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Prasanna S,

Chairman of Institute of Legal Education

No. 08, Arul Nagar, Seera Thoppu,

Maudhanda Kurichi, Srirangam,

Tiruchirappalli – 620102

Phone : +91 73059 14348 – info@iledu.in / Chairman@iledu.in



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FORENSIC PREPAREDNESS AND GENDER JUSTICE IN INDIA: ANALYZING GAPS IN POLICE TRAINING AND FORENSIC INFRASTRUCTURE IN CRIMES AGAINST WOMEN

AUTHOR – AYUSHI YADAV, ADVOCATE, JIWAJI UNIVERSITY GWALIOR

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Abstract

Forensic preparedness forms a critical foundation for achieving gender justice in cases of sexual offences in India, where timely and scientific handling of evidence plays a decisive role in conviction outcomes. The existing legal and institutional mechanisms, including statutory mandates for medical and forensic exams under criminal law, provide a structured framework for the collection, preservation, and evaluation of scientific evidence in crimes against women. However, the study reveals persistent gaps in police training, forensic infrastructure, and inter-departmental coordination that undermine the potential of these legal provisions.

Despite national directives establishing Sexual Assault Evidence Kits and specialised forensic units, implementation remains inconsistent. Shortage of trained personnel, delays in forensic analysis, and non-adherence to chain-of-custody standards weaken evidentiary value and create barriers to justice delivery. While specialised units and trauma-sensitive procedures are mandated, police often lack gender-sensitive training and forensic literacy, resulting in compromised evidence collection. Judicial authorities have consistently emphasised the importance of scientific evidence and professional investigation standards, affirming that procedural lapses can lead to miscarriage of justice.

This research paper highlight the need for systematic capacity-building, technological upgrades, and strict monitoring mechanisms to ensure standardised forensic practices. Strengthening police-forensic-medical coordination, enhancing victim-support structures, and adopting digital case-tracking systems are essential to improving justice outcomes. A holistic approach integrating scientific investigation, administrative reform, and survivor-centric protocols is necessary to reinforce public trust and secure gender justice in India.

Introduction

Ensuring justice for women in India remains one of the most urgent priorities in the criminal justice system. Crimes such as rape, sexual assault, domestic violence, dowry harassment, cyber-stalking, and human trafficking not only violate legal rights but shatter the dignity, physical security, and emotional well-being of women. Despite progressive legislative reforms and a growing societal awareness, many cases

fail to lead to timely conviction due to systemic gaps in the investigative and evidentiary process. In modern jurisprudence, forensic science plays a pivotal role in bridging this gap by transforming investigations from being intuition-based to evidence-driven. Scientific proof, DNA profiling, medical examination, trace evidence analysis, cyber-forensics, and digital documentation, serves as objective, unbiased testimony that strengthens the prosecution and

safeguards the rights of the accused, thereby promoting true gender justice.²⁰

Historically, criminal investigations in India relied heavily on eyewitness testimony, confessions, and circumstantial evidence. Such methods often proved inadequate or vulnerable to manipulation and memory lapses. With advancements in forensic science and judicial acknowledgment of its importance, India has steadily transitioned toward scientific investigation. Sections 53, 164A, and 173(2) of the CrPC mandate medical and forensic examinations in sexual-offence cases, while Sections 45 and 65B of the Evidence Act underscore the probative value of scientific and electronic evidence. Initiatives such as compulsory forensic investigation in offences punishable with more than six years, mobile forensic vans, Sexual Assault Evidence Kits (SAEK/SAEC), modernisation schemes for forensic labs, and projects funded under the Nirbhaya framework highlight India's push toward forensic-based policing.

However, despite legal and institutional developments, implementation gaps persist. Delayed evidence collection, sample contamination, inadequate chain-of-custody practices, shortage of forensic experts, limited laboratory capacity, and lack of standardized training undermine the evidentiary value of forensic inputs. Police-forensic-medical coordination is often weak, with digital tracking and inter-departmental communication still evolving. Moreover, the psychological trauma faced by survivors, societal stigma, and procedural delays further discourage reporting and cooperation in the justice process²¹. As a result, conviction rates in crimes against women remain disproportionately low compared to reported cases.

