Study of Familial DNA Searching Policies and Practices

National Survey of CODIS Laboratories Brief

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Key Terminology

CODIS: The Combined DNA Index System (CODIS) is software designed by the FBI to facilitate the sharing and searching of DNA profiles within and between jurisdictions across the country. CODIS has national (NDIS), state (SDIS), and local (LDIS) levels.

Familial DNA Searching: A deliberate search of a DNA database using specialized software (separate from CODIS) to detect and statistically rank a list of potential candidates in the DNA database who may be close biological relatives (e.g., parent, child, sibling) to the unknown individual contributing the evidence DNA profile, combined with lineage testing to help confirm or refute biological relatedness.

Partial Matching: A moderate stringency search of a DNA database using the routine search parameters within CODIS that results in one or more partial matches between single-source and non-degraded DNA profiles that share at least one allele at each locus, indicating a potential familial relationship between the known individual in the DNA database and the unknown individual contributing the evidence DNA profile. *Disclosing or proceeding with* a partial match would be to use information learned through partial matching in an investigation.

Lineage Testing: Additional genetic testing, such as Y-STR and mtDNA analysis, used to help confirm or refute biological relatedness between the known individual in the DNA database and the unknown individual contributing the evidence DNA. Y-STR analysis is the examination of STR patterns specific to the Y-Chromosome that is used to determine paternally derived relatedness among DNA profiles, whereas mtDNA is found in the mitochondria of cells and is used to determine maternally derived relatedness.

Study Overview

In recent years, jurisdictions across the United States have expressed a growing interest in the use of familial DNA searching (FDS) to aid criminal investigations. To date, much of the information available regarding FDS stems from anecdotal accounts and scholarly arguments about the various constitutional, ethical, and practical implications of its use posed by various stakeholders, but the field has conducted little rigorous research on the practice (beyond laboratory validation studies). To begin to fill these knowledge gaps and help provide information on this emerging practice, ICF, with support from the National Institute of Justice, conducted a multi-phase study on FDS policies and practices in the United States. This study had multiple components, including two expert roundtables, a literature and policy scan of practice, cost modeling, state case studies, and the National Survey of CODIS Laboratories. This brief summarizes the national survey, including methodology and key findings.

Methodology

ICF conducted a survey of all state and local CODIS laboratories to learn about key considerations and varied practices related to FDS and partial matching (PM) in the U.S. The survey instrument was developed in consultation with the project's expert roundtable members after an in-depth review of scholarly literature, existing surveys, and legislation and agency policies. The survey included the following topics: lab/respondent background, legislation and policies, scope of use of FDS and PM, perceptions and opinions of FDS and PM (including benefits and concerns), and specific practices related to FDS and PM (e.g., eligibility criteria, lineage testing protocols).

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With help from the National Forensic Science Technology Center, ICF developed a list of 133 CODIS laboratories operating in all 50 states, the District of Columbia, one U.S. territory, and at the federal level. The survey was emailed to lab directors (with instructions to complete in coordination with their CODIS administrator, as needed) and fielded from December 2014 to May 2015. In cases of multi-laboratory systems, only the overarching laboratory director was asked to complete the survey, as policies are typically consistent across laboratories within a system. In total, 103 crime labs completed the survey (a 77% response rate). ICF analyzed survey data using descriptive statistics and simple statistical comparison tests (e.g., chi-square tests, t-tests).

