



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

NFLIS
NATIONAL FORENSIC LABORATORY INFORMATION SYSTEM



DRUG

NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections Report



Highlights

The NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections was implemented from April through August 2019. The survey collected information on laboratory caseloads, policies, and practices for calendar year 2018. Overall, 94% of publicly funded State systems and local laboratories in the United States participated in the survey.

About 59% of responding laboratories reported loss of staff or full-time employees as a major contributor to their backlogs, and 53% of responding laboratories reported an influx of emerging drugs as a major contributor to their backlogs.

More than half (58%) of responding laboratories reported that their drug chemistry caseloads had increased compared with one year ago, whereas only 28% reported that their drug chemistry caseloads had decreased.

Not all the cases involving drug seizures or drugs found by the agencies served were submitted to laboratories for analysis. The most frequently reported reasons for cases not being submitted to the laboratories were if the defendant pled guilty or a plea bargain was reached before or without submission to a laboratory (61%) and if the case was dismissed before submission (61%).

Only 19% of responding laboratories reported that they analyzed all drug cases submitted to them. The most common reasons cited for not analyzing a case included if the case was dismissed or there was no defendant (52%), if a guilty plea or plea bargain was reached (51%), and if the case was adjudicated without forensic evidence testing (44%).

Approximately 82% of responding laboratories reported identifying noncontrolled drugs. The most common reasons these laboratories reported for identifying noncontrolled drugs included that it was a drug of interest (62%) or it was a special request made by a local official or other entity (47%).

The most critical issues moving forward concerning the testing of emerging drugs were reported to be available reference spectra for initial identification (91% rated as "very important"), procurement of standards (89% rated as "very important"), and validation of the procedures (56% rated as "very important").

About one-quarter (28%) of responding laboratories reported that they conduct quantitative analyses. The controlled drugs or drug classes for which responding laboratories most frequently reported that they "always" or "sometimes" conduct quantitative analyses included amphetamines (65%), cocaine (38%), and cannabis/THC (24%).

Contents

Highlights	i
Introduction	1
Laboratory Information Management Systems and Accreditation	1
Laboratory Operation, Geographic Distribution, and Laboratory Size	2
Backlog, Caseload, and Turnaround Time	2
Policies for Submitting Cases to Laboratories	3
Policies for Analyzing Submitted Cases	4
Identification of Noncontrolled Substances	4
Emerging Drug Testing	5
Quantitative Analyses	6
Appendix A: Data Collection Methods	8
Public Domain Notice and Obtaining Copies of This Publication	10

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. An important component of NFLIS-Drug is the Survey of Crime Laboratory Drug Chemistry Sections. The laboratories surveyed analyze controlled and noncontrolled substances secured in law enforcement operations across the country, making NFLIS-Drug an important resource in monitoring illicit drug abuse and trafficking.

The first NFLIS-Drug Survey was conducted in 1998 and provided key information about the Nation’s laboratories and the drug case analyses that they performed. Follow-up surveys were conducted in 2002, 2004, 2008, and 2013. In 2019, the NFLIS-Drug Survey was again administered to collect updated information on laboratory caseloads, policies, and procedures during calendar year 2018.

Like past surveys, the NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections will support the creation of national estimates and will be used to update the profiles of

laboratories currently participating or eligible to participate in NFLIS-Drug. Survey results also provide unique information about forensic laboratories and drug chemistry analyses that will be of great use in supporting further development of NFLIS.

This publication presents findings from the NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections for State systems and local laboratories. Federal laboratory data were also collected and are not included in the analyses of State system and local laboratory data. Overall, a total of 162 out of 172 State systems and local laboratories completed the survey for an overall response rate of 94%. Puerto Rico also completed the survey but was not included in the analysis or the reported response rate. Administrative information is first presented, including laboratory ownership and accreditation status; laboratory location and size; types of information management systems; and backlog, caseload, and turnaround time. This publication then examines testing policies and technical procedures, such as policies for case submissions and analysis, identification of noncontrolled substances, testing for emerging drugs, and quantitative analyses. The data collection methods for the NFLIS-Drug 2019 Survey are described in Appendix A.

Laboratory Information Management Systems and Accreditation

The use of a laboratory information management system (LIMS) can enhance a laboratory’s ability to manage its caseload and to create a database with useful reporting capabilities. Approximately 88% of responding local laboratories and State systems reported using a LIMS. As shown in Table 1, of the laboratories that reported using a LIMS, 43% used JusticeTrax, 31% used Bar Coded Evidence Analysis Statistics and Tracking (BEAST), and 11% used Forensic Advantage. Another 8% reported using an in-house LIMS.

Laboratories were queried about their accreditations, which serve as a benchmark of the quality and objective application of forensic science. Laboratories can be accredited by more than one accreditation board or organization. **State systems were considered to have an accreditation if at least one laboratory in the system was accredited.** Overall, 149 laboratories provided information on their accrediting body. Of these, 90% were accredited by the ANSI National Accreditation Board (ANAB), which merged with the American Society of Crime Laboratory Directors/Laboratory Accreditation Board; 2% were accredited by the American Association for Laboratory Accreditation; and 8% were accredited by other bodies, such as the Commission on Accreditation for Law Enforcement Agencies and State entities like the Texas Forensic Science Commission. Of the ANAB-accredited laboratories, 68% were local laboratories and 32% were State systems.