Gender-sensitive investigation demands not only technological readiness but also

procedural integrity, empathy, and professionalism. Scientific tools are impactful only when accompanied by ethical, transparent, and trauma-informed practices. Judicial perspectives increasingly emphasize that even minor procedural lapses, improper sealing of samples, missing signatures, or delayed submissions, can lead to acquittals. Therefore, forensic preparedness must include training, infrastructure development, accountability mechanisms, digital evidence management, victim-support systems, and standardized protocols across states.

In this context, the present research paper explores forensic preparedness within India's criminal justice system and examines its role in strengthening gender justice. By assessing legal frameworks, forensic techniques, institutional coordination, challenges, and reform pathways, the research seeks to highlight how better forensic utilization can ensure timely justice, enhance conviction rates, protect survivor rights, and reinforce public faith in the legal system. Ultimately, gender justice in India depends not only on strong laws but on scientifically grounded, empathetically implemented, and procedurally sound investigation processes.

Critical Analysis of Police Training Mechanisms and Capacity Building in Forensic Evidence Handling

Effective forensic evidence handling is one of the most critical components of criminal investigation in cases of violence against women. In India, statutory provisions and institutional directives emphasize scientifically grounded policing practices; however, police training systems continue to face significant structural and procedural gaps. While the legal framework mandates forensic involvement in sexual offence cases, the capacity of frontline officers to interpret and implement these provisions remains limited due to outdated training modules, inadequate refresher courses, and unequal access to specialised forensic instruction.

²⁰ Justice Verma Committee Report, Recommendations on Amendments to Criminal Law, Government of India (2013).

²¹ Ministry of Home Affairs, Modernisation of Police Forces Scheme, Government of India (2017–2023); MHA, Sexual Assault Evidence Collection Kit Guidelines (2019); Nirbhaya Fund Framework, Ministry of Finance (2013).

Police academies in India provide introductory modules on crime scene management, medico-legal documentation, and basic forensic principles. Yet, there remains a substantial gap between mandated competencies and operational knowledge. Officers frequently lack hands-on training in evidence preservation, proper use of Sexual Assault Evidence Kits, chain-of-custody protocols, and handling digital and trace evidence. This lack of technical proficiency results in procedural lapses such as delayed collection, improper sealing of biological samples, incomplete medico-legal forms, and communication gaps with medical and forensic professionals. These issues directly affect evidentiary value, leading to procedural challenges during trial.

Another challenge lies in the uneven availability and quality of forensic training across states and regions. While urban police units increasingly benefit from specialised workshops and institutional collaboration with forensic laboratories, rural policing units remain under-resourced. Limited access to forensic facilities, specialised equipment, and qualified instructors constrains the development of scientific investigation skills²². This disparity contributes to delayed examination, compromised evidence, and reliance on traditional investigative approaches.

Additionally, capacity-building efforts are often episodic rather than continuous. Forensic technology evolves rapidly, and evidence-based policing requires ongoing knowledge updates. However, the absence of mandatory refresher programmes and periodic certification results in outdated practices remaining in use. Police personnel require institutionalised, recurrent training cycles supported by modern infrastructure, simulation-based learning, and collaboration with forensic universities and legal institutions.

Another critical dimension concerns the need for gender-sensitive training. Scientific knowledge alone is insufficient if investigative processes are not trauma-informed and sensitive to the needs of survivors. Police officers must be trained in victim-friendly procedures, confidentiality requirements, and ethical handling of sensitive evidence to ensure survivors feel secure and respected during the investigative process. Without this sensitivity, survivors may hesitate to cooperate, resulting in incomplete evidence and weakened case outcomes.²³

Judicial pronouncements have repeatedly stressed that forensic evidence must be supported by proper chain-of-custody documentation and timely examination. Courts have affirmed that lapses in forensic handling undermine not only prosecution success but also the constitutional rights of both victims and accused individuals. Thus, the quality of police training and forensic competency directly influences justice delivery and public trust in the criminal justice system.

To strengthen forensic preparedness, India must prioritise structured capacity-building, specialised forensic units at all jurisdictional levels, digital evidence management systems, and strict monitoring of adherence to procedural standards. Coordination between police academies, forensic institutions, medical authorities, and judicial training institutes is essential for creating a uniform and robust forensic culture. Ultimately, forensic capacity building must be viewed not as an administrative formality but as a continuous institutional requirement aligned with gender-justice objectives.

