2016 Annual Report, the variance and covariance components of the $\mathbf{S}$ matrix for the means were estimated simultaneously. The variance-covariance matrix for the means was then converted into a variance-covariance matrix for the totals. A change was introduced in 2017 in which the covariances of the totals are directly estimated, and the estimation of the covariance of the means is no longer necessary. This change in the computation of the covariance of totals provides an incremental improvement over the old approach and theoretically provides more valid statistical inferences. In addition, it creates consistency in the covariance estimation between these long-term trends and the prior-year comparisons.

Regression coefficients are estimated using the REML method. Because higher-order polynomial regression models generally show strong collinearity among predictor variables, the model is reparameterized using orthogonal polynomials. The reparameterized model is

$$Y_t = \beta_0 X_0(t) + \beta_1 X_1(t) + \beta_2 X_2(t) + \cdots + \beta_m X_m(t) + \varepsilon_t \qquad t = 1, \ldots, T,$$

where

$X_0(t) = 1/\sqrt{T}$ for all t, and

$X_1(t), \ldots, X_m(t)$ provide contributions for the first-order (linear), second-order (quadratic), and higher-order polynomials.

Note that the error term is the same in the original model and the reparameterized model because the fitted surface is the same for both models. The model is further constrained to have regression residuals sum to zero, a constraint that is not guaranteed by theory for these models but is considered to improve model fit because of an approximation required to estimate $\mathbf{S}$. Standard errors of the regression trend estimates are obtained by simulation.

Final models are selected after testing for the significance of coefficients at the $\alpha = 0.05$ level ($p < .05$), which means that if the trend of interest (linear, quadratic, or other higher-order polynomial) was in fact zero, then there would be a 5% chance that the trend would be detected as statistically significant when in fact it is not. Final fitted models are most easily interpreted using graphical plots.