Type of LIMS	Number	Percentage
JusticeTrax	61	42.7
BEAST	44	30.8
Forensic Advantage	16	11.2
In-House LIMS	12	8.4
STARLIMS	4	2.8
RJ Lee Group	3	2.1
LabWare	1	0.7
QueTel	1	0.7
Zuercher	1	0.7
Total	143	100.0

LIMS = laboratory information management system.

¹ Percentages may not sum to 100% because of rounding.

Source: NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections (April–August 2019).

Laboratory Operation, Geographic Distribution, and Laboratory Size

To better understand the context in which laboratories conducting drug analyses operate, the survey asked about laboratory operations. Of laboratory organizational units, 41% were operated by a county, 31% by a State agency, 22% by a city or municipal laboratory, and 4% by a regional entity or task force. Three laboratories were operated by multiple organizational units (2%), such as being operated by a city and a county.

The 162 State systems and local laboratories that responded to the NFLIS-Drug 2019 Survey are in all four U.S. census regions and in all 50 States. Approximately 36% of responding laboratories

are in the South, 28% are in the West, 21% are in the Midwest, and 15% are in the Northeast.

Laboratory size was based on caseload during 2018. Small laboratories analyzed 1,000 or fewer cases, medium laboratories between 1,001 and 7,000 cases, and large laboratories more than 7,000 cases. Of the 162 responding laboratories, 154 provided caseload information. Overall, 18% of responding laboratories were small, 55% were medium, and 27% were large. Among the large laboratories, 71% were State systems and 29% were local laboratories.

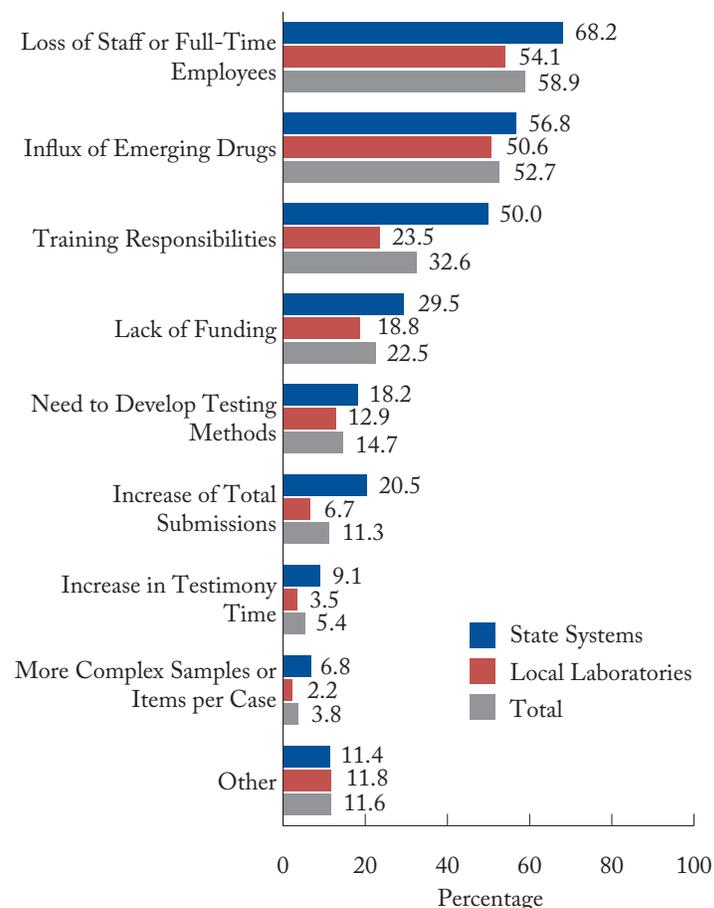
Backlog, Caseload, and Turnaround Time

Overall, 156 State systems and local laboratories provided information on their backlog. Backlog was defined as cases that went unanalyzed for 30 days or more after submission. Responding laboratories reported a combined 286,809 cases in backlog during 2018, with an average of 1,862 cases per laboratory. In total, State systems reported having more cases in backlog than local laboratories (186,295 vs. 100,514 cases).

Backlogs occur for a variety of reasons. As shown in Figure 1, among the 133 State systems and local laboratories that had at least one case in backlog, the most frequently reported contributors to backlog were loss of staff or full-time employees (59%) and influx of emerging drugs (53%), followed by training responsibilities (33%) and lack of funding (23%). A higher percentage of State systems than local laboratories reported each major contributor.

Of the 160 responding laboratories that provided information on their caseload compared with one year ago, 92 State systems and local laboratories (or 58%) reported that their current drug chemistry caseloads increased, and 44 (or 28%) reported that their caseloads decreased compared with their caseloads one year ago (Table 2). Forty percent of State systems and 30% of local laboratories reported that their caseloads greatly or moderately increased from the previous year. Laboratories were also asked about their average turnaround time (TaT), or the time from submission of a case to the laboratory until the report is administratively approved (measured in days or portion of days). The average TaT across all responding State systems and local laboratories was 60 days. The average TaT for laboratories not part of a State system was 47 days, whereas the average TaT for State system laboratories ranged between 49 and 151 days. Approximately 43% of laboratories reported that their TaT had increased from one year ago. Compared with the previous year, 40% of State systems and 31% of local laboratories reported that their TaT had greatly or moderately increased (Table 2).