Assessment of Forensic Infrastructure, Technological Gaps, and Chain-of-Custody Challenges

The effectiveness of forensic evidence in securing justice for survivors of sexual offences is directly linked to the strength of forensic

²² Bureau of Police Research & Development (BPR&D), Handbook on Forensic Procedures and Crime Scene Management (2022).

²³ National Forensic Sciences University (NFSU), Forensic Training Curriculum and Guidelines (2022).

infrastructure, technological capabilities, and adherence to chain-of-custody protocols. Although India has adopted progressive legislative and policy frameworks mandating forensic involvement in sexual-offence investigations, the operational capacity of institutions remains uneven and constrained by structural limitations. Delays in processing biological evidence, shortage of certified experts, inadequate supply of sexual assault evidence kits, and limited availability of female medical officers, particularly in rural regions, continue to impede uniform implementation of forensic standards.

Forensic laboratories across jurisdictions frequently operate with limited staffing and increasing caseloads, resulting in prolonged turnaround times that weaken evidentiary value and delay prosecution²⁴. Absence of modern laboratory infrastructure in several districts and gaps in specialised testing facilities, including DNA profiling and digital forensic analysis, further strain the system. While central and state-level forensic labs exist, decentralisation and expansion of district-level units remain insufficient. These challenges underscore the need for systematic investment in infrastructure, advanced equipment, and trained experts to ensure timely and reliable forensic outputs.

Technological modernisation has been initiated through crime-tracking networks, digital filing systems, and automated forensic workflows; however, adoption remains inconsistent and primarily urban-centric. Lack of integrated evidence-management software, absence of real-time coordination mechanisms between police, hospitals, and forensic laboratories, and limited digital chain-tracking systems hamper seamless functioning²⁵. As a result, manual processes continue to dominate case documentation and evidence handling, creating room for procedural lapses and administrative delays. Full operationalisation of

digital tracking solutions and standardised evidence-management platforms is necessary to strengthen transparency and accountability²⁶.

Chain-of-custody compliance remains a critical challenge. Deviation from prescribed sealing protocols, incomplete documentation, delays in sample transfer, and improper preservation practices compromise the integrity of biological and physical evidence. Courts have repeatedly emphasised that chain-of-custody lapses can weaken prosecution arguments and undermine judicial confidence in scientific evidence. Failure to maintain continuous custody documentation and timely laboratory submission opens space for allegations of tampering, thereby diminishing the probative value of forensic material. Judicial directives have reinforced the necessity of scientific rigour, recommending technological upgrades and capacity-building to ensure accuracy and reliability.

Furthermore, coordination gaps between investigation agencies and medical institutions impede timely collection and preservation of critical samples. Medical practitioners often report lack of support and guidance from investigating officers, insufficient training in forensic protocols, and high patient load, all of which affect timely medico-legal documentation and collection of samples. This highlights the need for integrated training, streamlined communication mechanisms, and dedicated forensic support systems at medical facilities. Deployment of Sexual Assault Response Teams and dedicated forensic support units can foster more efficient and survivor-centric procedures.

In conclusion, forensic infrastructure in India reflects a foundational framework that requires sustained improvement in manpower, technology, and procedural systems. Strengthening laboratory capacity, digitising evidence-tracking systems, enforcing chain-of-custody standards, improving inter-agency

²⁴ Ministry of Home Affairs, SAEC Kit Operational Guidelines (2019).

²⁵ BPR&D, Crime Scene Management & Forensic SOPs (2022).

²⁶ NITI Aayog, Justice and Policing Infrastructure Report (2021).

coordination, and institutionalising continuous forensic training are essential to enhancing justice delivery. Only a fully equipped and technologically supported forensic ecosystem can ensure reliable scientific evidence and uphold gender justice in cases of violence against women.

Inter-Agency Coordination, Gender-Sensitive Policing, and Barriers to Justice for Survivors

Inter-agency coordination and gender-sensitive policing constitute essential pillars for effective justice delivery in cases of violence against women. Crimes involving sexual assault and gender-based violence require a multi-institutional response involving police authorities, medical professionals, forensic laboratories, legal aid providers, child-protection units, and the judiciary. Each stakeholder plays a distinct role in the chain of investigation and victim support, making seamless coordination indispensable. However, in practice, fragmented institutional functioning, overlapping responsibilities, and procedural delays impede the timely collection, preservation, and presentation of evidence.