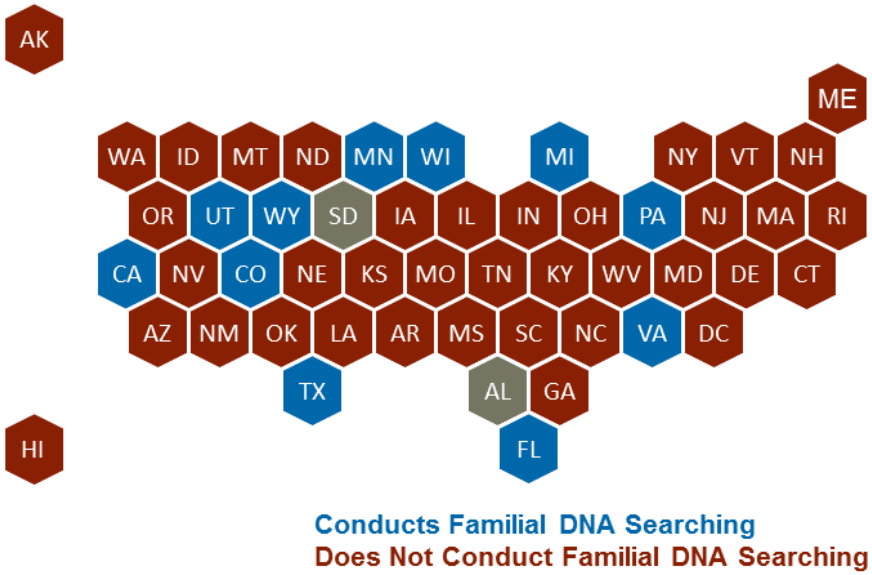
Results

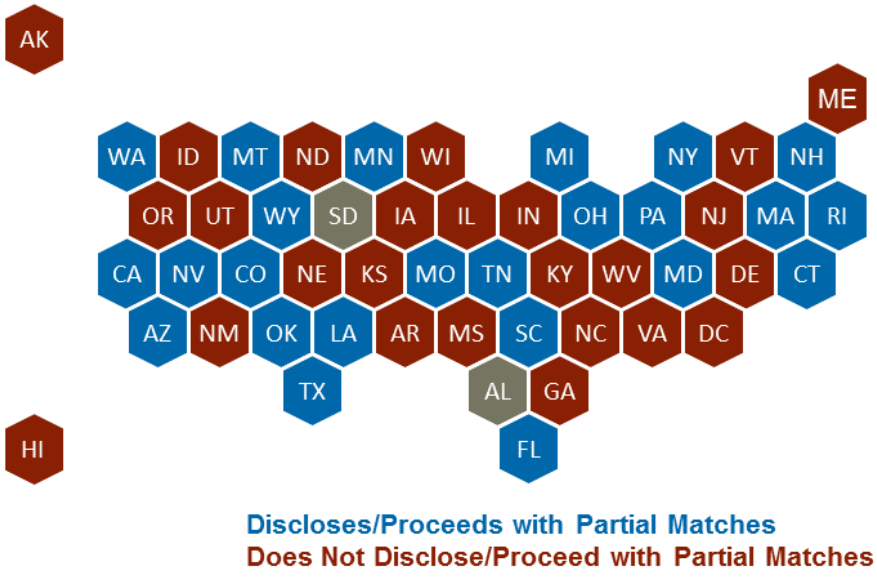
Description of Respondents and Use of FDS and PM

The survey was completed by CODIS labs in 48 states, Washington D.C., and one U.S. territory, as well as two federal labs. About half (53%) of respondents represented SDIS labs, and the state crime lab completed the survey in all 48 states which provided responses.[1] Respondents were well distributed by size, with 22% of respondents serving between 1 and 5 police agencies, 19% serving 6-25 agencies, 23% serving 26-100 agencies, and 36% serving over 100 agencies.

Respondents were provided with definitions for FDS and PM (see *Key Terminology* above) and asked whether their lab performs FDS and/or discloses/proceeds with partial matches. Twelve labs (12% of respondents) in 11 states reported conducting FDS, with the earliest beginning in 2007. Forty labs (39%) in 24 states (and one territory) reported disclosing/ proceeding with partial

Exhibit 1: 11 states conduct familial DNA searching and 24 states disclose/proceed with partial matches





[1] The number for SDIS labs includes two regional labs within one state which both serve as SDIS labs and the SDIS labs for two federal labs, Washington D.C., and a U.S. territory. Therefore, there are 53 SDIS labs serving 48 states.