Figure 1 Major Contributors to Backlog, Overall and by Laboratory Type¹



¹ Percentages may not sum to 100% because laboratories could select more than one answer.

Source: NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections (April–August 2019).

Table 2

CURRENT DRUG CHEMISTRY CASELOAD AND AVERAGE TURNAROUND TIME OF RESPONDING DRUG CHEMISTRY LABORATORIES COMPARED WITH ONE YEAR AGO¹

Caseload and Turnaround Time	Percentage						
	Greatly Increased (>20%)	Moderately Increased (10%–20%)	Slightly Increased (5%–10%)	No Change	Slightly Decreased (5%–10%)	Moderately Decreased (10%–20%)	Greatly Decreased (>20%)
Current Caseload							
State System (N=48)	14.6	25.0	25.0	8.3	12.5	4.2	10.4
Local Laboratory (N=112)	12.5	17.0	25.0	17.9	12.5	6.3	8.9
Total (N=160)	13.1	19.4	25.0	15.0	12.5	5.6	9.4
Current Turnaround Time							
State System (N=48)	25.0	14.6	2.1	14.6	14.6	6.3	22.9
Local Laboratory (N=112)	18.8	12.5	11.6	27.7	14.3	6.3	8.9
Total (N=160)	20.6	13.1	8.8	23.8	14.4	6.5	13.1

¹ Percentages may not sum to 100% because of rounding.

Source: NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections (April–August 2019).

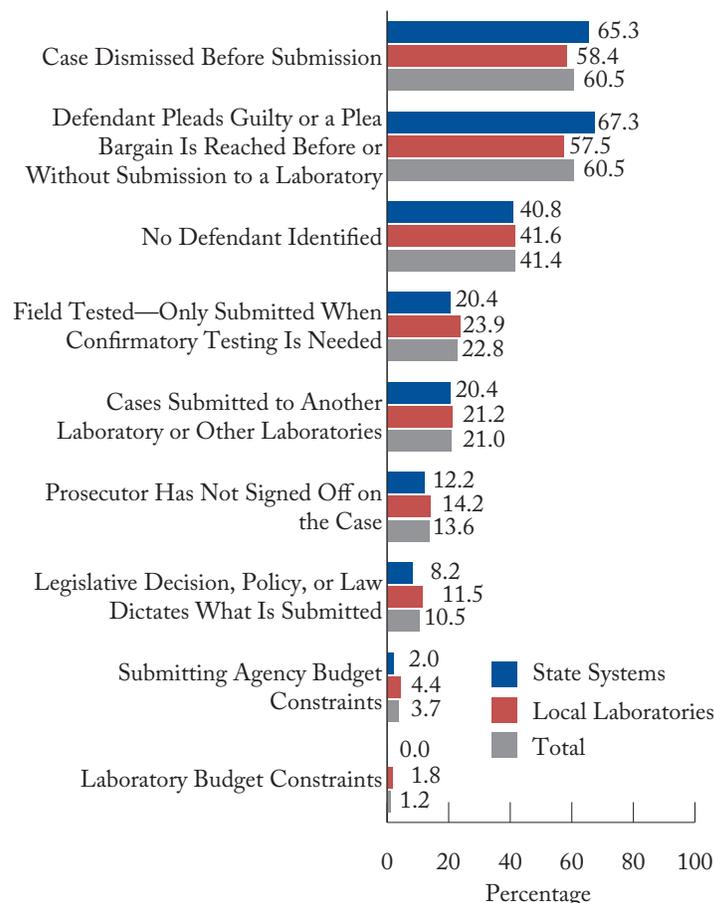
Policies for Submitting Cases to Laboratories

Law enforcement agencies differ in their policies and procedures regarding submitting cases seized or found to laboratories. As shown in Figure 2, of the 146 laboratories that provided information on these policies and procedures, the most frequently reported reasons for cases not being submitted to the laboratories included the following:

- A case was dismissed before submission (61%).
- A defendant pled guilty or a plea bargain was reached before or without submission to a laboratory (61%).
- No defendant was identified (41%).
- A case was field tested (23%).

A higher percentage of State systems than local laboratories reported a case being dismissed before submission and a defendant plea bargain or guilty plea before submission as reasons that cases were not submitted. In comparison, a higher percentage of local laboratories than State systems reported no defendant identified and a case being field tested as reasons that cases were not submitted to the laboratory.

Figure 2 Reasons That Cases Were Not Submitted to the Laboratory, Overall and by Laboratory Type¹



¹ Percentages may not sum to 100% because laboratories could select more than one answer.