A major challenge lies in the absence of uniform coordination protocols across jurisdictions. While guidelines exist for Sexual Assault Response Teams and medico-legal procedures, their application is inconsistent across states and districts. Communication gaps between police and medical authorities often result in delays in medical examination, incomplete medico-legal forms, or improper handling of forensic samples. Similarly, forensic laboratories frequently operate independently from investigating agencies, leading to delayed updates, backlog accumulation, and procedural ambiguities. The lack of real-time communication channels and integrated evidence-management platforms hampers transparency and can compromise the integrity of evidence.

Gender-sensitive policing, although emphasised under statutory mandates and police-training modules, remains an evolving

practice. Sensitive handling of survivors and trauma-informed responses are crucial for encouraging reporting, ensuring cooperation, and building trust in law-enforcement institutions. Survivors of sexual offences are often reluctant to approach police stations due to fear of humiliation, victim-blaming, social stigma, and potential retaliation. Insufficient female police presence, inadequate victim-support services, and lack of private, safe spaces for recording statements further intensify survivor anxiety. Although legislative mandates require statement recording by female officers and confidentiality safeguards, implementation varies significantly, especially in rural and low-resource contexts.

Medical institutions also face structural challenges. Limited availability of female medical practitioners, high patient loads, and lack of specialised forensic training can obstruct timely evidence collection and survivor-centred care. Without proper inter-agency cooperation, medical professionals may not receive timely information or guidance from investigating officers, resulting in missed evidentiary opportunities and procedural lapses. Judicial authorities frequently highlight the need for coordinated functioning between police, healthcare institutions, and forensic agencies to ensure procedural compliance and maintain evidentiary integrity.²⁷

Legal aid services and psychological-support mechanisms constitute another key dimension. Survivors require consistent emotional support, counselling, and legal guidance from the moment they report the offence until the completion of trial. Fragmented communication between police, legal-aid bodies, shelter homes, and support counsellors often leaves victims navigating the process alone, increasing the risk of withdrawal of complaints or reluctance to participate in legal proceedings. Witness-protection concerns, delayed hearings, and hostile legal

²⁷ Ministry of Home Affairs, Standard Operating Procedures for Sexual Assault Response Teams (SART), 2020; NFSU, Chain-of-Custody and Digital Evidence Protocols (2022).

environments further deter victims from actively pursuing justice²⁸.

In sum, achieving gender justice in sexual-offence cases depends on an integrated, survivor-centred justice ecosystem. Strengthening institutional linkages through standardised protocols, digital coordination platforms, and multidisciplinary response mechanisms is crucial. Equally important is the institutionalisation of trauma-informed policing, expansion of female workforce participation, survivor-friendly facilities in police stations and hospitals, and access to continuous legal and emotional support. When inter-agency collaboration and gender-sensitive practices operate in harmony, the justice system can uphold dignity, ensure procedural fairness, and foster an environment where survivors feel safe, respected, and empowered to seek justice.

Recommendations and Policy Reform Measures for Strengthening Forensic and Policing Systems in India

Strengthening forensic and policing mechanisms in India requires a multi-layered policy approach that addresses structural limitations, modernises investigative capacities, and institutionalises survivor-centred practices. Although statutory frameworks mandate scientific investigation and gender-sensitive procedures in cases of violence against women, consistent implementation demands comprehensive reforms in training, infrastructure, accountability, and inter-agency coordination.

A primary reform priority is capacity-building and specialised training. Police personnel and medical officers must receive continuous professional development in forensic evidence handling, chain-of-custody protocols, Sexual Assault Evidence Kit procedures, digital forensics, and medico-legal documentation.²⁹ Training academies should collaborate with

forensic institutions, law universities, and judicial academies to design advanced curricula. Mandatory refresher courses, certification requirements, and simulation-based training modules can ensure that knowledge remains current and aligned with technological advancements.

