



The Role and Challenges of Forensic Evidence in Criminal Investigations in Pakistan

Dr. Shahid Rizwan (Corresponding Author)

Assistant Professor College of Law, GCUF. Email: shahidrizwan@gcuf.edu.pk

Hussain Mehdi

Advocate High Court

doi.org/10.5281/zenodo.14600760

Abstract

Forensic evidence has become an important means of conducting investigations in the contemporary society, because it provides accurate and practical solutions to criminal cases and justice. In Pakistani context, where much depends on witness statements and circumstances, Forensic sciences can cater to major lacunas in investigation arena. Nevertheless, there are a lot of complexities in the application of forensic evidence in Pakistan such as shortage of facilities, skilled professionals and flow diagram problems. It focuses on the nature and purpose of forensic evidence in Pakistan to examine how they can positively impact the effectiveness of the criminal justice system and how potential difficulties may hinder or limit the potential of forensic evidence in Pakistan. Research highlights include the fact that forensic evidence has enjoyed a positive effect on the increase in conviction rates in some offences internationally, Pakistan lacks modern forensic laboratories and lacks a proper legal structure to handle increased forensic technology. This type of mismatch is symptomatic of the current state of forensic science, training, and cross-agency cooperation, which this study identifies as areas that desperately need investment.

Keywords: forensic evidence, criminal investigations, Pakistan, challenges, justice system

Introduction

Forensic evidence in criminal investigations have taken a central stage in solving crimes and alleviating sufferings in societies across the globe. Forensic science is the science of processes associated with crime scenes, investigation, trial, and providing evidence that can either be true or false depending on accurate analysis derived from other sciences (James & Nordby, 2020). In Pakistan however, use of forensic in criminal investigation is still minimal, despite the advancements in technology, while more traditional forms of investigation like eye witness or confessional accounts continue to predominate (Babar and Tariq, 2022; Iqbal, 2021).

Fingerprinting, DNA profiling, ballistics, and toxicology can in way provide a solution to operational problems that are inherent in the Pakistan's legal system from conviction of the innocent and delayed trials. Internationally, forensic investigations have helped solve such hefty cases while proving that the aspect can help with the formation of facts and fair proceedings (UNODC., 2023). Still, Pakistan has not capitalised on the use of forensic science as it is constrained by



inadequate facilities, meager resources and scarce skilled workforce (Ali & Malik, 2023).

The problem under consideration in this study relates to the lack of incorporation of forensic evidence in criminal investigations within Pakistan. While forensic science has been successful in other countries, the situations in Pakistan are not as favorable and have several problems, including the lack of reference protocols for handling and collecting pieces of evidence, contamination of crime scenes, and inadequate operational chain of custody (Khan 2020; Smith 2019). The purpose of this paper therefore is to discuss the importance of forensic evidence in criminal investigations in Pakistan with a view to also establish likely challenges to its successful adoption.

The objectives of this research are as follows:

1. To examine the role of forensic evidence in improving the efficacy of criminal investigations in Pakistan.
2. To identify challenges in the collection, analysis, and use of forensic evidence in Pakistan's judicial system.
3. To propose recommendations for strengthening forensic capabilities in Pakistan.

The introduction is designed to give an overview of the background to the study, identify the existing research, and set out the purpose and importance of the study. The following challenges could be faced on similar lines In this regard, the present study shall contribute to the existing literature on enhancing Pakistani criminal justice system by incorporating forensic science.

Literature Review

Literature review focuses on concepts of forensic evidence as an investigative tool, the history of forensic science in Pakistan and the issues arising from its application. This section compares and contrasts current studies done on Pakistan and presents an outline to represent the need and relevance of this research in the context of forensic science in Pakistan.

Importance of Forensic Evidence

Criminal investigations have come to encompass forensic evidence as a way of increasing the certainty and precision in investigations that could otherwise be inconclusive and subjective. Unlike other forms of testimonies whereby an eyewitness can be easily influenced either by his or her memory or by other people, forensics gives accurate and scientific results that would either incriminate a suspect or set free an innocent person. Long before scholars turn their focus on the role of forensic science, it has amply demonstrated in different parts of the world the worth of contributing significantly to solving complicated criminal cases, raising the conviction rates, and avoiding injustices. Methods like DNA, fingerprints, and bullets, digital forensics help in the legal process making it harder for the criminals to escape punishment or for the right thing not to be done (James & Nordby, 2020). According to the United Nations Office on Drugs and Crime UNODC, forensic science plays an essential function in securing justice with reference to a critical nature of crimes such as homicide, rape, and involving organized crime.

In the developed countries the forensic science is an integral part in the framework of the police and judicial procedures through which the investigation



is as credible as the trials are being fair. For instance, the United States has also invested hugely on the technological development of forensic science participating in the development of modern sophisticated forensic laboratories that can carry out sequencing of DNA, ballistics and toxicology tests among others. One of the most significant programs is the Combined DNA Index System (CODIS) that comprise some data base that helps the law enforcement agencies across the country to match up DNA samples and therefore more and accurate identification of the suspect. Houck and Siegel (2019) conduct investigations on the use of forensic science in criminal investigation to show that it has replaced what is often perceived as weak techniques such as eyewitness accounts which are easily influenced or impersonated. Like many countries of the world, the United Kingdom has a national DNA database and follows letter and spirit to collect and preserve forensic materials that can be safely used in courts. They do not only enhance conviction percentages but also reaffirm the community parade in the legal system.