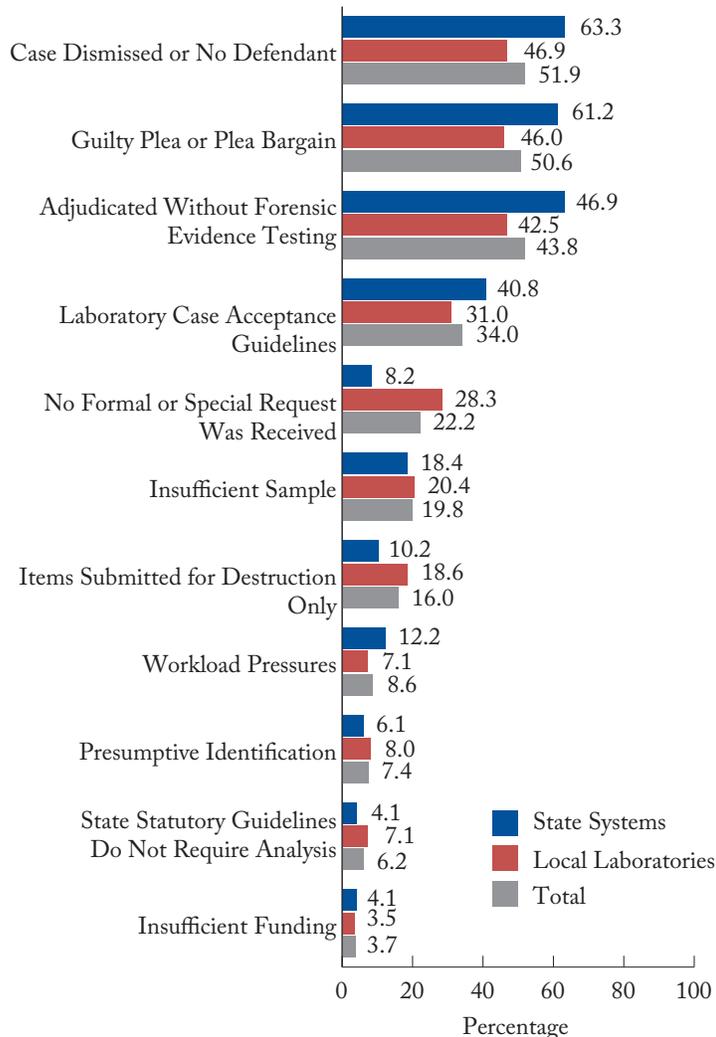
Source: NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections (April–August 2019).

Policies for Analyzing Submitted Cases

Laboratories also differ in their policies for processing and testing drug evidence submitted to their facility by law enforcement and other agencies. Overall, only 31 responding laboratories (or 19%) reported that they analyzed all cases that were submitted to the laboratory, a finding that did not vary significantly by laboratory type (17% of State systems and 20% of local laboratories). All but one laboratory provided information on reasons for not analyzing submitted cases. The most common reasons included the case was dismissed or there was no defendant (52%), a guilty plea or plea bargain was reached (51%), and the case was adjudicated without forensic evidence testing (44%) (Figure 3). In addition, 9% of laboratories reported workload pressures and 4% reported insufficient funding as factors for not testing submitted cases.

The most notable differences in reasons for not analyzing submitted cases between State systems and local laboratories were case dismissed or no defendant (63% vs. 47%), guilty plea or plea bargain (61% vs. 46%), and no formal or special request was received (8% vs. 28%).

Figure 3 Reasons That Submitted Cases Were Not Analyzed, Overall and by Laboratory Type¹



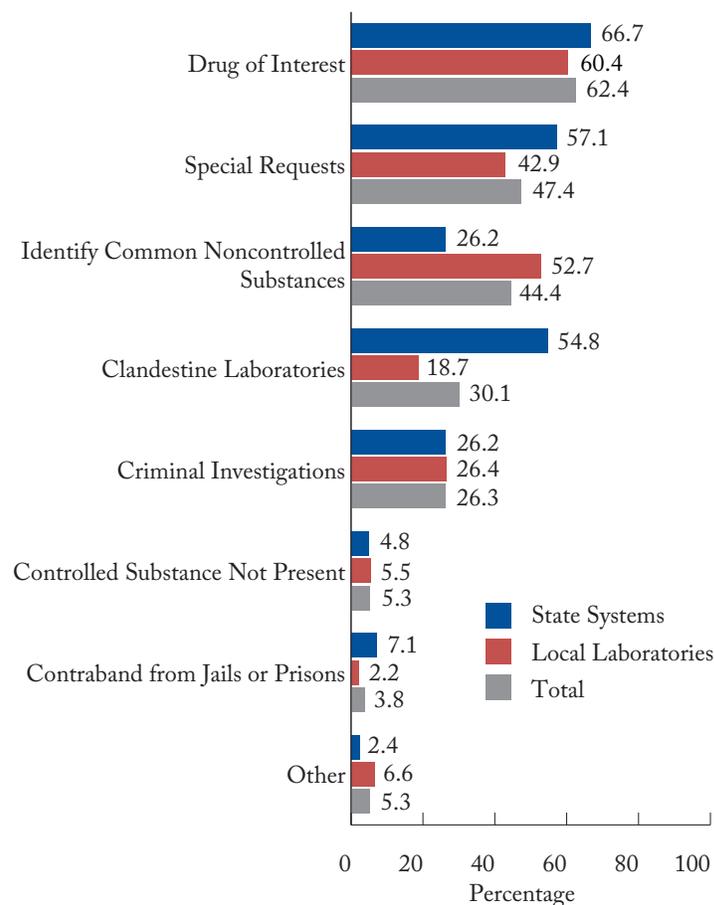
Identification of Noncontrolled Substances