Appendix B NFLIS-Drug Participating and Reporting Forensic Laboratories

State	Lab Type	Laboratory Name	Reporting
AK	State	Alaska Department of Public Safety	
AL	State	Alabama Department of Forensic Sciences (5 sites)	✓
AR	State	Arkansas State Crime Laboratory (2 sites)	✓
AZ	State	Arizona Department of Public Safety, Scientific Analysis Bureau (4 sites)	✓
	Local	Mesa Police Department	✓
	Local	Phoenix Police Department	✓
	Local	Scottsdale Police Department	✓
	Local	Tucson Police Department Crime Laboratory	✓
CA	State	California Department of Justice (10 sites)	✓
	Local	Alameda County Sheriff's Office Crime Laboratory (San Leandro)	✓
	Local	Contra Costa County Sheriff's Office (Martinez)	✓
	Local	Fresno County Sheriff's Forensic Laboratory	✓
	Local	Kern County District Attorney's Office (Bakersfield)	✓
	Local	Long Beach Police Department	✓
	Local	Los Angeles County Sheriff's Department (4 sites)	✓
	Local	Los Angeles Police Department	✓
	Local	Oakland Police Department Crime Laboratory	✓
	Local	Orange County Sheriff's Department (Santa Ana)	✓
	Local	Sacramento County District Attorney's Office	✓
	Local	San Bernardino County Sheriff's Department	✓
	Local	San Diego County Sheriff's Department	✓
	Local	San Diego Police Department	✓
	Local	San Francisco Police Department*	✓
	Local	San Mateo County Sheriff's Office (San Mateo)	✓
	Local	Santa Clara District Attorney's Office (San Jose)	✓
	Local	Solano County District Attorney Bureau of Forensic Services	✓
	Local	Ventura County Sheriff's Department	✓
CO	State	Colorado Bureau of Investigation (4 sites)	✓
	Local	Colorado Springs Police Department	✓
	Local	Denver Police Department Crime Laboratory	✓
	Local	Unified Metropolitan Forensic Laboratory (Englewood)	✓
CT	State	Connecticut Department of Public Safety	✓
DE	State	Chief Medical Examiner's Office	✓
FL	State	Florida Department of Law Enforcement (6 sites)	✓
	Local	Broward County Sheriff's Office (Fort Lauderdale)	✓
	Local	Indian River Crime Laboratory (Fort Pierce)	✓
	Local	Manatee County Sheriff's Office (Bradenton)	✓
	Local	Miami-Dade Police Department Crime Laboratory	✓
	Local	Palm Beach County Sheriff's Office Crime Laboratory (West Palm Beach)	✓
	Local	Pinellas County Forensic Laboratory (Largo)	✓
	Local	Sarasota County Sheriff's Office	✓
GA	State	Georgia State Bureau of Investigation (6 sites)	✓
HI	Local	Honolulu Police Department	✓
IA	State	Iowa Division of Criminal Investigations	✓
ID	State	Idaho State Police (3 sites)	✓
	Local	Ada County Sheriff's Office Forensic Lab (Boise)	
IL	State	Illinois State Police (6 sites)	✓
	Local	DuPage County Forensic Science Center (Wheaton)	✓
	Local	Northern Illinois Police Crime Laboratory (Chicago)	✓
IN	State	Indiana State Police Laboratory (4 sites)	✓
	Local	Indianapolis-Marion County Forensic Laboratory (Indianapolis)	✓
KS	State	Kansas Bureau of Investigation (3 sites)	✓
	Local	Johnson County Sheriff's Office (Mission)	✓
	Local	Sedgwick County Regional Forensic Science Center (Wichita)	✓
KY	State	Kentucky State Police (6 sites)	✓
LA	State	Louisiana State Police	✓
	Local	Acadiana Criminalistics Laboratory (New Iberia)	✓
	Local	Jefferson Parish Sheriff's Office (Metairie)	✓
	Local	New Orleans Police Department Crime Laboratory	
	Local	North Louisiana Criminalistics Laboratory System (3 sites)	✓
	Local	Southwest Louisiana Criminalistics Laboratory (Lake Charles)	✓
	Local	St. Tammany Parish Sheriff's Office Crime Laboratory (Slidell)	
MA	State	Massachusetts State Police	✓
	Local	University of Massachusetts Medical School (Worcester)	✓
MD	State	Maryland State Police Forensic Sciences Division (3 sites)	✓
	Local	Anne Arundel County Police Department (Millersville)	✓
	Local	Baltimore City Police Department	✓
	Local	Baltimore County Police Department (Towson)	✓
	Local	Montgomery County Police Department Crime Laboratory (Rockville)	✓
	Local	Prince George's County Police Department (Landover)	
ME	State	Maine Department of Health and Human Services	✓
MI	State	Michigan State Police (8 sites)	✓
	Local	Oakland County Sheriff's Office Forensic Science Laboratory (Pontiac)	✓
MN	State	Minnesota Bureau of Criminal Apprehension (2 sites)	✓
MO	State	Missouri State Highway Patrol (8 sites)	✓
	Local	KCMO Regional Crime Laboratory (Kansas City)	✓
	Local	St. Charles County Police Department Criminalistics Laboratory (O'Fallon)	✓
