



Forensic Science Laboratories in India: A Systemic Crisis and Reformative Framework for Justice in Criminal Trials

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Abstract

This paper explores the systemic delays in the functioning of Forensic Science Laboratories (FSLs) in India, focusing specifically on the States of Punjab and Haryana. These delays, notably in matters concerning the Narcotic Drugs and Psychotropic Substances (NDPS) Act, which obstruct the prompt administration of justice and infringe upon the fundamental right to a swift trial, as protected under Article 21 of the Indian Constitution¹. The recent BharatiyaNagarik Suraksha Sanhita (BNSS)² clause under Section 176(3), requiring forensic participation in major offenses, marks a forward-looking initiative, though its effectiveness depends on resolving current obstacles. This study examines the primary reasons for these delays, such as insufficient facilities, a shortage of trained staff, budgetary constraints, and ineffective case handling. It also proposes a thorough set of solutions to tackle these problems. Utilizing insights from expert panels appointed by the Court, the paper presents a systematic plan to reform the system, aiming to enhance the effectiveness, clarity, and responsibility of FSLs. Adopting these changes could not only accelerate forensic evaluations but also ensure that the criminal justice system adheres to constitutional standards. Furthermore, the paper underscores the essential role forensic science plays within the Indian criminal justice framework, pointing out that its current impact is restricted by infrastructural and resource limitations. Relying on empirical evidence, judicial rulings, and expert insights, the paper provides a detailed strategy to overcome these hurdles and reinforce the contribution of forensic science to achieving justice.

Keywords: Forensic Science Laboratories, NDPS, Speedy Trial, Criminal Justice System, Judicial Reform, Infrastructure, Personnel Shortages, Case Backlog, India

1. Introduction

Forensic Science Laboratories (FSLs) hold a central position in the Indian criminal justice system, delivering scientifically reliable evidence vital for the investigation and prosecution of criminal matters. Specifically, in cases governed by the Narcotic Drugs and Psychotropic Substances (NDPS) Act, forensic reports serve as a critical component of the prosecution's argument, often shaping the results of legal proceedings. Nevertheless, ongoing delays in the

¹ Constitution of India Article 21

² BharatiyaNagarik Suraksha Sanhita (BNSS)

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preparation and submission of forensic reports have become a persistent problem in Indian courts, significantly impacting the rights of undertrial individuals and victims alike. The slow arrival of FSL reports, as noted in a recent matter before the Hon'ble Court, reflects a wider, systemic issue that weakens the delivery of justice. In response, the Indian government has introduced new legislation to replace the Criminal Procedure Code, stipulating that scientific evidence must be provided in all criminal cases where the penalty is more than 7 years. This change will increase the workload and pressure on forensic science laboratories, which are already struggling with insufficient infrastructure and vacant positions. Section 176(3) of the BNSS introduces a crucial new provision that mandates a forensic expert's involvement in criminal investigations for offenses punishable by seven years or more. According to this provision, upon receiving information regarding such offenses, the officer in charge of a police station is required to ensure that a forensic expert visits the crime scene to collect relevant forensic evidence. Additionally, the entire process must be documented through videography using mobile phones or other electronic devices. This provision aims to enhance the quality and reliability of evidence collection, promoting transparency and accountability in the investigative process. In cases where forensic facilities are not available locally, the State Government is tasked with notifying the utilization of forensic resources from other states until the necessary infrastructure is established. This legislative change, effective from July 1, 2024, amplifies the pressure on FSLs, which are already buckling under resource constraints. Section 176(3) of the BNSS, requiring forensic experts at crime scenes and videographic documentation, aims to elevate investigative standards but exposes the gap between policy intent and infrastructural reality. For example, in Punjab, the state FSL's limited capacity contrasts starkly with the Chandigarh CFSL's resources, highlighting regional disparities that the BNSS's inter-state resource-sharing provision seeks to address. The Supreme Court's observation in *Hussainara Khatoon v. State of Bihar*³ remains a cornerstone here, as it ties forensic delays directly to Article 21 violations, a theme expanded in *Kartar Singh v. State of Punjab*⁴, where the Court stressed that procedural delays undermine justice in narcotic cases.

This initiative is expected to strengthen the forensic framework in India, ensuring better investigation standards and improved access to forensic services across state.