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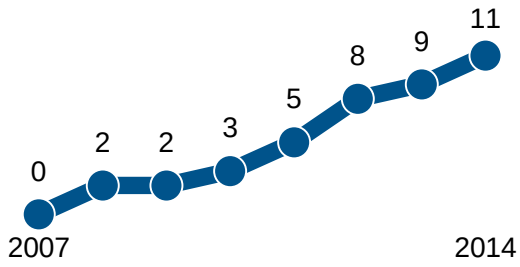
Exhibit 2: Use of FDS has expanded across 11 states since 2007

Year Started	State(s)
2007	Colorado
2008	California
2009	N/A
2010	Texas
2011	Virginia, Wyoming
2012	Florida, Michigan, Pennsylvania
2013	Minnesota
2014	Utah, Wisconsin



matches, and seven labs use both FDS and PM. Exhibit 1 shows which states reported at least one lab performing either FDS or disclosing/proceeding with partial matches.

Of labs that do not currently conduct FDS, the vast majority (75%) said they have discussed using it in the past, while nearly half (42%) are considering using it in future investigations. When asked why their labs had not used FDS to this point, the largest portion (34%) noted the lack of clear guidelines on the practice, while about a quarter cited usefulness (26%), training (24%), or technological considerations (22%). Smaller portions had questions about FDS' cost (12%), noted that it was prohibited by their state (12%) or another entity (8%), or expressed civil liberty concerns (8%).

When considering whether or not to use FDS, nearly half (44%) of responding labs turned to the FBI for guidance on their decision, while over a third consulted their state's legislation or court rulings (37%) or practices within other jurisdictions (34%). Smaller portions looked to other states' legislation or court rulings (18%) and membership organizations such as ASCLD (12%). Additional resources written in by labs included resources related to the Attorney General's office; Department of Justice; local District Attorney's office; department legal counsel; state CODIS administrator or state lab; journal articles; trainings; and other forensic commissions, working groups, or oversight committees. Only 17 percent of labs reported not considering the use of FDS at all.

Laboratory Perceptions

The survey asked about laboratories' perceptions of FDS and PM. Employing a 5-point Likert scale, respondents were asked to indicate the degree to which they agreed or disagreed with specific statements related to FDS and PM (1=*Strongly Disagree* to 5=*Strongly Agree*). Two items asked about the potential of FDS or PM to help identify suspects, and four questions apiece were combined into scales measuring

Exhibit 3: Support for familial DNA searching and partial matching statistically varies by lab practices, but all lab types have positive perceptions of FDS' potential

	Neither (n=51)	Only PM (n=30)	FDS (n=12)
Familial DNA searching has the potential to increase the ability of crime labs to identify suspects.✦	3.9	4.2	4.3
Disclosing/proceeding with partial matches has the potential to increase the ability of crime labs to identify suspects.*	3.6$_a$	4.1$_b$	3.4$_a$
Support for familial DNA searching scale*	2.5$_a$	2.8$_a$	4.1$_b$
Support for partial matching scale*	2.5$_a$	3.1$_b$	3.4$_b$

* Asterisked items have statistically significant differences in ratings between lab practices, according to ANOVA tests ($p<.05$). For these items, ratings that do not share lettered subscripts (e.g., a, b, c) are significantly different from each other according to Bonferroni post-hoc tests.

✦The ANOVA test was significant for this item, but post-hoc tests were not ($p=.100$ and $p=.101$), indicating that overall there were statistically observed differences between groups but these differences could not be detected when comparing each group to each other while controlling for type I error. This may be due to a lack of power for specific comparisons due to the small sample size for FDS labs.