The virtues of forensic evidence in cases of rape is exemplified by the Innocence Project in United States of America. Organizations employing this technique have helped reverse the wrongful convictions of more than 300 people, most of whom were serving their jail terms or awaiting death. They illustrate that forensic science plays the crucial role in protecting individuals and reversing unlawful rulings of the court. They also reveal other related potential objectives of forensic science, namely improving social satisfaction with the criminal justice system and supporting the rule of law.

In Pakistan still, the effectiveness of the forensic evidence part has not been fully clarified whereas its part in the overall criminal justice system is small and not developed enough. However, to date, and despite advancements in the last few years, forensic science remains far from being recognized as an essential feature of the criminal justice system, such as the PFSA. Formed in 2009 the PFSA possesses state of art facilities for DNA, toxicology, ballistics and trace evidence and has contributed positively to solving many complicated cases. An example, which is particularly worth mentioning, is the Zainab Ansari case in which the role of DNA was famous is identifying and convicting the person. From this case the significance of forensic evidence in the process of attaining justice and its relevance in the investigation of cases that lack sufficient physical or testimonial evidence was established by this authors(K rarely investigated with adequate physical evidence)(Ali & Malik, 2023).

But such success stories are exception rather the rule because of several constraints that hinder the expansion of forensic science in Pakistan. It is because developing provinces do not have access to forensic laboratories where forensic services can be provided across the country. Also, employees in police departments are usually not well trained or well equipped to gather and preserve important pieces of evidence, which in turn get compromised. There is also a low level of perception of the worth of delivering forensic information, the public is also not well sensitized to appreciate its importance in court or trial proceedings (Khan, 2020). These systemic difficulties are by no means exhaustive, they explain why it is critical for Pakistan to direct resources towards the development of forensic facilities, the training of forensic personnel, and the popularization of forensic science in the country in order to enhance the role of the forensic science in the country's criminal justice system.



Hence, forensic evidence is crucial in enhancing justice delivery because it contributes more reliable scientific data to the investigations and trials processes. That is why the effect can be observed in developed countries as well as in some cases in Pakistan; however, the extensive changes in the system are required for the manifestation of the successfully accomplished work. By improving the infrastructure, increasing training, and raising awareness Pakistan will be able to realize the benefits of the forensic and its implication on the criminal justice system as well as fairness and transparency of the legal system.

Historical Development of Forensics in Pakistan

Lack of Forensic Science and its historical development in Pakistan exposes that there have been delays, inconsistencies and underdevelopment and thus reveals the issues categorized in the Pakistan criminal justice system. Prior to the inception of actual criminalistics systems, police forces were nearly totally dependent on conventional and regularly unsound modes of investigation. Tasmanian police relied on eyewitness accounts and confessions, which are the basic forms of evidence collection but which had shortcomings. It also emerged that hatched confessions were normally produced out of compulsion or force, making many of the confessions inadmissible. Likewise, the core testimony, which at times helpful, were subjective, tainted by human inaccuracies and fallibility, and rife with misidentification, to build prosecutorial contexts for convictions (Iqbal, 2021). These problems were made worse by the absence of scientific instruments and experts, situations which ensured that police work relied on circumstantial evidence that could easily be disputed in courts.

Achievement of a distinctive theme for the advancement of forensic science in Pakistan was the foundation of the Punjab Forensic Science Agency (PFSA) in the year 2009. Since it was designed as one of the premier and highly sophisticated forensic science academies in South Asia, the establishment of the PFSA introduced an innovative form of criminal procedural reform in the nation. New advanced facilities were developed in the agency such as DNA and toxicology, ballistics, as well as trace evidence departments. These developments enabled police departments across Punjab to go from conventional methods to realism. The PFSA's specialized divisions and state of the art criminalistics infrastructure generated more extensive opportunities for evaluation and expeditious investigation that allowed the solving of intricate cases that would have been insolvable through the use of routine techniques (National Forensic Science Agency, 2022).

However, this has offered significant positive work of the PFSA which however is more or less confined to Punjab. Lacking such amenities and equipment, other provinces like Sindh, Balochistan and Khyber Pakhtunkhwa are still far behind to support Law enforcement agencies of corresponding provinces to undertake forensic evidences in an efficient way. This inequality of resource allocation points to a wide geographical gap, thereby limiting the rollout of forensic science as a potent differentiator only to a segment of Pakistan's population (Babar & Tariq, 2022). As a result, criminal investigations outside Punjab are still weak, employing outdated techniques, and which slows down the dispensation of justice.

Apart from formidable infrastructural bottlenecks, other systematic hindrances have Occurred to include sustained integration of forensic science into Pakistan's



criminal justice model. Saeed and Ahmed (2020) pointed that weak cooperation between the main stakeholders, the police, forensic services, and the judiciary effectively hinders the application of forensic evidence in criminal investigations. For example, police investigators frequently are not able to secure crime scenes sufficiently, which leads to the tampering of, or the destruction of, unknown evidence. This failure arises from the inadequate training of investigators on collection and preservation of forensic evidence a factor that leads to poor quality offorensic evidence. In addition, there is a lack of proper calibration between the expert and the judicial officers hence they do not fully understand the technicality of the forensic report, and thus constant distinctions in admissibility of the reports in trials. This lack of understanding hampers the potential of the judiciary in deploying forensic evidence and, thus, lessens its potential as well (Smith 2019).

Lack of properly articulated policy and procedure in regards to the collection and preservation of evidence is also problematic in application of forensic science in Pakistan. When there are no guidelines on the specifics of procedures, then the use of forensic evidence is a matter of doubt, and the evidential value of such products, which is used in passing judgment, is highly reduced. For instance, if an evidence is improperly deal with during the transportation or keeping it, then such an evidence cannot be used in court and this just closes the investigation. These procedural inconsistencies underscore the necessity of the methodological improvements across the country to set best practice and improve the credibility of the forensic sciences.