The identification of noncontrolled substances is vital for understanding the dangers associated with the use of such substances and effectively tracking the emergence of new drugs. Approximately 82% of the 162 responding laboratories reported identifying noncontrolled substances. Of these laboratories, the most common reasons reported for identifying noncontrolled substances included the following (Figure 4):

- It was a drug of interest (62%).
- It was a special request made by a local official or other entity (47%).
- Only common noncontrolled substances, cutting agents, or additives were identified (44%).

A higher percentage of State systems than local laboratories reported identification of noncontrolled substances when they were a drug of interest, when a special request was made, and when the seizure was from a clandestine laboratory. A higher percentage of local laboratories than State systems reported identification of noncontrolled substances when they were common substances, cutting agents, or additives, such as caffeine, aspirin, and ibuprofen.

Figure 4 Circumstances in Which Laboratories Identified Noncontrolled Substances, Overall and by Laboratory Type¹



¹ Percentages may not sum to 100% because laboratories could select more than one answer.

Source: NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections (April–August 2019).

Emerging Drug Testing

Laboratories are constantly dealing with the need to identify and test for new or emerging drugs. For the purposes of this survey, emerging drugs were defined as controlled and noncontrolled substances that laboratories began identifying in the past 10 years. Laboratories reported many important issues associated with the testing of emerging drugs (Table 3).

The most critical issues identified were available reference spectra for initial identification (91% rated as “very important”), procurement of standards (89% rated as “very important”), validation of the procedures (56% rated as “very important”), and limited staffing (44% rated as “very important”).

Table 3

IMPORTANCE OF ISSUES ASSOCIATED WITH THE TESTING OF CONTROLLED AND NONCONTROLLED EMERGING DRUGS, BY RESPONDING STATE SYSTEMS AND LOCAL LABORATORIES¹

Issue	Percentage					Total
	Very Important	Fairly Important	Slightly Important	Not at All Important	No Opinion	
Available Reference Spectra for Initial Identification (N=161)	90.7	8.1	0.6	0.6	0.0	100.0
Procurement of Standards (N=161)	88.8	9.9	0.6	0.6	0.0	100.0
Validation of the Procedures (N=160)	55.6	25.0	11.3	5.0	3.1	100.0
Limited Staffing (N=161)	43.5	26.1	16.8	9.3	4.3	100.0
Time Commitment (N=161)	35.4	32.3	19.9	6.8	5.6	100.0
Limited Budget (N=161)	34.8	30.4	19.3	7.5	8.1	100.0
Limited Analytical or Instrumental Methodology (N=160)	22.5	33.8	25.6	13.1	5.0	100.0
Limited Samples Available for Testing (N=160)	16.9	27.5	34.4	16.3	5.0	100.0
Expense Associated with Custom Synthesis (N=160)	14.4	13.1	23.8	18.1	30.6	100.0
Testing Based on Case History and Insufficient Information (N=159)	6.3	13.2	25.8	33.3	21.4	100.0

¹ Percentages may not sum to 100% because of rounding.

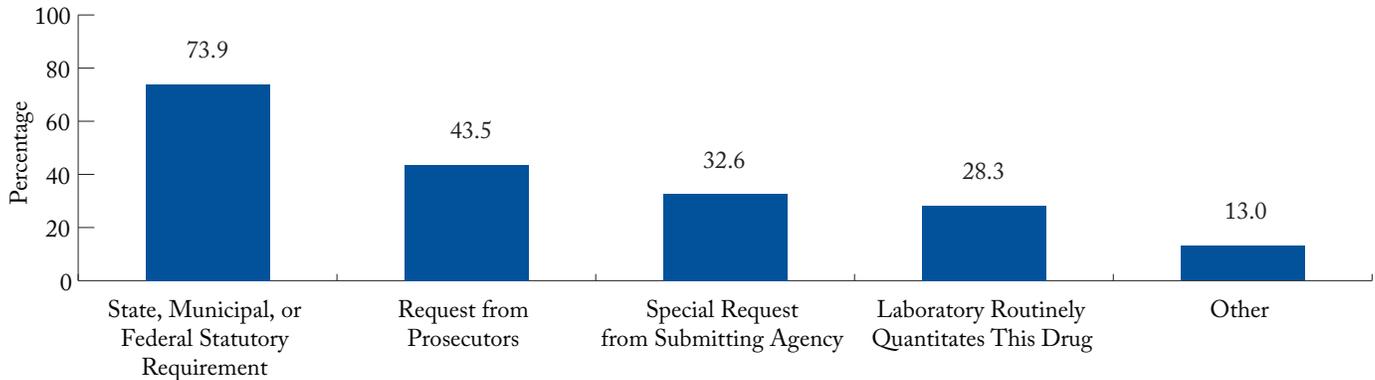
Source: NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections (April–August 2019).