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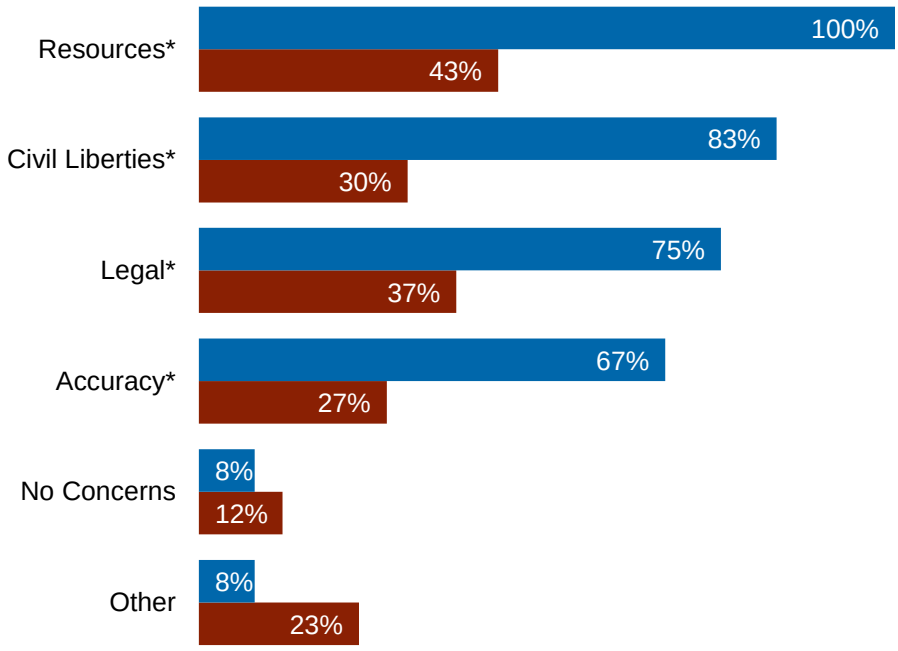
perceived institutional support for FDS and PM.[2] Lab practices did not have a strong impact on perceptions of the potential of FDS to solve cases, but laboratories which performed PM- but not FDS- had a significantly higher opinion of PM's potential than other labs (see Exhibit 3). Laboratories conducting FDS perceived it to have more investigative potential than PM, while labs that do not conduct FDS (either only PM or neither practice) gave similar ratings for both FDS and PM. Perceived institutional support for FDS was also significantly higher for labs using FDS.

The survey also asked if labs had any of a number of concerns related to FDS, including resources (e.g., staff and funding), legal (e.g., case being overturned), civil liberties (e.g., privacy), and accuracy (e.g., false positives). Exhibit 4 shows that labs that conduct FDS expressed significantly more concerns about the practice than labs that do not conduct FDS. This may be due to labs using FDS having undergone extensive discussions, vetting, and review processes to address concerns prior to approval. The survey also offered a place for respondents to write-in other concerns not specifically identified by the survey. Additional concerns written in included issues related to prohibition by state or agency law/policy, lack of guidance on whether it is allowed, and usefulness (e.g., whether it produces meaningful results).

Exhibit 4: Labs conducting familial DNA searching have had more concerns about the practice than labs that do not conduct familial DNA searching



* Statistically significant difference at p<.05

Laboratory Practices and Procedures

Laboratories that reported conducting FDS (n=10 state labs and n=2 local labs) or proceeding/disclosing with partial matches (n=22 state labs and n=18 local labs) provided additional information about the extent they've used these tools and practices related to their use. Readers should interpret the following results with caution due to small sample sizes. The majority of these labs- 67% of FDS labs and 59% of PM labs- reported that they have publicly available policies or protocols that govern their practices. Respondents shared the number of FDS/PM cases in the lab, how many of those cases resulted in a confirmed familial association, and how many of these cases have resulted in a conviction. Exhibit 5 shows that, while the number of familial searches varies greatly by lab, the number of convictions from FDS cases is low across all labs. Only five labs reported having any FDS cases that resulted in a conviction.

[2] Individual items included: "There is adequate collaboration among agencies in my jurisdiction to [perform FDS / disclose/proceed with a partial match]," "My laboratory is supportive of [using FDS / disclosing/proceeding with partial matches] during criminal investigations," "[Laboratory staff / Criminal justice officials (e.g., police, prosecutors)] in my jurisdiction receive adequate training related to [FDS / disclosing/proceeding with partial matches]." The internal reliability for both scales was adequate (Cronbach's $\alpha = .84$ for FDS and $\alpha = .77$ for PM).