In conclusion, it can be stated that problems related to the implementation of forensic science in the criminal justice system of Pakistan still persist despite the creation of institutions like the PFSA. These challenges can however only be addressed by augmenting the number forensic facilities in under privileged provinces individually, sponsoring law enforcement as well as judicial personnel trainings educationally, as well as cooperating towards implementation and enactment of set and refined check-pointing and evidence handling standard operating procedures. Thus, such changes can help Pakistan to cast off all sorts of barriers and gain the opportunity to use forensic science consistently and effectively at the stages of criminal investigations and enhance the overall perception of the credibility of the given state's justice system.

Challenges in the Use of Forensic Evidence

The problem of utilizing forensic evidence is pegged on multiple issues that can be best understood under legal institutional, technological, legal and cultural factors in the context of Pakistan.

- 1. Institutional Challenges:** This is one of the key barriers that include Inadequate national forensic framework coordination. However, the PFSA has played helpful roles in the contributors' provinces, while other provinces do not have these services. As pointed out by Ali & Malik (2023), lack of Forensic Labs in provinces such as Balochistan and Khyber Pakhtunkhwa makes law enforcement solve crimes and wait for trials using old methods. It is made worse by the fact that there is a shortage of qualified forensic personnel. Investigations show that Pakistan produces few forensic specialists per year, meaning key forensic positions in laboratories remain unoccupied (Iqbal, 2021). This shortage is worse because few training programs are



- provided to police officers who badly manage evidence at the time of collection and transportation (Babar & Tariq, 2022).
- 2. Technological Gaps:** Challenges emanating from the application of technological development affects the utilization of forensic evidence. For instance, many forensic labs use old generation equipment and software, which makes test results to be inaccurate or unreliable (Khan, 2020). In addition, access to international database including the CODIS have been restricted by the government hence, it is hard for forensic experts to compare on DNA samples in order to identify suspects (Smith, 2019). The investigations of cybercrime also present more difficulties because of inadequate forensic services. As cybercrime rates rise in Pakistan, inadequate possibilities for tracking digital footsteps and computerized proofs prove a major challenge to justice (UNODC, 2023).
 - 3. Legal and Procedural Barriers:** Legal factors also make it even tougher for forensic experts to go about their work. The relevance of such forensic evidence is commonly an issue in Pakistani courts because of the concerns related to the chain of custody, as well as the absence of well-stipulated standard protocols regarding the handling of such evidence (Saeed & Ahmed, 2020). Also, the lack of knowledge of forensic science by the judiciary influences the exclusion of scientifically sound evidence and thereby undercuts its function in trial (Khan, 2020). Procedural delays explain why forensic operations fail most of the time and they include; Several cases take years to be completed because of the slow handling of such evidence and procedures. A few current studies by Iqbal (2021) show that there is a high through put of cases in forensic labs in Pakistan, with a consequent high backlog.
 - 4. Cultural and Social Barriers:** Another difficulty stems from cultural beliefs in relationship to the scientific evidence . The reception of post mortem evidence is still a challenge because of conventional practices and lack of confidence in scientific approaches. This is especially so in most rural communities where the natural approach to conflict resolution takes priority over the legal one (Ali & Malik, 2023).
 - 5. Donor Sources and Resource Distribution:** Lack of funds is one of the biggest problems that Pakistan's forensic science faces, as the following statistics show. As highlighted by Babar and Tariq (2022), the funded of the forensic labs are modest meaning that they are unable to purchase better equipment, hire qualified personnel or research. This situation is symptomatic of the general disregard of science and technology in the strategic policy of Pakistan.

Comparative Analysis with Other Countries

A comparison of Pakistan's position with other countries in terms of forensic services reveals the shortcomings that make it difficult for Pakistan to utilize forensic findings in criminal cases. Forensic science, especially in the United States and the United Kingdom, has become a part of the criminal Justice System. These countries have strong built forensic systems, enhanced by adequate government funding, better technology, and professional course in education for forensic specialists and the police force. For example, the United States maintains a broad networks including the CODIS that allows for



comparison or identification of DNA samples across state lines (Houck & Siegel, 2019). The same can be said for the United Kingdom's national DNA database and or a very strong forensic safeguard mechanisms that make forensic examinations to be very accurate hence resulting in higher conviction rates among the public hence the more trust on the justice system.

On the other hand, Pakistan has many obstacles in all these aspects that hamper its capability to take advantage of forensic evidence. Due to the poor development of forensic science, the inadequate infrastructure, and generally scarce access to technology as well as the insufficient funding, the potential of forensic science will hardly be fully realized. For instance, whereas developed nations such as the U.S have technologically advanced systems for next-generation sequencing and automated evidence analysis systems, forensic labs in Pakistan are poorly equipped and way behind age technology means use old-fashioned means of sample analysis, with a consequence of wrong or delayed results (Iqbal, 2021). Moreover, there is lack of national fingerprint, DNA, and ballistics databases in practice that also makes weak integration of forensic evidence into criminal cases.

When it come to the advancement of forensic science however Pakistan seems to lag behind as compared to many other developing countries that share similar socio-economic issues like India and Bangladesh. For instance, India has increasingly developed its capabilities of forensic services. The creation of the regional forensic science laboratories means that there is forensic service even if the region is so backward. Furthermore, due to signing of the criminal procedure Act Section 22 in 2022, there is acceleration in the use of biometric/ forensic data and the identification of suspect/criminal during investigations. In this regard, India has been able to surmount many of the challenges that are inherent within capacity restraints and suboptimal infrastructure through capability development and technological advancement. Like Bangladesh, it has given emphasis on forensic training and international cooperation that has enhanced its capacity on difficult investigations especially in those areas of cybercrime and digital forensic.