Quantitative Analyses

Quantitative analysis is used to measure the purity of a substance (i.e., the percentage of “pure” substance in a sample). Generally, higher levels of purity enhance the danger or adverse pharmacological effects that may result from use, and in some States, the level of sanction associated with the possession or sale of substances is based on the amount of pure substance in the sample or seizure, excluding adulterants or other chemicals.

Overall, 28% of responding drug chemistry laboratories reported that they conduct quantitative analyses, including 43% of State systems and 22% of local laboratories. The most common circumstances for conducting quantitation among responding laboratories, regardless of laboratory type, included State, municipal, or Federal statutory requirements (74%) and requests from prosecutors (44%) (Figure 5).

Figure 5 Circumstances in Which Quantitative Analyses Are Conducted¹

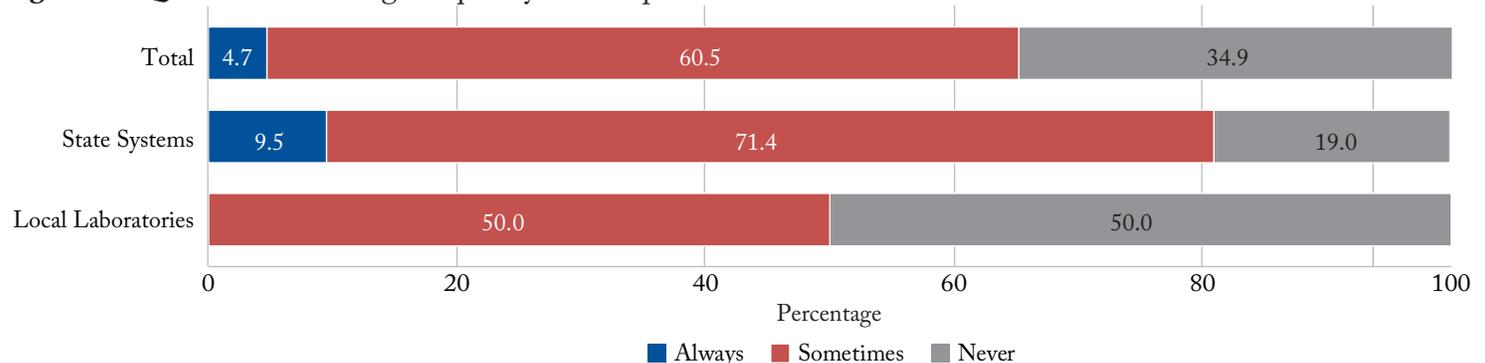


¹ Percentages may not sum to 100% because laboratories could select more than one answer.
Source: NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections (April–August 2019).

Figures 6 through 10 present the quantitative analysis frequency of selected drugs or drug classes, overall and by laboratory type. Drugs and drug classes in which more than 10% of laboratories reported “always” or “sometimes” conducting quantitative analyses are presented. Of the 46 laboratories that reported conducting quantification, the number of responding laboratories providing quantification frequency by drug or drug class ranged from 38 to 43. Among responding laboratories that reported conducting quantitative analyses, few reported “always” conducting quantitative analyses for specific controlled drugs or drug classes.

The controlled drugs or drug classes with the highest percentages of responding State systems or local laboratories reporting “always” or “sometimes” conducting quantitative analyses included amphetamines (65%), cocaine (38%), and cannabis/THC (24%). A higher percentage of State systems than local laboratories reported “always” or “sometimes” quantifying amphetamines and heroin. In contrast, a higher percentage of local laboratories reported “always” or “sometimes” quantifying cocaine, cannabis/THC, and ketamine.

Figure 6 Quantitative Testing Frequency for Amphetamines¹



¹ Percentages may not sum to 100% because of rounding.
Source: NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections (April–August 2019).