	Local	St. Louis County Police Department Crime Laboratory (Clayton)	✓
	Local	St. Louis Police Department	✓
MS	State	Mississippi Department of Public Safety (4 sites)	✓
	Local	Jackson Police Department Crime Laboratory	✓
	Local	Tupelo Police Department	✓
MT	State	Montana Forensic Science Division	✓
NC	State	North Carolina State Bureau of Investigation (3 sites)	✓
	Local	Charlotte-Mecklenburg Police Department	✓
	Local	Raleigh/Wake City-County Bureau of Identification	✓
ND	State	North Dakota Crime Laboratory Division	✓
NE	State	Nebraska State Patrol Criminalistics Laboratory	✓
NH	State	New Hampshire State Police Forensic Laboratory	✓
NJ	State	New Jersey State Police (4 sites)	✓
	Local	Burlington County Forensic Laboratory (Mt. Holly)	✓
	Local	Cape May County Prosecutor's Office	✓
	Local	Hudson County Prosecutor's Office (Jersey City)	
	Local	Ocean County Sheriff's Department (Toms River)	✓
	Local	Union County Prosecutor's Office (Westfield)	✓
NM	State	New Mexico Department of Public Safety (3 sites)	✓
	Local	Albuquerque Police Department	✓
NV	Local	Henderson City Crime Laboratory	✓
	Local	Las Vegas Metropolitan Police Crime Laboratory	✓
	Local	Washoe County Sheriff's Office Crime Laboratory (Reno)	✓
NY	State	New York State Police (4 sites)	✓
	Local	Erie County Central Police Services Laboratory (Buffalo)	✓
	Local	Nassau County Office of Medical Examiner (East Meadow)	✓
	Local	New York City Police Department Crime Laboratory**	✓
	Local	Niagara County Sheriff's Office Forensic Laboratory (Lockport)	✓
	Local	Onondaga County Center for Forensic Sciences (Syracuse)	✓
	Local	Suffolk County Crime Laboratory (Hauppauge)	✓
	Local	Westchester County Forensic Sciences Laboratory (Valhalla)	✓
	Local	Yonkers Police Department Forensic Science Laboratory	✓
OH	State	Ohio Bureau of Criminal Identification & Investigation (4 sites)	✓
	State	Ohio State Highway Patrol	✓
	Local	Canton-Stark County Crime Laboratory (Canton)	✓
	Local	Columbus Police Department	✓
	Local	Cuyahoga County Regional Forensic Science Laboratory (Cleveland)	✓
	Local	Hamilton County Coroner's Office (Cincinnati)	✓
	Local	Lake County Regional Forensic Laboratory (Painesville)	✓
	Local	Lorain County Crime Laboratory (Elyria)	✓
	Local	Mansfield Police Department	✓
	Local	Miami Valley Regional Crime Laboratory (Dayton)	✓
	Local	Newark Police Department Forensic Services	
	Local	Toledo Police Forensic Laboratory	✓
OK	State	Oklahoma State Bureau of Investigation (4 sites)	✓
	Local	Tulsa Police Department Forensic Laboratory	✓
OR	State	Oregon State Police Forensic Services Division (5 sites)	✓
PA	State	Pennsylvania State Police Crime Laboratory (6 sites)	✓
	Local	Allegheny Office of the Medical Examiner Forensic Laboratory (Pittsburgh)	✓
	Local	Philadelphia Police Department Forensic Science Laboratory	✓
RI	State	Rhode Island Forensic Sciences Laboratory	✓
SC	State	South Carolina Law Enforcement Division	✓
	Local	Anderson/Oconee Regional Forensics Laboratory	✓
	Local	Charleston Police Department	✓
	Local	Richland County Sheriff's Department Forensic Sciences Laboratory (Columbia)	✓
	Local	Spartanburg Police Department	✓
SD	State	South Dakota Department of Public Health Laboratory	
	Local	Rapid City Police Department	✓
TN	State	Tennessee Bureau of Investigation (3 sites)	✓
TX	State	Texas Department of Public Safety (13 sites)	✓
	Local	Austin Police Department	✓
	Local	Bexar County Criminal Investigations Laboratory (San Antonio)	✓
	Local	Brazoria County Sheriff's Office Crime Laboratory (Angleton)	✓
	Local	Dallas Institute of Forensic Sciences	✓
	Local	Fort Worth Police Department Criminalistics Laboratory	✓
	Local	Harris County Institute of Forensic Sciences Crime Laboratory (Houston)	✓
	Local	Houston Forensic Science Center	✓
	Local	Jefferson County Sheriff's Regional Crime Laboratory (Beaumont)	✓
UT	State	Utah Department of Public Safety (3 sites)	✓
VA	State	Virginia Department of Forensic Science (4 sites)	✓
VT	State	Vermont Forensic Laboratory	✓
WA	State	Washington State Patrol (6 sites)	✓
WI	State	Wisconsin Department of Justice (3 sites)	✓
	Local	Kenosha County Division of Health Services	✓
WV	State	West Virginia State Police	✓
WY	State	Wyoming State Crime Laboratory	✓
PR	Territory	Institute of Forensic Science of Puerto Rico Criminalistics Laboratory (3 sites)	