These examples are therefore important for Pakistan to learn from. Investment in constructing a single forensic system, the creation of regional forensic centres, and the adoption of regular practices regarding evidence collection are gradual improvements to the existing problems. By emulating successful approaches of nations such as the United States, the United Kingdom and India, Pakistan can strengthen its forensic structure, increase the availability of forensic services and optimise the credibility of forensic information used in criminal justice systems. It has to be noted that these reforms, however, cannot happen without significant investment in forensic science, as well as cultural shift in understanding the necessity of the forensic science in the contemporary law enforcement agencies.

Methodology

The following section briefs the applied research method used to investigate on the use and issues of forensic data in criminal investigations in Pakistan. It outlines the design, data collection tools, methods of data analysis and the various limitations incorporated in the study.

Research Design



The following section briefs the applied research method used to investigate on the use and issues of forensic data in criminal investigations in Pakistan. It outlines the design, data collection tools, methods of data analysis and the various limitations incorporated in the study.

Data Collection

1. Secondary Data Sources

- **Academic Journals:** Using Journal articles such as Journal of Forensic Sciences, Pakistan Journal of Criminology and Forensic Science International, findings concerning the roles and challenges of forensic evidence were collected.
- **Government Reports:** Assistance from the PFSA, the National Forensic Science Agency, and the UNODC's Office on Drugs and Crime enriched the findings on Pakistan's forensic landscape.
- **Case Law:** In order to get data related to Pakistan related to the role of forensic evidence in criminal process, the high profile case of Zainab Ansari was considered (Ali & Malik, 2023).
- **News Articles:** The recent articles in the local and international press such as Dawn and The News International were used to get a feel of recent trends and public opinion about forensic science in Pakistan.

2. Primary Data Sources

- **Interviews:** Interviews were semi-structured with forensic experts, policemen, and lawyer to understand firsthand the challenges and prospects of forensic evidence in Pakistan.
- **Focus Groups:** The current procedures and perceived cultural practices among the police and prosecutors were investigated through a series of focus group discussions with these categories of Criminal Justice personnel.

Data Analysis

The data collected was analyzed using thematic analysis so as to highlight the pattern and themes which emerged. This method enabled the researcher to categorize and analyze qualitative data in a mannered approach (Braun & Clarke, 2006). Key themes included:

- The role of forensic evidence in solving crimes.
- Institutional, technological, and legal challenges.
- Comparisons with forensic practices in other countries.

Further, for case-studies of successful and unsuccessful investigations involving forensic evidence in Pakistan the best practices and learnings were then compared and analyzed (Saeed & Ahmed, 2020).

Limitations

Despite its comprehensive approach, this study has several limitations:

1. **Access to Data:** Stringencies such as restricted access to forensic case records and some government documents skewed the study's depth.
2. **Regional Focus:** Majority of the data were extracted from Punjab province given that PFSA is the most advanced forensic organization in



Pakistan. But this may not fully represent challenges in other provinces of the country.

3. **Interviewee Bias:** The usage of interviews is well explained by the fact that it is inherently predisposed to the subjectivity of observed phenomena and may facilitate the overselling of certain problems by participants due to individual experience (Creswell & Poth, 2018).
4. **Time Constraints:** The amount of time that could be dedicated to carrying out primary research was restricted, which reduced the scope of the study.

Ethical Considerations

It was ensured before conducting interviews as well as focus group discussion that ethical clearance was sought. Before engaging the participants, they were offered an explanation of the goals of the research, and they agreed to be involved. The anonymity and the confidentiality of data were maintained during data collection and analysis (Bryman, 2016).

Findings and Discussion

Regarding, this section of the research actually provides a view on the collected empirical data which unveil the position of forensic evidence in criminal investigations in Pakistan some challenges observed in the effective implementation and a comparative study on best practices internationally. The discussion is concerned with the critical analysis of the findings and relates it with the overall framework of criminal justice system of Pakistan.

The Role of Forensic Evidence in Criminal Investigations

Modern criminal evidence investigations cannot be talked of without mentioning forensic evidence since it offers scientific evidence and reliability in the cases investigations. Over recent years, this field in Pakistan has slowly come to the limelight and has been given a much higher profile and recognition especially in high profile crimes. The following aspects highlight its significance:

1. **Additional Endorsement of Investigative Studies:** The forensic evidence adds to the traditions means of gathering information by offering scientific findings to prove occurrences. For example, DNA profiling has been used in analyzing cases of sexual violence with effectiveness in identifying perpetrators. You may recall the Zainab Ansari case in Kasur where DNA evidence resulted in the convicting of the culprit, which underlines how great change forensic science is capable of occurring in Pakistan as well (Ali & Malik, 2023).
2. **Improving the Formulation of the Judicial Decision:** Pakistan courts have of recent adopted the use of forensic evidence to support witness by detailing and ensuring a fair trial. Saeed and Ahmed (2020) observed that the admissibility of DNA, ballistics, and toxicology has enhanced the judicial procedure by eradicating hearing-usual eye-witness and confessional evidence, which are attainable under coercion.
3. **Strengthening Conviction Rates:** The literature review of the study shows that crime scenes that include forensic evidence records higher conviction compared to scenarios that involves only circumstantial evidence. Another study by Iqbal (2021) revealed the fact that



enhancement of DNA in sexual assault cases in Punjab was enhancing the conviction rate about 35% that clearly shows the importance of forensic science in getting the justice.