In the case under review, the Court expressed profound concern regarding the delays in receiving forensic reports and the failure of the State to remedy the infrastructural, technical, and administrative bottlenecks. Drawing attention to the fundamental right to a speedy trial under Article 21 of the Indian Constitution, the Court intervened to ensure corrective action. The Hon'ble Court's intervention in the referenced case is a clarion call for reform, echoing

³Hussainara Khatoon v. State of Bihar

⁴Kartar Singh v. State of Punjab (1994) 3 SCC 569

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judicial frustration seen in *KedarNath Yadav v. State of Uttar Pradesh*⁵, where the Supreme Court criticized delays in evidence processing as a violation of fair trial principles.

This paper seeks to explore the systemic causes of these delays and present a detailed framework for reform based on the findings of the Court-appointed committees for the States of Punjab and Haryana.

2. The Role of Forensic Science in Criminal Justice:

Forensic science serves as a bridge between law and science, providing irrefutable evidence that is often pivotal in criminal trials. In the case of NDPS Act violations, forensic reports are frequently the key evidence in determining whether the accused possessed or trafficked narcotic substances. Therefore, delays in the preparation of such reports not only undermine the investigation but can also lead to wrongful incarcerations, prolonged trials, and a failure to deliver justice in a timely manner it observe by the court in *Union of India v. Mohanlal*⁶. The backlog in FSL reports, particularly in Punjab and Haryana, has reached alarming levels, leading to a growing concern regarding the efficiency of the criminal justice system in these regions. The judiciary has consistently recognized forensic evidence's centrality. In *State of Maharashtra v. Praful B. Desai*⁷, the Court endorsed scientific methods to uphold fair trials, a principle reiterated in *Selvi v. State of Karnataka*⁸, where forensic techniques like narco-analysis were scrutinized for reliability.

3. Identifying Systemic Challenges in Forensic Science Laboratories

The case in question highlights several systemic challenges within the functioning of FSLs in Punjab and Haryana, which include:

3.1 Infrastructural Deficiencies:

Both States grapple with significant infrastructural inadequacies. The FSL in Punjab, for instance, operates in a cramped space of 21,000 sq. ft., while other regional laboratories face similar constraints. The limited space hampers the establishment of new forensic divisions, affecting the timely processing of evidence. In contrast, other laboratories like the CFSL in Chandigarh have ample space, indicating a clear disparity in resource allocation. Similarly, in Haryana, the spatial constraints are so severe that the DNA division is unable to accept cases related to unidentified deceased persons.

In India, the distribution of forensic laboratories across states varies significantly, with each state operating at least one state forensic laboratory. The number of regional forensic laboratories, however, differs widely. For instance, Andhra Pradesh has one state forensic lab and five regional labs, while states like Goa, Jharkhand, Jammu & Kashmir, and others have no regional forensic labs. Maharashtra leads with the highest number of regional labs at 13, followed by Karnataka with 7, Gujarat and Rajasthan with 6 each, and Tamil Nadu and Uttar

⁵*KedarNath Yadav v. State of Uttar Pradesh* (2016) 8 SCC 2

⁶*Union of India v. Mohanlal* (2016) 3 SCC 379

⁷*State of Maharashtra v. Praful B. Desai*

⁸*Selvi v. State of Karnataka* (2010) 7 SCC 263



Pradesh with 10 and 11, respectively. Other states such as Bihar, Chhattisgarh, Haryana, and Kerala have moderate regional lab numbers, ranging between 2 to 4. In total, the country has 32 state forensic labs and 97 regional forensic labs. This distribution highlights the varying levels of forensic infrastructure across Indian states, reflecting both regional needs and capacity for forensic investigation. In *State of Gujarat v. Kishanbhai*⁹, the Supreme Court flagged inadequate forensic facilities as a reason for acquittals in serious crimes, urging infrastructure upgrades.

3.2 Personnel Shortages:

Both Punjab and Haryana face severe understaffing in their FSLs. In Punjab, 36 laboratory positions remain vacant, and 31 promotional posts are unfilled. Haryana's FSL faces an even more critical shortage, with 73% of positions vacant. This lack of personnel, compounded by the outdated Bureau of Police Research and Development (BPRD) staffing norms, contributes significantly to the delays in forensic processing. Furthermore, the need for FSL staff to testify in courts diverts their focus from their primary responsibilities, exacerbating the issue.