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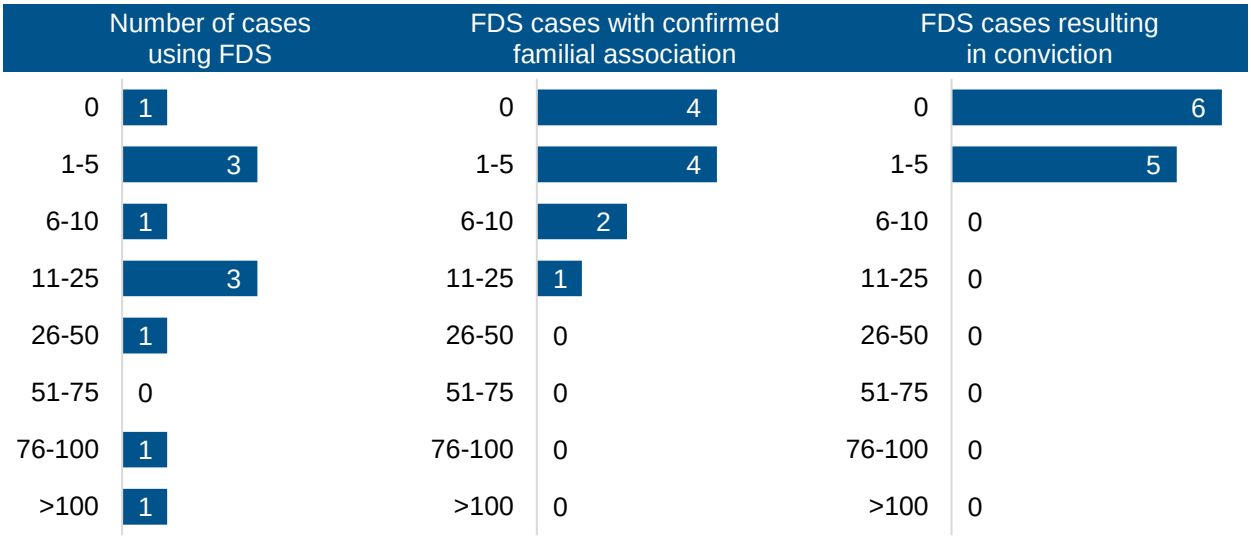
Exhibit 5: The number of familial searches varies greatly by lab, but the practice has generated few convictions across all labs to date.



Data on labs that disclose/proceed with partial matches reflect similar trends, despite the fact that partial matching is more widespread and identification of partial matches occurs fortuitously as part of routine CODIS searches. One-fifth (20%) of labs that allow PM say they have not had any cases in which they disclosed/proceeded with a partial match, and a majority (63%) of labs reported using it in only 1-5 cases.[3] Smaller portions of respondents indicated disclosing/proceeding with partial matches in 11-25 cases (3 labs), 26-50 cases (1 lab), 51-75 cases (1 lab), and over 100 cases (2 labs). Similar to FDS, convictions resulting from partial matching are very rare. Only 20% of labs that reported disclosing/proceeding with partial matches reported any convictions resulting from those cases.

The survey asked labs to select from a list of eligibility criteria for performing familial searches or partial matching (see Exhibit 6). If respondents selected "case status," "DNA sample specifications," or "crime type" they were presented with additional lists in those sub-categories to further specify eligibility criteria. Labs reported more eligibility requirements for FDS than PM, and labs tend to have very consistent practices for FDS while no single eligibility criteria was indicated by a majority of labs for PM. Eligibility criteria for FDS included exhausting all other investigative leads (100% of labs using FDS), DNA sample specifications such as number of profiled alleles or being single-source (92%), commitment from police (92%) or prosecution (83%) to pursue the case, exigent circumstances/high public safety risk (83%), and particular crime types (75%). While labs tended to focus more on violent crimes, one lab reported that property crimes would also be eligible for FDS. The majority of FDS labs accepted both active/open cases (83%) and cold cases (83%).

Labs performing FDS were also asked whether they had used FDS in more unique circumstances. Four labs reported using FDS with female offenders,[4] but none indicated using FDS on mixed DNA samples or for exoneration purposes. However, a partial match helped to exonerate Darryl Hunt in 2003, after serving 19 years for a murder he did not commit, demonstrating the potential for FDS to similarly be used for this purpose. Only one lab reported using FDS in inter-state searches, compared to 14 labs (35%) using PM.