4. **Exonerating Innocent Individuals:** Forensic also contributes in the reduction of wrongful convictions or rather and exarceration. Fingerprint analysis, ballistic report, and digital forensic have proved useful in freeing individuals who have been implicated unfairly in criminal activities; therefore are practical means of a fair society (UNODC, 2023).

Challenges in the Use of Forensic Evidence

However, there are many challenges which make forensic evidence in Pakistan significantly less effective than it could be. These challenges are discussed below:

1. **Institutional Gaps:** The absence of a clear coordinated national forensic structure is nevertheless still a problem. Although the Punjab Forensic Science Agency (PFSA) has provided a benchmark for the forensic services the other three provinces are nowhere near in terms of infrastructure and trained personnel (Babar & Tariq, 2022). For instance, Sindh and Balochistan with very few options of forensic labs to refer to which makes the LEAs to use very outdated techniques of investigation.
2. **Shortage of Trained Personnel:** However, the main challenge is scarcity of human resource particularly skilled forensic scientists and technicians. Another study by Khan (2020), that indicates that only less than 50 trained forensic experts graduate each year in Pakistan, these are not enough to meet the escalating need for forensic services. Also, the law enforcement personnel do not possess adequate formal education and knowledge in the correct collection and preservation on the scene that often gets tainted and therefore rejected by the court (Smith, 2019).
3. **Technological Deficiencies:** Funding of many forensic laboratories in Pakistan is very low, and these labs do not possess modern facilities and equipment. Forensic investigation, for instance, entails highly effective technologies and neat infrastructural amenities, most of which are scarce in the regional territories beyond Punjab (Ali & Malik, 2023). Also, there are no equal of national databank regarding fingerprints, DNA profiles, and ballistic which in some way restricts the area of forensic analyses (UNODC, 2023).
4. **Legal and Procedural Challenges:** Despite the integration of forensic sciences in the criminal justice system of Pakistan, there are certain issues involved in the admissibility of such evidence in Pakistani courts due to various procedural lapses. The presentation of forensic evidence is problematic in trials because of the issues of chain of custody regulation and inconsistency in handling of evidence (Iqbal, 2021). In addition, lack of knowledge in forensic science among the judiciary as a result of scientific invalidities also play a large role in rejecting sound forensic science results (Khan, 2020).

Cultural and Social Barriers

Such factors include: Societal culture and beliefs and distrust for scientific tools. While receiving the forensic evidence is acceptable in highly-developed settings, traditionalism and powerful informal structures in the rural areas defeat formal



investigations in rural areas, thereby reducing the acceptance of the forensic evidence.

Comparative Analysis with Global Practices

A bench marking study also highlights a number of deficiencies in Pakistan's forensic practices, but provides useful information concerning prospects of enhancements against international norms.

1. Developed Countries

Among developed countries of the world particularly the United States and the United Kingdom forensic evidence is considered a strong basic part of police investigation. These countries has their own national forensic agencies, advanced forensic laboratories and produce and encourage their policemen and forensic scientists. For example, the United States use Combined DNA Index System (CODIS) as centralized database that can facilitate the comparison and analysis of DNA from one location to the other (Houck & Siegel, 2019). Likewise, the United kingdom uses a national DNA database to complement other sophisticated forensic acts that makes the identification of suspect and closure of cases faster and accurate. In these states, the incorporative use of forensic science in crime fighting has not only boosted conviction, but also faith in the system.

2. Developing Countries

Among developed countries of the world particularly the United States and the United Kingdom forensic evidence is considered a strong basic part of police investigation. These countries has their own national forensic agencies, advanced forensic laboratories and produce and encourage their policemen and forensic scientists. For example, the United States use Combined DNA Index System (CODIS) as centralized database that can facilitate the comparison and analysis of DNA from one location to the other (Houck & Siegel, 2019). Likewise, the United kingdom uses a national DNA database to complement other sophisticated forensic acts that makes the identification of suspect and closure of cases faster and accurate. In these states, the incorporative use of forensic science in crime fighting has not only boosted conviction, but also faith in the system.

3. Lessons for Pakistan

The following are prime examples that Pakistan can learn a few profound lessons to overcome its shortfall in forensic science. Increasing the number of forensic facilities in every province is the only way to provide all citizens with access to contemporary forensic services. Procuring high tech tools and developing national DNA, fingerprint, and ballistics for information can dramatically increase the effectiveness and accuracy of investigations. Enhancement of training & development par programmes for the personnel in cop-in and judiciary will enhance the management and admissibility of the forensic evidence in the courtrooms. Last, but not least, the practice of systematic and universally accepted procedures for acquiring and handling the evidence is an essential step on the way to the acquiring of the public recognition of the effectiveness of the forensic procedures. Through these measures, this country will be able to bring the forensic system to a modern level and enhance the framework of criminal



justice system.

Discussion

The findings of this study is seen in the requirements of forensic in increasing the effectiveness, effectiveness and neutrality of criminal investigations in Pakistan. Forensic science gives credence to results and procedures informing investigations, thus hammering the certificate of undue faith in resultants like combinations of hearsay or coercion. Even then, the study identifies several barriers to the efficient utilization of forensic evidence in the country; and these encompass a lack of infrastructure and technology resources, poor collaboration among stakeholders.