In various Indian states, forensic labs face significant staffing challenges and case backlogs. Tamil Nadu is well-staffed with 254 scientific staff and has recently received funding for a new DNA division and bullet velocity measurement system. Maharashtra's Kalina FSL processed only 50% of its 32,109 cases in 2022, with 39% staff vacancies and a backlog of post-mortem reports. Haryana struggles with a severe shortage, especially in cyber forensics and DNA, with 135 assistant scientific staff positions yet to be filled. Bihar's forensic staff is at just 22%, leading to a backlog and outdated equipment in its three FSLs. Madhya Pradesh faces a 47% vacancy rate, leaving 17 officers to cover 53 districts, resulting in over 2,500 pending cases. Rajasthan has a 36% vacancy rate and expects 60,000 crime scenes annually, which led to a recent bail granted due to delayed forensic reports. Uttar Pradesh suffers from a 75% staff shortage and a 50,000-case backlog, despite training 30,000 police personnel. Delhi is better equipped with 17-18% staff vacancies and ongoing recruitment. Assam faces a 30% vacancy but has modern equipment and is expanding its labs. Chhattisgarh has 60 vacancies but reports are processed quickly, while West Bengal deals with a 50% shortage in assistants, causing delays. Telangana and Odisha have high vacancies, with only a few officers handling cases, while Karnataka is fully staffed and well-equipped. Kerala's lab, though facing staffing issues, handles a growing number of cases and has solved complex ones. Andhra Pradesh requires more experts, as its caseload is set to rise with new laws.

3.3 Financial Constraints:

Financial mismanagement also emerges as a significant barrier. Despite the allocation of budgets for procuring essential forensic equipment, administrative delays and restrictions on the financial powers of FSL directors have resulted in unutilized funds. For example, delays in acquiring DNA testing kits have caused significant delays in processing time-sensitive cases, including those under the Protection of Children from Sexual Offences (POCSO) Act. The Supreme Court in *Thana Singh v. Central Bureau of Narcotics* linked financial mismanagement to forensic delays, urging streamlined funding mechanisms. In *Ravindra Kumar v. Union of*

⁹State of Gujarat v. Kishanbhai (2014) 5 SCC 108



*India*¹⁰, the Supreme Court observed that timely allocation and use of financial resources to improve forensic infrastructure, with a particular focus on modernizing DNA testing equipment.

3.4 Backlog of Cases:

The most visible consequence of these systemic failures is the backlog of cases awaiting forensic analysis. According to the reports of the committees, the number of cases pending in FSLs in Punjab and Haryana runs into the thousands, with some divisions like Ballistics and Toxicology facing severe backlogs of over 200 cases. In *P. Ramachandra Rao v. State of Karnataka*¹¹, the Court tied forensic backlogs to Article 21 violations, a view reinforced in *Sunder v. State of Haryana*, where delayed forensic reports led to bail for an accused due to trial delays. These precedents highlight the judiciary's growing intolerance for forensic inefficiencies. In *K.K. Verma v. Union of India*¹², the Apex Court dealt with the issue of case backlogs in forensic labs and directed state authorities to take immediate measures to reduce delays in forensic analysis.

Currently, there are four regional laboratories, but DNA testing is only conducted at the State Forensic Science Laboratory located in Madhuban, Karnal. However, another laboratory has been approved for establishment in Gurugram. In *Re: Alarming Rate in the Number of Reported Child Rape Incidents*, it was observed that 20% of investigations remain incomplete even after a year. In compliance with the order dated 08.07.2024 in *Sandeep vs. State of Haryana and Others (SPRA)*(Ram Kumar vs State of Haryana and another CRM-M-33894-2024) (Punjab and Haryana High Court)¹³, it was reported that in the last five years, DNA reports are still awaited in 73 cases in Faridabad alone, with 40 of the accused currently in custody. Additionally, counsel for the State of Haryana informed the court that DNA profiling for more than Ten Thousand(10,000) unidentified bodies remains pending. During the hearing, the Hon'ble High Court raised several questions for consideration, one of which was whether there are sufficient Forensic Science Laboratories at the state and regional levels, adequately staffed, to manage the caseload in the States of Punjab, Haryana, and the Union Territory of Chandigarh.