This list identifies laboratories that are participating in and reporting to NFLIS-Drug as of July 31, 2020.

*This laboratory is not currently conducting drug chemistry analyses. Cases for the agencies it serves are being analyzed via contracts or agreements with other laboratories.

**The New York City Police Department Crime Laboratory currently reports summary data.

Appendix C NFLIS-Drug Benefits and Limitations

Benefits

The systematic collection and analysis of drug identification data aid our understanding of the Nation's illicit drug problem. NFLIS-Drug serves as a resource for supporting drug scheduling policy and drug enforcement initiatives nationally and in specific communities around the country.

Specifically, NFLIS-Drug helps the drug control community achieve its mission by

- providing detailed information on the prevalence and types of controlled substances secured in law enforcement operations;
- identifying variations in controlled and noncontrolled substances at the national, State, and local levels;
- identifying emerging drug problems and changes in drug availability in a timely fashion;
- monitoring the diversion of legitimately marketed drugs into illicit channels;
- providing information on the characteristics of drugs, including quantity, purity, and drug combinations; and
- supplementing information from other drug sources, including the National Survey on Drug Use and Health (NSDUH) and the Monitoring the Future (MTF) study.

NFLIS-Drug is an opportunity for State and local laboratories to participate in a useful, high-visibility initiative. Participating laboratories regularly receive reports that summarize national and regional data. In addition, the Data Query System (DQS) is a secure website that allows NFLIS-Drug participants—including State and local laboratories, the DEA, and other Federal drug control agencies—to run customized queries on the NFLIS-Drug data.

Limitations

NFLIS-Drug has limitations that must be considered when interpreting findings generated from the database.

- Currently, NFLIS-Drug includes data from Federal, State, and local forensic laboratories. Federal data are shown separately in this publication. Efforts are under way to enroll additional Federal laboratories.
- NFLIS-Drug includes drug chemistry results from completed analyses only. Drug evidence secured by law enforcement but not analyzed by laboratories is not included in the database.
- National and regional estimates may be subject to variation associated with sample estimates, including nonresponse bias.
- State and local policies related to the enforcement and prosecution of specific drugs may affect drug evidence submissions to laboratories for analysis.
- Laboratory policies and procedures for handling drug evidence vary. Some laboratories analyze all evidence submitted to them, whereas others analyze only selected case items. Many laboratories do not analyze drug evidence if the criminal case was dismissed from court or if no defendant could be linked to the case.
- Laboratories vary with respect to the records they maintain. For example, some laboratories' automated records include the weight of the sample selected for analysis (e.g., the weight of one of five bags of powder), whereas others record total weight.

Appendix D NFLIS-Drug Website and Data Query System (DQS)

The NFLIS website (https://www.nflis.deadiversion.usdoj.gov/) is an important feature of the NFLIS program. It is the key resource to provide information related to NFLIS-Drug, through a public site and through a private site, which gives secure access to the NFLIS-Drug DQS. The NFLIS website and the DQS will be updated in late 2020.

The public site is frequently updated with news related to the NFLIS program, including downloadable versions of published NFLIS-Drug reports, NFLIS-Drug data sets, guides for accurate data use and citations, links to other websites, and contact information for key NFLIS-Drug staff. Public features include a link to the Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG) mass spectral library at http://www.swgdrug.org/.

The private site requires user accounts, and security roles are assigned to manage access to its features, including the Map Library, NFLIS-Drug Data Entry Application, and DQS. The DQS is a distinct resource for NFLIS-Drug reporting laboratories to run customizable queries on their own case-level data and on aggregated metropolitan, State, regional, and national data. Features include the drug category queries for synthetic cannabinoids and synthetic cathinones.

To obtain information about NFLIS-Drug participation or the DQS, please visit the NFLIS website at https://www.nflis.deadiversion.usdoj.gov/.

NFLIS
NATIONAL FORENSICS LABORATORY INFORMATION SYSTEM
U.S. DEPARTMENT OF JUSTICE
DRUG ENFORCEMENT ADMINISTRATION
DIVERSION CONTROL DIVISION

DEA Synth-Opioids
Real-Time Communication Network

Special NFLIS Announcement

DEA is pleased to announce the partnership between NFLIS and another DEA-sponsored system, the Real-Time Communication Synth-Opioids Network (Synth-Opioids), resulting in a permanent communication platform for Synth-Opioids. Since its inception in August 2017, Synth-Opioids has been bridging multiple disciplines and communities in forensic sciences for the rapid sharing of emerging psychoactive substances in the United States. By sharing scientific data to assist in detecting and identifying unknown synthetic substances and opioids, DEA has been expanding the Nation's collective scientific expertise by breaking down silos of information, not only across the Nation, but also globally. With this new partnership, NFLIS and Synth-Opioids will continue to strengthen and expand the power of collective scientific knowledge.

DEA is pleased to continue to work with our partners in the forensic communities to address the challenges associated with the rapid evolution of the illicit drug market.

The new communication platform will provide the following:

1. Rapid dissemination of information from Synth-Opioids@usdoj.gov
2. DEA emerging psychoactive alerts (for public and law enforcement use)
3. Reports on emerging drug trends and unknown substances
4. Searchable and permanent storage of information that is organized by category
5. Sharing of data and methodologies to address analytical challenges and facilitate the rapid detection and identification of emerging psychoactive substances
6. Sharing of information on novel forms of drug submissions
7. Opportunity for scientific forensic surveys to gather information rapidly

Public Domain Notice

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Electronic copies of this publication can be downloaded from the NFLIS website at **https://www.nflis.deadiversion.usdoj.gov**.

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