Among the difficulties, the most significant one is the absence of the full-scope availability of the forensic facilities throughout the country. Though PFSA has set phenomenal example of the efficiency of modern forensic labs in solving complicated crimes; such capabilities are either non existent or restricted in other provinces. This has greatly contributed to the development of massive regional disparities in the application of forensic evidence such that underprivileged provinces conduct post-mortem through rudimentary practices or outsourcing and therefore prolong the process of justice while at the same time eroding the integrity of investigations. The increase of forensic resources and making them accessible to all states is the solution for these problems.

Technological shortcoming also contributes largely perhaps to a limited extent to the weaknesses of forensic evidence. Seriatricos that are situated in Punjab has for instance better equipments for DNA, digital, ballistic and toxicology analysis than many other forensic labs across the country. Additionally, the current system of not having centralized databases for fingerprints, DNA profiles, and ballistics makes it much harder for different jurisdictions to connect the evidence from one case with another, unfortunate for different law enforcement agencies. Probably the most critical prerequisites essential to enhance the result of the investigations and establish more efficient cooperation between agencies include investing in modern technology and creating a centralized database of a forensic nature.

The other major hindrance stated in the study is the weakness in capacity of police, forensic and judicial system. A lot of the policemen and detectives are not sufficiently trained in respect to collection, handling and preservation of evidence which in turn get contaminated or even destroyed. Notably, judicial officers do not possess the right competencies to review forensic reports hence the inefficient or sometime incorrect application of the reports in trials. To fill these gaps, the improvement of capacity building in the form of continued training, seminars, and workshops throughout all the stakeholders is necessary to better position forensic evidence in its most effective way.

Another area that is problematic is public awareness and or perception and societal attitude towards forensic science. This creates a big problem of ethnic and social acceptance of science and scientific techniques, especially in rural regions. Nature and custom judgments regularly supersede legal procedures, and also eliminate the efficacy of lawful, scientific findings. Addressing these challenges involves enhancing people's awareness of the centrality of forensic science in the quest for justice and in the need for openness and fairness in the delivery of justice.



Vol. 2 No. 5 (December) (2024)

Although the PFSA evidence shows the value of fundamentally changing the forensic science, its success has to be repeated all over the country on a coordinated and comprehensive basis. The Government must dedicate its resources into update infrastructure and technology in forensic field as it works to change the laws that has procedural deficiencies such as lack of standard procedures for collection of evidence. Awareness of forensic science, knowledge enhancement efforts among the police force, forensic professionals, trial and appeals court judges as well as jurists also goes a long way to ensure that forensic science is seamlessly linked to the criminal justice system.

In conclusion, it is obvious that these challenges cannot be solved single handedly but through a joined up effort between the government, police, forensic science providers, judiciary and the citizens. Thus, the achievements of the PFSA, when combined with international trends, will allow Pakistan to develop the concept of forensic evidence to the maximum and enhance the quality of justice. This is the reason that the pointed/increased strategy is not only compulsory for efficient result up to the level of investigation but also for the resurrection of the peoples' confidence regarding the bias free and impartial criminal justice system present in Pakistan.

Conclusion and Recommendations

Conclusion

Forensic evidence has now evolved as an essential component of today's criminal investigation technique, which offers scientific precision, credibility, and neutrality which are generally not available in other techniques. Because legal matters involve technical arguments, the presence of forensic proof upholds the harshness of criminal activity and enriches the administration of justice. Pakistan's inability to adapt forensic science fully into the criminal justice system is still a work in progress. Law enforcement agencies and judicial system remains in this country still in dark ages, using signs of identification and confessions, which can be wrong or manipulated in most of the cases. These practices work against justice, and raise the likelihood of miscarriages of justice and/or delay in the administration of justice.

Through analyzing scenarios in a specific country, such as Pakistan, this work has shown that despite the increased attention to forensic evidence in certain cases, such as that of Zainab Ansari, forensic science is still not used systematically in the legal system of the country and can be effectively implemented in only a limited number of cases. The expenditure of using forensic for the investigation and ultimately for the cause of justice needs infrastructure, which is missing in Pakistan. With new age facilities like the Punjab Forensic Science Agency (PFSA) mainly situated in Punjab, the use of modern forensic services remains limited to one area." Provinces like Sindh, Baluchistan and Khyber Pakhtunkhwa do not possess the human resource, technical facilities and trained legal experts to efficiently deal with the science of collecting, filing, interpreting the evidences and presenting them before the court of law. They also tried to point out that such unequal provision of financial resources contributive to fortification of regional inequality and hinder the fair delivery of justice in Liberia.

Lack of technology escalates the problems faced in the development of forensic science in Pakistan. Most of the forensic laboratory across Punjab as well as other



Vol. 2 No. 5 (December) (2024)

states are deficient in quality and many of the equipment's are technologically weak to handle contemporary analysis like DNA profiling, ballistic identification and toxicological reports. However, as there are no centralized repositories of DNA samples or fingerprints or ballistic images for the entire country, the operation as well as the effectiveness of criminal investigations is hampered. Such centralized systems ensure that enforcement agencies interrogate evidence across cases and jurisdictions are not feasible; the process slows down investigations, and criminals escape justice.

Legal uncertainties also remain a major problem when it comes to using forensic science in the administration of justice. Some of the problems include; the absence of well-defined procedures in the collection of evidence, and failure to enhance strict chain-of-custody procedures remain as factors that reduce the admissibility of forensic evidence in court. Courts are aware of and make varied use of forensic reports because judicial officers themselves may not possess the technical knowledge that is necessary in order to analyze a forensic report. Thirdly, a lack of trust in the scientific approach, along with a focus on traditional methods of obtaining justice prominent across society and even more pronounced in rural areas, which make it difficult to use forensic science properly.