Labs that conduct FDS were asked what entity(s) in their jurisdictions typically request or approve familial searches. The vast majority of labs reported requests coming from police agencies (73%), while

[3] Eight lab respondents reported no cases, and 25 labs reported 1-5 cases.
[4] Whether labs interpreted this to mean conducting FDS to identify a female perpetrator of a crime or to identify a potential female family member in the CODIS database is unclear. To date, we are unaware of any instances of FDS being used when the perpetrator of the crime being investigated was female.

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others noted requests from the crime laboratory (46%), prosecution (27%), or a multi-stakeholder committee (18%). All labs said that the crime laboratory must approve the request for the familial search; additionally, some labs also required approval from a multi-stakeholder committee (33%), police (17%), and prosecution (8%).

Exhibit 6: Labs reported much more stringent eligibility criteria for familial DNA searching than partial matching

	FDS (n=12)	PM (n=40)
Exhausted all other investigative leads	100%	25%
Case status	92%	28%
Active/open cases	83%	25%
Cold cases	83%	23%
Serial/related crimes	83%	20%
DNA sample specifications	92%	53%
Minimum number of alleles profiled	67%	38%
Single-source sample	67%	43%
Non-degraded sample	50%	20%
Commitment from police	92%	43%
Commitment from prosecution	83%	40%
Exigent circumstances	83%	25%
Crime type	75%	25%
Homicide	67%	30%
Other violent/person crimes	67%	18%
Sexual	50%	30%
Property	8%	8%
Weapon	8%	5%
Drug	0%	5%
No eligibility criteria	0%	38%

Once FDS is approved, the lab performs the actual search. Specialized software is a key component of FDS, and the survey asked labs to specify what software they use. Four states reported using software developed by the Denver Police Crime Lab, four use MPKin FS Edition developed by the University of North Texas, and one apiece use GeneMarker and software developed internally by California's state laboratory. All the labs indicated that they performed their own validation checks on the programs before beginning to use them for familial searches. FDS labs reported using the tool with convicted offender (83%), arrestee (50%), and forensic unknown (42%) profiles, and more rarely other types of profiles such as suspects, victims, missing persons, or lab staff (8-17%).

The survey also asked labs to select from a list of requirements they must meet before releasing the identity of a DNA profile found through FDS or PM (see Exhibit 7). All labs performing FDS noted that they have to conduct Y-STR testing on potential male relatives, unsurprising since lineage testing is a key part of FDS. However, about half of labs that disclose/proceed with partial matches also reported that Y-STR testing was required prior to releasing information from a partial match. Commitments by other justice professionals to pursue the case and additional levels of approvals were the next most common requirements. Training and additional investigation (e.g., through records research) were also required for one-quarter of the labs using FDS (but slightly fewer labs using PM). While all FDS labs reported some extra requirements before releasing information found through FDS, nearly one-fifth (18%) of labs disclosing/proceeding with partial matches said they had no additional requirements that must be met before they could release the results of partial matches to law enforcement.

Labs were asked about differences in collecting confirmation DNA samples from suspects in FDS and PM cases compared to cases that do not use these techniques. One-quarter (25%) of FDS labs noted differences, such as a preference for a surreptitious sample, longer discussions between the lab and law enforcement, and more training or education for law enforcement. Only 8% of PM labs reported differences between the types of cases. Similarly, labs were asked about differences in investigative practices between FDS cases or PM cases and normal DNA match cases. Three-quarters of FDS labs and 53% of PM labs reported differences. Similar types of differences were noted by both sets of labs, including extra consideration for the privacy of potential relatives of the offender, the construction of a