Figure 7 Quantitative Testing Frequency for Cocaine¹

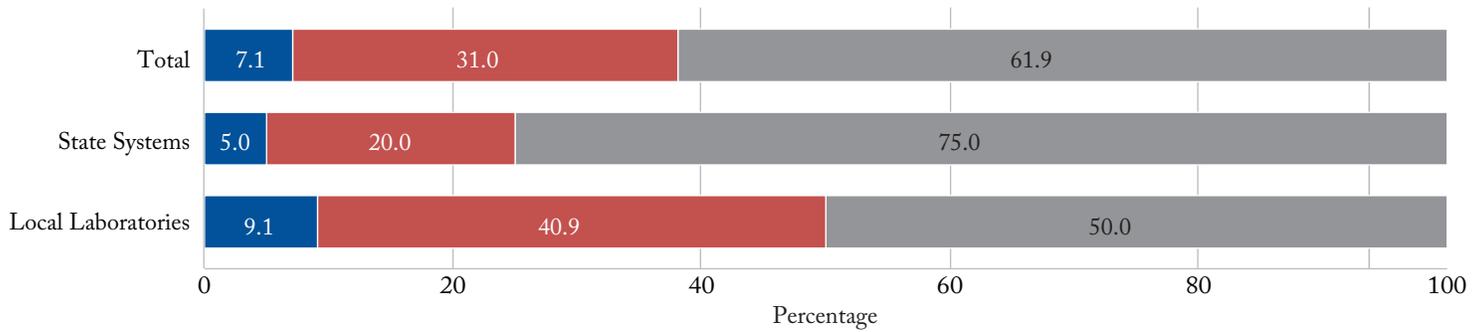


Figure 8 Quantitative Testing Frequency for Cannabis/THC¹

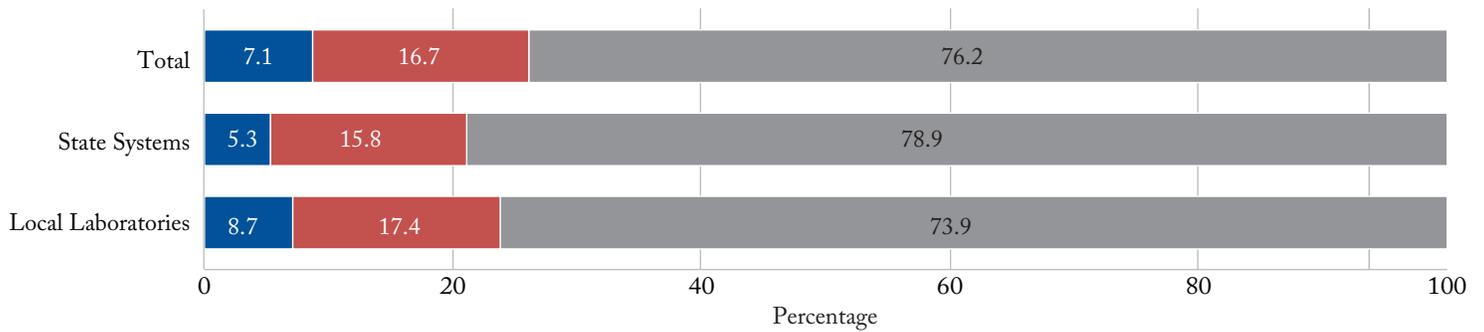


Figure 9 Quantitative Testing Frequency for Heroin¹

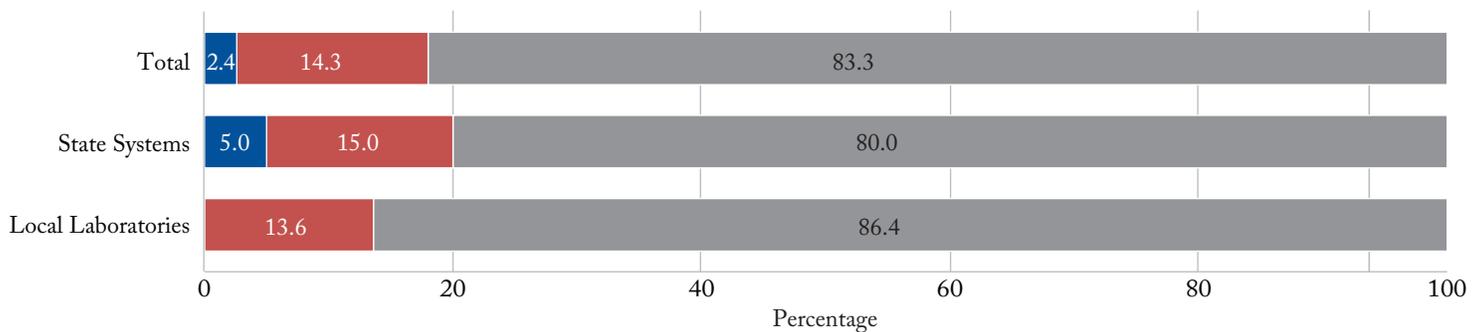
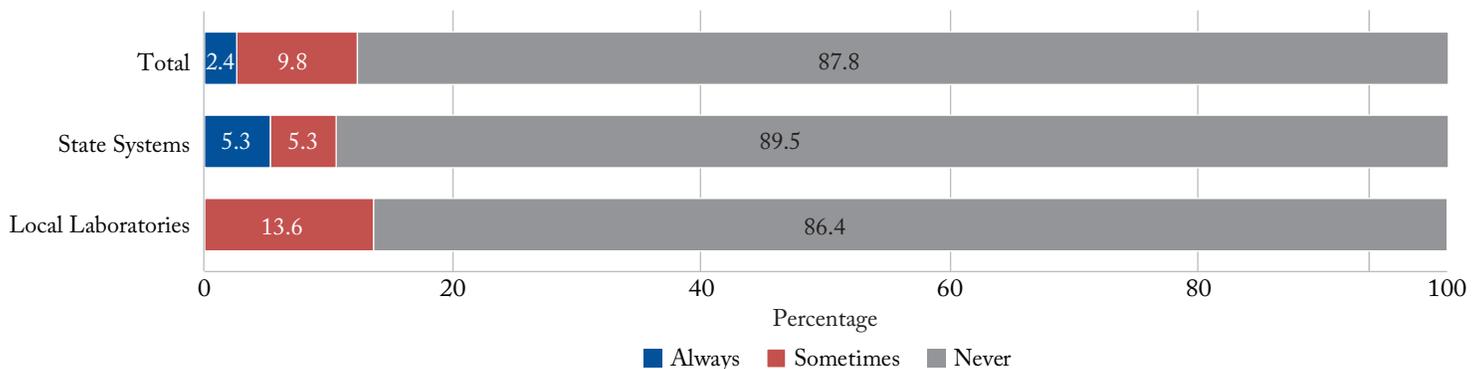


Figure 10 Quantitative Testing Frequency for Ketamine¹



¹ Percentages may not sum to 100% because of rounding.