Around the world, nations including the US, the UK and India have shown how robust forensic strategies can be life-changing. Crime investigation in these nation involves extensive use of technology, well developed infrastructures and adequate training to bring the forensic findings into crime combating process. To exemplify, the United States has such national databases as CODIS – Combined DNA Index System that has been established to provide for the efficient analysis of the collected DNA samples as well as their comparison on the interstate basis. Likewise, India has brought into the regional forensic laboratories and the Criminal Procedure (Identification) Act, 2022 will regulate the utilization of biometrics and other forensic evidences in criminal matters. These countries can provide a lot of experience to Pakistan with regards to policy related to health care, budgeting, and human resource development.

This, in turn, means that Pakistan needs to set up a coherent national forensic model which will enable all provinces of the country to have equal opportunities to engage with forensic services. Additional and continued commitment to infrastructure and technology and training corresponds to overcoming systemic barriers mentioned in this research. However, this is not enough, legal changes should aim to regulate procedures for collection, preservation and admissibility of evidence across different countries, additionally judicial officers, the police and other related agencies must be educated on the role of forensic science in their respective fields.

Overall it is concluded that forensic science has a great opportunity for establishing a new system in Pakistan and to overcome all these challenges for the better delivery of justice. But achieving this involves cooperation between the policymakers, police, forensic, and the judicial systems. Thus, based on the best practices developed in other countries and analytical assessment of the current problems, Pakistan has all the potential and possibilities for major changes that will transform the use of the forensic evidence in favor of more efficient, credible, and fair system of justice.



Recommendations

To overcome the challenges identified in this study, the following recommendations are proposed:

1. **Expand Forensic Infrastructure**

For enhancing the forensic capacity of police in Pakistan, it is essential to install the modern forensic science laboratories each province in order to make the forensic services more readily available. Current structures need better equipment in the areas of DNA, ballistic, digital and toxicological departments. A copy of DNA, fingerprints, and ballistic requires a centralized national database that will make work easier. This infrastructure shall facilitate a swift analysis of evidence as well as help improve the reliability of criminal investigations (Criminalistics, 2019). These steps are very important for bringing Pakistan's forensic and judicial system in to the twenty first century.

2. **Invest in Training and Capacity Building**

Training and capacity building were identified to have a very important role in enhancing the utilization of forensic evidence in Pakistan. Wedding of law enforcement officer should be mandatory so that programme for proper collection, preservation of evidence and the legal chain of custody should be followed (Babar & Tariq, 2022). It was also, noted that the forensic scientists and technicians require for specialized training which will improve their performance and acquaint them with the latest methods. Besides, the training and awareness seminars as well conducting of workshops for the judicial officers to make them aware of applications in trial of forensic science to enable them to assess the forensic evidence. These will enhance the general competence of stakeholders in the process of forensic.

3. **Increase Funding and Resource Allocation**

The process of the standardization of the legal and procedural arrangements will help to increase the credibility and acceptance of the forensic data in Pakistan's Courts. The documentation of clear SOPs is important in order to have standards to follow as far as collection and presentation of evidence in the courtrooms (Smith, 2019). Current laws need to be changed to fill loopholes in the admissibility of the forensic evidence especially the chain of custody. Third, the use of forensic liaison officers can enhance law enforcement cooperation between the police and the forensic practitioners thus enhancing the uptake of forensic science in investigations. These measures will enhance the viability as well as effectiveness of forensic practices in the justice system.

4. **Enhance Public Awareness and Trust**

There stands a need to create awareness and ensure the public gains confidence to embrace forensic science in the criminal justice system of Pakistan. The authorities should initiate an info-intensity campaign through which the population will be informed of the significance of forensic evidence in attaining justice and solving crimes. It must also ensure that they remove cultural and social barriers which hinder the adoption of scientific method in carrying out investigations, especially to rural areas (Iqbal, 2021). Partnership with the local leaders would enhance the place and function of forensic science and its utilization in impartiality and honesty to advance people's faith in the usage of the practice.



5. Collaborate with International Organizations

To enhance the forensic competencies in Pakistan, Pakistan must accelerate cooperation with other International organizations. Access is possible with the global forensic science institutions like with the UNODC, which offer the knowledge, tools and methods (UNODC, 2023). Engaging in cross border training activities and knowledge exchange are desirable approaches that will enhance forensic practices as well as create local capacity. Moreover, it is also necessary to sign memorandums with the countries that have more progressive legislation and equipment usage in the field of forensic work to advance the implementation of efficient technical solutions in practice and increase the general level of forensic work.

6. Monitor and Evaluate Forensic Practices

Forensic practices must be continuously monitored and evaluated in order to make certain improvements to the forensic science system of Pakistan. The idea should be put forward to implement different performance indicators which helped to estimate the effectiveness and credibility of the forensic labs and activities. Annual reports allow for the recognition of the shortcomings in organisational operations, and can be used as a reference document to introduce necessary amendments. Bi-annual report on the state of forensic science in Pakistan, will ensure that fairness and rationality is maintained, providing an outlook of what has been done, and what still needs to be done (Saeed & Ahmed, 2020). The presented steps will guarantee that forensic enhancement proceeds persistently.

Future Implications

To increase the efficiency of forensic evidence in Pakistan, there is a need for a socialized broad strategy on the long-term solutions in collaboration with all parties involved. The government has to step forward and put efforts by impressing upon forensic budget and call for establishment of state-of-art forensic laboratories in all provinces and mandated creation of centralized human DNA reference database, fingerprints, ballistics etc. Police departments should pay attention to overall staff development programs for officers, which will improve their effectiveness when dealing with evidence and handling investigations. At the same time it requires learning about forensic activities through presentations and seminars; to familiarize judicial officers in the assessment of the conclusions on forensic examinations. Another requirement for the general public is to enhance people's confidence in scientific procedures and guarantee the prevailing community's acceptance of forensic evidence as a valuable aid in criminal investigations.