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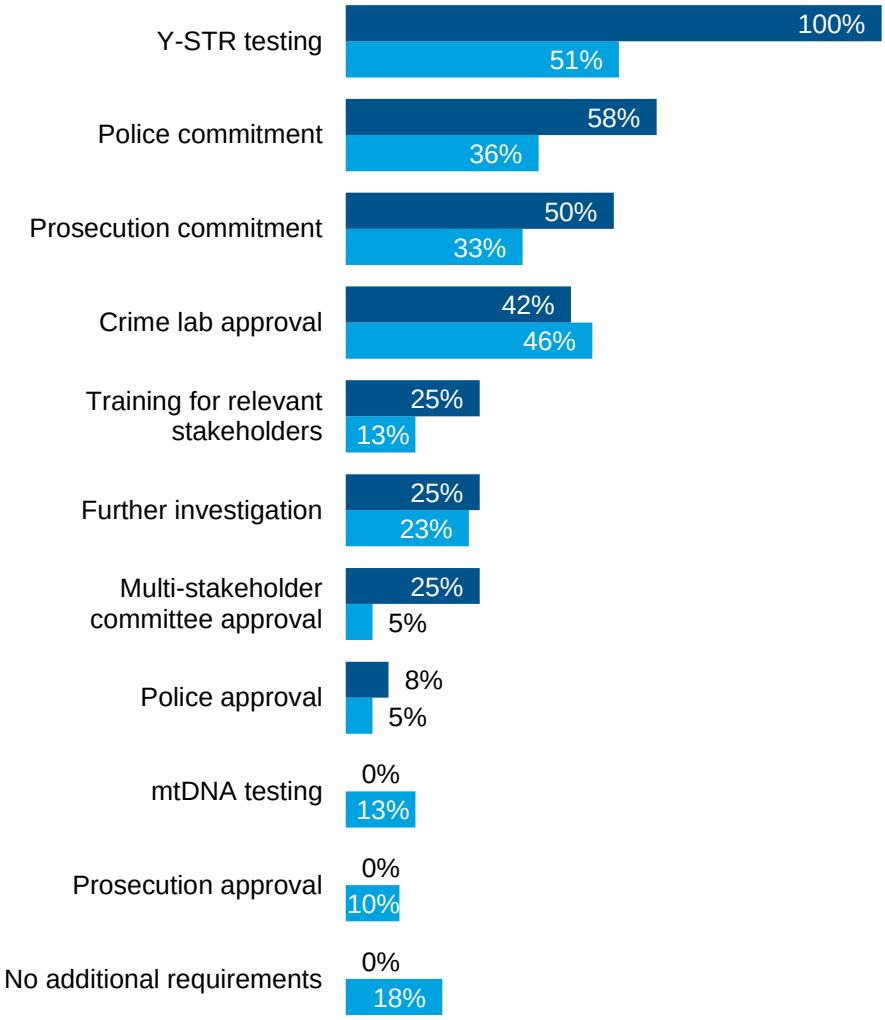
family tree through geographical and biological information, education provided by the crime lab to law enforcement on the match, and assigning FDS cases to detectives with special training.

Lastly, both sets of labs were asked about training and if they had experienced any challenges when conducting FDS or PM. Labs performing FDS reported that justice professionals often received at least some type of training about FDS, including crime lab staff (100%), police (100%), prosecutors (100%), defense (50%), and judges/court staff (50%). Labs allowing PM were less likely to report training for PM across these same categories (21-38%), with lab staff still having the highest reported rates of training (69%). Only 33% of FDS labs and 23% of PM labs reported challenges, including issues related to interagency collaboration, resources/ budget, technical challenges, and the fact that they have not found any successful matches. Additionally, no labs reported any legal challenges against FDS in courts in their jurisdictions/states.

Exhibit 7: Labs conducting familial DNA searching have more requirements before releasing information to law enforcement than labs that disclose/proceed with partial matches



Conclusion

Findings from the National Survey of CODIS Laboratories offer a comprehensive portrait of U.S. crime labs' perceptions, policies, and procedures regarding FDS and PM. Although only 12 labs reported using FDS, their practices were remarkably consistent. Disclosing or proceeding with partial matches, on the other hand, was more commonly allowed, but had wider variation in requirements and practices. The majority of respondents believed that FDS (87%) and PM (69%) had the potential to be useful tools for investigation, although perceived institutional support for these practices varied. Labs also shared a number of concerns or challenges related to FDS, although interest in it remains high as evidenced by the number of labs reporting past or current consideration of the tool. Analysis of those labs not performing FDS suggests that the primary reason may be a lack of guidelines or other logistical concerns, as opposed to ethical or legal concerns. These findings can help inform practice by sharing what states have implemented to date to help guide other jurisdictions in their decision-making.

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