Investment in forensic infrastructure and decentralised laboratory networks is essential to reduce processing delays and ensure timely evidence examination. Establishing forensic facilities at the district level, expanding DNA laboratories, equipping hospitals with forensic kits, and strengthening cyber-forensic units will enhance capacity. Dedicated forensic officers embedded within police units, along with mobile forensic vans and automated evidence-tracking systems, can support real-time scientific intervention during investigations.

To ensure transparency and evidentiary integrity, digital chain-of-custody systems and integrated case-tracking platforms must be institutionalised³⁰. Digitised documentation, secure electronic storage of records, and real-time transmission of forensic reports can reduce tampering risks and procedural errors. Adoption of national forensic information systems that connect police, hospitals, laboratories, and courts will streamline coordination and improve accountability.

Enhancing gender-sensitive policing and survivor support mechanisms forms another critical component. Establishing dedicated women-help desks, increasing female officer representation, creating confidential and trauma-sensitive spaces for statement recording, and deploying specialised Sexual Assault Response Teams can improve survivor confidence. Counselling services, legal-aid facilitation, medical support, and witness protection must be available from the first point of contact and continue throughout judicial proceedings.

²⁸ Ministry of Home Affairs, Modernisation of Forensic Science & Criminal Justice System Guidelines, Government of India (2022).

²⁹ State of Punjab v. Gurmit Singh, (1996) 2 SCC 384; Lalita Kumari v. Govt. of UP, (2014) 2 SCC 1

³⁰ Ministry of Home Affairs, Crime and Criminal Tracking Network and Systems (CCTNS) & ICJS Framework, Government of India (2021).

Accountability measures are necessary to secure compliance with mandated procedures. Periodic audits of police stations, forensic units, and medical facilities; performance review systems linked to forensic compliance; and disciplinary action for procedural lapses—including chain-of-custody violations and delays in evidence submission—are crucial to sustaining professional standards. Court-directed monitoring mechanisms and independent forensic oversight bodies can further enhance institutional transparency³¹.

Policy reform should also address inter-agency coordination. Establishing unified Standard Operating Procedures applicable across jurisdictions, forming multi-stakeholder coordination cells, and conducting joint training programmes for police, doctors, prosecutors, and forensic experts will help build a collaborative and consistent investigative culture.

Public awareness campaigns that promote legal literacy, survivor rights, and the importance of scientific investigation can support reporting and confidence in the justice process. Partnerships with civil society, academic institutions, and forensic experts can strengthen community trust and bridge knowledge gaps.

Ultimately, effective forensic preparedness and gender-sensitive policing depend on a holistic, institutionally embedded reform framework. By modernising infrastructure, strengthening training, enforcing accountability, improving coordination, and prioritising survivor dignity, India can move toward a justice system where scientific evidence and compassionate policing operate together to deliver timely and credible justice for women.

Conclusion

Forensic preparedness and gender-responsive policing are indispensable to strengthening the justice delivery system in cases of violence against women in India. Although statutory

reforms and institutional guidelines recognise the centrality of scientific investigation, significant gaps in capability, infrastructure, coordination, and sensitivity continue to affect outcomes. The effective use of forensic science requires not only modern laboratories and technological tools but also skilled personnel, efficient chain-of-custody procedures, and trauma-informed policing practices.

Ensuring justice for survivors is a multi-institutional responsibility that spans police stations, hospitals, forensic laboratories, and courts. Bridging institutional divides, standardising protocols, and implementing digital case-tracking mechanisms are essential to minimise delays and prevent evidentiary lapses. Likewise, specialised training, professional accountability, survivor-friendly reporting systems, and strong inter-agency coordination must be sustained as continuous institutional priorities rather than sporadic administrative efforts.³²

Ultimately, the pursuit of gender justice cannot rely solely on legal reforms; it must be supported by scientific rigor, empathetic engagement with survivors, and robust institutional frameworks. Strengthening forensic capacities and gender-sensitive policing is not only a matter of administrative efficiency but a moral and constitutional imperative. A coordinated, technology-driven, and survivor-centric criminal justice system is essential to ensuring timely convictions, restoring public confidence, and upholding the dignity and rights of women in India

³¹ State of Karnataka v. Shivanna, (2014) 8 SCC 913; BPR&D,

³² National Forensic Sciences University (NFSU), Inter-Agency Forensic Coordination SOPs, 2022.