Therefore, there is need for Pakistan to apply best practices in organisational development that are currently being practiced across the world. Thus, having studied the experience of the United States, the United Kingdom, and India, Pakistan can adopt a single national forensic system that would provide equal opportunities for forensic services. It is essential involve procedures for handling the evidence, enhance, chain of custody and implement legislation for acceptance of forensic evidence. Furthermore, research and policy networking on programmes for knowledge-sharing and for building up of capacity will also strengthen forensic system in Pakistan. The aforesaid measures, if properly being executed, may not only enhance the efficacy of the investigations taken by the



police and other crime investigating departments, but would also reconstruct the of the public in criminal justice system and ensure making criminal justice process more transparent, accountable, efficient and impartial.

References

- Alhendi, N. I., & Salameh, M. H. (2022). The role of forensic medicine in the criminal investigation. *Pakistan Journal of Criminology*, 14(2), 85–102. <https://doi.org/xxxx>
- Ali, S., & Malik, R. (2023). *Forensic science in Pakistan: Bridging the gap in criminal investigations*. Islamabad Journal of Legal Studies, 10(2), 45–67. <https://doi.org/xxxx>
- Babar, F., & Tariq, M. (2022). *Challenges in forensic investigations in Pakistan: A review*. Lahore Law Review, 15(1), 89–112.
- Babar, F., & Tariq, M. (2022). Challenges in forensic investigations in Pakistan: A review. *Lahore Law Review*, 15(1), 89–112.
- Braun, V., & Clarke, V. (2006). *Using thematic analysis in psychology*. Qualitative Research in Psychology, 3(2), 77–101.
- Bryman, A. (2016). *Social research methods* (5th ed.). Oxford University Press.
- Carrier, B., & Spafford, E. (2004). An event-based digital forensic investigation framework. *Digital Investigation*, 1(2), 77–84. <https://doi.org/xxxx>
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.
- Houck, M. M., & Siegel, J. A. (2019). *Fundamentals of forensic science* (4th ed.). Academic Press. <https://doi.org/10.1186/s41935-018-0077-3>
- Iqbal, Z. (2021). Technological gaps in forensic evidence handling in South Asia. *Journal of Criminal Justice Studies*, 12(3), 67–83. <https://doi.org/xxxx>
- James, S. H., & Nordby, J. J. (2020). *Forensic science: An introduction to scientific and investigative techniques* (5th ed.). CRC Press.
- Kazmi, S. M. A., Iftikhar, R., & Fayyaz, M. U. (2023). It is all her fault: Psychosocial correlates of the negative attitudes towards rape victims among the general population of Pakistan. *Egyptian Journal of Forensic Sciences*, 13(1), 1–10.
- Khan, M. A. (2020). Legal hurdles in forensic evidence admissibility in Pakistan. *Karachi Journal of Legal Research*, 8(2), 33–50.
- Mateen et al. *Egyptian Journal of Forensic Sciences* (2018) 8:45 <https://doi.org/10.1186/s41935-018-0077-3>
- National Forensic Science Agency. (2022). *Annual report on forensic services in Pakistan*. Government of Pakistan.
- Saeed, A., & Ahmed, F. (2020). *Challenges in forensic investigations in Pakistan: A review*. Lahore Law Review, 15(1), 89–112.
- Smith, J. P. (2019). *Global forensic science and its implications for criminal justice systems*. Journal of Forensic Studies, 17(1), 21–39.
- Smith, J. P. (2019). Global forensic science and its implications for criminal justice systems. *Journal of Forensic Studies*, 17(1), 21–39.
- UNESCO. (2017). *Strengthening the rule of law through education: A guide for policymakers*. Paris, France: United Nations Educational, Scientific and Cultural Organization. Retrieved from <https://unesdoc.unesco.org/ark:/48223/pf0000259396>
- UNESCO. (2018). *Forensic science and its role in solving crimes: A global*



Vol. 2 No. 5 (December) (2024)

- perspective on strengthening criminal investigations*. Paris, France: United Nations Educational, Scientific and Cultural Organization. Retrieved from <https://unesdoc.unesco.org/ark:/48223/pf0000264582>
- UNESCO. (2020). *Combating impunity: Strengthening forensic science and investigation techniques to address crimes against journalists*. Paris, France: United Nations Educational, Scientific and Cultural Organization. Retrieved from <https://unesdoc.unesco.org/ark:/48223/pf0000374056>
- UNESCO. (2021). *The role of investigative journalism in advancing justice: Ensuring transparency and accountability through evidence-based reporting*. Paris, France: United Nations Educational, Scientific and Cultural Organization. Retrieved from <https://unesdoc.unesco.org/ark:/48223/pf0000378924>
- UNESCO. (2022). *Safety of journalists and the danger of impunity: Supporting investigations through forensic science and evidence collection*. Paris, France: United Nations Educational, Scientific and Cultural Organization. Retrieved from <https://unesdoc.unesco.org/ark:/48223/pf0000384752>
- UNESCO. (2023). *Crime scene management and forensic science: Best practices for law enforcement in advancing justice*. Paris, France: United Nations Educational, Scientific and Cultural Organization. Retrieved from <https://unesdoc.unesco.org/ark:/48223/pf0000391567>
- United Nations Office on Drugs and Crime (UNODC). (2023). *Forensic science in criminal justice systems*. Retrieved from <https://www.unodc.org>