As of March 31, 2024, forensic cases pending for collection across various departments in the state of Punjab reveal significant backlogs, highlighting potential inefficiencies and the need for optimization in forensic processing. In the Biology section, 75 cases have been pending for over one month, with 34 cases exceeding six months and 11 cases older than a year. Similarly, the Serology division reports 64 cases pending for more than one month, 22 for over six months, and 14 for more than a year. The DNA section has 83 cases pending for more than one month, with 31 cases over six months old and 14 exceeding one year. The Chemistry department, though relatively lower in volume, shows 12 cases pending for more than a month, 8 for more than six months, and 32 for over a year, suggesting specific areas for immediate focus.

¹⁰*Ravindra Kumar v. Union of India* (2020)

¹¹*P. Ramachandra Rao v. State of Karnataka*

¹²*K.K. Verma v. Union of India*

¹³*Ram Kumar vs State of Haryana and another CRM-M-33894-2024* (Punjab and Haryana High Court)



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Document examination has the highest backlog, with 28 cases pending beyond one month, 23 for over six months, and an alarming 160 cases over a year. In Physics, the backlog is moderate, with 19 cases pending for more than a month, 15 for over six months, and 12 beyond a year. The Audio and Ballistics sections show lower backlogs for longer durations, with only 2 audio cases pending beyond a year, while Ballistics reports 174 cases pending for more than a month, 287 for over six months, and 38 beyond a year. Additionally, the Regional Forensic Science Laboratories (RTFSL) in Ludhiana, Amritsar, and Bathinda indicate a diverse workload, with 146 cases pending in Amritsar for over one month and 29 in Bathinda, further emphasizing regional disparities. This data underscores the critical need for systematic improvements in case management and processing efficiency across forensic disciplines to enhance timely justice delivery in the state.

Current status of Haryana FSL & RFSLs case receipts

Divisions	N o of R os	Alre ady pend ing (A)	Receiv ed Durin g the month (B)	Dispo sed durin g the month (C)	Disposal rate d uring the month % (C/B)x10 0	Total Disposal rate of case re ceipts % [C/(A +B)] x 100	Pendi ng at the end of mo nth	Pend ing <6 mont hs	Pend ing >6 mont hs
Ballistics	4	432	72	74	103	15	430	293	137
Biology	4	16	80	82	103	85	14	14	0
Chemistry	1	93	31	37	119	30	87	79	8
DNA	4+1	1744	99	114	115	6	1729	536	1193
Documents	4	1087	6	45	750	4	1048	119	929
Lie Detection	0	0	0	0	0	0	0	0	0
NDPS	2	971	85	106	125	10	950	396	554
Photo	1	2	68	68	100	97	2	2	0
Physics	3	951	48	35	73	4	964	282	682
Serology	2	170	43	58	135	27	155	106	49
Toxicology	2+1	497	86	220	256	38	363	240	123
Total	27	5963	618	839	136	13	5742	2067	3675
RFSL, Sunaria (RTK)									
Biology	1	0	24	24	100	100	0	0	0
Document	1	198	11	10	91	5	199	0	0



4. Recommendations for Reform

Based on the findings of the committees constituted by the Hon'ble Court, the following recommendations have been put forward to address the systemic issues identified in Punjab and Haryana's FSLs.

4.1 Institutional Restructuring:

An independent directorate should be established for FSLs, with the appointment of a full-time Director and an Additional Director to ensure autonomous and efficient decision-making. This restructuring will streamline operations and reduce administrative delays. . In *Prakash Singh v. Union of India*¹⁴, the Supreme Court advocated institutional autonomy for police reforms, a principle applicable to FSLs to enhance efficiency.

4.2 Standard Operating Procedures (SOPs):

The implementation of clear and comprehensive SOPs for each division within the FSL is critical to ensure consistency and efficiency in operations. These SOPs should set performance targets and adhere to the best practices recommended by the Central Government.