Source: NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections (April–August 2019).

Appendix A: Data Collection Methods

The NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections was administered from April through August 2019 and gathered information from publicly funded State systems and local laboratories in the United States that regularly conduct drug chemistry analyses. Approximately 300 individual forensic laboratories conducting drug chemistry analyses operate in the United States. This number includes individual laboratories that are owned and operated by State, county, and municipal governments, and those owned and operated by regional or jointly owned entities or task forces. Following is a description of the data collection methodology used to collect survey data from State systems and local laboratories.

Instrumentation

The NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections is an update of previous surveys conducted as part of NFLIS. The questionnaire was based primarily on the 2013 survey instrument. The survey was reviewed by DEA and RTI International staff and compared with other similar surveys of laboratories.* Forensic science staff at RTI completed a final review before fielding the survey.

Data Collection Strategy

Laboratories were aggregated into three categories:

- Participating NFLIS-Drug local laboratories
- Nonparticipating local laboratories and laboratory systems
- Participating NFLIS-Drug State laboratory systems (all State systems are currently participating in NFLIS-Drug)

For State and local systems, surveys were mailed to the headquarters laboratory; each individual laboratory in the system did not receive a survey. The laboratory headquarters completed the survey for all the laboratories in its system. State systems and local laboratories completed the same version of the survey. Cover letters and reminder letters were formatted relative to the category in which each laboratory belonged.

The survey was initiated in April 2019, with a mailing of 173 surveys to laboratories and laboratory systems. State and local system headquarters completed the survey for all individual laboratories in the system, which reduced the size of the mailing. Each laboratory or laboratory system received a packet of information that included a letter from RTI explaining how to complete the survey and a letter of endorsement from DEA. A hard copy of the survey was not included in the initial mailing in order to encourage completion of the survey online. The information packets were mailed via Federal Express and tracked throughout the duration of data collection. Laboratory directors were given the option of completing the survey in several ways. Surveys could be completed online, submitted electronically via e-mail (using a Microsoft Word file), or returned by U.S. mail (completing a printed version of the survey).

Two weeks after the initial mailing, a reminder letter was sent to all laboratories that had not yet responded to the questionnaire. A printed version of the survey and a stamped return envelope

were included in the follow-up packet. In addition, a customized 18-month NFLIS calendar was included in the two-week follow-up mailing as a token of appreciation. The calendar included conference and annual meeting data that were available at the time the calendar was created. Laboratory systems received one copy for each laboratory in the system. Laboratories received the calendar even if they did not complete the survey. Additional follow-up telephone calls and e-mails were made throughout the data collection period to obtain as many completed surveys as possible.

Response Rates

A total of 173 State systems and local laboratories were identified for the survey. At the completion of the five-month data collection period, 163 State systems (including Puerto Rico) and local laboratories had completed the survey, resulting in a 94% response rate. For this publication, Puerto Rico was excluded from the analyses. This publication focuses on survey findings from laboratories in the 50 States. Table A.1 presents the final response rates overall and by laboratory type (excluding Puerto Rico). Overall, 93% of the local laboratories and 98% of the State systems completed the survey. A higher percentage of completed surveys were returned by local laboratories currently participating in NFLIS than local laboratories not yet participating in NFLIS.

Table A.1 *NFLIS-DRUG 2019 SURVEY OF CRIME LABORATORY DRUG CHEMISTRY SECTIONS RESPONSE RATES, BY RESPONDING STATE SYSTEMS AND LOCAL LABORATORIES¹*

Laboratory Type	Number of Eligible Laboratories ²	Number of Laboratories Completing the Survey	Response Rate
Overall	172	162	94.2%
Local Laboratories	122	113	92.6%
Participating in NFLIS ³	102	91	95.1%
Not Participating in NFLIS ³	20	16	80.0%
State Systems	50	49	98.0%
Participating in NFLIS ³	50	49	98.0%
Not Participating in NFLIS ³	0	0	0.0%

¹ Percentages may not sum to 100% because of rounding.

² Defined as laboratories that conduct drug chemistry analyses; excludes Puerto Rico.

³ Participating and not participating as of April 2019 (survey implementation); all State systems are currently participating in NFLIS.

Source: NFLIS-Drug 2019 Survey of Crime Laboratory Drug Chemistry Sections (April–August 2019).

Laboratories were given multiple options for completing the survey. The strategy to encourage completion of the web-based survey was successful. Overall, 84% of responding laboratories completed the web-based survey, 12% responded by e-mail, 4% responded by U.S. mail, and 1% completed the survey over the telephone.

* RTI International is a registered trademark and a trade name of Research Triangle Institute. RTI is the DEA contractor for NFLIS.

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