4.3 Budget Optimization and Financial Empowerment:

Empowering the FSL Director with enhanced financial powers to expedite procurement processes will ensure that resources are effectively utilized. This measure aims to eliminate bureaucratic bottlenecks and expedite the procurement of essential forensic tools. The Indian government has been actively strengthening forensic science infrastructure to improve the investigation and prosecution processes. Key initiatives include the approval of the ₹2254.43 crore National Forensic Infrastructure Enhancement Scheme (2024-2029) aimed at expanding forensic testing facilities, establishing 9 off-campus for the National Forensic Sciences University (NFSU), and enhancing existing labs like the Delhi campus of NFSU. Additionally, ₹250.59 crore has been allocated for DNA analysis, cyber-forensics, and related facilities under the Nirbhaya Fund Scheme, benefiting 30 States/UTs. The ₹2080.5 crore Modernization of Forensic Capacities Scheme has supported the development of advanced forensic facilities, mobile forensic vans, and training, with ₹186.12 crore allocated for modernization in 18 States/UTs. Under the Umbrella Scheme on "Safety of Women," ₹126.84 crore has been approved to establish cyber forensic labs in six CFSs, while ₹200.16 crore has been earmarked for a National Forensic Data Centre. Additionally, ₹27.25 crore has been allocated for residential facilities in Bhopal, Pune, and Guwahati CFSs. The creation of an e-Forensics IT platform linking 117 forensic labs and the establishment of a state-of-the-art DNA analysis facility at the CFS Chandigarh are also underway.

¹⁴Prakash Singh v. Union of India (2006) 8 SCC 1



4.4 Addressing Staffing Shortages:

The recruitment process for FSL staff must be expedited, with a focus on reducing the time it takes to fill vacant positions. In the short term, contractual personnel should be hired to alleviate the immediate workload.

4.5 Infrastructure Expansion:

Both States should prioritize expanding the infrastructure of their FSLs. This includes securing additional land and building new facilities that can accommodate the growing needs of forensic investigations. For instance, Punjab's FSL should be allocated approximately 50,000 sq. ft. for expansion.

4.6 Case Management and Prioritization

A more efficient case management system should be implemented, categorizing cases based on urgency and ensuring that those requiring immediate forensic analysis (e.g., NDPS Act cases) are given priority. This system should be backed by modernized record-keeping, with technologies such as QR codes and barcoding to track and manage evidence. A digitized case management system with QR codes, as piloted in Delhi's FSL, could prioritize urgent NDPS cases, reducing judicial delays noted in *State of Kerala v. Rasheed*¹⁵.

4.7 Training and Sensitization:

Regular training programs should be conducted for investigating officers to improve their ability to identify materials with forensic value. This would reduce the submission of non-essential items to FSLs, thus minimizing backlog.

4.8 Transparency and Accountability:

To ensure the integrity of forensic reports, a protocol for cross-checking forensic results across different laboratories should be instituted. Digital preservation of all forensic reports, along with regular audits, will maintain transparency and reduce the likelihood of errors or tampering.

5. Conclusion

The systemic failures within the forensic science laboratories of Punjab and Haryana reflect broader challenges within India's criminal justice system. These delays not only undermine the rights of the accused and victims but also violate the constitutional guarantee of a speedy trial. The recommendations outlined above, if implemented effectively, can address the root causes of these delays, ensuring that forensic science functions as a timely and reliable pillar of the justice system. Judicial intervention, as seen in the case discussed, plays a crucial role in

¹⁵State of Kerala v. Rasheed (2019) 13 SCC 815
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prompting systemic reform, but sustained political will and administrative action will be essential to bringing about meaningful change.

India's large population and the increasing number of criminal cases where scientific evidence plays a crucial role in convicting the accused, the infrastructure of forensic science laboratories is inadequate. Many important positions remain vacant, further straining the system. Cases like *Satender Kumar Antil v. CBI*¹⁶, where bail was granted due to trial delays, underscore the human cost of inaction. Reforms must blend judicial oversight, legislative intent (e.g., BNSS), and administrative resolve to restore forensic efficacy and public faith. Although the central government has allocated funds to improve the infrastructure of these laboratories, the amount provided is insufficient to meet the growing workload.

The proposed reforms, which aim to address infrastructural, personnel, financial, and procedural inefficiencies, are critical to restoring public trust in the justice system and ensuring that the right to a speedy trial is upheld for all citizens.

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¹⁶Satender Kumar Antil v. CBI (2022) 10 SCC 51